INSTALLATION GUIDE

Connecting a B&G H1000 System to EssentialSail NMEA

A low-cost NMEA 0183 to Wi-Fi installation for Android phones and tablets

Item	Details
Document version	1.0 (September 2026)
Applies to	B&G H1000 with H1000 Universal Interface; EssentialSail NMEA v1.57 (Android 8.0 or later)
Audience	Boat owners with no previous NMEA or networking experience
Based on	A working installation (wiring documentation version 2, January 2026)
Keywords	Refit, retrofit, B&G H1000, FastNet, NMEA 0183, Wi-Fi NMEA gateway, AIS, EssentialSail, low-cost boat electronics, DIY

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About the example values

All network names, IP addresses, logins and passwords in this guide are example values chosen for illustration (for instance MYBOAT-NMEA). Always set your own names and strong passwords, and never keep factory default credentials on board.

1. Introduction

The B&G H1000 is a capable and reliable instrument system found on many boats that are now due for an electronics refit, but it communicates on FastNet, a proprietary B&G network that no phone or tablet can read directly. This guide shows how to publish the H1000 data (wind, depth, boat speed and heading) on a Wi-Fi network for about US $85 to $135, using widely available components, and how to display it with the EssentialSail NMEA app. An optional extension adds AIS targets from a Matsutec HA-102 Class B transponder.

1.1 Scope

Covered in this guide	Not covered
NMEA 0183 output from the H1000 Universal Interface	Installation of the H1000 system itself
Cabling, power and grounding of all added devices	Installation of the AIS VHF antenna and its licensing (MMSI)
Configuration of the HF2221A serial server	EssentialSail features beyond the connection (see the EssentialSail User Manual)
Connection of EssentialSail NMEA to the Wi-Fi server	Chart-plotter and navigation software set-up

1.2 Disclaimer

> **Disclaimer: scope of this configuration**
> This configuration was designed and tested for a B&G H1000 system with the specific devices listed in this guide. Other boats may need less hardware:

- **NMEA 0183 multiplexer.** In many installations a multiplexer is not necessary. It is only needed when several transmitters must share one input. With a single source per serial port (for example the H1000 alone), connect the source directly to the serial server.
- **Serial server.** In most cases a single-port serial server is enough. Two ports are used here only to keep the 4800-baud instrument data and the 38400-baud AIS data separate; without AIS, or with the AIS data already merged upstream, one port is sufficient.
- Always adapt the wiring and the settings to the equipment actually installed on your boat and follow its manufacturer documentation.

> **Safety**
> EssentialSail NMEA is a supplementary aid. It does not replace certified navigation equipment, a proper lookout or good seamanship. Wi-Fi links and phones can fail. Disconnect the boat battery before working on the wiring, and fuse every new power feed.

2. System overview

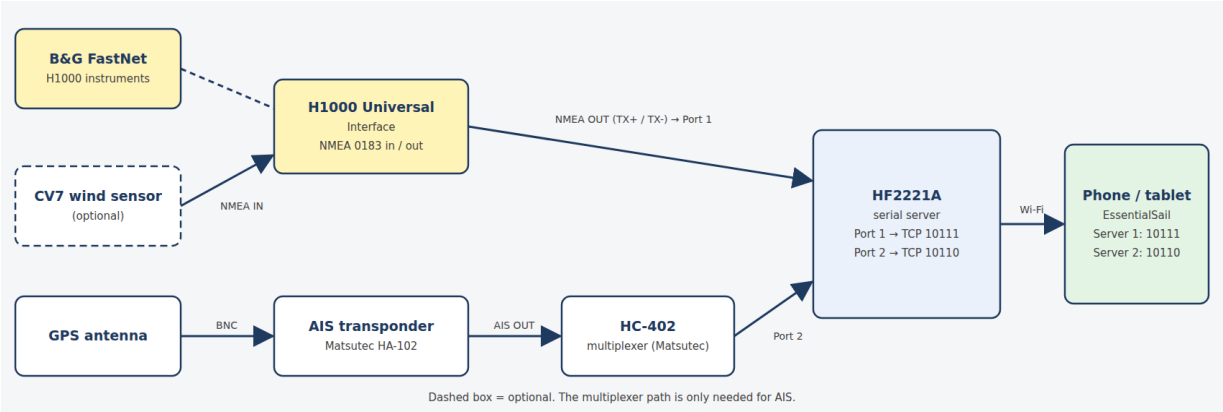


Figure 1. Data flow from the H1000 instruments to the phone

The installation uses two independent data paths that both end in the HF2221A serial server:

1. **Instrument path (essential).** The H1000 Universal Interface converts the FastNet data to NMEA 0183 and transmits it directly to serial port 1 of the HF2221A.
2. **AIS path (optional).** The AIS transponder sends its data to input 1 of the HC-402 multiplexer. The multiplexer output is connected to serial port 2 of the HF2221A.
3. **Wi-Fi publication.** The HF2221A makes each serial port available as a TCP server on the Wi-Fi network.
4. **Display.** EssentialSail NMEA connects to both TCP ports and merges the two streams.

In the reference installation, a CV7 ultrasonic wind sensor is also connected to the NMEA input of the Universal Interface, so that its wind data reaches the H1000 system. This connection is optional.

2.1 Port and data summary

Keep this table at hand: every setting in the rest of the guide derives from it.

Serial port	Source	Baud rate	TCP port	EssentialSail setting
Port 1	H1000 Universal Interface (NMEA TX)	4800	10111	Primary server
Port 2	HC-402 output (AIS data)	38400	10110	Secondary server (optional)

NMEA 0183 instrument data is transmitted at 4800 baud. AIS data needs the high-speed variant of the standard (NMEA 0183-HS) at 38400 baud, which is why the two data paths are kept on separate serial ports.

3. Bill of materials

All components below are available on AliExpress or similar online marketplaces. Prices are indicative (September 2026) and exclude shipping. As explained in the disclaimer (section 1.2), the multiplexer and the second serial port are not needed in every refit.

Component	Function	Model	Path	Approx. price
Serial server	Converts the serial NMEA data to TCP over Wi-Fi and Ethernet (2 ports)	HF2221A (Hi-Flying)	Essential	US $60

Component	Function	Model	Path	Approx. price
Wi-Fi / 4G router	Boat network shared by several devices, with internet access (connected by RJ45)	Generic 4G router with external antennas	Optional	US $50
NMEA multiplexer	Brings the AIS data to serial port 2; 4 inputs available for future devices	HC-402 (Matsutec)	AIS	US $45
AIS transponder	Class B AIS transmitter and receiver with GPS antenna input	HA-102 (Matsutec)	AIS	US $255
DC-DC voltage stabiliser	Buck-boost converter, 8-40 V in, stabilised 12 V out; protects the electronics from voltage changes	Generic 8-40 V to 12 V, 3 A or more	Advised	US $25
Instrument path subtotal				**US $85 to $135**
Complete installation				**about US $435**

Recommended: DC-DC voltage stabiliser

The boat supply is not a constant 12 V. With the engine running, the alternator charges at up to about 14.4 V; under sail the battery drops towards 12 V and below; starting the engine causes short, deep dips. A buck-boost DC-DC converter (8-40 V input, 12 V output, sold as "voltage stabiliser / power regulator for car electronics", 3 A to 40 A versions) delivers a steady 12 V in all these conditions, so the switch from motoring to sailing does not disturb or reset the serial server, the multiplexer and the sensors. A 3 A model is sufficient for this installation.

Items already on board or needed in small quantities:

- B&G H1000 Universal Interface (provides the NMEA 0183 input and output of the H1000 system).
- Alternative to the HA-102: a VHF radio with built-in AIS receiver already on board, plus a low-cost NMEA 0183 GPS receiver (see section 5.5).
- GPS antenna with BNC connector for the AIS transponder, and a VHF antenna (or antenna splitter) for AIS transmission.
- Shielded twisted-pair data cable, two-core power cable, an inline fuse holder, wire ferrules and a small DIN-rail or terminal block for the power distribution.

4. Preparing the H1000 system

Before wiring, confirm that the H1000 system accepts and shares NMEA data. On the H1000 Autopilot Remote Unit:

1. Open the Remote Unit Setup menu.
2. Navigate to NMEA Input.
3. Enable the wind sentences.

If the wind sentences do not appear, check the wiring to the H1000 Universal Interface, and check that the STBG and LCJ units are properly grounded and share a common ground with the other connected devices.

5. Cabling

5.1 General rules

Grounding rule

The positive supply is taken from the instrument circuit and the negative goes to the battery negative. Every device in this installation must share the same ground (-), with one exception: the H1000 Universal Interface is NOT connected to the common ground. Any other arrangement will corrupt the NMEA signal.

Topic	Recommendation	Reason
Data cable	Shielded twisted pair, 2 x 0.5 mm² (AWG 20), one pair per NMEA link	Twisting and shielding reject electrical noise from the engine, pumps and VHF
Cable shield	Connect the shield at the transmitting (talker) end only. On the Universal Interface use terminal 3 (NMEA SCN); leave the far end insulated	Grounding the shield at both ends creates ground loops
Power cable	2 x 1.0 mm² for runs of a few metres; red for +12 V, black for ground	Keeps the voltage drop negligible
Protection	Inline fuse (2 A is ample for the serial server, multiplexer and wind board) on the battery feed, before the DC-DC converter	Protects the wiring against short circuits
Voltage stability	Feed all added devices from the 12 V output of the DC-DC stabiliser; connect its negative to the common ground	Engine start and charging voltage changes do not reset or disturb the devices
Terminations	Crimp ferrules on every stranded wire entering a screw terminal	Prevents loose strands and intermittent contacts
Talkers and listeners	One transmitter (talker) per NMEA 0183 line; several receivers may share it	Two talkers on one line corrupt each other; use the multiplexer to combine sources
Polarity	Connect + to + (A) and - to - (B)	A reversed pair gives no data or garbled data but does not normally cause damage

5.2 Wiring diagram

The diagram shows every connection of the reference installation. Wire colours correspond to the cables used on board; white wires are drawn with a grey outline. Terminal names are those printed on each device.

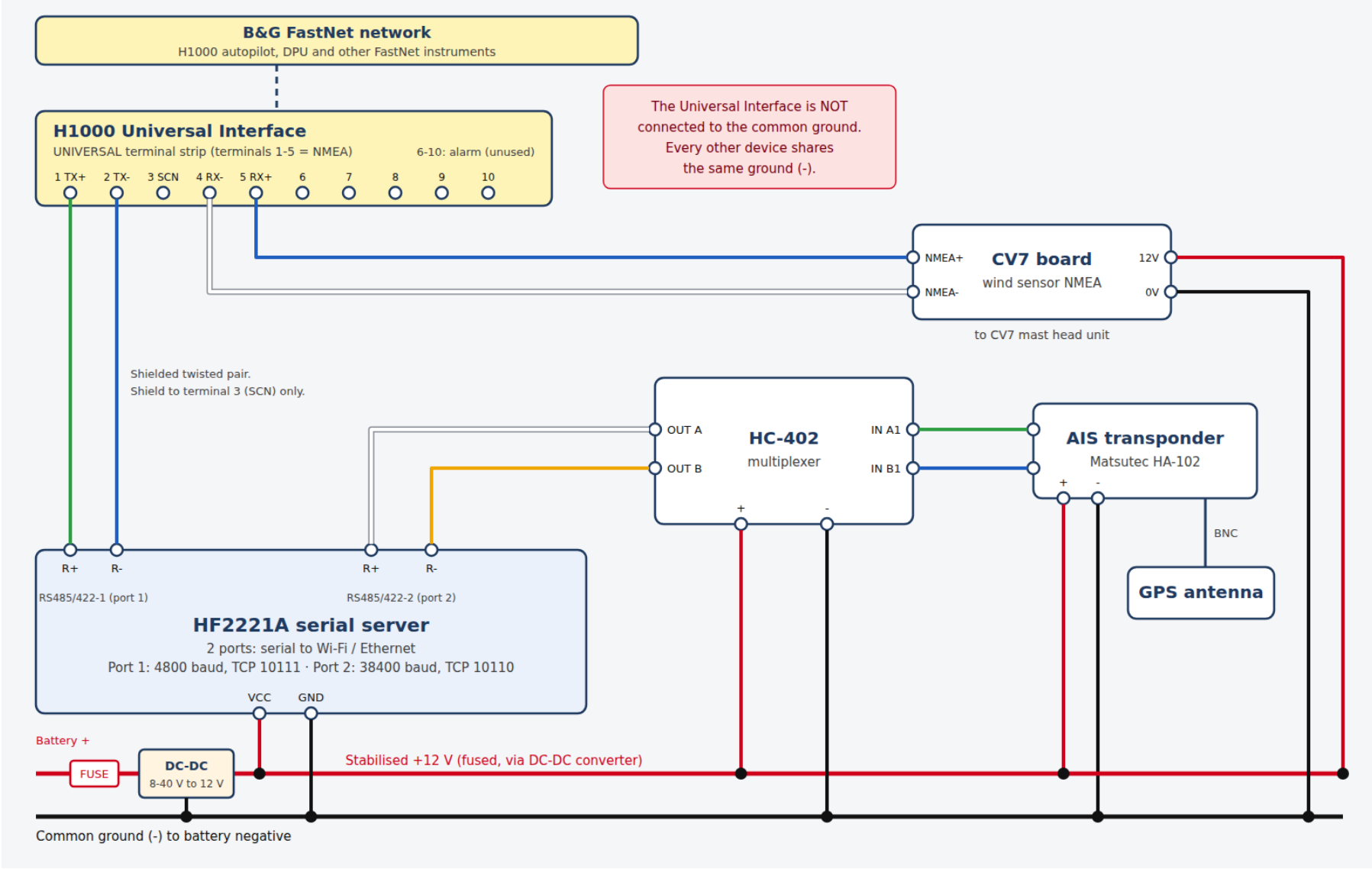


Figure 2. Terminal-level wiring of the complete installation

5.3 Connection schedule

Use the schedule below to wire and label each cable. Label both ends with the wire number (W1, W2, …) to make future troubleshooting easy.

Wire	From	To	Cable	Function
W1	Universal Interface, terminal 1 (NMEA TX+)	HF2221A RS485/422-1, R+	Twisted pair, shielded	H1000 data to port 1
W2	Universal Interface, terminal 2 (NMEA TX-)	HF2221A RS485/422-1, R-	Same pair as W1	H1000 data to port 1
W3	Universal Interface, terminal 3 (NMEA SCN)	Shield of the W1/W2 cable	Drain wire	Shield, this end only
W4	CV7 board, NMEA+	Universal Interface, terminal 5 (NMEA RX+)	Twisted pair, shielded	Wind data into H1000 (optional)
W5	CV7 board, NMEA-	Universal Interface, terminal 4 (NMEA RX-)	Same pair as W4	Wind data into H1000 (optional)
W6	HA-102 transponder, AIS OUT (+/A)	HC-402, input A1	Twisted pair, shielded	AIS data (optional)
W7	HA-102 transponder, AIS OUT (-/B)	HC-402, input B1	Same pair as W6	AIS data (optional)
W8	HC-402, output A	HF2221A RS485/422-2, R+	Twisted pair, shielded	AIS data to port 2
W9	HC-402, output B	HF2221A RS485/422-2, R-	Same pair as W8	AIS data to port 2
W10	Battery + via 2 A fuse	DC-DC converter input +	Power, red	Protected supply
W10a	DC-DC converter output +12 V	HF2221A VCC, HC-402 +, CV7 board 12V, AIS +	Power, red	Stabilised supply
W11	Battery negative distribution	DC-DC converter -, HF2221A GND, HC-402 -, CV7 board 0V, AIS -	Power, black	Common ground
GPS	GPS antenna	HA-102 transponder, GPS input	Coaxial, BNC	Position for AIS

> **Check your own hardware**
> Terminal layouts can differ between hardware revisions. Always compare the labels printed on your Universal Interface, multiplexer, serial server and transponder with this schedule before applying power. The exact pin-out of the AIS transponder data cable is given in its manual.

5.4 Checks before applying power

1. Measure continuity of every data pair from end to end.
2. Measure the resistance between +12 V and ground: there must be no short circuit.
3. Confirm that the H1000 Universal Interface is not connected to the common ground.
4. Confirm that each cable shield is connected at one end only.
5. Fit the fuse, reconnect the battery and check that the power LED of each device lights up.

5.5 Alternative AIS source: VHF radio with AIS receiver

If the boat already has a VHF radio with a built-in AIS receiver, it can replace the HA-102 transponder in the AIS path and save about US $255. The Navicom RT-650 is used as the example below; this configuration is proven on the reference installation.

- An AIS receiver shows other vessels on the EssentialSail AIS radar, but it does not transmit your own position. Choose a transponder such as the HA-102 if you also want to be seen.
- The VHF needs a GPS position for DSC distress calls and for correct AIS ranges. A low-cost marine NMEA 0183 GPS receiver ("GPS puck") is connected to the NMEA input of the VHF.
- The AIS output of the VHF (38400 baud) goes to HC-402 input A1/B1, exactly like the transponder. Serial port 2 settings, TCP port 10110 and the EssentialSail secondary server stay unchanged.
- In EssentialSail, keep GPS Position set to NMEA Network only if the GPS data also reaches the serial server; otherwise select Device GPS or NMEA + Device Fallback.

5.5.1 Wiring of the VHF with AIS receiver (Navicom RT-650)

Pin numbers and colours refer to the 8-pin data cable of the Navicom RT-650. The negative NMEA input of the VHF (pin 4) is connected to the common ground because the GPS receiver has a single-ended output (TX referenced to ground).

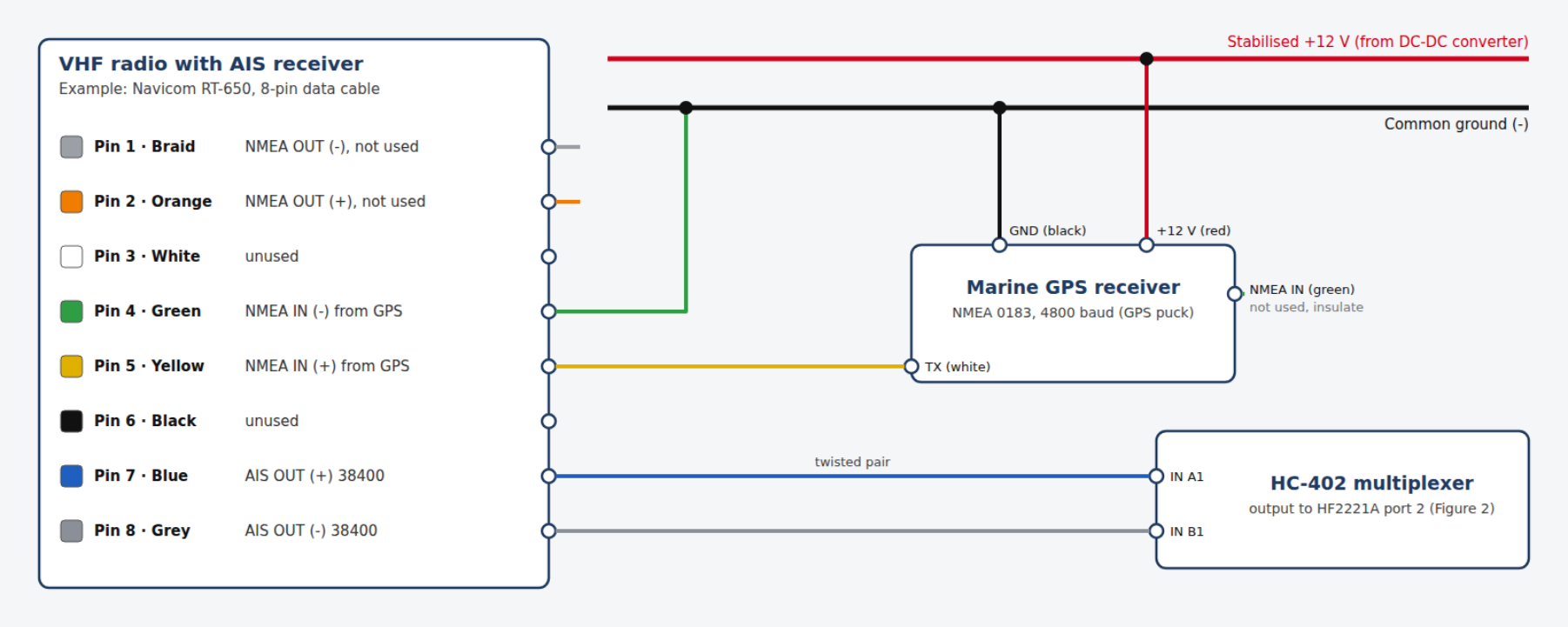


Figure 3. Wiring of a VHF radio with AIS receiver and a GPS receiver

5.5.2 Connection schedule for the VHF option

Wire	From	To	Cable	Function
V1	VHF pin 5, yellow (NMEA IN +)	GPS receiver TX, white	Single core	GPS position into the VHF
V2	VHF pin 4, green (NMEA IN -)	Common ground (-)	Single core	Reference for the GPS signal
V3	GPS receiver GND, black	Common ground (-)	Power, black	GPS supply
V4	GPS receiver +12 V, red	Stabilised +12 V distribution	Power, red	GPS supply
V5	VHF pin 7, blue (AIS OUT +)	HC-402, input A1	Twisted pair, shielded	AIS data, 38400 baud
V6	VHF pin 8, grey (AIS OUT -)	HC-402, input B1	Same pair as V5	AIS data, 38400 baud
-	VHF pins 1, 2 (NMEA OUT), 3, 6; GPS green (NMEA IN)	Not connected	-	Insulate each unused wire individually

> **Other VHF models**
> Most VHF radios with an AIS receiver offer the same three functions: an NMEA input for GPS, an NMEA output, and a high-speed AIS output at 38400 baud. Wire colours and pin numbers differ between manufacturers, so always follow the data cable table in your VHF manual.

6. Configuring the HF2221A serial server

6.1 Opening the web interface

1. On a phone or laptop, join the Wi-Fi network created by the serial server (factory mode: Access Point).
2. Open a web browser and go to `http://10.10.100.254` (factory address). The browser marks the page "Not secure" because it uses plain HTTP; this is normal on a local network.
3. Log in with the factory credentials given in the device documentation, then change them. This guide uses the example login `boatadmin` with password `Anchor-2026`.

6.2 Serial port settings

Open SERIAL PORT SETTINGS, select each Serial Port Id in turn and enter the following values.

Setting	Port 1 (H1000)	Port 2 (AIS, optional)
Baud Rate	4800	38400 (must match the HC-402 output)
Data Bit	8	8
Stop Bit	1	1
Parity	None	None
Buffer Size	512	512
Gap Time	50	50
Flow Control	Disable	Disable
Cli	Disable	Disable
Protocol	None	None

6.3 Communication settings

Open COMMUNICATION SETTINGS and create one TCP server socket for each serial port.

Setting	Socket for port 1	Socket for port 2
Protocol	TCP server	TCP server
Local port	10111	10110
Buffer size	512	512
Keep-alive	Enabled	Enabled
Timeout	0 (never)	0 (never)
Max accept	10	10
Security	Disabled	Disabled
Route	UART 1	UART 2

Max accept 10 allows up to ten apps or devices to read the same data at the same time, for example EssentialSail on two phones and a navigation app on a tablet.

6.4 Wi-Fi settings

Setting	Example value	Notes
WiFi Mode	AP	The serial server creates its own network
AP SSID	MYBOAT-NMEA	Network name shown on the phone
AP KEY	SeaBreeze-2026	Use at least 8 characters
AP Channel	Auto	

Save the settings and restart the serial server from the web interface.

7. Network options

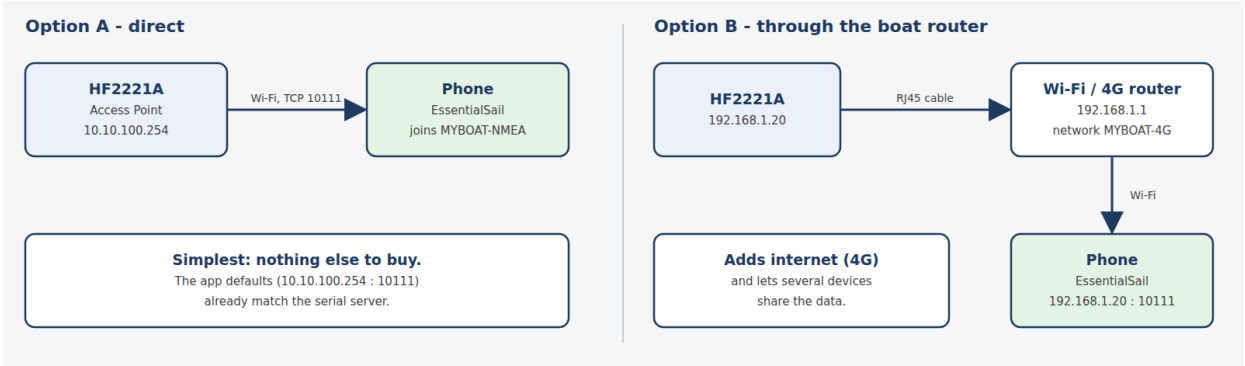


Figure 4. The two ways to reach the serial server

	Option A: direct	Option B: through the router
Connection	Phone joins the serial server Wi-Fi	Serial server wired to the router with an RJ45 cable; phone joins the router Wi-Fi
Network name (example)	MYBOAT-NMEA	MYBOAT-4G (key NorthWind-2026)
Serial server address	10.10.100.254	192.168.1.20 (fixed address)

	Option A: direct	Option B: through the router
Router address	Not used	192.168.1.1
Advantages	Simplest; nothing else to buy; matches the app defaults	Internet access through 4G; all devices on one network
Additional cost	None	US $50

Fixed address

With option B, give the serial server the fixed address 192.168.1.20 in its network settings (or reserve it in the router). An address that changes would break the app connection.

8. Connecting EssentialSail NMEA

EssentialSail NMEA requires Android 8.0 or later. The connection needs only the address and port of the serial server.

8.1 First launch

1. Connect the phone to the boat network (MYBOAT-NMEA for option A, MYBOAT-4G for option B).
2. Start the app and accept the location permission request (used only for the device GPS).
3. The first screen presents the subscription plans; a 15-day free trial is available with the monthly or annual plan, and a lifetime licence is also offered.

8.2 Primary server (instruments)

1. Swipe to Settings and open the Connections card.
2. Enter the IP address and port from the table below, and select TCP.
3. Tap Connect. The status indicator changes from connecting to connected.
4. Switch on Auto Connect so that the app reconnects every time it starts.

Field	Option A	Option B
IP address	10.10.100.254	192.168.1.20
Port	10111	10111
Protocol	TCP	TCP

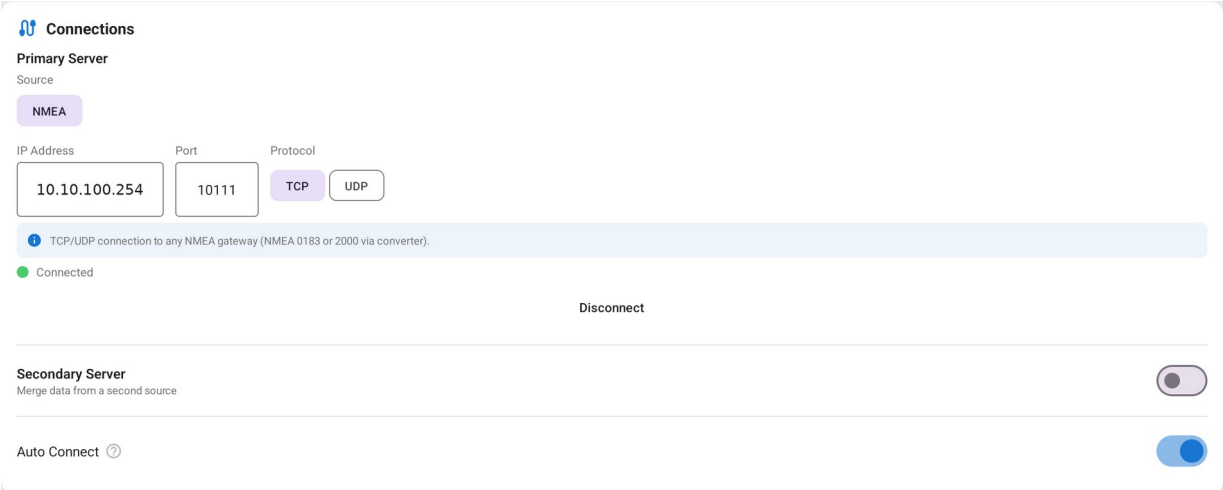


Figure 5. Settings > Connections: primary server connected (option A address shown)

8.3 Secondary server (AIS, optional)

If the AIS path is installed, switch on Secondary Server in the same card, enter the same IP address with port 10110 and TCP, and tap Connect. The app merges both streams automatically. Enable the AIS Radar page in Design > Visible Screens.

8.4 Verifying the data

Open Design > Visible Screens and enable the NMEA Data page (see section 9.1), then swipe to it. Sentences should scroll continuously. The table lists what to expect from this installation.

Data	NMEA sentences	Displayed on
Wind	MWV (or VWR / VWT)	Wind page, A/T button for apparent or true
Depth	DBT, DPT	Depth page
Boat speed	VHW	Speed page (STW)
Heading	HDT, HDM (or HDG)	Heading page
Position and SOG	RMC, GLL, VTG	Speed page (SOG), AIS and Anchor Watch
AIS targets (port 2)	VDM, VDO	AIS radar page



Figure 6. NMEA Data page: instrument sentences (MWV, HDT, VHW, DBT, DPT) and AIS messages (VDM) arriving

The exact sentences depend on the H1000 configuration. If a value shows --- while other sentences scroll, check in Settings > Data Sources that the correct speed and true-wind sources are selected.

9. Troubleshooting

EssentialSail provides two tools for troubleshooting: the NMEA Data page, which shows every sentence received, and the Diagnostics page, which records the state of the network and every connection event for the last 24 hours. Both pages are hidden by default.

9.1 Enabling the NMEA Data and Diagnostics pages

1. Swipe to the last page of the app, Design.
2. In Visible Screens, tick NMEA Data (raw sentences viewer) and Diagnostics (connection troubleshooting log).
3. Check the page order shown at the bottom of the card: the two new pages appear before Settings and Design.



Figure 7. Design > Visible Screens with NMEA Data and Diagnostics enabled

9.2 Checking the AIS messages

Open the NMEA Data page (Figure 6). Each line shows the time of reception and the sentence as received:

Sentence starts with	Meaning
$II, $SD, $GP	Instrument data from the H1000 (wind, heading, speed, depth) and GPS data, received on port 1
!AIVDM	AIS messages from other vessels, received on port 2 through the multiplexer
!AIVDO	AIS messages about your own vessel (sent by a transponder only)

- If !AIVDM lines appear, the AIS path works end to end; targets appear on the AIS Radar page once your own GPS position is valid.
- If no !AIVDM lines appear, check that the secondary server is connected on port 10110, that serial port 2 is set to 38400 baud, and the wiring W6 to W9 (or V5 and V6 for the VHF option).
- Use Pause to freeze the list and read a line, and the bin icon to clear it.

9.3 Reading the Diagnostics page

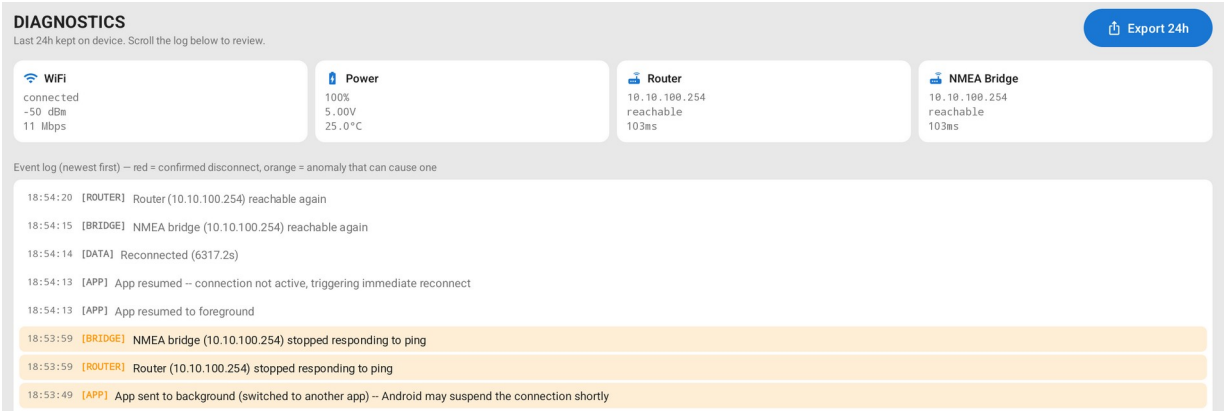


Figure 8. Diagnostics page: status cards and event log

The four cards at the top show the current state: WiFi (connection, signal strength and link speed), Power (battery level of the phone or tablet), Router and NMEA Bridge (address of the serial server, whether it answers, and the response time). Below, the event log lists the events newest first. Orange lines are anomalies that can cause a disconnection; red lines are confirmed disconnections.

Message in the log	Meaning and action
SocketTimeoutException: failed to connect to <address> (port 10111)	The app cannot reach the serial server. Check that the phone is on the boat network, that the address and port are correct, and that the serial server is powered.
Router / NMEA bridge stopped responding to ping	The Wi-Fi link or the device was lost. Check the power supply (DC-DC output) and the distance to the serial server.
App sent to background	Android may suspend the connection while another app is in front. Keep EssentialSail in the foreground and Keep Screen On enabled.
attempt #n in 60000ms (fallback timer)	The app keeps retrying automatically every 60 seconds.
Reconnected / reachable again	The connection is restored; no action needed.

Contacting support

Tap Export 24h on the Diagnostics page to save the log, and send it with a short description of the problem to support@essentialsail.com.

9.4 Common symptoms

Symptom	Checks
The app does not connect	Phone on the correct Wi-Fi network; IP address and port as in section 8.2; TCP selected. Some phones switch to mobile data when the Wi-Fi has no internet: disable the smart network switch or mobile data.
Connected, but all values show ---	Open the NMEA page. If nothing scrolls, the serial server receives no data on port 1: check W1/W2, the baud rate (4800) and the socket route (UART 1).
"Instruments disconnected" banner	The link is up but no data has arrived for 10 seconds. Check the Diagnostics page, the DC-DC output and the power of the serial server and of the Universal Interface.
Devices reset when the engine starts or stops	Supply voltage changes: power the devices from the DC-DC stabiliser (section 3).
Garbled characters on the NMEA page	Baud rate mismatch or ground problem. Re-check sections 5.1 and 6.2.

Symptom	Checks
No data at all after wiring	Swap the two wires of the pair (W1/W2 or W8/W9) and test again.
Wind sentences missing	Enable the wind sentences in the H1000 NMEA Input menu (section 4).
No AIS targets	Secondary server connected on port 10110; port 2 set to 38400 baud; GPS antenna connected to the transponder; valid own position.
Depth reading looks wrong	Check Draft Calibration in Settings > Boat. If the depth sounder already applies a keel offset, set it to 0.

10. Acknowledgements

Many thanks to the Lowcost Sailor YouTube channel for the great suggestions that inspired this low-cost approach to boat electronics.

Contact

EssentialSail
Visit www.essentialsail.com
For information, write to support@essentialsail.com

References

- EssentialSail NMEA User Manual, version 1.57 (September 2026).
- NMEA 0183 Connections, reference installation documentation, version 2 (January 2026).
- Manufacturer documentation of the HF2221A serial server, HC-402 multiplexer and HA-102 AIS transponder.