

Yacht Devices

User Manual

NMEA 0183 Wi-Fi Router YDWR-02

Firmware version

1.00

2018

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Package Contents

Device	1 pc.
Wi-Fi antenna	1 pc.
Screws	2 pcs.
This Manual	1 pc.
Paperclip for reset	1 pc.

Introduction

The NMEA 0183 Wi-Fi Router (hereinafter Router or Device) is a smart NMEA 0183 and SeaTalk multiplexer which also allows you to see data from marine devices on a PC or smartphone. Thanks to the built-in administrative web site, you can easily configure physical ports speed, set up routing between ports and apps, and define data filters to reduce traffic on low-speed ports.

The Router has four physical NMEA 0183 ports (four inputs and four outputs) with configurable speed from 300 to 115200 baud. This allows organization of data exchange between multiple devices with different speeds. Multiple physical listeners can be connected to the Router's outputs.

Ports #1 and #2 are configured at factory for 4800 bps speed, and ports #3 and #4 for 38400 bps. The factory routing scheme is printed at the bottom of the Router. The port #4 is galvanically isolated and has five terminals: four data terminals (TX+, TX-, RX+, RX-) and a dedicated ground (also isolated from other ports and Router's ground).

SeaTalk is a proprietary binary protocol of Raymarine company. It allows co-existence of multiple devices on the bus, so the Router has only one SeaTalk port. A bi-directional converter between SeaTalk and NMEA 0183 supports all known SeaTalk datagrams, including autopilot. This allows controlling SeaTalk autopilots from NMEA 0183 chart plotters and marine apps.

The Router has three network data servers which can be configured for UDP or TCP network protocols. For UDP protocol, the number of clients (physical devices or software applications) is unlimited. In the routing settings, you can select one or more outputs (physical port or TCP/UDP server) for any data source, including the same port or server from which data is received. Multiple data sources can be selected for any physical or network output. This turns the Device into a powerful router and multiplexer.

Individual data filters can be defined for incoming and outgoing NMEA 0183 data on any physical port or network server. For a SeaTalk port, you can define filters at the NMEA 0183 level (acts after conversion from SeaTalk or before conversion to SeaTalk) or at the SeaTalk datagram level.

The Router creates its own Wi-Fi network (with range of about 30 meters in open spaces) or it can be connected to an existing Wi-Fi network. In the second case, coverage depends on the coverage of the base network; laptops and PCs can be connected to Wi-Fi routers (and the Device services) by Ethernet; and you

can configure remote access to the Device over the Internet.

To configure the Router, you need any Wi-Fi enabled device (laptop or smartphone) with any web browser. The Device's settings can be reset to factory values using the hidden reset button (a paper clip is required, supplied with the Device).

The Web Gauges page of the administrative website allow real time viewing of vessel data using a web browser on PC, laptop, tablet or smartphone. This can replace instrument displays. No internet connection or app installation is required.

A pair of Wi-Fi Routers can act as an NMEA 0183 or SeaTalk wireless extender and can join two or more physical networks. To pair the Routers, you need to set up both using UDP protocol and set the same port number.

You can also pair this Router with Yacht Devices NMEA 2000 Wi-Fi Gateway in the same way. Its server should be configured to NMEA 0183 protocol; this supports bi-directional conversion between NMEA 2000 and NMEA 0183. This forms a wireless bridge between NMEA 2000 and NMEA 0183 or SeaTalk networks.

The Router automatically records your track along with weather, depth and other data to the internal memory. These data can be exported to GPX (for Garmin MapSource, Google Earth or other cartographic applications) or CSV (spreadsheet) formats.

Thank you for purchasing our product and 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 sales 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/or replacement of the goods and do not include the cost of equipment installation and configuration, or 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 through authorized dealers.
10. The contact details of the manufacturer and a list of the authorized dealers are published on the website: <http://www.yachtd.com/>.

I. Product Specification

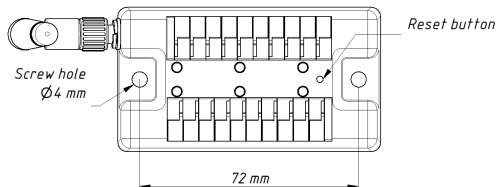
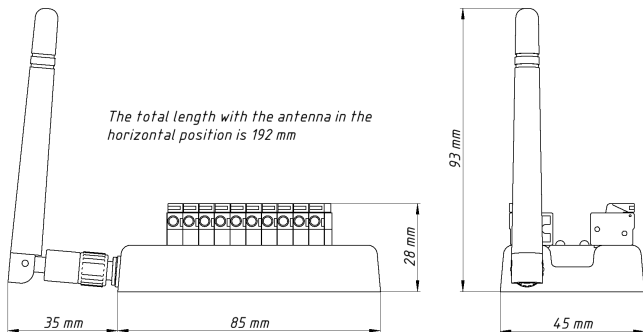



Figure 1. Drawing of Router

Device parameter	Value	Unit
Supply voltage	7..17	V
Average current consumption	47	mA
Wi-Fi module 2.4 GHz	802.11b/g/n	—
Wi-Fi internal range (open space)	30 / 100	m / feet
Wi-Fi connections in Access Point mode (max.)	3	—
TCP connections from applications (max.)	9	—
UDP clients (applications or devices)	Unlimited	—
NMEA 0183 physical ports (inputs / outputs)	4 / 4	—
Galvanic isolation of NMEA 0183 Port #4	2500	V _{RMS}
SeaTalk physical ports	1	—
Device case without antenna (LxWxH)	85x45x28	mm
Total height with the antenna in vertical position	93	mm
Total length with the antenna in horizontal position	192	mm
Weight	80	g
Operating temperature range	-20..55	°C

 Yacht Devices Ltd declares that this product is compliant with the essential requirements of EMC directive 2014/30/EU and radio and TTE directive 1999/5/EC.

 Dispose of this product in accordance with the WEEE Directive. Do not mix electronic disposal with domestic or industrial refuse.

II. NMEA 0183 Basics

The default speed of a NMEA 0183 interface is 4800 baud. High-speed interfaces are 38400 baud and were designed especially for AIS, but usually chart plotters and instrument displays allow any data (not only AIS) on a high-speed port. On a chart plotter, port speed can be configured in the settings. NMEA 0183 uses different wires for talking (transmitting, TX) and listening (receiving, RX) data.

One talker can be connected to multiple listeners, but a listener can have only one talker connected. The Router can act as a “multiplexer” and join the output of two physical talkers to a single stream.

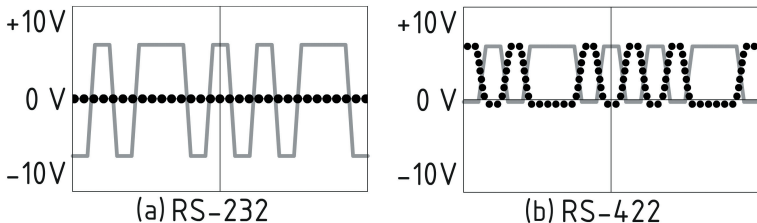


Figure 1. (a) RS-232 and (b) RS-422

NMEA 0183, until version 2.0 (1992), used a “single ended” RS-232 interface with one TX line and one RX signal line (grey at Figure 1.a) and ground line (dotted at Figure 1.a) used as reference for TX and RX signals. Therefore, old devices have only three wires.

Since Version 2.0, NMEA 0183 has been based on a “differential” RS-422 interface, which has two RX lines RX+ (can also be marked as “A”) and RX- (or “B”), two TX lines TX+ (or “A”, grey at Figure 1.b) and TX-

(or “B”, dotted at Figure 1) and a ground (not shown at Figure 1.b). Modern devices use five wires.

Devices of different versions can be connected, but with one cautionary note. TX- (“B”) is not equal to a ground line. Voltage on the TX- line (dotted on Figure 1.b) changes from 0 to 5V, and connecting this line to ground line can cause a short circuit.

The correct connection schemes are shown in Figure 2.

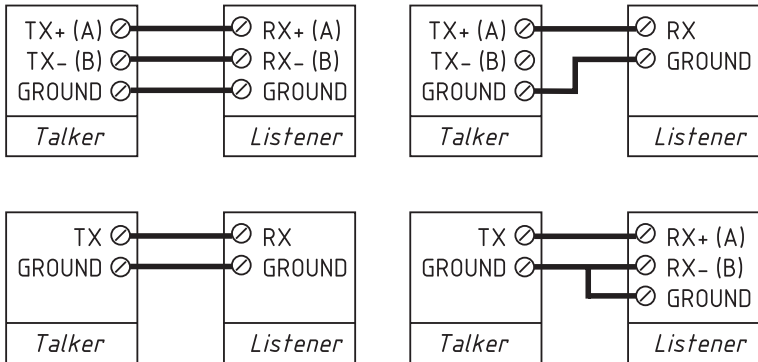


Figure 2. Connection of NMEA 0183 devices

III. Installation and Connection of Device

The Device requires no maintenance. When deciding where to install the Device, choose a dry mounting location. Despite the fact that the Router case is waterproof, the terminals are open and seawater can cause a short circuit. Do not place the Device where it can be flooded by water, get wet in the rain or be sprayed with water.

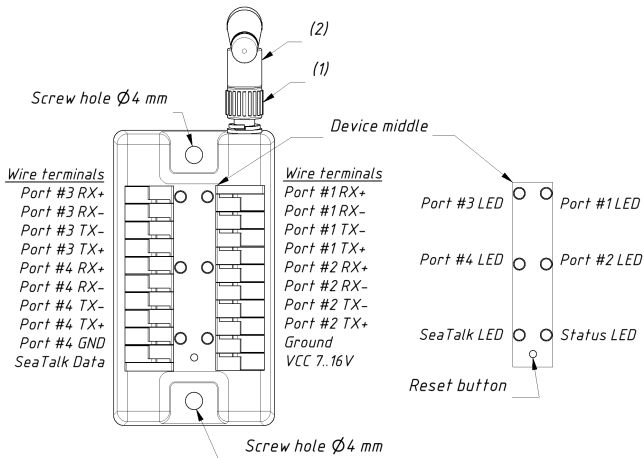


Figure 1. Router wire terminals (left) and LED's scheme (right)

If the antenna is not connected, connect the antenna first. Part (2) of the antenna base (see Figure 1) rotates relative to part (1) with notches. The angle of the antenna changes between horizontal and vertical positions. The signal is better when the antenna has a vertical orientation.

The Router can be fixed horizontally or vertically using the two screw holes (4 mm diameter, 72 mm between centers) and the screws supplied. When the holes of wire terminals are pointing to the sides, they are better protected from occasional water spray.



The connection to the NMEA 0183 network varies depending on the version of the connecting equipment. Please, refer to Section II for connection schemas. The wrong wiring can damage the equipment!

The Router is supplied with two NMEA 0183 ports (#1 and #2) configured for 4800 baud and two ports (#3 and #4) for 38400 bauds. If your NMEA 0183 equipment has a different speed, it is recommended to configure the Router port speed before connecting to NMEA 0183 equipment (see Section IX.1). If your NMEA 0183 equipment supports port speed configuration, it is recommended initially to set the highest available speed on the Router and equipment.

The ground wire of high-speed ports (38400 bps) should be connected to the Router's ground terminal. In case of connection to isolated port #4, the ground wire of the equipment should be connected to the dedicated ground terminal of port #4 ("Port #4 GND" at Figure 1).

A SeaTalk bus has three wires: 12 Volts power supply (red label on equipment, red lead within a SeaTalk cable), ground (white or grey label on equipment, bare shield within a SeaTalk cable) and data (yellow label, yellow lead within a cable).

The Router can be powered from the SeaTalk bus: ground and power supply wires of the SeaTalk bus should be connected to the Router's VCC and Ground terminals on the right side (see Figure 1), the data wire should be connected to the "SeaTalk Data" terminal on the Router's left side (Figure 1). In case of powering of the Router from another source, the ground wire of the SeaTalk bus should be connected with the Router's ground terminal on the right side.

All connections should be made when the power is off. This will protect against accidental short circuits

during installation. When the power and ground wires are connected, turn on the power supply and the Device's LEDs will blink (see the next Section).

IV. LED Signals

The Device is equipped with the six bi-color LEDs (see the Figure 1 in the previous Section): a status LED and five port LEDs (NMEA ports #1-#4 and SeaTalk). At powering on, all LEDs light up green for a few seconds counterclockwise in direction starting from the status LED, indicating that the Device is functioning. Ten seconds later the LEDs start flashing in normal operation mode.

1. Signals during normal operation

During normal operation, the Device produces a series of four flashes of each LED (starting from the status LED) every ten seconds. The flashes indicate the state of the Device interfaces over the last ten seconds and have the following meaning:

- **Status LED, flash #1:** Wi-Fi configuration. Green, if the Router is configured to use its own Wi-Fi network named “YDWR” (SSID), Access Point mode. Red, if the Router is configured to use the boat’s existing Wi-Fi network, Client mode.
- **Status LED, flash #2: Wi-Fi state.** Red, if the Wi-Fi link is not established yet or some error has happened (cannot connect to existing Wi-Fi network, wrong password, etc.). Otherwise green.
- **Status LED, flash #3: TCP connections.** Green, if some clients are connected to Router services by TCP protocol. When the administration website is browsed, the connection exists only a short period when page is downloading from the web server. Red, if no TCP connections are open (but applications can receive data by UDP protocol at the same time).
- **Status LED, flash #4: data received from network.** Green, if data was received by any of the network servers (by TCP or UDP protocols). Otherwise red.
- **Port LED, flash #1: data received.** Green, if any data was received by this port in the last 10 seconds.
- **Port LED, flash #2: RX errors.** Green, if any data was received and all data was received without errors. NMEA 0183 sentences contain a checksum, so any transmission error will be detected.

- **Port LED, flash #3: data sent.** Green, if data was sent to this port. As there is no confirmation of reception, this signal does not mean that data was received by any listener. Red means that the Router has nothing to send.
- **Port LED, flash #4: TX overflow.** Green, if data was sent without overflow. In case of a red signal, you should increase the port speed (if possible) or filter our unnecessary data, because the selected speed is not enough to send all the data. This signal will also be red if flash #3 is red.

With the factory settings, the status LED should flash GREEN-GREEN-RED-RED after the power on; this means that the Router is configured for Access Point mode, successfully created the Wi-Fi network with “YDWR” name (SSID) and has no incoming connections from mobile devices yet.

2. Signals during device reset

Hardware reset or settings reset is initiating by pressing of the hidden reset button. See Section VI.

3. Signals during firmware update

Firmware update can be uploaded at the administrative web site. See Section XII.

V. Wi-Fi Settings

The Device can work in Access Point mode (factory defaults) and in Client mode when it is connected to an existing Wi-Fi network. To configure the Router, you need any Wi-Fi enabled device (laptop or smartphone) with a web browser.



The internal web server of the Router has limited possibilities and simultaneous access from multiple devices is not recommended. Updating settings of NMEA servers can cause termination of the current TCP data connections.

1. Access Point mode

In the Access Point mode, the Device creates its own Wi-Fi network with the name “YDWR” (SSID) and password 12345678. To open the administration web site, connect to this network and type <http://192.168.4.1> in a web browser. Use the login “admin” and password “admin” (without quotes) to log into the administration web site.

The administration web site has a navigation menu on the left; in the mobile version, the menu is accessible by clicking on the icon in the top left corner.

On the “Wi-Fi Access Point” page, you can change the Wi-Fi network name (SSID), password, change the authentication type and make the network hidden. Hidden networks are not visible in the list of Wi-Fi networks, and you can connect to such networks only by entering the name. To enter the name, click on the button with a name like “Other network..” in the list of Wi-Fi networks.



We strongly recommend changing the default Wi-Fi password. A hijacker can take control of autopilot and other important ship systems. In the air drone era, this can happen even far from shore.

Up to three Wi-Fi connections are supported in Access Point mode. You can switch the Device to Client mode to avoid this limitation.

2. Client mode

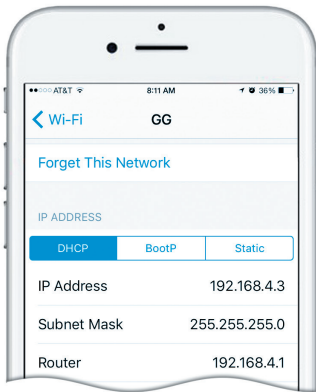


Figure 1. Wi-Fi details on iPhone 6

In this mode, the Router connects to an existing Wi-Fi network. To switch to this mode from Access Point mode, or tune the settings, open the “Wi-Fi Client” page on the administration website.

The Router must have a fixed IP address. This can be done in the Wi-Fi router settings; you can assign a fixed IP address by the MAC address of the Router printed on the “Wi-Fi Client” page. In this case, you can leave the default “Use DHCP” setting in the IP address configuration. Note that the Router has two different MAC addresses, one for the internal Access Point and one for connecting to other networks. You should use the MAC address from the “Wi-Fi Client” page.

Or you can choose “Static IP” address and enter an IP, subnet mask and network router address. In most cases, you can open the settings of the Wi-Fi network on a smartphone or PC, and copy the mask address and router address and select a free IP address from this subnet. For example, if the router has the address 192.168.4.1 (see Figure 1 on the previous page) and a smartphone has the address 192.168.4.3, you can try 192.168.4.100. This is far enough from the address assigned to the smartphone.

In case of difficulty, contact your router administrator or refer to the router documentation.

The “Save” button saves settings to EEPROM, and they will be applied at the next connection to the Wi-Fi network. The “Save & Apply” button saves settings and tries immediately to apply them if the Router is in Client mode already.

Choose the network from the list or enter the name of a hidden network in the “Other...” edit box and click “Connect”.



If the Router was in Access Point mode before, it will shutdown the “YDWR” network after successful connection. Your client device (smartphone, laptop) will continue searching for a non-existing network, and you may need to change the Wi-Fi network manually and enter the new IP address of administration website in the browser.

For example, you connect the Router to the network “Yacht” and specify 192.168.1.100 as the address in the static IP address field. You should connect your smartphone or laptop to the “Yacht” network and type <http://192.168.1.100> in the web browser to open administration the website.

3. What to do if the Device is not accessible

There many possible reasons why you may not be able connect to the Router after changing settings. Check the following:

- was the IP address configured before switching to Client mode?
- what is the Router state according the LED signals? (see IV.)
- is your smartphone or laptop connected to the same Wi-Fi network as the Router?
- what IP address was assigned to the Router? (in Wi-Fi router settings)

If you cannot diagnose what is wrong, you can reset the Device's settings (see Section VII) and the Device will be returned to Access Point mode. You can connect to the "YDWR" network again and try to change the settings one more time.

4. Other important settings

We also strongly recommend changing the default password for access to the administration website. This can be done on the "Administration" page.

Access to port 80 (default port of web server) can be limited in some network configurations, and you may change the port on the "Home" page to another, 8000 for example. In this case, you will need to type <http://192.168.4.1:8000> in the address bar of browser instead of <http://192.168.4.1> to get access to the administration website.

VI. Configuration of Application Protocols

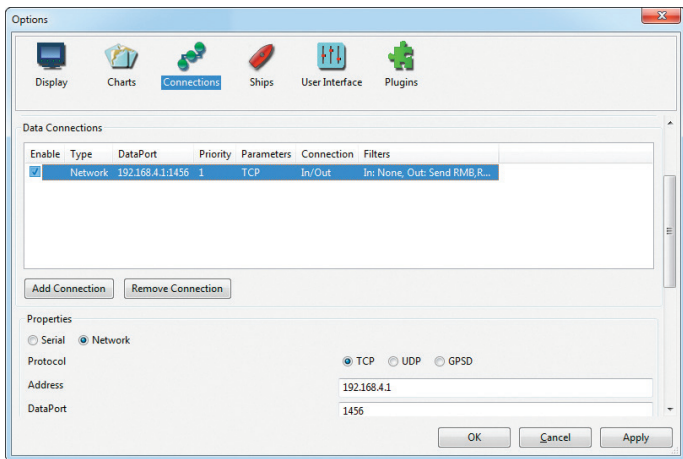


Figure 1. Settings of OpenCPN application

Most marine applications support both TCP and UDP network protocols. TCP is a connection-oriented protocol. This means that the receiver must confirm reception of data before it gets the next packet of data, otherwise the sender repeats the transmission after a timeout. So, the second TCP connection doubles the network traffic and CPU load, despite the fact that both clients receive the same data.

UDP is a connectionless protocol; any number of clients can listen to data broadcasted from a specified port without any additional load on the server and without increasing the actual network traffic. We recommend using UDP protocol where possible, because the resources of the Device’s CPU are limited.

NMEA 0183 is supported in virtually all marine applications. On the “NMEA Server” page on the administration website, you can set up to three server ports (see Figure 2 on the next page). If TCP network protocol is selected, up to three connections (from three different applications on one device, or from three devices with one marine application running on each) are allowed at the same time. So three servers allow nine connections in total.

In the case of using UDP protocol, the number of devices or applications used the data port is not limited. We recommend using UDP protocol when possible.

The server port can be configured as bi-direction, read-only (Transmit Only) or write-only (Receive Only). We recommend configuring data ports as read-only if possible, to prevent the network from flooding from incorrectly configured applications.

Server 3 also supports “Debug” data protocol, designed to diagnose issues with software applications (see Section XI), and “Memory” data protocol, to download the sailing data recorded to the internal memory of the Router (see Section IX).

With the factory settings, the Router has the 1st server enabled and pre-configured use TCP port 1456 and the NMEA 0183 data protocol. To connect your application to the Router with factory settings:

- connect your laptop or mobile device to YDWR network;
- set the IP address 192.168.4.1 in the application settings;
- specify the TCP protocol and port 1456 in the application settings.

To use the Router with a Navionics Boating App, no settings are required in the app, but some changes are required in the Router configuration:

- configure one of the Router servers to use UDP port 2000 and NMEA 0183 protocol;
- connect your smartphone or tablet to the Router’s Wi-Fi network.

YDWR x

192.168.4.1/servers.html

Home

Wi-Fi Client

Wi-Fi Access Point

NMEA Server

NMEA Filters

NMEA Routing

NMEA Settings

Administration

Firmware Update

Logout

Web Gauges

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Internet Page

NMEA Data Servers

You can set up to three servers. Up to three connections (from three different applications on one device, or from three devices with one marine application running on each) are allowed on TCP servers the same time. In the case of using UDP protocol, the number of devices or applications using the data port is not limited. We recommend using UDP protocol when possible.

Server #1

Network Protocol	Data Protocol	Port	Direction
TCP	NMEA 0183	1456	Transmit Only

Server #2

Network Protocol	Data Protocol	Port	Direction
TCP	NMEA 0183	1457	Transmit Only

Server #3

Network Protocol	Data Protocol	Port	Direction
TCP	Memory	1458	Transmit Only

Update

Figure 2. Router server settings

VII. Reset of Settings and Hardware Reset

Insert the paper clip to the small hole at the small hole near the status and SeaTalk LEDs (see the reset button location at Figure 1 in Section III). The status LED of the Router will constantly shine red when the hidden button under the hole is pressed.

Wait 2-3 seconds and the LED will change from red to green. Release the button to reset the Device's settings. Otherwise, the LED will become red 2-3 seconds later. Keep the button pressed ten seconds more, and the LED becomes green. Release the button to complete a hardware reset of Device. Alternatively, wait two seconds, and the LED color returns to red.

Note that nothing happens if you release the button when the LED signal is red. The settings reset occurs if you release the button during the first green light period, and the hardware reset occurs on the second period.

During settings reset, the Device changes all settings to factory values (returns to Access Point Mode, network SSID to "YDWR"), and the Device will produce fast green flashes for 2-3 seconds, then reboot.

During hardware reset, the Router returns to the firmware version programmed at the factory (the Device always keeps a copy of this version in EEPROM) and to the factory settings. LED signals during firmware updates are described in Section XII. Hardware reset is normally not required. It can be used for firmware rollback.

VIII. Routing and Data Filters

With the factory settings (see Figure 1), the Router sends all data from physical ports to network servers and vice versa.

Home

Wi-Fi Client

Wi-Fi Access Point

NMEA Server

NMEA Filters

NMEA Routing

NMEA Settings

Administration

Firmware Update

Logout

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NMEA Routing

You can select output ports and servers for each input source. Note that each server has individual filters, and a routed sentence can be filtered out by output filters of the selected server.

Tunneling allows routing of incorrect sentences from the server or port, including sentences with an invalid checksum. Invalid sentences are not processed by incoming filters of input server/port or outgoing filters of output port/server. Correct sentences are always processed by filters, whether tunneling is off or on.

Input	Tunnel	Output							
		NMEA Port				ST	TCP/UDP Server		
Port/Server		1	2	3	4	1	1	2	3
Port #1	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Port #2	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Port #3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Port #4	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
SeaTalk (ST)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Server #1	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Server #2	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Server #3	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Figure 1. Default routing settings

Different devices can be connected to the input and output wires of the same port of the Router. In this case you may need to specify that this port is the output for itself.

Web gauges (see section X) display the data from the server #1. With the configuration shown in Figure 1, web gauges will display data received from any physical port. If you need to see the data received from the application on the server #1, you need to specify that server #1 is the output for the server #1 input.

The Router ignores incorrect sentences received, including sentences with an invalid checksum. The “Tunnel” allows routing of incorrect sentences from this server. It allows connecting Navtex and rare NMEA equipment produced decades ago when a checksum was not a mandatory part of the sentence.

Invalid sentences are not processed by incoming filters or outgoing filters of output server/port. Correct sentences are always processed by filters, whether tunneling is off or on.

The Device has 40 filter lists, which allow limiting the set of incoming or outgoing sentences. To modify filters, open the “NMEA Filters” page on the administrative website. Each server or port has four filter lists: two for incoming NMEA 0183 sentences (one for sentence formatters and one for talker ID), and two the same for outgoing sentences.

Each filter list has a switchable type: WHITE or BLACK. A message is passed thru the WHITE filter if it contains a record matched with a message. And the reverse for BLACK. In the factory settings, all filter lists are empty and are of BLACK type, so all messages are passed through the filters.

According to the standard, an NMEA 0183 sentence starts with a \$ or ! symbol, followed by a two-character talker ID and a 3-char sentence formatter. These elements are followed by data fields (after the comma). The sentence is finished by a check sum after the * (asterisk) symbol.

The following sentences matches to GLL and VDM records in the sentence filter:

```
$GPGLL,4146.5894,N,07029.6952,W,173412.02,A*15  
!AIVDM,1,1,,B,ENk`smq71h@@@@@@@@@@@@@@@@=MeR6< 7rpP00003v f400,4*5F
```

or GP and AI records in the talker ID filter. The Talker ID filter contains 2-char talker IDs separated by a space character, and sentence filters contain 3-char NMEA 0183 sentence formatters separated by a space character. Example of sentences and talker IDs filters:

- GLL VDM VDO
- GP AI

Filters allow reduction of the port or server load. This is not significant for servers because a Wi-Fi network is fast, but it can be useful for physical port configuration. If the fourth flash of the port's LED indicates overflow (see Section IV), unnecessary messages can be excluded using the transmit filter of this port.

The Router has a bi-directional converter between SeaTalk and NMEA 0183. On the Seataalk port you can use NMEA 0183 filters and datagram filters ("Sxx", where xx - hexadecimal datagram number, see Appendix B). For example, NMEA 0183 water temperature MTW sentence is converted to Seataalk datagrams 23 and 27 (hexadecimal). To prevent sending water temperature to or from SeaTalk, you can specify the sentence filter "MTW" (temperature will be filtered out at NMEA 0183 level) or "S23 S27" (will be filtered at datagram level).

In case of a WHITE filter on the SeaTalk port, you should specify "MTW S23 S27" to allow water temperature processing because you need allow processing of SeaTalk datagrams 23 and 27 and generation of MTW sentence.

IX. NMEA Settings and Data Logging

This chapter describes settings available on the “NMEA Settings” page of the administration website.

1. Port Speed

The default speed of a NMEA 0183 port is 4800 baud, but speeds of 9600 (Navtex) and 38400 (AIS) are also widely used. Some equipment has no speed selector, but you can switch the port type between "NMEA", "Navtex" and "AIS" (or something similar). Even though a port is labelled "AIS" type, usually that only means that it works at 38400 baud and processes not only AIS, but all other NMEA 0183 messages too. If you are connecting the Router to PC's serial port, you can set 115200 baud speed.

2. NMEA 0183 Output

In this section, you can configure the talker ID of the Router. It is used in the NMEA 0183 sentences generated by the Router. The only sentences generated by the Router are MWV (sentence with true wind data, see below) and sentences converted from SeaTalk (see the Appendix B).

The wind sensor always measures apparent wind; true wind angle is calculated using SOG or STW data and true wind direction requires COG or heading. In this section, you can turn on the calculation of the true wind. The MWV sentence with true wind sends to the port/server immediately after the MWV with apparent wind if true wind data was not sent to this port from another port or server in last 5 seconds.

3. SeaTalk Settings

The Router has a bi-directional converter between SeaTalk and NMEA 0183. Here you can turn on the generation of \$STALK sentences with raw SeaTalk data. This can be used for debug and diagnostics purposes, and to setup the wireless SeaTalk bridge between two physical SeaTalk networks (two Routers are required).

With factory settings, the Router does not send datagrams to SeaTalk if they are already present on the bus (except autopilot control and waypoint transfer datagrams). In this section, you can change this behavior.

4. Data Logging

The Router automatically saves the most important boat data to the internal memory: position, course and speed, wind speed and direction, heading, STW and depth. Settings in this section allow setting the logging interval or turning the logging off, you can also clear all recorded data using the button at the bottom of the page.

The shortest interval is 30 seconds and the Router's memory allows storage of 32000 points, which is about 11 days of sailing. Old data will be overwritten automatically.

You can configure server #3 to "Memory" protocol and download a GPX (for cartographic applications like Google Earth or Garmin MapSource) or CSV (spreadsheet) file with these data using a web browser.

If the Router has the address 192.168.4.1 and server #3 has port address 1458 (the factory setting) and configured for "Memory" protocol, open the page <http://192.168.4.1:1458/> in your browser. Data will be loaded to the browser, and the data export page will be shown. On this page you can choose the desired format, set the options (XML schema for GPX file, column separator for CSV file, preferred units and so on) and download the file with data.

Export may not work properly on the iPad and iPhone: the file with data may be opened in the browser window instead of saving or opening in the application. In this case, you can copy and paste your data or export data using other mobile device or laptop.

YDWN 1.00 00000000 M x

192.168.4.235:1458

Data Export

You can export the data to a GPX (for Google Earth, Garmin MapSource and other cartographic applications) or CSV (spreadsheet) file. Export may not work properly on the iPad and iPhone.

If the number of waypoints below is zero, it possible means that logging is turned off at the NMEA Settings page.

Number of waypoints: 1934

First waypoint date: 3/18/2018, 10:38:16 AM

Last waypoint date: 4/11/2018, 1:04:56 PM

Output file format:

CSV Format GPX Format GPX 1.1 Schema

New track when: 10 hours to next WPT Save only this: Last 3 Tracks

Total tracks: 15 For export: 3 tracks, 1912 waypoints

Preferred units:

Speed: Knots Depth: Feet

Export

Figure 1. Data export page

X. Web Gauges of Administrative Web Site

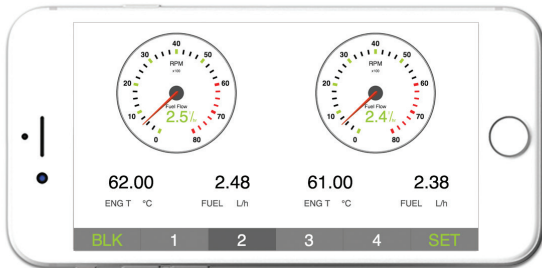


Figure 1. Built-in web gauges (Apple iPhone 7)

The Web Gauges page (WG) allows real time viewing of vessel data using a web browser on a PC, laptop, tablet or smartphone and can replace instrument displays. You can open the WG using the link on the logon page of the Router's administrative web site (no authorization is required) or, if you are logged in, using the «Web Gauges» menu item. No internet connection or app installation is required.

WG offers four customizable data pages. On mobile devices you can slide pages, or you can use the numeric buttons on the menu (at the bottom of the screen) to choose the active page.

Data pages are pre-configured. The first page contains circular gauges for course/speed and AWA/AWS (apparent wind angle and speed), and text data bars with STW, heading, TWS and TWA data. The second page (see Figure 1) is configured to view twin engines' data and contains circular tachometers and text data bars with engine temperature and fuel rate data. The third page contains data bars with position, time, log, sea and air temperature, barometric pressure and depth surface graph with current depth value. The fourth page is not configured and contains no gauges or data bars. You can change any page's layout and its sets

of data bars.

On an iPhone, iPad and Android devices, the address bar and/or menu bar of a web browser can reduce the visible area and overlap with the WG menu in horizontal or vertical screen orientation. In this case, add WG to the Home Screen (see browser menu) and open it using the WG icon on the Home Screen. The page will then open in full screen mode without browser menus or address bars.

The actual WG guide is available on administrative web site (the next link after Web Gauges link at the logon page or in the menu of administrative web site) and online at:
http://www.yachtd.com/products/web_gauges.html

XI. Recording of Diagnostics Data

Diagnostics designed to troubleshoot issues with software applications. A log contains all sent and received sentences. Server #3 can be configured to send log data in a real time to a web browser or terminal application.

To get the diagnostics log, configure server #3 port to the “Debug” data protocol (it is TCP network protocol). If the Router has the address 192.168.4.235 and server #3 port has a number 1458, type <http://192.168.4.235:1458> in browser address bar (experienced users can also use terminal applications to get data from this port).

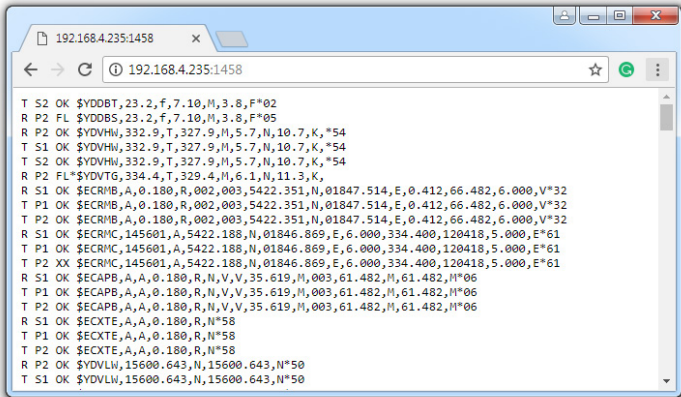


Figure 1. Chrome browser with log

Press the “Stop” button in the browser (or the Esc button in some browsers) when enough data is downloaded and save the log to the disk. Some mobile browsers do not allow saving of files and we recommend using a laptop or PC to record diagnostics data. Some web browsers may try to download the web page again while saving. In this case, you can use the clipboard (Copy All and Paste commands of operating system) and a text editor to save the data to a file.

The first character in the log line (see the Figure 1) indicates whether the sentence was received (R) or transmitted (T). P2 means physical port #2 and S1 means server #1. “XX” indicates overflow on this port (and this sentences was not actually sent), “FL” indicates that sentences was filtered out. Symbol * (asterisk) after “FL” indicates that sentence is invalid (and was filtered by this reason).

XII. Firmware Updates

You can check the current firmware version at the login or on the home page of administration website. We recommend updating the firmware from a laptop or PC. You can download the latest firmware version from our website: <http://www.yachtd.com/downloads/>

You should open the downloaded .ZIP archive with an update and copy the RUPDATE.BIN file to the disk. The README.TXT file inside the archive can contain important information regarding the update.

1. Log in to the administration website.
2. Open the “Firmware Update” page.
3. Click the “Choose File” button and locate the RUPDATE.BIN file on the disk.
4. Click the “Update the firmware” button.

The Firmware upload takes 20 – 40 seconds. After this period you’ll get a message that the update is started. You will see chaotic flashes of the status LED for 40 – 60 seconds, and the Router will be rebooted when the update procedure is finished.

The firmware update cannot damage the Device and all settings will remain intact (unless otherwise stated in the README.TXT file provided with the update). For example, if the update procedure is interrupted due to power failure, it will be re-started at the next power on.

You can roll back all firmware updates and return to the factory firmware with hardware reset (see Section VII).

Appendix A. Troubleshooting

Situation	Possible cause and correction
All LEDs are off	Check the voltage between ground and power terminals, it should be 7..17 V
Software application does not work as expected	<ol style="list-style-type: none">1. Check filters configuration (see VIII).2. Record diagnostics data (see XI) and send it with a software screenshot to technical support.
Cannot connect Wi-Fi device to Router	<ol style="list-style-type: none">1. Exceeded the number of allowed connections (3) in Access Point mode. Reboot the Router to drop all Wi-Fi connections.2. High load of the Router. Switch applications from TCP to UDP protocol.
Cannot open TCP server port of Router in application	<ol style="list-style-type: none">1. Exceeded the number of TCP connections (3) to server. Configure application to use another server port or UDP.2. IP address of Router changed. Static IP address is not configured or DHCP server of Wi-Fi router is not configured. Be sure that you can open the administration website with browser, reset Router settings in case of failure.
Cannot login to Wi-Fi network or administration web site	Wrong password or authorization settings. Reset Router settings (see VII).
Port LED indicates an overflow	Exclude unnecessary sentences on this port using filters (see VIII).
Router does not accept Navtex messages	Navtex messages are not NMEA 0183 sentences. Turn on the tunneling (see VIII) to pass-thru Navtex messages.

Appendix B. Conversions Between SeaTalk and NMEA 0183

From SeaTalk Datagrams	NMEA 0183 Sentence	To SeaTalk Datagrams	Comment
Any	ALK	Any	Raw SeaTalk data (\$STALK sentence)
85 A2	APB	82 85 9E A1 A2	Heading/Track Controller Sentence "B" (Autopilot)
82 85 A1	BWC	82 85 9E A1	Bearing & Distance to Waypoint – Great Circle
—	BWR	82 85 9E A1	Bearing & Distance to Waypoint – Rhumb Line
00	DBT	00	Water Depth
00	DPT	00	Water Depth
50 51 58	GLL	50 51 58	Geographic Position – Latitude/Longitude
89 (99)	HDG	89 99	Heading and Variation
89	HDM	89	Heading, Magnetic
89 (99)	HDT	89	Heading, True
23 27	MTW	23 27	Water Temperature
10 11	MWV	10 11	Wind Speed and Angle
85 A2	RMB	82 85 9E A1 A2	Recommended Minimum Navigation Information (Autopilot)

From SeaTalk Datagrams	NMEA 0183 Sentence	To SeaTalk Datagrams	Comment
50 51 58	RMC	50 51 58 52 53 54 56 99	Recommended Minimum Specific GNSS Data
05	RPM	05	Engine Revolutions (three engines supported)
84 9C	RSA	9C	Rudder Sensor Angle
20 26 84 89 9C (99)	VHW	20 26 89 9C 99	Water Speed (STW) and Heading
21 22 25	VLW	21 22 25	Trip and Total Distance
(52) 53	VTG	52 53 99	Course Over Ground & Ground Speed
9E A1	WPL	9E A1	Waypoint Location
85	XTE	85	Cross-Track Error (Autopilot)
54 56	ZDA	54 56	Time & Date

Note: (XX) means that the datagram does not cause sending of an NMEA sentence, but data from this datagram are used or required.



