

Yacht Devices

User Manual

Tank Adapter YDTA-04

also covers models
YDTA-04N

Firmware version
1.05

2025

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Contents

Introduction 4

Warranty and Technical Support..... 5

I. Product Specification6

II. Device Installation and Connection 8

III. LED Signals20

IV. Device Configuration and Settings 21

V. Configuration with Presets via the Hidden Button23

VI. Device Configuration with an Installation Description Field25

VII. Digital Switching33

VIII. Firmware Updates38

Appendix A. Troubleshooting 40

Appendix B. NMEA 2000 Messages Supported by Device42

Appendix Appendix C. Digital Switching with NMEA 2000 Bridge 44

Package Contents

Device	1 pc.
Screws	2 pcs.
This Manual	1 pc.
Paperclip for reset	1 pc.
NMEA 2000 Drop Cable	not supplied

Introduction

The NMEA 2000 Tank Adapter YDTA-04 (hereinafter Adapter or Device) allows you to connect an existing resistive, current or voltage-output type fluid level sensor installed on a tank and display the fluid level on NMEA 2000 devices, including chart plotters and instrumental displays.

The Device 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.

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. The Device can also be used with fluid level sensors, which output an analog voltage signal in the range of 0 to 16 Volts, as well with current-output sensors, for example, industry standard 4..20 mA sensors.

The Device 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. Each of the four measuring channels of the Device can have individual settings, matching connected analog fluid metering circuitry parameters. Fluid tank level sensor readings can be calibrated with 12 calibration points to get accurate readings on tanks of any shape.

The Device can switch the load channels of NMEA 2000 digital switching equipment on or off. Up to eight different conditions for each measuring channel can be used.



The Device is equipped with a hidden button that allows switching among 15 configuration presets (refer to Section V). However, for advanced configuration (calibration curves, digital switching functions, connection in parallel with analog gauges, using voltage sensors) the NMEA 2000 PC gateway (from any manufacturer) or MFD which allows editing of installation description strings (refer to Section VI) is required.

Firmware updates are available only with Yacht Devices gateways (Wi-Fi, USB or Ethernet), refer to Section VIII for details.

The Device is powered from the NMEA 2000 network and provides high voltage (2500 Volt RMS) 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

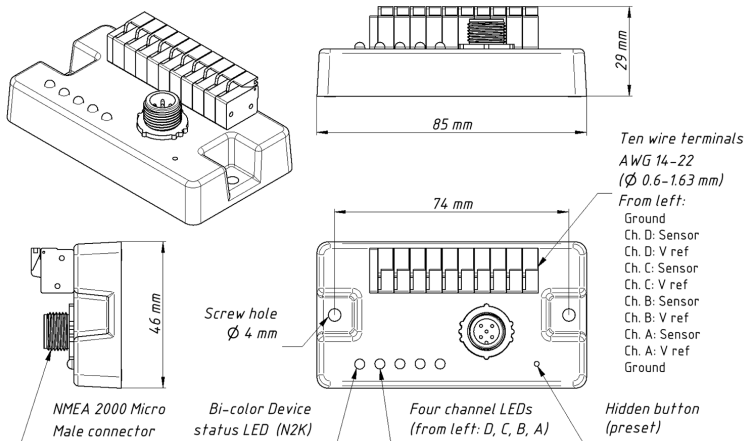


Figure 1. Drawing of Tank Adapter YDTA-04N

Device parameter	Value	Unit
Supply voltage (from NMEA 2000 network)	7..16	V
Current consumption (from NMEA 2000 network), avg./max	51 / 62	mA
Load Equivalency Number	2	LEN
Galvanic isolation between NMEA 2000 interface and sensor inputs	2500	V _{RMS}
Number of measurement channels	4	
Maximum voltage on sensor and gauge reference voltage inputs in respect to GND	16	V
Voltage output sensor supported range	0..16	V
Fluid level sensors resistance range	0..400	Ohm
Analog gauge coils resistance range	0..10 000	Ohm
Sensor resistance/voltage measurement accuracy	±1	%
Analog input recommended pin / wire end lug diameter	1,5	mm
Analog input recommended pin / wire end lug length	18	mm
Device case dimensions (LxWxH)	85 x 46 x 29	mm
Weight	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. 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 fuel tanks.

The Device requires no maintenance. When deciding where to install the Device, choose a dry mounting location. Despite the fact that the Device's case is waterproof, its wire terminals are open, and seawater can cause corrosion or a short circuit. Avoid places where the Device can be flooded with water, get wet in rain or be sprayed by water.

The Device has two mount holes (refer to Section I), 4 mm in diameter. Use the supplied screws to fix the Device on a flat surface. The orientation is not important. However, when the holes of wire terminals are pointing down, they are better protected from occasional spray.

1. Tank level sensor connection

The Device has four measurement channels (A, B, C, D) which share a common electrical ground (two ground wire terminals, labeled as GND, are connected inside and galvanically isolated from the NMEA 2000 ground).

Each channel contains two individual inputs: a sensor input (labeled as SENS), which should be connected to the tank sensor, and a voltage reference input (labeled as VREF), used in parallel connection with analog gauges.

You must connect analog fluid measurement circuits to the clamp terminal block (see Figure 1). Crimp an end lug or pin onto each wire end before connecting. Recommended pin/end lug diameter is 1.5 mm, length 18 mm or longer. Always use a marine grade cable with proper voltage, current, temperature, and water/oil resistance ratings.

Different channels may have different connection schemes and settings. In this section, we will show an example of the possible connections for one channel, and channel name will be omitted on the drawings.

1.1 Standalone resistive sensor connection

If you have a resistive type sensor and do not have a gauge connected to your fluid level sensor (e.g. you have installed the sensor yourself), you should connect only two wires: the Device's «SENS» terminal to sensor «Signal» or «+» wire and Device's «GND» terminal to sensor «Ground» or «-» wire. Device's «VREF» terminal should be left not connected. See Figure 2, left.

Set CONNECTION setting for the corresponding measurement channel to RESISTIVE (this is factory default setting). You also need to measure sensor's resistances on full and empty tank and set those values into OHMS_SENSOR setting, R_EMPTY and R_FULL values (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 Device in parallel with the MDI unit «Fuel level» input: the SENS terminal should be connected to MDI pin 11 (or the sensor's Green wire) and GND terminal to the MDI pin 12 (or sensor Green/Black wire). VREF terminal should be left unconnected. See Figure 2, right.

Set CONNECTION setting for the corresponding measurement channel to MDI (refer to Section VI).

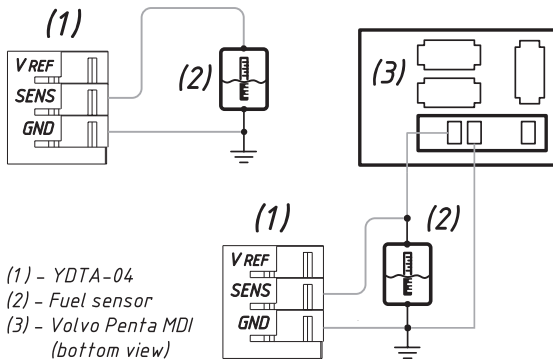


Figure 2. Standalone sensor connection (left) and connection in parallel with Volvo MDI unit (right)

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 3, right), one of which activates measurement of the tank level. The Device can detect whether the button pressed or not, thus button position 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 «GND» and «Sensor» in both probes polarities, you should get very high resistance, close to infinity;
- 3) between «+» and «GND» 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.

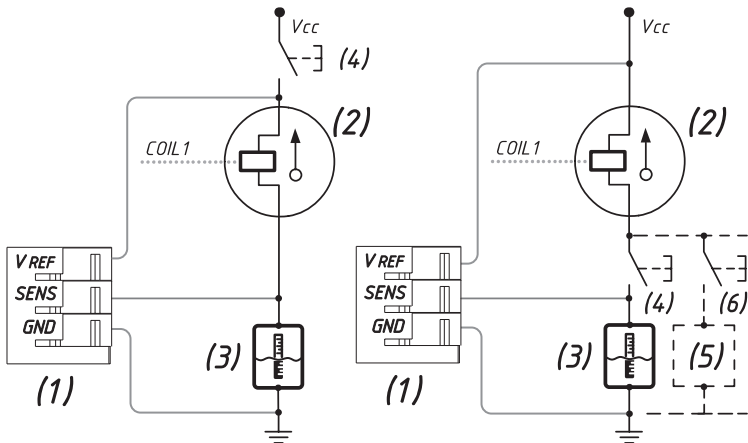
Connect Device's «Vref» terminal to the gauge's power «+» input terminal (up to 16 Volts), the «SENS» terminal to the gauge's «Sensor» input terminal, and the «GND» terminal to the gauge's and sensor's common ground terminal (see Figure 3, left).

If you have the «combined» gauge with selector switch, connect the Device's «SENS» terminal to the sensor after the switch (see Figure 3, right).

Set the corresponding measurement channel CONNECTION setting to 1COIL and set the measured gauge coil resistance value (R_COIL1) into corresponding measurement channel OHMS_GAUGE setting, R_COIL1 value.

You also need to measure sensor's resistances on full and empty tank and set those values into corresponding measurement channel OHMS_SENSOR setting, R_EMPTY and R_FULL values (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-04, (2) – Gauge, (3) – Fluid Level Sensor, (4) – Optional Button, (5) and (6) – Parallel Sensors (optional)

Figure 3. 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 winded 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 4).

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.

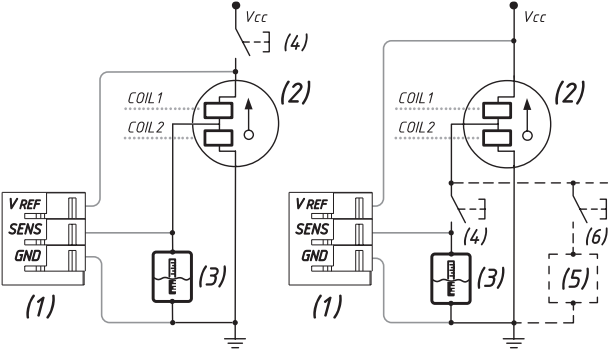
Connect the Device's «Vref» terminal to the gauge's power «+» input terminal (up to 16 Volts), the «SENS» terminal to the gauge's «Sensor» input terminal, and the «GND» terminal to the gauge's and sensor's common ground terminal (see Figure 4, left).

If you have the «combined» gauge with selector switch, connect the Device's «SENS» terminal to the sensor after the switch (see Figure 4, right).

Set the corresponding measurement channel CONNECTION setting to 2COIL for connection scheme shown on the right part of Figure 4 or to 2COIL_VCC for connection scheme shown on the left part of Figure 4. Then set the measured gauge coils resistances values into OHMS_GAUGE setting, R_COIL1 and R_COIL2 values.

You also need to measure sensor's resistances on full and empty tank and set those values into corresponding measurement channel OHMS_SENSOR setting, R_EMPTY and R_FULL values (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-04, (2) – Gauge, (3) – Fuel Sensor, (4) – Optional Button, (5) and (6) – Parallel Sensors (optional)

Figure 4. Connection in parallel with an existing 2-coil analog gauge

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 Device 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» terminal to the gauge's power «+» input terminal (up to 16 Volts), «SENS» terminal to the gauge's «Sensor» input terminal, and «GND» terminal to the gauge's and sensor's common ground «-» terminal.

Set the corresponding measurement channel setting CONNECTION to 1COIL, set OHMS_GAUGE setting, R_COIL1 value with calculated R_INT value, set REFERENCE with measured V_INT_REF value.

You also need to measure sensor's resistances on full and empty tank and set those values into corresponding measurement channel OHMS_SENSOR setting, R_EMPTY and R_FULL values (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» terminal to the gauge's power «+» input terminal (up to 16 Volts), «SENS» terminal to the gauge's «Sensor» input terminal, and «GND» terminal to the gauge's and sensor's common ground «-» terminal.

Set the corresponding measurement channel settings: CONNECTION to 2COIL_VCC, set OHMS_GAUGE with calculated R_COIL1, R_COIL2 and R_RES values.

You also need to measure sensor's resistances on full and empty tank and set those values into corresponding measurement channel OHMS_SENSOR setting, R_EMPTY and R_FULL values (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 the Device's «SENS» terminal to the «Voltage» output of the sensor and Device's «GND» terminal 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» terminal should be left not connected. If sensor's output voltage depends on (linearly scales with) sensor's power supply voltage, connect Device's «VREF» terminal to Sensor's power input wire.

Set the corresponding measurement channel CONNECTION setting to VOLTAGE. You also need to measure sensor's output voltages on full and empty tank and set those values into VOLTS_SENSOR setting. If Device's «VREF» terminal is connected, you also need to measure voltage on «VREF» terminal and set its value into REFERENCE setting (refer to Section VI). To get most accurate results, keep REFERENCE voltage on the «VREF» terminal stable during the full and empty tank voltage 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 get 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 the Device's «SENS» terminal to the «Current sink» input of the sensor and Device's «GND» terminal to current source and sensor's common «Ground».

The corresponding measurement channel 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_SENSOR setting values (measure voltages across the sensor when the current source is ON, refer to Section III.1.4 and IV) and sensor's resistances range (measure sensor's resistances on full and empty tank and set those values into OHMS_SENSOR setting, R_EMPTY and R_FULL values, refer to Sections 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 which connects the fluid level sensor to a «Signal» input of an analog gauge is too long, it may add 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 corresponding measurement channel setting OHMS_WIRES (refer to Section VI.3.4).

2. Connection to NMEA 2000

The Device should be connected to the NMEA 2000 network backbone with a NMEA 2000 drop cable (not supplied with the Device). The Device is equipped with a DeviceNet Micro Male connector. For NMEA 2000 networks with other connector types, you will need an appropriate adapter cable.

Before connecting the Device, turn off the bus power supply. If you have any questions regarding the use of connecting cables, terminators or connectors, please refer to the following documents:

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

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

The Device is powered from the NMEA 2000 network and has LEDs, which flash red or green. After the NMEA 2000 network power is turned on, the status LED (labeled “N2K”) 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. 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. Usually, access to this list is in the «Diagnostics», «External Interfaces» or the «External devices» menu entry of the chart plotter.

III. LED Signals

The Device is equipped with a two-color red/green status LED (labeled “N2K”) and four channel status LEDs. Their locations are pictured in Section I, Figure 1.

1. Signals during power-up

The Device N2K status LED emits one long (half second) GREEN flash after powering on, indicating that the Device is successfully initialized.

After initialization, the Device N2K status LED emits three short (quarter of second) GREEN flashes, indicating that it has successfully connected to the NMEA 2000 network.

Constant RED flashes (one second on, one off) of the N2K status LED indicate a failure to obtain an NMEA 2000 network address.

2. Normal operation

The Device’s N2K status LED indicates NMEA 2000 connection status. It emits a short flash every 2.5 seconds, GREEN if data was successfully transmitted to or received from NMEA 2000 network. RED means bad connection to NMEA 2000 network, refer to Appendix A for troubleshooting.

Each channel status LED will also emit a short single flash every 2.5 seconds, indicating a corresponding measurement channel analog circuitry issue, like sensor, wire or gauge fault, or channel misconfiguration (incorrect connection, wrong operation mode or analog circuitry parameters mismatch with a real connected circuitry). For example, if you power up the Device with analog inputs not connected, the corresponding channels status LEDs will flash.

If no issue is detected on the measurement channel (and calculated and measured fluid level is within the 0..100% range), or if the channel is disabled (CONNECTION set to NC, refer to Section VI.3.1) its channel status LED will NOT flash.

3. Signals during configuration with button

LED signals during the configuration with a hidden button are described in the Section V.

4. Signals during firmware update

LED signals during the firmware update procedure are described in the Section VIII.

IV. Device Configuration and Settings



Configuration of the Device should not be performed at sea.

The Device can be configured by two different methods:

1. Select one of the predefined configuration presets using the hidden button. This method is limited. You can only select basic settings for standard resistive sensors and Volvo Penta MDI units. Method 2 is required for sensor calibration curves, digital switching functions, and settings for connection in parallel with analog gauges or voltage and current sensors.
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.

All settings configured with the second method will be lost after switching the preset with the first method. If you have previously had selected any of the presets with a button (first method) but then change any setting with a «YD command» (second method), the actual preset number will be changed to 15 (user-defined preset, refer to Section V).

The most important settings are:

- A. **Tank number.** Sets outgoing PGN 127505 «Fluid Level» static data field «Fluid Instance», also known as tank number. You can set each measurement channel tank number individually. Current convention is to enumerate tanks starting from 0, moving from port to starboard, bow to stern. Numbering is individual for each fluid type, e.g. the first diesel tank and first fresh water tank both have number 0.

- B. **Fluid type.** Sets outgoing PGN 127505 «Fluid Level» static data field «Fluid Type», the Device supports all fluid types available in NMEA 2000: diesel, fresh water, waste, live well, oil, sewage (black water), and gasoline. These types have numbers 0..6. You can also use numbers 7..15, which are reserved in NMEA 2000 and for now have no defined meaning. Note that chart plotters usually support only a few of those types, for example, gasoline tanks are not supported by many chart plotters.
- C. **Analog circuitry parameters.** The Device supports multiple connection methods and sensor types and different connection schemes (refer to Section III). You should measure and enter all analog circuitry parameters and set connection type; this is possible with the second configuration method only.

With the factory settings, Device channels are configured for standalone connection to USA resistive sensors (240 Ohms when empty, 33 Ohms when full). Tank numbers for channels A, B, C, and D are 0, 1, 2, and 3 correspondingly. Fluid type is set to diesel for all channels. These settings correspond to configuration preset #1.

Aside from the mandatory settings above, the following settings can improve the accuracy of the fluid level readings (can be configured with the second method only):

- D. **Calibration.** Resistive fuel level sensors do not take the shape of the fuel tank into account, therefore, the readings usually have substantial error on tanks of non-uniform shape. 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. The Device allows setting a 12-point calibration curve for each channel.
- E. **Tank capacity.** If the capacity for a tank is specified, your MFD will allow display of a tank's level not only in percent, but in liters or gallons also. In factory settings, capacity for all tanks is set to UNKNOWN.
- F. **Damping.** With factory settings, the Device transmits the average value measured in last 3 seconds. This can be too small for rough sea conditions and too big for some applications (e.g., controlling of live well pump or fuel pump with digital switching).

We recommend learning about both configuration methods before configuring the Device.

V. Configuration with Presets via the Hidden Button

Press the hidden button (see Figure 1) with the paper clip supplied with the Device. The N2K status LED of the Device will constantly shine RED and channel LEDs will display the preset number in binary (A is the lowest bit, D is highest, see the Table 1 below) when the hidden button is pressed.

Wait 2-3 seconds and the LEDs lights will start flashing. Release the button to enter the programming mode. Otherwise, when LEDs will stop blinking 2-3 seconds later, release the button to return to normal operation.

In the programming mode, each press of the button increases the preset number. After preset 15 (all channel LEDs are on, binary 1111), the preset number will be rolled over back to 1 (only the channel's A LED is on, binary 0001). Settings of the active preset will be applied immediately, and you can check the configuration on MFD screen or instrument displays (are numbers correct or not).

To save the selected preset, press the button and hold it for 3 seconds until all LEDs start blinking. After saving, the Device will return to normal operation mode.

To return to normal operation mode without saving, do not press the button for 30 seconds, and the Device will restore the configuration that was active before entering the programming mode, and return to normal operation.

Table 1. Configuration presets

Preset (DCBA)	Description
1 (0001)	Factory settings. Channels ABCD are configured to USA (240..33 Ohm) resistive sensors of fuel tanks with numbers 0..3.
2 (0010)	Channels ABCD are configured to EUR (10..180 Ohm) resistive sensors of fuel tanks with numbers 0..3.
3 (0011)	Channels ABCD are configured to JAP (0..310 Ohm) resistive sensors of fuel tanks with numbers 0..3.

Table 1 continued

4 (0100)	Channels AB are connected to fuel tanks (0 and 1), and CD to water tanks (0 and 1). Sensors are of resistive type (USA, 240..33 Ohm).
5 (0101)	Channels AB are connected to fuel tanks (0 and 1), and CD to water tanks (0 and 1). Sensors are of resistive type (EUR, 10..180 Ohm).
6 (0110)	A – fuel tank (0), B – waste tank (0), CD – fresh water (0 and 1). Sensors are of resistive type (USA, 240..33 Ohm).
7 (0111)	A – fuel tank (0), B – waste tank (0), CD – fresh water (0 and 1). Sensors are of resistive type (EUR, 10..180 Ohm).
8 (1000)	A – MDI unit (fuel tank 0), B – waste tank (0), CD – fresh water (0 and 1). Sensors are of resistive type (USA, 240..33 Ohm).
9 (1001)	A – MDI unit (fuel tank 0), B – waste tank (0), CD – fresh water (0 and 1). Sensors are of resistive type (EUR, 10..180 Ohm).
10 (1010)	AB – MDI units (fuel tanks 0 and 1), CD – fresh water (0 and 1). Sensors are of resistive type (USA, 240..33 Ohm).
11 (1011)	AB – MDI units (fuel tanks 0 and 1), CD – fresh water (0 and 1). Sensors are of resistive type (EUR, 10..180 Ohm).
12 (1100)	Reserved for future use. In the 1.00 firmware is identical to preset 1 but with tank numbers 4..7.
13 (1101)	Reserved for future use. In the 1.00 firmware is identical to preset 2 but with tank numbers 4..7.
14 (1110)	Reserved for future use. In the 1.00 firmware is identical to preset 3 but with tank numbers 4..7.
15 (1111)	User defined. Settings that were set with configuration method 2. Refer to Sections IV and VI.

VI. 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.

Device Properties

Address Claim

Address: 67 HEX: 43 [Update]

Unique number: 860001

Manufacturer code: 717

Device instance: 0

System instance: 0

Class / function: 75 / 150

Industry: 4: Marine

Self-configurable: Yes [Update]

Product Information

Database version: 2.100

Product code: 8015

Model version: Tank Adapter YDTA-04 YACHTD.COM

Model ID: YDTA-04

Software version: 1.00 19/02/2021

Serial: 00860001

Certification: Not applicable

LEN (mA): 2 [100 mA]

Heartbeat

☒ CAN1 ☐ CAN2 ☐ Equipment

Updated: 00:25:22.225

Configuration Information

Installation description 1: []

Installation description 2: YD:DEV 1

Manufacturer information: Yacht Devices Ltd., www.yachtd.com [Update]

[Refresh]

Figure 5. 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 (for example shown on Figure 5 «YD:DEV 1 DONE» will be displayed). If a command is entered without the setting value(s), the Device replies with the current setting value(s).

Figure 5 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 YDTA-04 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, Yacht Devices NMEA 2000 Ethernet Gateway, Yacht Devices NMEA 2000 USB Gateway or Yacht Devices NMEA 2000 Wi-Fi Router is required to connect CAN Log Viewer 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 5, 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.

List of all supported commands is given below, note that parameters in square brackets [] can be omitted to obtain the current setting's values.

1. Reset and NMEA 2000 specific commands

1.1 YD:RESET

Resets all Device settings to the default values. Unlike all other commands, it yields no reply and leaves «Installation description 2» field empty.

1.2 YD:PRESET [1..15]

Switches the current preset (refer to Section V) or returns the current preset number if parameter is omitted. This setting is immediately applied and saved.

1.3 YD:DEV [0..255]

Sets Device's NMEA 2000 «Device Instance» value. Factory default: 0.

1.4 YD:SYS [0..15]

Sets Device's NMEA 2000 «System Instance» value. Factory default: 0.

1.5 YD:PGN <pgn> [OFF | 0 | 100..60000]

Where: <pgn> can be 127505 «Fluid Level», 127496 «Trip Fuel Consumption, Vessel» or 126993 «Heartbeat».

Sets corresponding PGN transmission interval in milliseconds. OFF or 0 value disables PGN transmission.

Factory default (as per NMEA 2000 Standard v3.000): 127505 — 2500; 127496 — 1000; 126993 — 60000.

Example 1. Set the periodic transmission interval for PGN 127505 «Fluid Level» to 1 second:

YD:PGN 127505 1000

Example 2. Query for the transmission interval for PGN 126993 «Heartbeat»:

YD:PGN 126993

2. Basic channel configuration

2.1 YD:TANK <A..D> [0..252]

Sets output PGN 127505 data field «Fluid Instance», also known as «tank number» for the corresponding measurement channel.

If multiple fluid level data sources are used in the same network, set different and unique combination of «Fluid Instance» and «Fluid Type» for each data source.

For example, if there are three fresh water tanks and one black water tank installed on the vessel, configure the black water data source with fluid type «SEWAGE» and tank number 0, fresh water tank sources with fluid type «WATER» and tank numbers 0, 1, 2.

Factory default: A=0, B=1, C=2, D=3

Example 1. Get the «Fluid Instance» (tank number) of the channel A:

YD:TANK A

Example 2. Set the «Fluid Instance» (tank number) of the channel B to 5:

YD:TANK B 5

2.2 YD:FLUID <A..D> [type]

Where: [type] can be a number 0..15 or one of NMEA 2000 predefined types, they have numbers 0..6 (0 – DIESEL, 1 – WATER, 2 – WASTE, 3 – LIVEWELL, 4 – OIL, 5 – SEWAGE, 6 – GASOLINE).

Sets outgoing PGN 127505 data field «Fluid Type» for the corresponding measurement channel. Factory default: 0 (meaning DIESEL). Note that GASOLINE type (6) and types 7..15 (without defined meaning) are not supported by some chart plotters.

Example: configure the tank of channel B to fresh water, two options:

YD:FLUID B WATER

YD:FLUID B 1

2.3 YD:CAPACITY <A..D> [UNKNOWN | 0..99999]

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

Factory default: UNKNOWN.

2.4 YD:DAMPING <A..D> [0..600]

Sets damping time constant for the corresponding channel in seconds. 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. Factory default value is 3 seconds, set to 0 to disable damping.

3. *Fluid metering system analog circuitry configuration*

3.1 YD:CONNECTION <A..D> [NC | RESISTIVE | 1COIL | 2COIL | 2COIL_VCC | MDI | VOLTAGE | HYBRID]

Sets sensor connection method for the corresponding measurement channel. RESISTIVE — standalone connection, 1COIL — in parallel with 1-coil gauge, 2COIL and 2COIL_VCC — in parallel with 2-coil or 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 II.

Use NC value if channel is not used — to disable the Device to send PGN 127505 «Fluid Level» for this channel.

Factory default value: RESISTIVE on all channels.

3.2 YD:OHMS_SENSOR <A..D> [R_EMPTY R_FULL] | [alias]

Where: R_EMPTY and R_FULL are measured sensor resistances on full and empty tank in Ohms, you can also use an alternative syntax and just specify an alias for most common sensors: EUR (equal to 10 180), USA (240 33) or JAP (0 310).

Supported resistances range is 0..400 Ohms with 0.01 step. Factory default: USA (240 Ohms when empty, 33 Ohms when full).

This setting is applicable only for RESISTIVE, 1COIL, 2COIL, 2COIL_VCC and HYBRID operation modes, will be ignored in all other operation modes.

Example 1. Configure channel A for a sensor with a range of 235 Ohms (when empty) to 10.45 Ohms (when full):

YD:OHMS_SENSOR A 235 10.45

Example 2. Configure channel B for a European type of the sensor, two options:

YD:OHMS_SENSOR B 10 180

YD:OHMS_SENSOR B EUR

3.3 YD:OHMS_GAUGE <A..D> [R_COIL1 [R_COIL2 [R_RES]]]

Use in 1COIL mode and set measured R_COIL_1 resistance value in Ohms. Refer to Section III.1.3.1 and III.1.3.3.

Use in 2COIL or 2COIL_VCC modes and set measured R_COIL_1 and R_COIL 2 resistance values in Ohms. Refer to Section III.1..3.5.

Use in 2COIL_VCC mode with KUS/WEMA «Smart» gauge and set calculated R_COIL1, R_COIL2 and R_RES values. Refer to Section III.1.3.4.

Supported resistances range for R_COIL_1 and R_COIL 2 is 0..10000 Ohms, for R_RES is 1..10000, with 0.01 step.

Factory default values are 200, 200 and «not defined» (R_RES will return an empty string if not set).

3.4 YD:OHMS_WIRES <A..D> [0.00..100.00]

The sensor wire's parasitic resistance in Ohms. Used for compensation of the sensor wire resistance. Refer to Section II.1.7.

Allowed range is from 0 to 100 Ohms, with 0.01 step. Factory default value is 0.

This setting is applicable only for 1COIL, 2COIL and 2COIL_VCC operation modes.

3.5 YD:VOLTS_SENSOR <A..D> [VOLTS_EMPTY VOLTS_FULL]

Use in VOLTAGE or HYBRID mode and set two voltages in Volts, for empty and full tank. Refer to sections II.1.4. and II.1.5.

Allowed range is from 0 to 16 Volts, with 0.01 step. Factory default values are 0.5 and 4.5.

Example. Configure channel A for a voltage sensor with a range of 1 to 5 Volts:

YD:CONNECTION A VOLTAGE

YD:VOLTS_SENSOR A 1 5

3.6 YD:REFERENCE <A..D> [0.00..16.00]

Sets REFERENCE voltage, used to compensate for sensor's power voltage fluctuations on those sensors that have voltage level output linearly dependent on power supply voltage. Use with VOLTAGE mode only. Set with REFERENCE voltage in Volts, measured at the same time as sensor's output voltages. Refer to Section II.1.4.

Allowed range is 0..16 Volts, with 0.01 step. Factory default value is 5.

If the measurement channel «VREF» terminal is not connected to any 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 4.1 in this Section).

4. Advanced configuration commands

4.1 YD:CALIBRATION <A..D> [p4 p8 ... p95|OFF]

Where: p4 p8 ... p95 — 12 calibration points (decimal values, range 0..100, with step 1, factory setting: OFF — linear curve).



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, neither do they 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.

4.2 YD:CUSTOM_DATA <A..D> [OFF | 0..9]

Where: the number in the last parameter is Garmin «Custom Channel» number.

Disables/enables Garmin «Custom Channels» mode. In this mode, the Device starts transmitting the measured value as an percent type value (with name YDTA) for the specified «Custom Channel» number with 500 ms interval along with «Fluid Level» PGN 127505 for specified channel. This mode can be used only with compatible Garmin NMEA 2000 equipment.

4.3 YD:JOIN [[A][B][C][D] | NONE]

Turns on/off transmission of PGN 127496 «Trip Fuel Consumption, Vessel» with «Estimated Fuel Remaining» field filled by the sum of fuel volume in selected tanks. The CAPACITY (see 2.3 in this section) for selected tanks must be configured.

The transmission interval for this message can be configured with YD:PGN command (refer to 1.5 in this Section). If some other equipment also transmits this PGN, the Device will immediately send its own PGN with the corrected value of estimated fuel remaining.

Example 1. Send summarized data from channels A and B in PGN 127496:

YD:JOIN AB

Example 2. Turn off the transmission of PGN 127496:

YD:JOIN NONE

4.4 YD:SW<A..D><1..4> [<ON|OFF> [conditions]]

This setting enables, disables and configures up to 8 rules for each measurement channel to control NMEA 2000 Digital Switching equipment. This command is described in the Section VII.

VII. Digital Switching

The Device supports NMEA 2000 digital switching equipment (managed with Standard PGNs 127501 and 127502). The Device can send commands to turn on/off electrical loads connected to external NMEA 2000 two-state devices (e. g. relay banks).

The Tank Adapter is compatible (not only) with:

*** Yacht Devices NMEA 2000 Circuit Control YDCC-04.** Circuit Control has one bank of four latching (bi-stable) relays capable of switching direct current (DC) and alternating current (AC) loads. Tank Adapter can be used to automatically fill the main fuel tank from reserve tank, or to stop filling of the live well tank when it is full, or balance two ballast tanks.

*** Yacht Devices Alarm Button YDAB-01.** The Alarm Button is a digital switching «music box»; it has a powerful sound amplifier inside and a connection to a sound speaker. The Tank Adapter can turn ON any of 28 alarm sounds (or even voice messages uploaded by a user) of the Alarm Button. For example, you can activate an alarm when the fuel level is low.

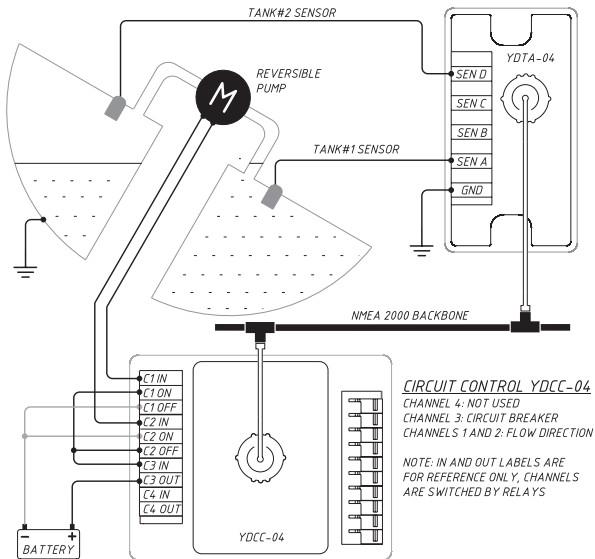
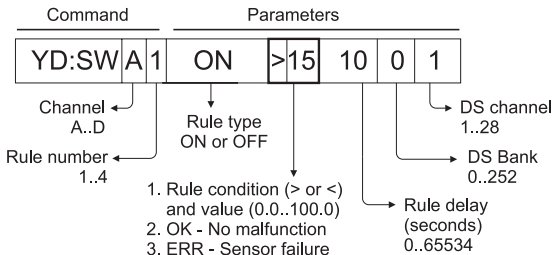


Figure 6. Automatic management of ballast tanks with YDCC-04 and YDTA-04

The Device allows setting up to 8 rules for each measurement channel (A..D), four to switch the digital switching channel ON, and four to switch OFF. The condition can be programmed by tank level (more or less than specified value) or by sensor state (are readings available or sensor is failed).



The common command's syntax is shown above. You can specify one ON and one OFF rule with the same number.

Example 1. Turn on the digital switching channel 1 of the digital switching bank 5 if the sensor connected to channel D is not working at least 10 minutes (600 seconds):

YD:SWD1 ON ERR 600 5 1

Example 2. Turn on digital switching channel 2 of digital switching bank 0 immediately if the level of the tank connected to channel A is less than 20%:

YD:SWA1 ON <20 0 0 2

To turn off the rule, special syntax with the NEVER keyword after the rule type is used.

Example 3. Turn off the ON rule with number 1 at channel A (defined at Example 2):

YD:SWA1 ON NEVER

The command without parameters or with the rule type only, returns the current settings.

Example 4. Get the settings of the ON rule with number 1 at channel D (defined at Example 1):

YD:SWD1 ON

Example 5. Configure the Device to manage the ballast tank system shown in Figure 1. When tank 2's level (connected to channel D) is less than 20% (for 10 seconds or more), turn on the pump until the level in tank 2 is more than 70%. When the level in tank 1 (connected to channel A) is less than 20%, turn on the pump in another direction (switch the polarity of reversible pump).

YD:SWA1 ON <20 10 0 1

YD:SWA1 OFF <20 10 0 2

YD:SWA2 ON <20 10 0 3

YD:SWA2 OFF >70 10 0 3

YD:SWD1 ON <20 10 0 2

YD:SWD1 OFF <20 10 0 1

YD:SWD2 ON <20 10 0 3

YD:SWD2 OFF >70 10 0 3

Lines 1–2 and 5–6 above set the right polarity for the reversible pump. Lines 3 and 7 turn the pump ON. Lines 4 and 8 turn the pump OFF.

After the activation (all conditions are met), the rule becomes inactive until conditions will no longer match. Imagine that tank 1 has 10% level and the Tank Adapter runs the pump in the Example 5. When the level reached 15%, the user turned off channel 3 on the YDCC unit manually (from connected buttons or from the MFD screen) and turned off the pump. In this case, the rule on line 3 will not try to run the pump again, despite the level still being less than 20%, because it was already activated. It will be activated again only when the level goes to 20.1% or more, for a at least half of second (with the respect of DAMPING setting, see Section VI.2.4).

Example 6. Turns on digital switching channel 3 on bank 0 if the level in the tank connected to channel A is less than 20% for at least 10 seconds. After 5 minutes (300 seconds plus 10 seconds for activation of the first rule), try to turn on the channel again if the level is still less than 20%.

YD:SWA2 ON <20 10 0 3

YD:SWA3 ON <20 310 0 3

In the example above, the second rule will be activated 5 minutes later, and if the user turned off the channel manually, the second rule will turn the channel on again.

In real conditions, ballast tank management system must take in account the heeling and actual level in tanks (corrected to heeling) to drain or fill the system, or to pump the water between tanks, etc. This cannot be done with the simple rules of the Tank Adapter, but can be programmed with the **Yacht Devices NMEA 2000 Bridge YDNB-07**, which allows executing custom programs to process NMEA 2000 data stream and manage NMEA 2000 devices in the real time. The sample program for the Bridge is available in Appendix C.

VIII. Firmware Updates

Firmware updates can be done with free CAN Log Viewer software (version 1.35 or later) running on Microsoft Windows, Mac OS X and Linux:

http://www.yachtd.com/products/can_view.html

The program must be connected to an NMEA 2000 network with a Yacht Devices USB Gateway YDNU-02, or a Wi-Fi Gateway YDWG-02, or an Ethernet Gateway YDEN-02, or a Wi-Fi Router YDNR-02.

You can download the latest firmware version for the Tank Adapter YDTA-04 from our website (do not confuse with YDTA-01 model firmware):

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

Open the downloaded .ZIP archive with and extract the YDTA04.BIN file to the disk. The README.TXT file inside the archive can contain important information regarding the update.

1. Click the «NMEA 2000 Devices» item in the «View» menu.
2. Click the «Refresh» button (see Figure 7 on the next page) in the opened window and wait for the Device to appear in the list.
3. Select the YDTA-04 Device and click the «Firmware Update» button.
4. Locate and select the YDTA04.BIN file on the disk.
5. Wait while the firmware is uploading.

If in doubt, see the video with the update procedure on our web site. During the firmware upload, the Device's N2K status LED flashes RED very fast. When the firmware is updated, the Device status LED emits the sequence of RED and GREEN half-second flashes five times and then reboots. CAN Log Viewer also informs you that the update is successfully done.

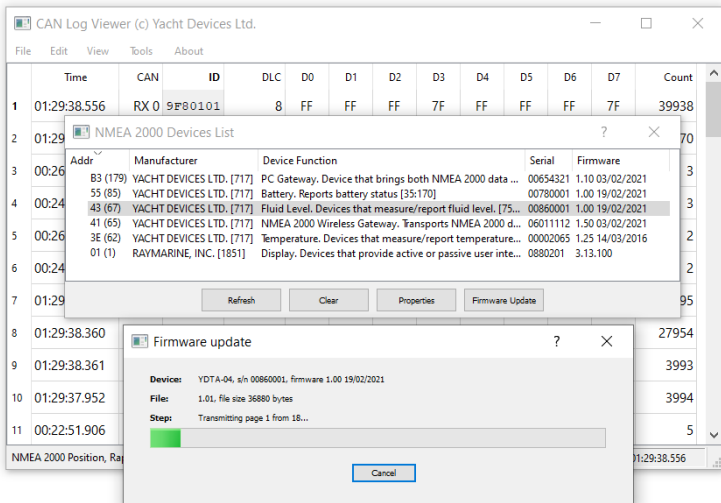


Figure 7. Firmware update with CAN Log Viewer

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.
Channel LED flashes every 2.5 seconds (MFD displays «Equipment failure» alert for the Device)	1. Fluid level sensor connection issue. Check if the fluid level sensor is connected according to the instructions given in Section II. 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 Sections IV–VI). 3. No sensor is connected. Mark the channel as unused (see Section VI.3.1).
N2K Status LED flashes RED every 2.5 seconds	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.

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 II. 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 Sections IV–VI). 3. Fluid level sensor needs calibration. Perform calibration as described in Section VI.4.1.
The Device is displayed in the list of devices on the chart plotter, but fluid level data does not appear on the screen, status LED flashes 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.2.2).

Appendix B. 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
Heartbeat, PGN 126993 (0x1F011)	No	Yes (1)
Product Information, PGN 126996 (0x1F014)	No	Yes
Configuration Information, PGN 126998 (0x1F016)	No	Yes
Fluid Level, PGN 127505 (0x1F211)	No	Yes (2)
Trip Fuel Consumption, Vessel, PGN 127496 (0x1F208)	Yes	Yes (3)
Binary Status Report, PGN 127501 (0x1F20D)	Yes	No
Switch Bank Control PGN 127502 (0x1F20E)	No	Yes

- Note 1 : Sent every 60 seconds by default, interval can be changed in the Adapter's settings (refer to Section VI). The message reports failed equipment state if any of four external sensors is not connected or malfunction. For unused channels, set the connection type to NC (see Section VI.3).*
- Note 2: Sent every 2.5 seconds for each channel by default, interval can be changed in the Adapter's settings (refer to Section VI).*
- Note 3 : Sent only if YD:JOIN command was used (see Section VI.4); the default transmission interval is 1 second, can be changed in Adapter's settings. If some other equipment sent this message, the Adapter will immediately send its own message afterward with the corrected value of the estimated fuel remaining.*
- Note 4: 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 C. Digital Switching with NMEA 2000 Bridge

The program below turns on the ballast pump (see Figure 1 in Section VII) if the heeling is above 20 degrees and if the tank on the relevant side is not 100% full. Please, refer to NMEA 2000 Bridge YDNB-07 manual for details.

```
# Switch direction and run pump commands, PGN 127502
SLOT1 = 000EF20D FF 08 00D1FFFFFFFFFFFFFF # One direction (on,off,on)
SLOT2 = 000EF20D FF 08 00D4FFFFFFFFFFFFFF # And another (on,on,off)
SLOT3 = 000EF20D FF 08 00CFFFFFFFFFFFFFFF # Stop pump (off,n/a,n/a)

# Process "Fluid Level" PGN 127505
match(CAN1, 0x01F21100, 0x01FFFF00 )
{
    I = get(DATA, UINT8)
    F = get(DATA+1, INT16)

    if (F != 0x7FFF) # Are data valid?
    {
        if (I == 0){
            A = F * 0.004 # Tank A, %
        }
        if (I == 3){
            D = F * 0.004 # Tank D, %
        }
    }
}
```

```

# Switch # Process "Attitude" PGN 127257
match(CAN1, 0x01F11900, 0x01FFFF00 )
{
    H = get(DATA+1, INT16)
    if (H != 0x7FFF) # Is heeling valid?
    {
        load(SLOT3) # Prepare stop pump command
        H = H * 0.0180 / M_PI # To degrees
        if (H > 0) { # Heeling to starboard
            if (H > 20.0)
            {
                if (A < 100) { # Is level in A not 100%?
                    load(SLOT1) # Run pump command
                }
            }
        }
        else { # Heeling to port
            if (H < (0-20.0))
            {
                if (D < 100) { # Is level in D not 100%?
                    load(SLOT2) # Other direction
                }
            }
        }
        send(CAN1) # Send the command to run/stop
    }
}

# End of program

```

NOTES

NOTES

