

User Manual

NMEA 2000 ⇔ WiFi ⇔ RS485 multiplexer **and** tactical sailing computer: instrument calibration, true & ground wind, VMG, current, polars and performance — streamed to your phone, plotting apps and the Pixel display. [Руководство на русском →](#) · [Download as PDF](#)

1 • What it does

The gateway joins your NMEA 2000 backbone as one more device, listens to everything on the bus, **calibrates and smooths** the readings, computes tactical data, and streams standard NMEA 0183 sentences over WiFi:

Output	Default port	For
UDP broadcast	2000 (configurable)	Pixel mast display, apps that accept UDP
TCP server	10110 (configurable)	Navionics Boating, OpenCPN, iSailor, qtVlm...
NMEA 2000 out	—	Calibrated values back on the bus as the gateway's own source (opt-in)
RS485 wired 0183	4800/9600/38400 Bd	Legacy instruments — in and/or out

The stream includes position (**RMC**), COG/SOG, heading (**HDM** , and **HDT** whenever true heading exists or can be derived from magnetic variation), apparent and true wind (**MWV**), **ground wind** (**MWD** , computed in the earth frame so it stays correct straight through tacks), depth, boat speed, heel/pitch (**XDR**) and **AIS targets** (**AIVDM**).

When several devices send the same data (two GPS sources, two depth senders), the gateway arbitrates per data type. Tap a data card on the web page to pick the winning source yourself.

2 • Installation

NMEA 2000

Connect to a free N2K drop with a standard drop cable. The gateway is powered from the bus — no other wiring is required.

As with any N2K device: connect to a properly terminated backbone (two 120 Ω terminators).

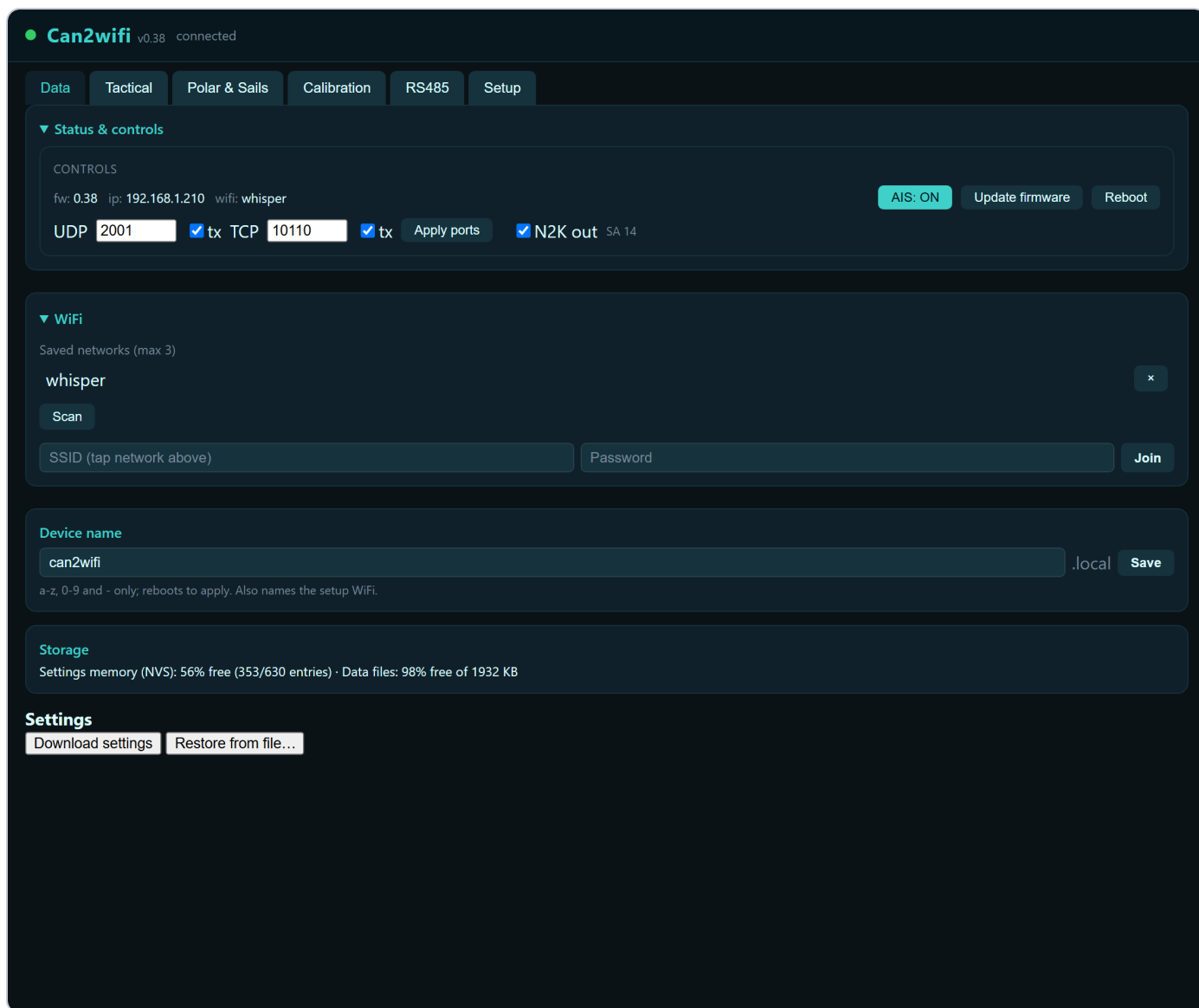
RS485 (optional, for NMEA 0183 instruments)

A 2-wire RS485 terminal (A/B) accepts or drives wired NMEA 0183. The pair is **half-duplex**: use it as an input, an output, or time-shared both — but not truly simultaneous separate in+out.

Configure on the *RS485* tab (see §9).

3 • First start & WiFi

1. Power the bus. The gateway starts its own WiFi network `can2wifi`.
2. Connect your phone/laptop to it and open `http://can2wifi.local` (or `192.168.4.1`).
3. On the *Setup* tab, scan and join your boat WiFi (up to **3 saved networks**; the strongest is used). The setup network returns automatically whenever no saved network is reachable.
4. *Device name* on the Setup tab changes the address (e.g. `myboat` → `http://myboat.local`) and the name of the setup network.



Setup tab: status & controls, ports, WiFi networks, device name, storage health, settings backup.

4 • Connecting your apps

Navionics Boating

Menu → Paired devices → add a TCP connection to the gateway's IP, port . Position, AIS and instruments appear on the chart.

OpenCPN

Options → Connections → Add: *Network*, protocol *TCP*, address = gateway IP, port . Alternatively *UDP*, port , address blank (listen).

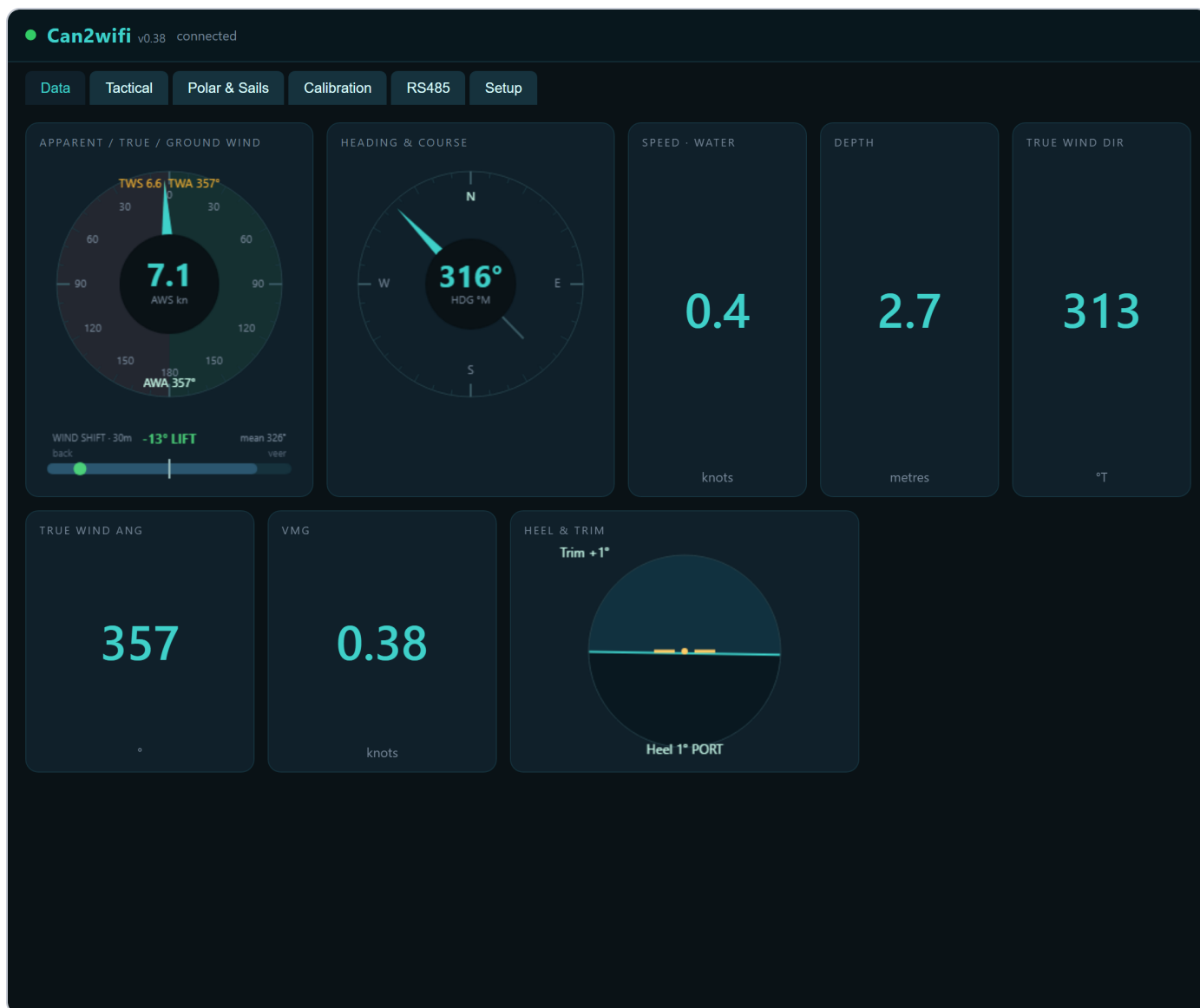
Pixel display

Nothing to configure — the Pixel listens for the UDP feed on the same network. If another NMEA source (e.g. a WiFi router/gateway) already broadcasts on port 2000, move this gateway to another port (e.g. `2001`) in *Setup* → *Status & controls* and set the Pixel to the same port.

5 • The web interface

`http://can2wifi.local` — six tabs, live over a permanent connection (values update in place, settings apply immediately):

Tab	What's there
Data	Live cards for every received data type; tap a card to see all sources and pick which one wins.
Tactical	True wind, ground wind, VMG, current (set/drift), leeway, laylines, wind-shift statistics, gusts, polar targets.
Polar & Sails	Polar upload, polar library, sail wardrobe, self-learning, polar diagram, leeway K.
Calibration	Per-channel smoothing; heading offset; wind vane curve; boat-speed (STW) heel grid; live wind dial.
RS485	Wired NMEA 0183 port: enable, baud, routing, diagnostics.
Setup	Status & controls (firmware, AIS, ports, N2K out, reboot), WiFi networks, device name, storage health, settings backup.



Data tab: live instrument cards — wind rose with shift bar, heading, speed, depth, heel & trim.

6 • Calibration

All corrections are applied inside the gateway, so *every* consumer — WiFi apps, the Pixel, the N2K re-broadcast — gets the same calibrated values.

Heading (HDG)

A single offset in degrees for compass installation error.

Wind (AWA / AWS)

The wind-vane **curve editor** corrects apparent wind angle at multiple points around the circle (mast twist, vane misalignment); wind speed gets a percentage correction. The **live wind dial**

shows raw and final (calibrated + smoothed) values together, so you see exactly what will be transmitted.

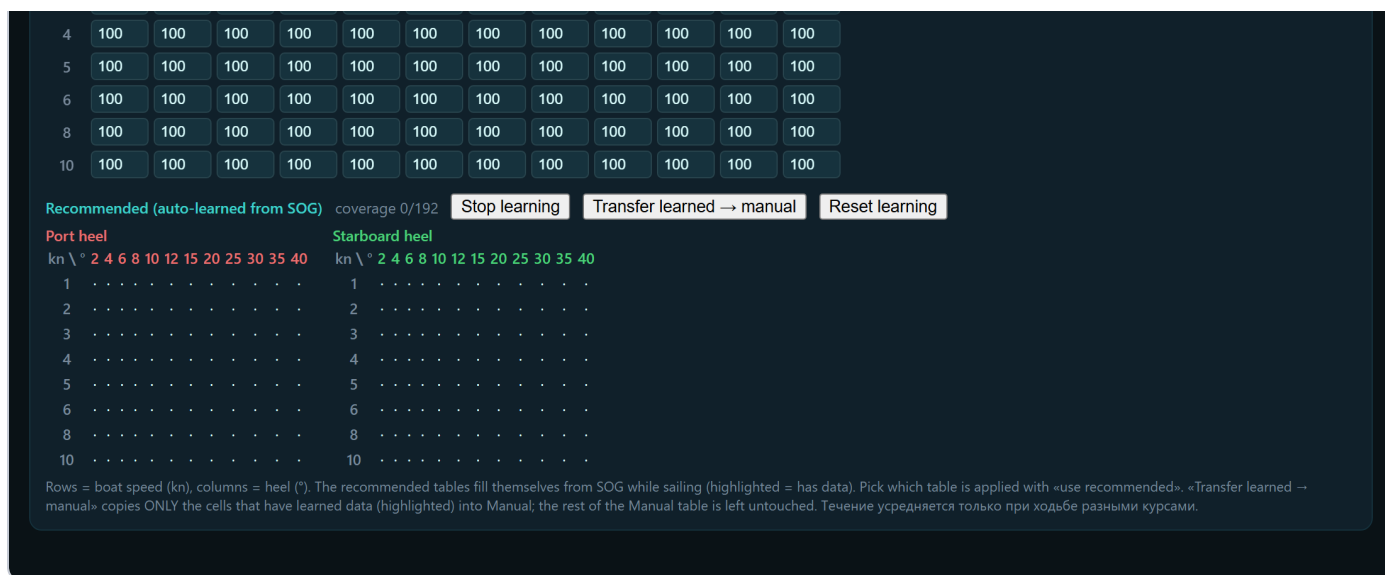
Averaging & smoothing

Per channel (AWA, AWS, SOG, COG, HDM, HDT, STW): *Mean* (even average), *Weighted* (recent samples count more) or *Median* (rejects spikes), window up to 30 s. Angles use circular math so 350°/10° average to 0°, not 180°.

Boat speed (STW) — speed × heel, per tack

The paddlewheel misreads when the boat heels, and differently on each tack. The STW grid corrects it as a percentage over **8 speed rows × 12 heel columns** (2°-steps up to 12° where the error changes fastest, then 15–40°), with separate port (red) and starboard (green) tables. Heel comes from the bus (attitude PGN or XDR Roll).

Next to your manual table the gateway builds a **recommended** table by itself: whenever both GPS speed and paddlewheel speed are available it learns the ratio per cell while you sail. Review it and press *Transfer* to copy learned cells into the manual table. *Reset learning* starts over. The **Stop learning / Start learning** button pauses the self-learning — use it when motoring in waves or towing would pollute the table, and resume when sailing clean. The live row highlights which cell is active right now.

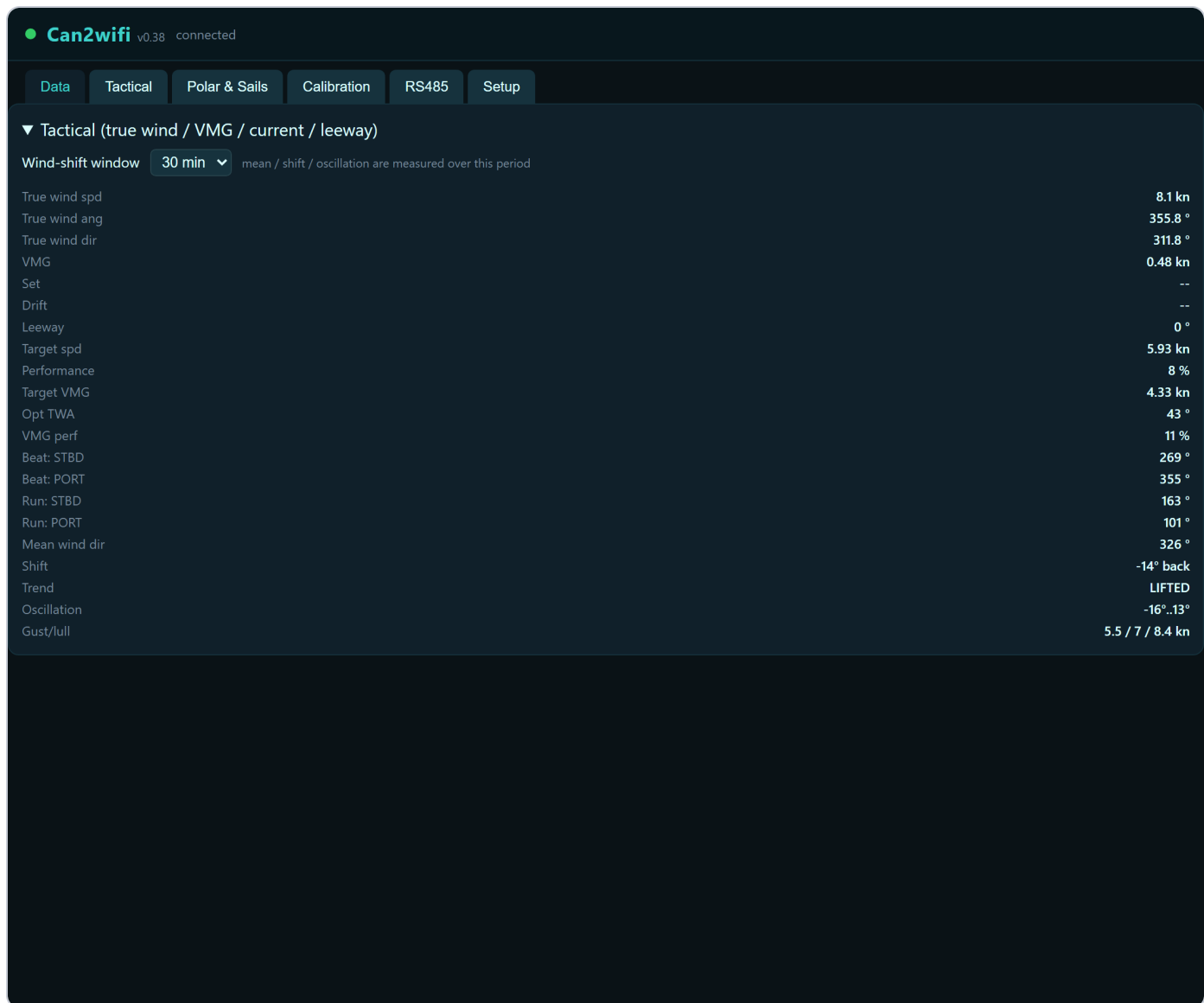


Calibration tab: smoothing, heading offset, wind-vane curve editor with the live dial, and the STW speed × heel grid with self-learning.

7 • Tactical computer

Value	Needs	Meaning
True wind (TWA/TWS/TWD)	apparent wind + STW	Wind over the water; TWD uses true heading when available.
Ground wind (GWD/GWS)	apparent wind + heading + GPS	Wind over the ground, recomputed continuously in the earth frame — stays correct through tacks and gybes. Sent as MWD .
VMG	true wind + boat speed	Speed made good toward/away from the wind.
Current (set/drift)	heading + STW + GPS	Difference between water track and ground track.
Leeway	heel + STW	$K \cdot \text{heel} / \text{STW}^2$; set K on the Polar tab (10 is a common start).
Laylines	true wind + polar	Port/starboard layline headings for the optimal upwind/downwind angles.
Wind shift	true wind	Mean direction, current shift and oscillation band over a selectable window (2–30 min), flagged <i>lifted/headed</i> for your tack.
Gusts	true wind	Lull / average / gust wind speed over the last 30 s.

Polar performance	polar + true wind + STW	Target speed at the current wind, your % of target, optimal TWA and target VMG.
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Tactical tab: true & ground wind, VMG, current, leeway, wind-shift statistics over the selected window.

8 • Polars & sails

Upload a polar as CSV: first row = TWA list, first column = TWS, cells = target boat speed. **Polar library** stores several complete polars to switch between. **Sail wardrobe**: store a polar per sail, tick what's rigged — the gateway combines the enabled sails into the working polar envelope.

Learning: while sailing (engine off — it pauses automatically when engine RPM is on the bus), the gateway records your best speed per wind bin; *Promote learned* turns it into the active polar. The polar diagram plots the active polar with your live point on it.

Can2wifiv0.38connected

Data

Tactical

Polar & Sails

Calibration

RS485

Setup

Polar & Leeway

leeway K10Save

Polar CSV (1st row = TWA list, 1st col = TWS):
,40,52,90,135
6,4.0,4.8,5.0,4.6
10,5.2,6.0,6.4,6.0

Upload polar

Polar learning (from sailing):
Coverage: 5 / 91 bins sailed
Promote learnedReset learning

Sail wardrobe (toggle what's aboard)

☒ Jib

☒ Code0

☒ AsymCL

sail name (e.g. Jib 2)

TWA row, then TWS rows (same format as polar)

Add/replace sail

Polar library (save/switch whole polars)
whisperSeabiscuit
save current polar as...Save

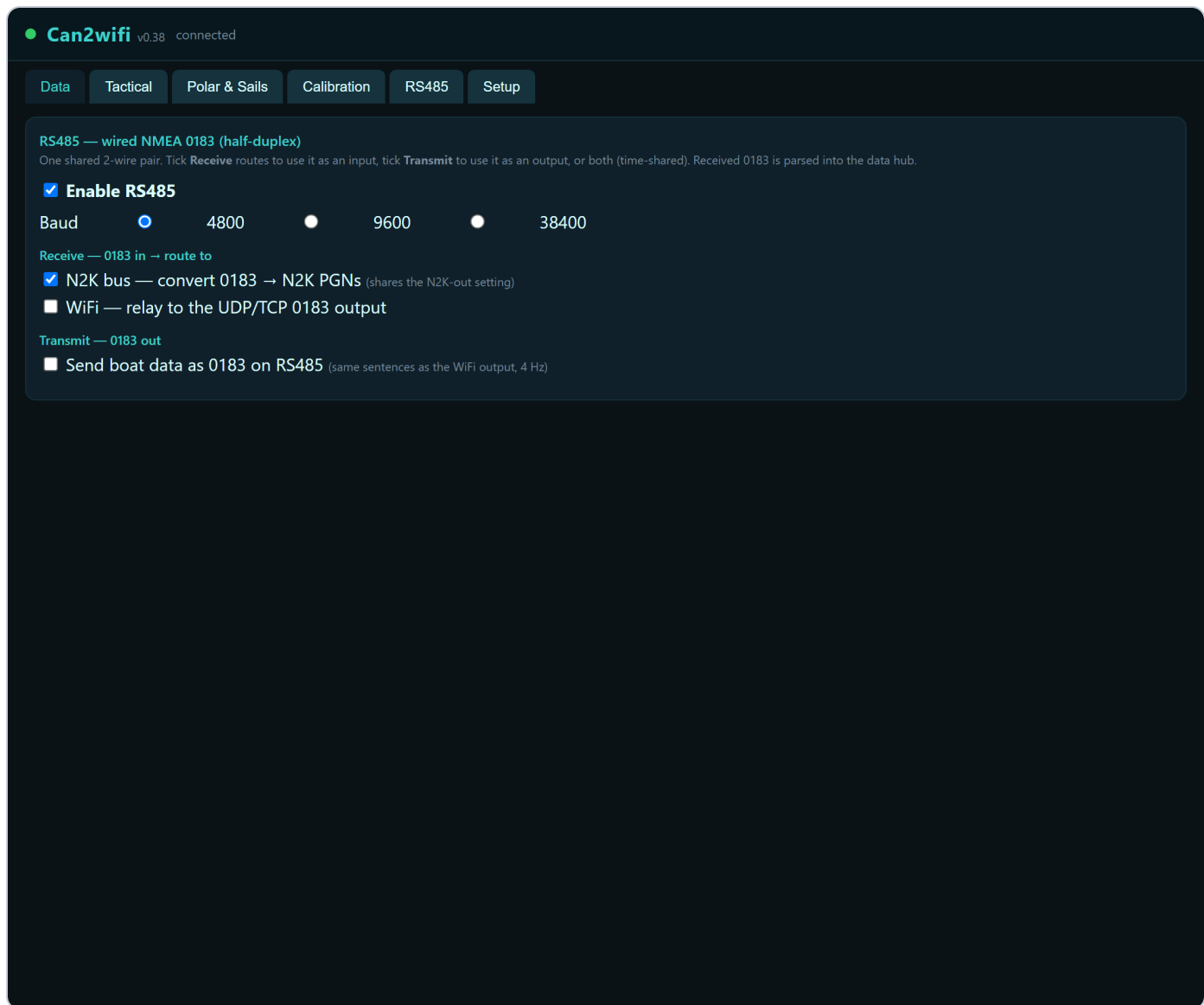
Polar diagramRefresh

Polar & Sails tab: polar upload, learning, sail wardrobe, polar library and the live polar diagram.

9 • RS485 wired NMEA 0183

Setting	Meaning
Enable + baud	4800 (standard NMEA), 9600 or 38400.
RX → instruments	Sentences received on the wire feed the gateway's data pool (and on to WiFi/N2K).

RX → WiFi relay	Raw received lines are also forwarded to the WiFi outputs unchanged.
TX	The gateway transmits its 0183 sentence set on the wire (for a legacy autopilot/repeater).
Diagnostics	Byte counter + last raw characters — tells wiring problems (0 bytes) from baud/polarity problems (garbage) at a glance.



RS485 tab: wired NMEA 0183 port — baud, routing and wire diagnostics.

10 • NMEA 2000 output

With *N2K out* enabled (Setup tab; off by default), the gateway claims an address and transmits its calibrated heading, wind, boat speed and COG/SOG back onto the bus as its own source. Your

MFD can then **source-select** the gateway instead of the raw sensor. The raw sensor keeps transmitting too — that's how N2K works — so make the selection once on each display.

11 • Firmware updates

Over the air from pixelmast.com: *Setup* → *Status & controls* → *Update firmware*. The device needs boat WiFi with internet. Settings survive updates.

12 • Storage, backup & factory reset

The **Storage** card on the Setup tab shows settings-memory usage and data-file space, and turns red if a save ever fails — so nothing is lost silently. *Download settings* saves a full backup file (calibration, polars, sails, ports, everything); *Restore from file* puts it back — handy before experiments or when moving to a replacement unit.

Factory reset: power-cycle the device **3 times in a row** (a few seconds each). This wipes all settings including WiFi and calibration.

13 • Troubleshooting

Symptom	Check
No data in the app	Phone/tablet on the <i>same WiFi network</i> ? TCP 10110 / UDP port correct? UDP tx enabled on the Setup tab?
No AIS targets	AIS receiver present on the N2K bus? AIS toggle ON (Setup tab)? Targets appear within ~3 minutes.
Web page unreachable	Try http://can2wifi.local (or your device name); if the boat network is down the gateway opens its own setup network.
Wrong source used	Data tab → tap the data card → pick the source.
STW table only learns one tack	Learning needs heel with sign (attitude sensor on the bus) and GPS speed. Check Roll on the Data tab.
No HDT / ground wind	True heading needs either a true-heading source or magnetic variation on the bus (GPS usually sends it). Ground wind additionally needs COG/SOG.

Settings don't survive reboot	Setup → Storage must show free space and no save errors. Update firmware if it shows red.
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14 • Support

Questions, feature requests: bad040@gmail.com