

## vYacht Wifi Router

The vyacht's Wifi Router brings instrument data to your iPad, tablet and on-board computer. As of January 2016 all router come with three different types of galvanically isolated inputs:

- 3 x NMEA0183
- 1 x Seatalk
- 1 x NMEA2000

or

- 4 x NMEA0183
- 1 x NMEA2000

The NMEA 0183 inputs are configurable for the standard 4800 baud and 38400 AIS speed.

The router also has

- 1 x electrical NMEA0183 output
- 1 x optional LAN ethernet
- 1 x optional WAN ethernet

The LAN port can also be configured as WAN port.

In order to see your instrument data simply attach the output of your charting plotter or instrument to the router and the data is automatically routed in a secure way via WiFi and ethernet. The router uses TCP connections but also allows UDP. This allows all instrument data to be used in marine charting software like iNavX on the iPad or most PC based navigation software. Many parallel clients (iPads, iPhone, Android devices and other) can be connected via wifi and is only limited by the performance of the router.

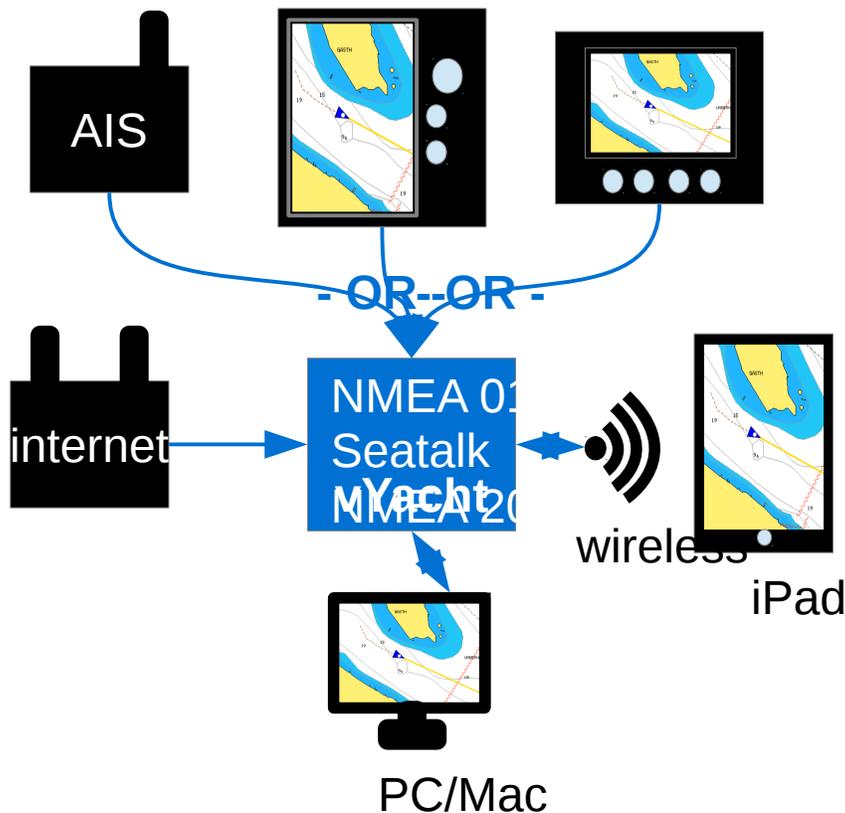
The standard and cheaper iPad Wifi does not come with a GPS. If you still want to use it for navigation the Wifi router is the perfect option. In addition to GPS it can even transfer AIS or instrument data. If you purchased the version with additional ethernet then you can even route internet through the same wireless network.

### About this manual

This manual describes all three version of the vYacht Wifi Router MK III: NMEA 0183, Seatalk and NMEA 2000.

## Before you start the installation

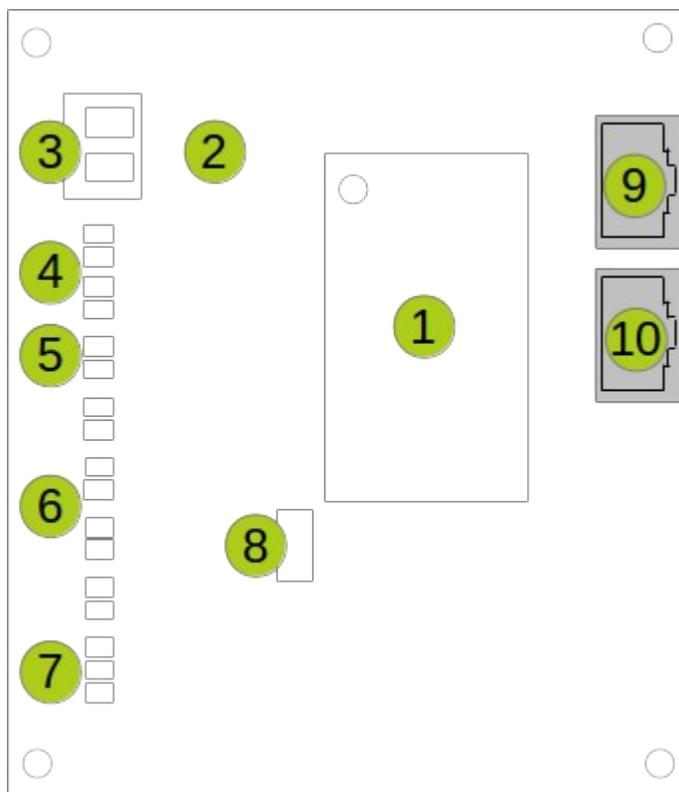
1. Become familiar with the router and its functions before installing it permanently.
2. For the connection and installation please first find a place comfortable to work at. Rather use cables longer than necessary and install permanently when everything works.
3. For first tries do not connect any NMEA 0183, Seataalk or NMEA 2000 signal lines.
4. First connect the router to a 12V power supply (2A fuse). Mind the polarity even though this router is protected by a reverse polarity protection.
5. Make sure the power LED and the WiFi LED come on.
6. Establish a WiFi connection from your iPad, tablet or computer to the router (details see bottom of router).
7. Check that you can access the router by using the router's IP address as the address in any browsers address bar.
8. Once these steps have successfully confirmed you can continue to add NMEA 0183, Seataalk or NMEA 2000 signals **with the router powered off**.



## Features

<b>Hardware</b>	
<b>NMEA or Seatalk Interfaces (3 different options - mutually exclusive)</b>	4 x galvanically isolated NMEA 0183 interfaces or/and 1 x Seatalk and 4 x NMEA 0183 interfaces or/and 1 x NMEA 2000 interface
<b>WiFi / internet interfaces</b>	WiFi for wireless TCP network to iPad, PC and Mac Two optional 100/1000 Mbps-LAN/WAN-Port for cable network to PC and Mac and internet
<b>Powersupply</b>	12V (26V absolute maximum) DC on-board For fixed installations attach to navigational instrument switch/fuse.
<b>Size(l x w)</b>	100mm x 100mm (board only)
<b>Wireless range</b>	Depended on the location of the router or the hull material. Installed centrally the router works well everywhere on sailing vessels measuring 40 feet with the built in chip antenna.
<b>Temperature range</b>	Most components are rated -40 to +85 °C. However the AR9331 chip on the actual wireless module is rated -10 to +55 °C operating temperature.
<b>Power consumption</b>	The CE/FCC certified wireless module on this board consumes the vast amount of power. But even if used for heavy duty downloads it will consume max. 0.5W.
<b>Case</b>	
<b>Available Colors</b>	Black with white front
<b>Size(l x w x h)</b>	111 mm x 111 mm x 33 mm (4.3 in x 4.3 in x 1.3 in)
<b>Material</b>	ABS 94HB
<b>Water resistance</b>	The router should be installed into a dry place. The WiFi only version can be made watertight by using marine sealant.
<b>Software</b>	
<b>OS</b>	OpenWrt firmware (Linux optimized for embedded systems and routers such as this router)
<b>NMEA GPS &amp; AIS processing</b>	Modified GPSD
<b>Source code</b>	<a href="https://github.com/vyacht/nmea">https://github.com/vyacht/nmea</a>

## Connections and overview



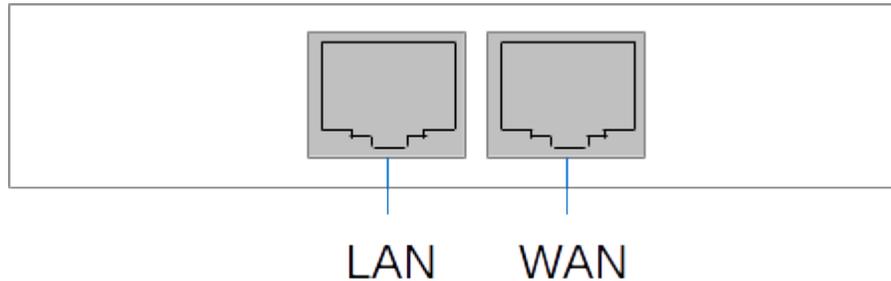
*Illustration 1: Board overview*

### Power supply connections

When connecting the router to the 12V on-board system please make sure to protect the power supply for the router is protected by a 2A fuse.

<b>Board components and modules</b>	
1	Wireless module running NMEA processing software on a Linux (openwrt) kernel
2	Power supply based on an efficient TPS54231 step down converter and reverse polarity protection.
3	12 V power connector
4	Isolated Seatalk input
5	Isolated NMEA 0183 output
6	Isolated NMEA 0183 inputs
7	Isolated NMEA 2000 input
8	Seatalk / NMEA 0183 switch for input 2
9	Ethernet module/jack by default configured for cable bound LAN access to NMEA data.
10	Ethernet module/jack by default configured for WAN access. Connect this jack to an active internet connection. The vYacht WiFi Router will automatically share internet and NMEA data via wireless.

## Ethernet connections detail view (front view)

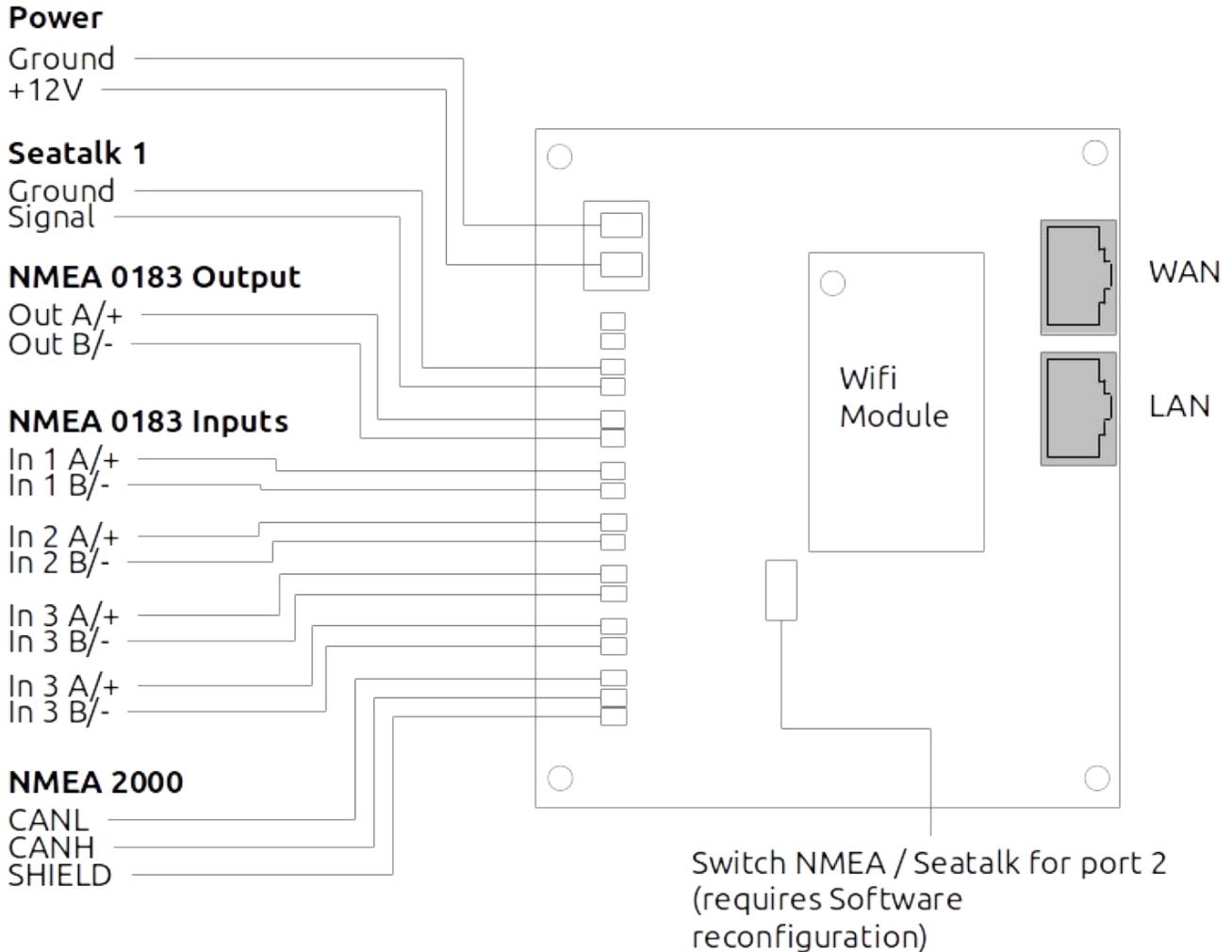


The LAN ethernet port is used to connect a laptop or PC/Mac to your vyacht router. The WAN ethernet allows to connect a 3<sup>rd</sup> party router to the vyacht router. Usually this will be used to connect the vyacht router to the internet through that other router.

The WAN connection can be reconfigured as a 2<sup>nd</sup> LAN port.

<b>LED</b>	<b>Meaning</b>
Power	This status LED indicates that the module is connected to the power supply. It will always be on as soon as the 12V to 3.3V on-board power converter supplies the required internal 3.3V.
Wireless	This status LED indicates the availability of a wireless signal. This LED will be on independent of any wireless connection to the router.
Ethernet 1	The ethernet 1 status LED will only be on if the router was connected to the ethernet port of a laptop or PC.
Ethernet 2	The ethernet 2 status LED will only be on if the router was connected to the ethernet port of a laptop or PC.

## Connecting to the router



*Illustration 2: Connectors of the vyacht router*

Illustration 2: Connectors of the vyacht router shows all connectors of the latest version of the router. The latest version of the router is prepared to handle NMEA 2000, NMEA 0183 and Seataalk signals.

The router **only supports EITHER four NMEA 0183 inputs OR three NMEA 0183 and one Seataalk input simultaneously.**

Table 1: Inputs and outputs available shows which inputs and outputs are active in which

configuration of the router. NMEA In 2 and Seatalk can never be active at the same time.

<b>Input port</b>	<b>4 x NMEA Version</b>	<b>3 x NMEA 1 x Seatalk version</b>
NMEA In 1	Active	Active
NMEA In 2	Active	Not active
Seatalk	Not active	Active
NMEA In 3	Active	Active
NMEA In 4	Active	Active
NMEA Out	Active	Active

*Table 1: Inputs and outputs available*

## **NMEA 0183 version 1 and 2**

There are two different electrical versions defined in the NMEA 0183 standard. The old version 1 NMEA 0183 standard is very similar to the RS232 PC-serial interface standard. The newer version 2 standard uses a differential signal and is based on the RS422 standard.

The NMEA 0183 version of the vYacht Router can handle both versions, the old version and the differential signals.

**Differential signals are usually marked with A and B or + and -.**

## NMEA 0183 wiring

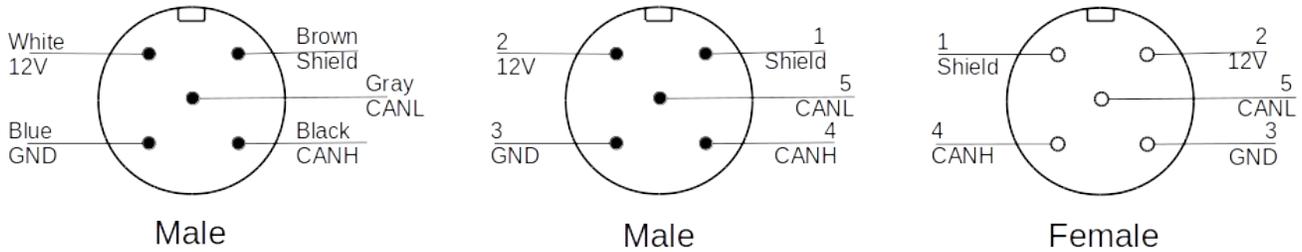
Table 2 lists how to connect the various NMEA 0183 outputs to the vYacht router. Please note that instruments manuals claim NMEA Version 2 compatibility but deliver NMEA Version 1 electrical signals. In this case the compatibility refers to the software protocol rather than the electrical characteristics.

In summary: only ground and the A (or +) data output of the instrument will be connected.

<b>NMEA 0183 instrument out</b>	<b>NMEA 0183 router input (port 1 and 2)</b>	<b>NMEA 0183 Version</b>
Output B or -	NMEA In B/-	Version 2
Instrument/Signal ground	NMEA In B/-	Version 1
Output A or +	NMEA In A/+	Version 1 and Version 2

*Table 2: NMEA 0183 connections*

## NMEA 2000 / Seataalk NG connections

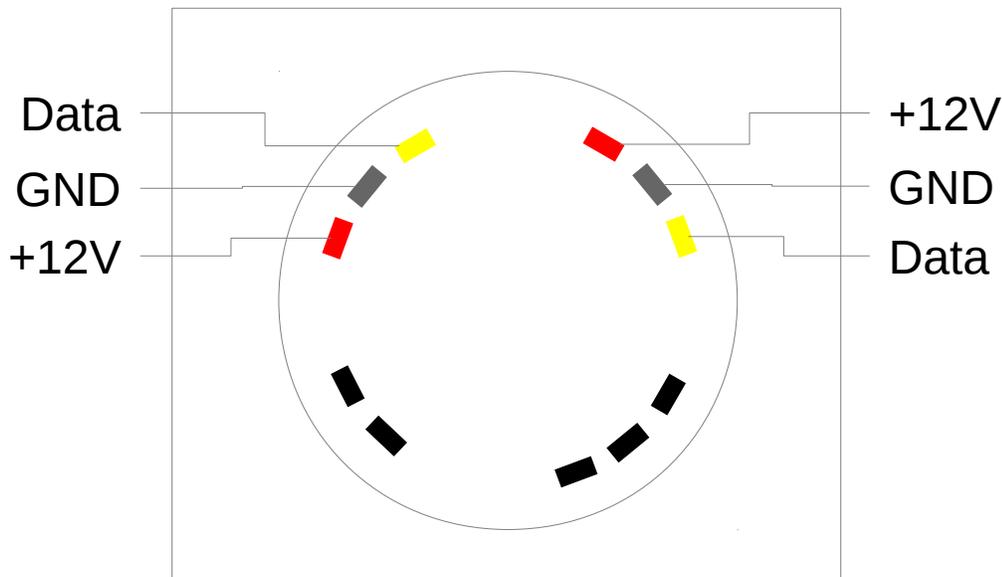


Pin	Name	Color vyacht	Color Garmin
1	Shield	Brown	Blank
2	12V / NET-S	White	Red
3	Ground / NET-C	Blue	Black
4	CAN-H / NET-Hi	Black	White
5	CAN-L / NET-Lo	Gray	Blue

*Illustration 3: NMEA 2000 pinouts and connections*

Illustration 3: NMEA 2000 pinouts and connections shows the pinout, wire colors and their meaning for the most common NMEA 2000 and Seataalk NG connectors. The Name column describes also the name of the screw terminal of the vyacht router.

## Seatalk connections



*Drawing 1: Typical Sealtalk Instrument*

This section describes the router configured as a NMEA/Seatalk version.

The Seatalk as the NMEA 0183 inputs and the output are galvanically isolated. Drawing 1 shows the typical instrument with its Seatalk connections. In order to connect the vYacht router to the Seatalk network the free data (yellow) and ground (gray) output of the instrument are connected to the Seatalk data and Seatalk ground input of the vYacht Router.

Connector vyacht	Seatalk connector
ST	Seatalk Data (yellow)
GND	Seatalk Ground (gray/white)

As the router board has its own power supply the 12V Seatalk will not be connected.

**Do not power the router board from the 12V Seatalk power supply. This power supply is usually too instable for a wireless computer like the router.**

The router has no Seatalk output which could relay incoming signals. The router will thus usually be installed at the end of the Seatalk network or connected to an additional 2<sup>nd</sup> output available at some plotters and autopilots.

## Installation

The vYacht Wifi Router is not watertight. It should be installed into a dry location below the deck.

1. Connect 12V on-board power supply to the vYacht Wifi Router's 12V input
2. Connect the NMEA 0183, Seatalk or NMEA 2000 output of your charting plotter, AIS or any other source to either of the isolated inputs of the router.
3. Depending on the source and the interface connected you will need to set the transfer speed to usually 4800 Baud (standard), 4800 Baud (Seatalk), 38.4k Baud (e.g. AIS) or NMEA 2000. This setting is performed via the WiFi Router Configuration (described below).

Usually no further steps are needed to serve instrument data to your iPad or Android device via WiFi.

In case you use a laptop or PC/Mac it is recommended to use the cable bound ethernet connection rather than WiFi to save power. Please refer to the Mac/PC set-up section.

## iPad set-up

The vYacht Wifi Router is configured as an automatic Access Point. This means that usually no particular installation steps are necessary to retrieve data from it.

1. Connect iPad to the vYacht Wifi Router. Select the access point with the name (SSID) vYachtWifi
2. Configure charting software to use vYachtWifi as the hostname (or the default IP address 192.168.10.1) and 2947 as the port.

## iPad and iNavX

As an example the configuration of iNavX on an iPad is shown. Instead of the router name vYachtWifi the alternative IP address 192.168.1.1 was used to demonstrate that both possibilities can be used.



Illustration 4: wireless NMEA output in iNavX

## PC or Mac set-up

When using your PC or Mac in order to connect the the vYacht Wifi Router you have two choices. Either you use the wireless access or you use the wired cable bound ethernet connection.

### Ethernet cable connection

1. Connect your PC/Mac's ethernet port with the router's ethernet port using a **standard ethernet** cable. **Do not** use a cross cable! Cross cables are for direct connections between two PCs only.
2. For Windows 7, please go to Start → Settings → Control Panel  
Look for the section Internet and Network  
Click on View network status and tasks → Manage network connection.  
Right click Wireless Network Connection, and select Properties.
3. For Windows 7, double click Internet Protocol Version 4 (TCP/IPv4).  
Select "Obtain an IP address automatically" and "Obtain DNS server address automatically".  
Click OK to finish the settings.

## Using the router with internet connections

Some boats have a 3G or other internet routers on board. The Wifi Router is configured to allow the internet network traffic to be routed through the same vYachtWifi connection.

Just make sure that the internet router has a different IP address from the vYacht Wifi Router. The internet router needs to provide an IP address to the vYacht Wifi Router via DHCP.

Connect the internet router to the WAN ethernet jack of the vYacht Wifi Router. The ethernet 2 connection of the router needs to be set to the "WAN (internet)" setting in the configuration tool.



## vYacht Wifi Router Configuration

The vYacht Wifi Router provides a configuration tool which is installed on the router. The configuration tool allows changes to the wireless IP address and the data port number.

In order to access the configuration tool you need to connect to the router as described above. You can perform this configuration from any device with a web-browser (such as Internet Explorer, Firefox or Safari).

The configuration can either be performed directly from your iPad after connecting to the vYacht Wifi Router or from your PC/Mac.

Once connected open a web browser and type vYachtWifi into the browser's address field.

After a moment the configuration screen will appear informing about the status of the router. You will see two edit text fields and a change button. Use these to choose more appropriate settings for your environment.

Update view

Info		
Name	vYachtWifi	
OpenWrt version	OpenWrt Chaos Calmer r42067	
Firmware version	1.0.0	
Time	Tue Dec 1 17:34:51 2015	
Uptime	911	
NMEA Network		
NMEA TCP port	<input type="text" value="2947"/> <input type="button" value="Change"/>	Running (0%)
NMEA 0183	<input type="text" value="4800 (NMEA 0183)"/> <input type="button" value="Change"/>	4800
Seataalk / NMEA 0183	<input type="text" value="4800 (NMEA 0183)"/> <input type="button" value="Change"/>	4800
NMEA 2000	250k Baud	
Streamed data	<input type="text"/> <input type="button" value="Change"/>	...
UDP broadcast	<input type="text" value="*:2000"/> <input type="button" value="Change"/>	...
TCP/IP Network		
WiFi	<input checked="" type="radio"/> On <input type="radio"/> Off <input type="text" value="192.168.10.1/24"/> <input type="button" value="Change"/>	Up
WiFi password	<input type="text" value="●●●●●●●●"/> <input type="button" value="Change"/> <input type="checkbox"/> Show password	
Ethernet 1	<input type="text" value="0.0.0.0/0"/> <input type="button" value="Change"/>	Not installed
Ethernet 2	<input type="radio"/> WAN (Internet) <input checked="" type="radio"/> LAN <input type="text" value="0.0.0.0/0"/> <input type="button" value="Change"/>	Not installed
Upgrade		
Update	<input type="button" value="Browse..."/> No file selected. <input type="button" value="Upgrade"/>	<input type="text"/>

Illustration 5: Configuration Dialog