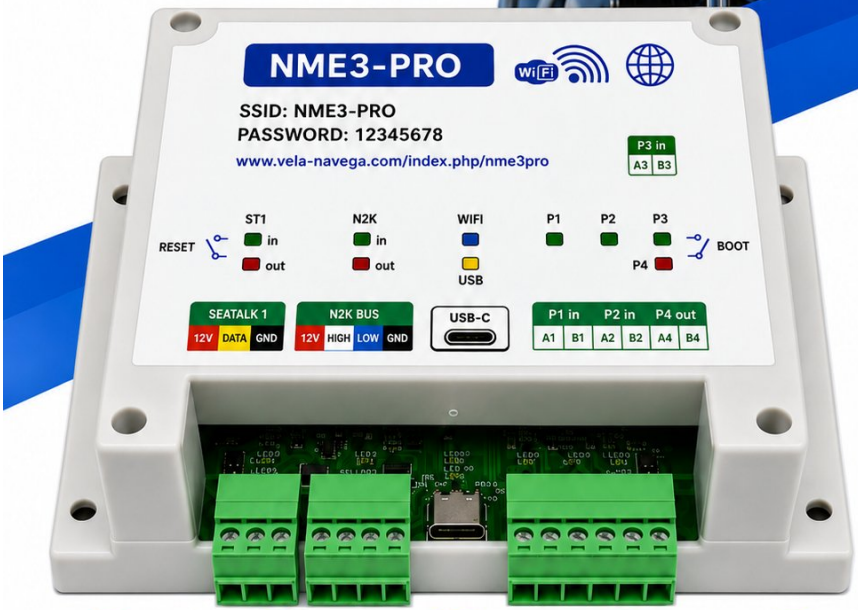
NME3PRO
GATEWAY



MULTI-STANDARD MARINE GATEWAY

The intelligent gateway for seamless data conversion between SeaTalk1, NMEA 0183 and **N2K** networks with built-in WiFi and USB connectivity for modern systems.



SEATALK1
Bi-directional conversion with SeaTalk1 network

N2K
Bi-directional conversion with N2K network

USB-C
Power and NMEA 0183 routing to/from USB

NMEA 0183
3x inputs (P1, P2, internal P3)
1x output (P4)
Flexible data routing

WIFI GATEWAY
1x UDP input/output
2x TCP input/output
Wireless integration made easy

BIDIRECTIONAL DATA CONVERSION
Convert and route data between all networks

EASY SETUP
Web interface via WiFi for configuration and monitoring

FLEXIBLE ROUTING
Route data between networks, WiFi, USB and ports

N2K • SeaTalk1 • NMEA 0183 • WiFi Gateway

NME3-PRO



Nme3Pro is an intelligent multiplexer and protocol gateway designed to interconnect modern and legacy marine electronic systems. The device supports N2K, SeaTalk1 and NMEA 0183 communications, allowing bidirectional data conversion between any two of these standards. In addition to protocol conversion, the gateway provides advanced multiplexing, filtering and routing functions. Data received from wired ports, WiFi and USB can be filtered if required and redistributed simultaneously to multiple outputs and applications. The integrated WiFi interface supports UDP and TCP communications for wireless access from smartphones, tablets and computers. Firmware updates can also be performed wirelessly. Simulation and Debug modes allow monitoring, analysis and generation of marine data traffic during installation and testing.

ELECTRICAL CHARACTERISTICS

Microcontroller: ESP32-S3 dual core, 240 MHz

Power Supply: 9V to 16V DC through N2K or SeaTalk1 connections, or 5V through USB-C. Use a 1A fuse if connecting directly to a battery. Internal power regulation automatically combines available sources. Only one power source is required.

Power Consumption: Typically less than 100mA

NMEA 0183 Input Ports: P1, P2 and P3 - optically isolated up to 115200 baud

NMEA 0183 Output Port: P4 - RS-422 compatible (galvanically isolated)

N2K Port: Fully bidirectional

SeaTalk1 Port: Fully bidirectional

Filtering and Routing: NMEA 0183 sentences, N2K PGNs and SeaTalk1 datagrams

WiFi Protocols: UDP (1 port) and TCP (2 ports)

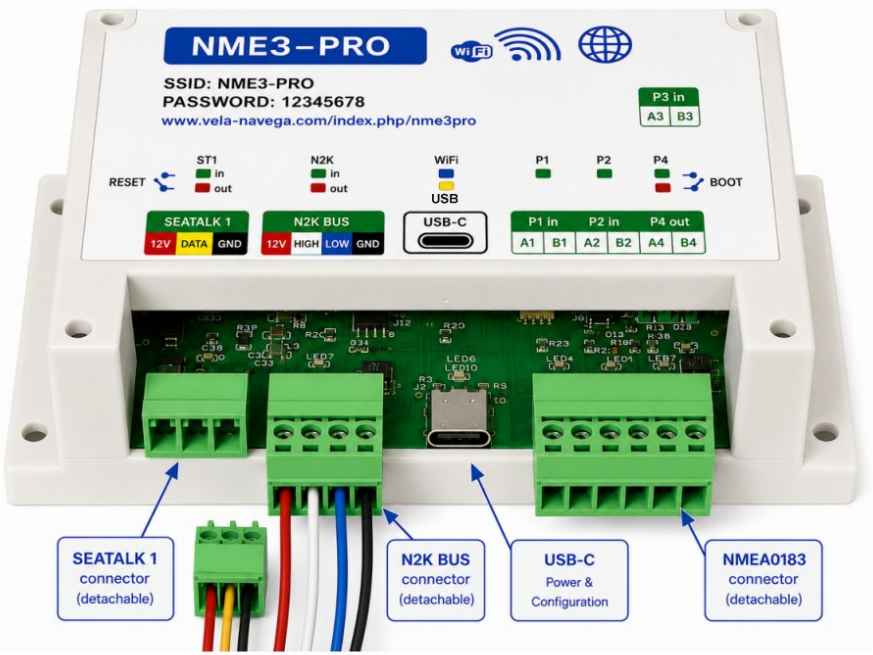
USB-C Port: NMEA 0183 routing and diagnostics

Firmware Update: Over-the-Air (OTA), no cables required

Other Features: Simulation and Debug modes. Configuration through integrated web interface in 6 languages.

INSTALLATION

Before installation, the gateway can be powered through the USB-C connector to become familiar with its operation and configuration interface. When powered for the first time, the device automatically creates a WiFi network named **NME3-PRO**. If necessary, disable mobile data and connect to this network using the default password **12345678**. After connecting, enter the address **192.168.4.1** in your browser's address bar to access the integrated configuration webpage.



As shown in the figure, the gateway uses detachable screw terminal connectors for the N2K, SeaTalk1 and NMEA 0183 ports. Before inserting a wire, fully loosen the corresponding screw so that the internal clamp moves down. Insert the stripped wire completely before tightening the screw. Additional connection details and illustrations are provided on the following page.

CONNECTOR WIRING – HOW TO

1 LOOSEN SCREW FULLY



Turn the screw counter-clockwise until the clamp moves down.

2 INSERT STRIPPED WIRE COMPLETELY



Insert the stripped wire straight in until it cannot go any further.

3 TIGHTEN SCREW FIRMLY



Turn the screw clockwise to clamp the wire securely.

WIRING REFERENCE

SEATALK 1	
12V	+12V
DATA	Data
GND	Ground

N2K BUS	
12V	+12V
CAN-H	CAN High
CAN-L	CAN Low
GND	Ground

NMEA0183	
A1	Input A (+)
B1	Input A (–)
A2	Input B (+)
B2	Input B (–)
A4	Output A (+)
B4	Output A (–)

N2K cable colours are not always standard. Identify wires by function or pinout.

IMPORTANT
Check all connections carefully before powering the system.

FULL MANUAL & ADDITIONAL INFORMATION

The complete manual is available directly from the integrated configuration webpage of the multiplexer firmware.
Scan the QR code for quick access.

IMPORTANT DISCLAIMER

The **Nme3Pro** multiplexer is an electronic device intended for recreational marine use. It has been designed to facilitate the exchange, routing, filtering and conversion of marine data between equipment using NMEA 0183®, NMEA 2000® and SeaTalk® communication protocols. The device is not designed, certified or approved for use as a primary navigation, collision-avoidance or other safety-critical system, nor as the sole source of navigational information.

NMEA®, NMEA 0183® and NMEA 2000® are trademarks of the National Marine Electronics Association. SeaTalk® is a trademark of Raymarine. The Nme3Pro multiplexer is an independent product developed by Vela Navega and is not certified, endorsed, sponsored or approved by NMEA, Raymarine, or any other standards organisation or equipment manufacturer.

Marine electronic systems may be subject to interruption, degradation, configuration errors, software defects, electromagnetic interference, equipment failures or environmental influences that may affect the accuracy, completeness or availability of data. For this reason, users remain responsible for the correct installation, configuration and operation of the device, and for verifying navigational information by independent and appropriate means.

The manufacturer and seller shall not be liable for injury, damage, loss, consequential loss, or any direct or indirect damages to persons, vessels or property arising from the installation, use, misuse, modification, or inability to use this product. The user assumes all risks associated with the installation and operation of the equipment.

By using this product, the user acknowledges and accepts the limitations described above.

ABOUT THIS MANUAL

Thank you for choosing the Nme3Pro Multiplexer and Gateway.
The printed leaflet supplied with the multiplexer contains the essential information required for basic installation and initial operation. This complete manual provides additional detailed information regarding configuration, routing, protocol conversion, WiFi communication, diagnostics, firmware updating and advanced operation.

The Nme3Pro is a highly flexible multiplexer, protocol converter and network gateway capable of routing and converting data between NMEA 0183, SeaTalk1, N2K, USB and WiFi interfaces. Most configuration and operational functions are performed through the integrated web interface.

This manual is organized in a progressive manner. Initial sections describe installation and basic operation, while later sections explain routing architecture, filtering systems, protocol conversion, diagnostics and advanced configuration examples.

Some functions described in this manual depend on firmware version. The currently installed firmware version is always shown in the header area of each web interface page. It is recommended to keep the multiplexer firmware updated in order to benefit from the latest improvements and corrections.

MANUAL ORGANISATION

PART 1 — Getting Started
Basic installation, WiFi connection and first operation.

PART 2 — Data Flow and Routing
Explanation of the routing architecture and protocol conversion philosophy.

PART 3 — Web Interface Reference
Detailed description of all configuration pages and parameters.

PART 4 — Technical Reference
Detailed technical information regarding filtering systems, hardware architecture, protocol conversions and LED indicators.

PART 5 — Practical Guides
Step-by-step procedures and practical examples for configuring, operating, troubleshooting, and maintaining the Nme3Pro Gateway.

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PART 1 — GETTING STARTED

1. Introduction

The Nme3Pro multiplexer is a versatile marine data gateway capable of routing and converting information between NMEA 0183, SeaTalk1, N2K, USB and WiFi interfaces.
The multiplexer combines protocol conversion, serial communication, WiFi networking, data filtering and routing capabilities in a compact and flexible platform suitable for a wide range of marine navigation systems.

Most configuration and operational functions are performed through the integrated web interface, accessible using a standard web browser from computers, tablets or smartphones connected to the multiplexer WiFi network or to an external network where the multiplexer operates as a client station.

This manual explains the installation, configuration and advanced operation of the multiplexer and assumes basic familiarity with marine navigation systems and NMEA communications.

2. Basic Installation

The Nme3Pro multiplexer is designed for simple installation in marine environments. The unit requires a DC power supply between 9V and 16V and provides connections for NMEA 0183, SeaTalk1, N2K, USB and WiFi communication.

Before applying power, verify all wiring connections carefully, especially polarity, NMEA 0183 signal pairs and SeaTalk wiring. The N2K connection should be made using a proper NMEA 2000 backbone and T-connector arrangement according to standard marine installation practices.

Once powered, the multiplexer automatically starts its internal WiFi Access Point and becomes operational within a few seconds. Green LEDs indicate active data reception while red LEDs indicate active data transmission on the corresponding interfaces.

3. First WiFi Connection

By default, the multiplexer starts in AP ONLY mode and creates its own WiFi network using the factory default SSID NME3-PRO. Connect a smartphone, tablet or computer to this network using the default password 12345678 unless it has been changed previously.

Once connected, open a web browser and enter the default multiplexer IP

address: 192.168.4.1

The HOME page of the web interface will appear, allowing access to all configuration and routing functions. If the multiplexer is later configured to also operate as a Client Station on an external network, its assigned IP address will be shown in the webpage header.

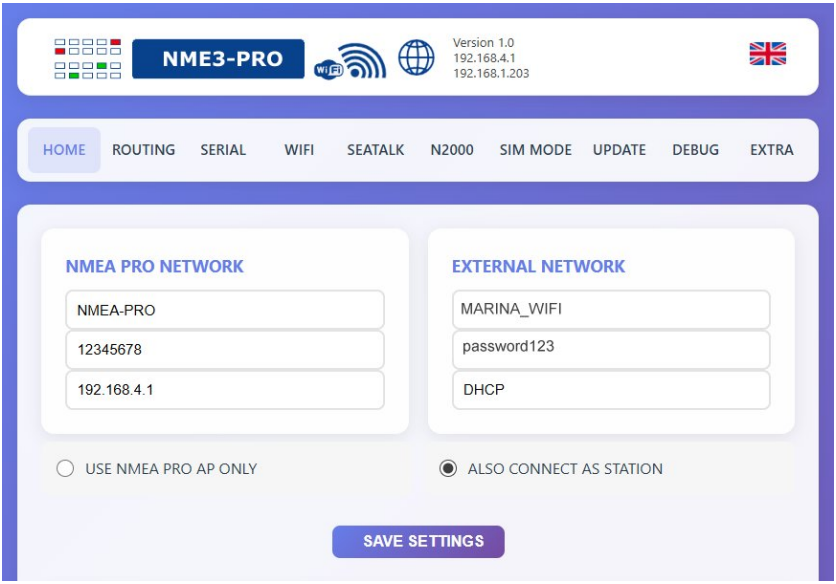


Figure 1: HOME page after successful WiFi connection.

4. First Data Routing Example

The routing matrix is the core operational element of the multiplexer and defines how data flows between interfaces. As a simple first example, assume that a GPS receiver connected to serial input port P1 must send navigation data to a tablet running navigation software through WiFi UDP.

On the ROUTING page, enable routing from input P1 to output UDP by checking the corresponding box in the routing matrix. If required, configure the UDP port number on the WIFI page; the default value is 2000.

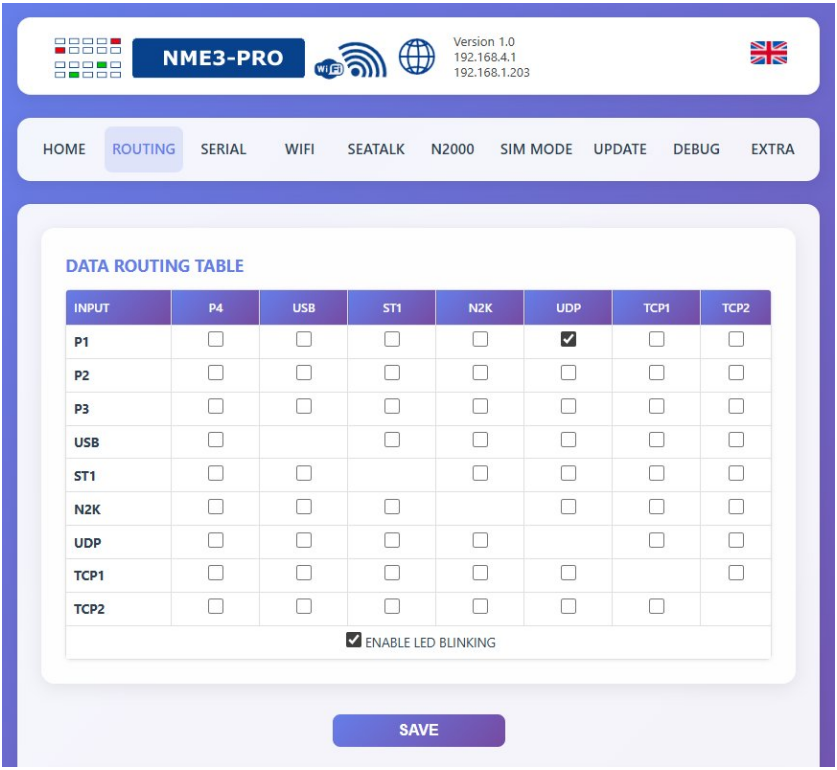


Figure 2: Example of routing from P1 to UDP.

Once routing is enabled, NMEA 0183 sentences received on P1 are automatically transmitted through WiFi UDP and become available to navigation applications connected to the multiplexer network. The corresponding LEDs will blink to indicate data activity.

PART 2 — DATA FLOW AND ROUTING

5. Data Flow Architecture

The internal architecture separates four main operational stages:

1. Data reception from physical interfaces
2. Optional message filtering
3. Routing through the internal routing matrix
4. Protocol adaptation when required by the destination interface

The multiplexer does not use manually configured protocol conversion rules. Instead, protocol adaptation occurs automatically whenever data is routed between interfaces using different communication standards.

For example, when NMEA 0183 sentences received on serial port P1 are routed to the SeaTalk1 interface, the multiplexer automatically converts the incoming NMEA 0183 sentences into the corresponding SeaTalk1 datagrams required by the destination bus.

Internally, the system is based on two bidirectional protocol conversion engines:

- NMEA 0183 ↔ SeaTalk1
- NMEA 0183 ↔ N2K

As a consequence, indirect conversions between SeaTalk1 and N2K are performed through an intermediate NMEA 0183 representation. For example, when N2K data is routed to SeaTalk1, the corresponding N2K messages are first internally converted to NMEA 0183 sentences and then translated into SeaTalk1 datagrams before transmission.

This architecture simplifies routing configuration while maintaining predictable and deterministic data flow behavior across all supported interfaces.

6. Routing Matrix

The routing matrix is the central operational element of the multiplexer and defines how data flows between all supported interfaces. Each routing selection establishes a unidirectional data path between one input interface and one output interface.

The routing matrix is organized as a table where rows represent data sources and columns represent data destinations. Routing paths are enabled by checking the corresponding matrix cells.

Multiple simultaneous routing paths may be active at the same time. A single input may distribute data to several outputs simultaneously, and a single output may receive data from multiple inputs. This flexibility allows the multiplexer to support a wide range of installation topologies and mixed-protocol navigation systems.

Routing decisions are independent and continuously active. Once a routing path is enabled, all compatible messages received on the source interface are automatically transmitted to the selected destination interface.

When routing data between interfaces using different communication standards, protocol adaptation is automatically performed when required by the destination interface. No explicit conversion configuration is necessary.

The routing matrix supports routing between all major interfaces available in the multiplexer, including:

- NMEA 0183 USB and serial ports
- N2K
- SeaTalk1
- WiFi UDP, TCP1 and TCP2

Changes to the routing configuration only become effective after pressing the SAVE button on the ROUTING page. When the configuration is successfully stored, a green SUCCESS message is displayed.

Some routing paths depend on WiFi services that must be enabled separately on the WIFI configuration page. The multiplexer provides three independent WiFi data services:

- UDP
- TCP1
- TCP2

Each WiFi service is controlled by its associated port number. A WiFi service is considered active when configured with a valid non-zero port number in the range 1024 to 65535. Setting the port number to zero disables the corresponding WiFi service.

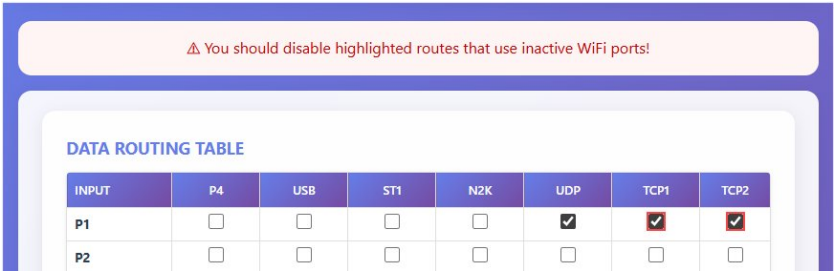


Figure 3: Routing error caused by inactive WiFi ports.

If a routing configuration uses inactive WiFi services, the configuration cannot be saved. In such cases, the multiplexer displays the following warning message:

The invalid routing paths are highlighted and the SAVE operation is rejected until the configuration becomes valid.

Depending on the selected interfaces and enabled filters, data streams may be transparently forwarded, selectively filtered or internally converted before transmission.

The ROUTING page provides immediate visual control of all active data paths and allows rapid reconfiguration of the multiplexer without requiring system restart or firmware changes.

7. Protocol Conversion Philosophy

The multiplexer is designed to preserve navigation information as accurately and transparently as possible while allowing communication between different marine protocol families.

Because NMEA 0183, SeaTalk1 and N2K use different message structures and transport mechanisms, protocol conversion cannot always be performed as a simple one-to-one translation. In many cases, information must be reformatted, combined or distributed across multiple messages in order to match the capabilities of the destination protocol.

Whenever possible, the multiplexer preserves:

- information content,
- timing characteristics,
- and semantic meaning

of the original data stream.

When routing occurs between interfaces using the same protocol family, messages are normally forwarded transparently without modification. Protocol adaptation only occurs when required by the destination interface.

Some protocol families support information that may not exist in others or may use different precision, update rates or message structures. As a consequence, certain conversions may involve approximation, reduced precision or partial information transfer.

The conversion system is intentionally designed to operate automatically from the selected routing paths. Users configure routing relationships rather than individual conversion rules, allowing the multiplexer to maintain a simple and predictable operational model.

The multiplexer continuously processes multiple simultaneous data streams and applies protocol adaptation independently to each active routing path. This allows mixed-protocol systems to coexist transparently within the same installation.

8. Filtering Systems

The multiplexer provides several filtering mechanisms that allow navigation data streams to be selectively accepted, rejected or rate-limited before transmission to destination interfaces. Filtering plays an important role in optimizing bandwidth usage, reducing unnecessary traffic and preventing duplicated or unwanted information from circulating through the navigation network.

Different filtering systems are available depending on the protocol family and interface involved. Filtering may be applied to:

- NMEA 0183 sentences
- SeaTalk1 datagrams
- N2K messages

Filtering is configured independently for each interface and operates continuously as part of the internal data processing pipeline.

For NMEA 0183 interfaces, filtering may be based on:

- sentence identifiers,
- talker IDs,
- checksum validation,
- and optional rate reduction rules.

The filtering system supports both ACCEPT and REJECT operating modes. In ACCEPT mode, only selected messages are transmitted. In REJECT mode, selected messages are blocked while all remaining messages are allowed to pass.

To simplify configuration, the multiplexer provides dedicated modal configuration dialogs adapted to each protocol family. These dialogs allow filtering rules to be created interactively without requiring manual specification of complex filtering expressions.

Figure 4 shows an example of the NMEA 0183 filtering configuration dialog.

Depending on the selected interface and protocol family, additional filtering options may become available, including message grouping and transmission rate reduction mechanisms.

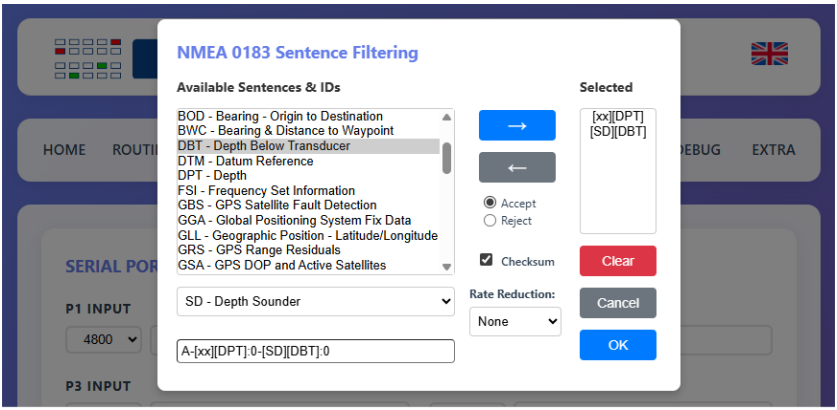


Figure 4: Example of NMEA 0183 sentence filtering configuration.

Filtering configuration is introduced throughout the operational chapters associated with each protocol family. A detailed technical description of all filtering mechanisms, syntax rules and practical applications is provided in the Technical Reference section of this manual

PART 3 — WEB INTERFACE CONFIGURATION

The Nme3Pro multiplexer is primarily configured and monitored through its integrated web interface. The interface is accessible from computers, tablets and smartphones using a standard web browser connected either directly to the multiplexer WiFi Access Point or through an external network when the multiplexer operates as a Client Station.



The web interface is organized into several functional pages accessible through the top navigation bar. Each page controls a specific aspect of the multiplexer operation, including routing, serial communications, WiFi networking, SeaTalk1 operation, N2K configuration, simulation functions, diagnostics and firmware updating. The interface also supports multiple selectable languages accessible through the flag selector located in the upper-right corner of each webpage.

This section of the manual describes the operational purpose of each webpage together with the meaning of the corresponding parameters, configuration options and filtering mechanisms. Complete screenshots of all webpages are provided in Appendix A for reference.

9. HOME Page

Overview

The HOME page is the central configuration page of the Nme3Pro multiplexer and is normally the first page shown after accessing the web interface. It is used to configure the WiFi operating mode, Access Point parameters, external network connection settings and several global operating options.

The multiplexer can operate either as a standalone WiFi Access Point or simultaneously as both Access Point and Client Station connected to an external network. In all cases, the HOME page provides the information necessary to identify the active operating mode and the current network status.

Access Point Operation

In its default configuration, the multiplexer operates in AP ONLY mode and creates its own WiFi network using the factory default SSID NME3-PRO. Smartphones, tablets and computers connect directly to this network and communicate with the multiplexer through the default IP address 192.168.4.1.

This operating mode is particularly useful onboard vessels where no external WiFi infrastructure exists or where a simple direct connection between navigation software and the multiplexer is desired.

Some Android devices may display a warning indicating that the selected WiFi network has no internet connectivity and suggesting alternative networks with internet access. This behavior is normal because the multiplexer Access Point is intended primarily for local marine data communications rather than internet access. In such cases, users should confirm that they wish to remain connected to the Nme3Pro network. In some situations, temporarily disabling mobile data may help prevent automatic switching to another network.

Client Station Operation

The multiplexer can also operate simultaneously as a Client Station connected to an external WiFi network such as a marina router, onboard router or smartphone hotspot. In this mode, the multiplexer still maintains its own Access Point while also joining the external network.

This operating mode is useful when internet access is required by navigation

applications running on connected devices. Examples include weather downloads, online charts, AIS internet services, software updates or remote access applications.

When the connection to the external network is successful, the webpage header shows an additional IP address corresponding to the external network assignment. The original Access Point IP address remains active and available for direct local connections.



Figure 5: Webpage banner showing simultaneous AP and external network operation.

Connection Status Indicator

The top webpage banner includes a rotating globe symbol used as a visual indication of connection to an external WiFi network. The globe is visible only when the multiplexer is connected as a Client Station to an external network.

If the connection to the external network is lost, the rotating globe disappears automatically while the internal Access Point remains operational. This may occur, for example, when leaving the coverage area of a marina WiFi network or when a smartphone hotspot used by the multiplexer is switched off.

During startup and WiFi operation, the LEDs may briefly display moving patterns indicating the current network status.

A left-to-right LED sequence indicates that the WiFi Access Point is active

A right-to-left LED sequence indicates that the multiplexer has connected to an external WiFi network and obtained an IP address.

Static IP Configuration

By default, the multiplexer obtains its external network IP address automatically using DHCP. This is the recommended configuration for most installations.

Advanced users may optionally configure a static IP address instead of

DHCP. In this case, the selected address must belong to the same subnet as the external network and should not conflict with other existing devices. Care should also be taken to avoid addresses already used by the router DHCP allocation pool.

NO_GATEWAY Option

The NO_GATEWAY option, configured on the EXTRA webpage, indicates that the multiplexer Access Point does not provide Internet access. On many Apple iOS devices, this may allow the device to remain connected to Nme3Pro while using mobile data for Internet services. Behaviour may vary according to the device and operating system version. Android devices do not generally use this information in the same way.

WIFI_ON Option

The WIFI_ON option, configured on the EXTRA webpage, controls whether the WiFi subsystem remains permanently active. When enabled (default), WiFi is always available and the web interface can be accessed normally. When disabled, WiFi is automatically turned off approximately 10 minutes after startup if no WiFi ports are being used for routing. This can reduce power consumption but prevents further WiFi access until the multiplexer is restarted.

OPEN_AP Option

By default, the Nme3Pro Access Point is protected by WPA2 security and requires a password. When the OPEN_AP option is enabled on the EXTRA webpage, the Access Point operates without password protection, allowing devices to connect without entering credentials. This option is intended mainly for troubleshooting, temporary installations or other situations where network security is not required.

Saving and Restoring Configuration

Changes made on the HOME page are not applied immediately. After modifying any parameter, press SAVE SETTINGS to store the new configuration. The FACTORY RESET button restores all factory default parameters after confirmation.

10. ROUTING Page

Overview

The ROUTING webpage is the operational core of the Nme3Pro multiplexer. It defines how incoming data from all supported interfaces is distributed to the available outputs and determines which protocol conversions are performed internally by the system.

The routing matrix allows flexible interconnection between NMEA 0183 ports, SeaTalk1, N2K, USB and WiFi communication channels. Multiple simultaneous routes may be enabled, allowing the multiplexer to distribute marine data to several devices and applications at the same time.

The ROUTING webpage also provides visual LED indicators showing real-time routing activity. A complete screenshot of the ROUTING webpage is provided in Appendix A.

The routing system is based on independent input and output channels. Each active route transfers compatible navigation data from one source to one or more destinations. Routing decisions are processed continuously in real time and may optionally include protocol conversion and message filtering.

The routing matrix is intentionally flexible and allows many simultaneous routing combinations. Typical examples include forwarding N2K GPS information to legacy NMEA 0183 equipment, distributing SeaTalk1 instrument data to WiFi applications or sending AIS information simultaneously to USB and TCP clients.

Routing activity may also be monitored through the physical LED indicators and corresponding webpage LED mimics described in the Technical Reference section.

Input Sources

Available routing inputs depend on the hardware configuration and enabled operating modes. Possible input sources include NMEA 0183 serial ports, SeaTalk1, N2K, USB virtual serial communication and WiFi channels operating in UDP, TCP or RAW N2K modes.

Each input may simultaneously feed multiple outputs depending on the selected routing configuration. Message filtering can optionally restrict the transferred data to specific sentence types or PGNs.

Output Destinations

Routing outputs include all supported communication interfaces capable of transmitting navigation data. Outputs may include the NMEA 0183 serial port, USB, WiFi channels, SeaTalk1 and N2K depending on the selected operating mode and enabled conversions.

A single output may receive information originating from multiple simultaneous inputs. Care should be taken to avoid excessive duplication of identical information when several parallel routes are enabled.

Routing Matrix Operation

Each routing connection is activated by enabling the corresponding routing checkbox in the matrix. When active, compatible messages arriving at the selected input are forwarded automatically to the designated output.

The routing system supports multiple simultaneous routes and can therefore operate as both a protocol gateway and a data distributor. Internally generated conversion messages are treated in the same manner as physical input data and may also be routed to multiple outputs.

Protocol Conversion

The multiplexer performs automatic protocol conversion between SeaTalk1, NMEA 0183 and N2K whenever compatible information is available. Depending on the enabled routes, converted messages may be redistributed to multiple interfaces simultaneously.

Not all protocol messages have direct equivalents in other standards. In some cases, equivalent information may be represented using different message structures or update rates depending on the destination protocol.

11. SERIAL Page

Overview

The SERIAL webpage configures the NMEA 0183 serial interfaces of the multiplexer together with the associated filtering mechanisms and routing behavior. The multiplexer provides three serial inputs (P1, P2 and P3) and one serial output (P4), allowing simultaneous interconnection of multiple NMEA 0183 devices operating at different baud rates.

The SERIAL webpage also controls the USB virtual serial port used for communication with computers and navigation applications. A complete screenshot of the SERIAL webpage is provided in Appendix A.

Shared UART Architecture

Internally, serial input P3 and serial output P4 share the same UART peripheral. For this reason, both ports always operate at the same baud rate. Changing the baud rate associated with P3 automatically changes the baud rate of P4 and vice versa.

This architecture allows simultaneous reception and transmission using the same UART hardware while minimizing processor overhead and maintaining reliable communication timing.

Internal P3 Connector

Unlike ports P1, P2 and P4, the P3 input connector is not available on the external removable terminal block. Instead, P3 is accessible through an internal two-pin screw terminal located inside the multiplexer enclosure.

Access to the P3 connector therefore requires temporary removal of the top enclosure lid. After connecting the two signal wires, the lid may be reinstalled normally because sufficient space exists for the wires to exit above the removable connectors.

Figure 6 shows the internal P3 connector identified by the labels A3 and B3 together with several activity LEDs used by the multiplexer.

Serial Isolation

All NMEA0183 input ports are optically isolated in order to improve electrical protection and reduce the risk of ground-loop problems commonly found in marine installations. The serial output port P4 is also galvanically isolated from the remaining system electronics.

This isolation architecture improves compatibility with external navigation equipment and contributes to increased robustness in electrically noisy onboard environments.

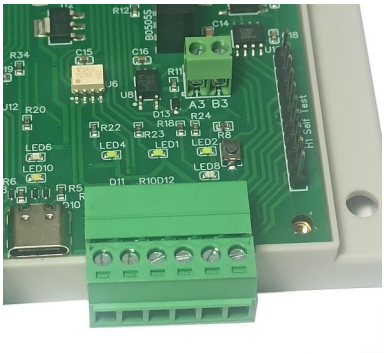


Figure 6: Internal P3 connector.

USB Virtual COM Port

The USB interface appears to connected computers as a standard virtual COM port compatible with common navigation applications and terminal software. Internally, however, USB communication operates at high speed independently of the baud rate selected for the virtual serial port.

Although navigation software may require selecting a nominal baud rate for the virtual COM port, actual USB communication internally operates at approximately 12 Mb/s and is therefore not limited by conventional NMEA 0183 serial speeds.

Filtering and Routing

All serial inputs and outputs may participate simultaneously in the routing matrix described in Chapter 10. Routing paths may optionally include NMEA 0183 sentence filtering in order to restrict transmitted data to selected sentence types.

Filtering can reduce unnecessary traffic and simplify compatibility with legacy equipment or software applications requiring only specific navigation messages. Additional filtering information is provided in the Technical Reference section.

LED Indicators

The multiplexer includes dedicated LED indicators associated with serial interfaces and communication activity. P1, P2 and P3 serial inputs are associated with green LEDs, while the P4 serial output uses a red LED indicator. USB communication activity is indicated through an amber LED.

Figure 6 also shows several of these activity LEDs. Additional information about all LED indicators and webpage LED mimics is provided in the Technical Reference section.

12. WIFI Page

Overview

The WIFI webpage configures all wireless communication channels used by the multiplexer. Supported WiFi communication modes include UDP, TCP and RAW N2K transport. These channels may be used simultaneously for routing navigation data between mobile applications, computers and onboard equipment.

Independent filtering may be applied separately to WiFi inputs and outputs, allowing selective transmission and reception of navigation messages. A complete screenshot of the WIFI webpage is provided in Appendix A.

Configuration changes performed on the WIFI webpage only become active after pressing the SAVE button and receiving the corresponding green SUCCESS confirmation message.

UDP Communication

UDP communication is generally the recommended operating mode when the primary objective is broadcasting navigation data from the multiplexer to multiple listening applications simultaneously.

UDP transmission does not require establishing persistent communication sessions and is therefore particularly suitable for lightweight marine data distribution. Many navigation applications can simultaneously receive the same UDP broadcast data stream without requiring additional configuration.

UDP is typically preferred when communication mainly occurs from the multiplexer toward navigation software rather than in both directions.

TCP Server Operation

The TCP channels implemented by the multiplexer operate as TCP servers. This means that external applications act as TCP clients and must initiate the connection using the IP address of the multiplexer together with the configured TCP port number.

In practical terms, navigation software running on computers, tablets or smartphones must therefore know the current IP address assigned to the multiplexer in order to establish communication successfully.

Unlike UDP broadcasting, TCP communication establishes dedicated point-to-point connections between the client application and the multiplexer. TCP operation is generally preferred when reliable bidirectional communication is required. Figure 7 illustrates UDP and TCP communication models.

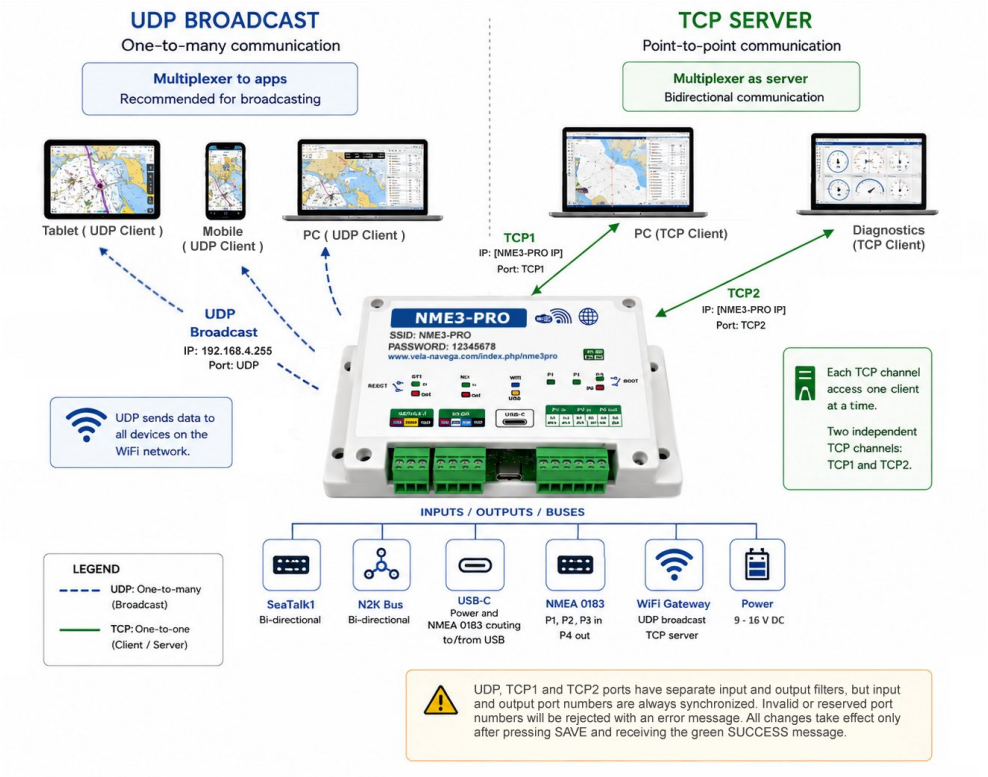


Figure 7: UDP broadcast and TCP server communication models.

Shared Port Architecture

UDP, TCP1 and TCP2 each contain separate filtering fields for input and output communication. This allows different filtering rules to be applied independently to received and transmitted data streams.

Although filtering is independent, the corresponding input and output port numbers always remain synchronized. Changing the configured port number associated with a given channel automatically updates both directions simultaneously. This behavior ensures consistent bidirectional communication using the same network port.

The multiplexer validates all configured network port numbers before accepting new settings. Attempting to save invalid or reserved port numbers causes an error message to be displayed and the configuration is rejected.

WiFi Filtering

All WiFi communication channels support optional NMEA 0183 sentence filtering. Independent filtering rules may be applied separately to incoming and outgoing data streams in order to restrict transmitted traffic to selected navigation messages.

Filtering is particularly useful for reducing unnecessary traffic, simplifying compatibility with specific applications and limiting bandwidth usage on slower wireless connections. Additional filtering information is provided in the Technical Reference section.

RAW N2K WiFi Operation

In addition to conventional NMEA 0183 communication, the multiplexer also supports RAW N2K communication through WiFi connections. This allows compatible software applications to exchange native N2K traffic for monitoring, analysis or advanced gateway operation.

WiFi RAW communication may use UDP, TCP1, UDP Extra or TCP1 Extra depending on the RAW channel selected on the N2000 webpage and on software compatibility requirements. UDP Extra and TCP1 Extra use the configured UDP and TCP1 port numbers plus one.

13. SEATALK Page

Overview

The SEATALK webpage configures all SeaTalk1-related functions of the multiplexer, including datagram filtering and protocol conversion between SeaTalk1, NMEA 0183 and N2K.

Independent filtering may be applied separately to incoming and outgoing SeaTalk1 datagrams, allowing selective transfer of navigation information between legacy SeaTalk equipment and modern navigation systems.

A complete screenshot of the SEATALK webpage is provided in Appendix A.

SeaTalk1 Datagrams

SeaTalk1 communication is based on binary datagrams exchanged between marine instruments over a shared single-wire bus. Different datagram types represent navigation information such as depth, wind, heading, speed and autopilot control data.

Unlike NMEA 0183 sentences, SeaTalk1 datagrams are compact binary structures and are therefore identified internally through hexadecimal datagram identifiers.

SeaTalk Filtering

The multiplexer supports selective filtering of SeaTalk1 datagrams in order to restrict the transfer of specific information types. Filtering may be used to reduce unnecessary traffic, eliminate incompatible messages or simplify protocol conversion behavior.

As with NMEA 0183 filtering, the multiplexer provides an auxiliary popup window that simplifies filter construction and avoids manual entry of datagram identifiers.

Input and Output Filters

Independent filtering rules may be configured separately for incoming and outgoing SeaTalk1 datagrams. This allows different filtering policies to be applied depending on the direction of communication and routing requirements.

The SEATALK webpage therefore includes separate filtering fields associated with input and output datagrams in a manner similar to the filtering architecture used by the SERIAL and WIFI webpages.

Filter Configuration Example

Figure 8 shows an example of SeaTalk1 datagram filtering configuration using the auxiliary popup filter selection window.

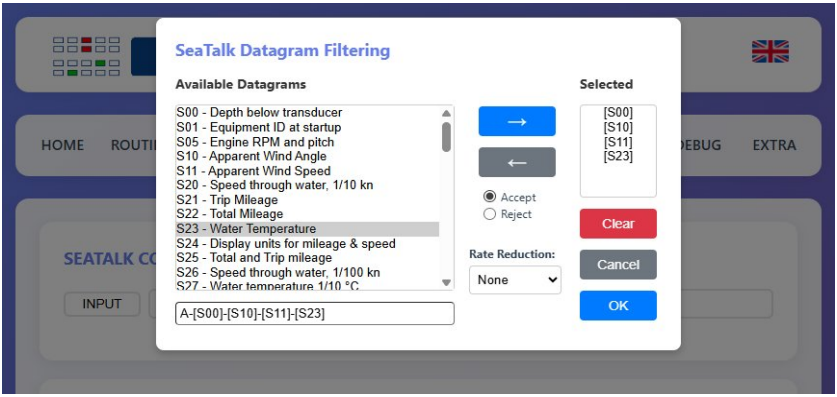


Figure 8: Example of SeaTalk1 datagram filtering configuration.

Additional filtering information is provided in the Technical Reference section.

SeaTalk ↔ NMEA 0183 Conversion

The multiplexer automatically converts many common SeaTalk1 datagrams into equivalent NMEA 0183 sentences whenever compatible routing paths are enabled. This allows legacy SeaTalk instruments to exchange information with modern navigation software and NMEA 0183 equipment.

Because SeaTalk1 and NMEA 0183 use fundamentally different communication structures, some information may require approximation or aggregation during conversion.

SeaTalk ↔ N2K Conversion

The multiplexer also supports conversion between SeaTalk1 datagrams and N2K PGNs, allowing integration of older Raymarine instruments within modern N2K networks.

Conversion behavior depends on the availability of equivalent information in both protocols and on the enabled routing configuration.

ST > NMEA0183 MODE

This setting controls how SeaTalk1 datagrams received by Nme3Pro are converted into NMEA 0183 sentences. It affects only the SeaTalk1-to-NMEA 0183 direction and does not change conversions from NMEA 0183 to SeaTalk1.

A **$STALK** sentence is a non-standard textual representation of a SeaTalk1 datagram. It contains the original datagram bytes in hexadecimal form and a checksum, allowing the datagram to be forwarded to compatible software or examined for diagnostic purposes.

- **Mode 0 - Default:** generates only the available standard NMEA 0183 conversions. This is the recommended mode for normal operation.
- **Mode 1 - Add Some $STALK:** performs the standard conversions and also generates **$STALK** sentences for selected autopilot-related datagrams, allowing compatible software to monitor Raymarine autopilot information.
- **Mode 2 - Always Add $STALK:** performs the standard conversions and also generates a **$STALK** sentence for every received datagram. This mode is useful for monitoring or analysing all SeaTalk1 traffic.
- **Mode 3 - Only Send $STALK:** disables standard NMEA 0183 conversion and represents every received datagram only as a **$STALK** sentence. This mode should be used with software that specifically supports the **$STALK** format.

Conversion Limitations

Not all SeaTalk1 datagrams have direct equivalents in NMEA 0183 or N2K.

Some proprietary or rarely used datagrams may therefore remain unsupported or may only be partially converted.

Detailed conversion tables and protocol mapping information may be provided separately depending on firmware version and enabled conversion modules.

Routing Interaction

All SeaTalk1 communication channels participate fully in the routing matrix described in Chapter 10 and may therefore operate simultaneously with serial ports, USB, WiFi and N2K routing paths.

SeaTalk1 information may therefore function both as a navigation data source and as a destination for converted information originating from other protocol families.

Additional SeaTalk Compatibility Options

Several additional SeaTalk-related options are available on the EXTRA page. These options provide compatibility with specific instruments, applications and SeaTalk implementations and normally should be left at their default values.

SOG_TO_STW causes GPS Speed Over Ground (SOG) information to be converted into SeaTalk Speed Through Water (STW) data. This option is intended for installations that do not have a paddlewheel speed sensor but require STW information for compatibility with certain instruments.

SAILGRIB_VHW enables generation of VHW sentences required by some versions of the SailGrib application. The generated sentences contain heading information and allow compatibility with software that expects VHW data to be present.

ST26_INVALID controls the handling of SeaTalk Datagram 26 messages marked INVALID. When enabled (default), these messages are still accepted and converted. This option exists because some SeaTalk instruments transmit useful speed information while incorrectly setting the INVALID flag.

DATAGRAM_58 enables SeaTalk Datagram 58 for position data. It combines latitude and longitude in one message with significantly higher resolution than the older Datagram 50 (latitude) and Datagram 51 (longitude) messages. This option is enabled by default.

14. N2000 Page

Overview

The N2000 webpage configures all N2K-related functions of the multiplexer, including message filtering and protocol conversion between N2K, NMEA 0183 and SeaTalk1.

Independent filtering may be applied separately to incoming and outgoing N2K messages, allowing selective exchange of navigation information between N2K devices and other protocol families. A complete screenshot of the N2000 webpage is provided in Appendix A.

N2K PGNs

N2K communication is based on binary CAN bus messages identified through Parameter Group Numbers (PGNs). Different PGNs represent navigation information such as GPS position, heading, wind, AIS targets, engine data and environmental measurements.

Unlike NMEA 0183 sentences, N2K messages are compact binary frames optimized for high-speed network communication between multiple simultaneous devices.

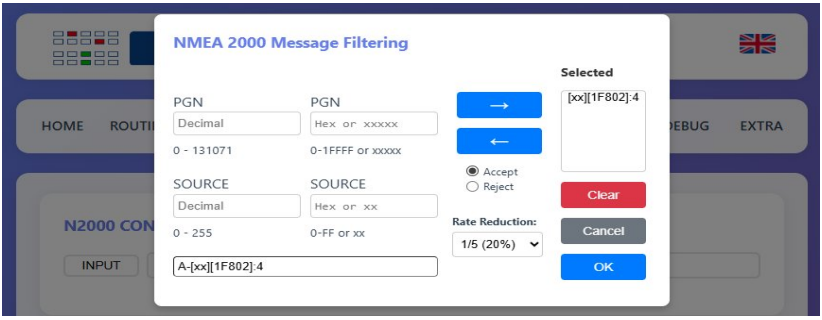


Figure 9: Example of N2K message filtering configuration.

N2K Message Filtering

The multiplexer supports selective filtering of N2K PGNs in order to restrict the transfer of specific message types. Filtering may be used to reduce unnecessary traffic, simplify routing configurations or limit conversion processing.

As with other protocol families, the multiplexer provides an auxiliary popup selection window that simplifies filter construction and avoids manual entry of PGN values.

Input and Output Filters

Independent filtering rules may be configured separately for incoming and outgoing N2K traffic. This allows different filtering policies to be applied depending on routing direction and operational requirements.

The N2000 webpage therefore includes separate filtering fields associated with input and output PGNs in a manner similar to the filtering architecture used by the SERIAL, WIFI and SEATALK webpages.

RAW N2K Communication

The multiplexer supports transmission and reception of RAW N2K messages through USB and WiFi communication channels. RAW communication allows compatible software applications to monitor and process native N2K traffic directly, without intermediate conversion to NMEA 0183.

RAW N2K communication is particularly useful for diagnostics, protocol analysis, network monitoring and advanced gateway applications.

The RAW TYPE setting selects the active RAW format or disables RAW communication entirely. The RAW CHANNEL setting selects the communication interface used for RAW data exchange and may be USB, UDP, TCP1, UDP Extra or TCP1 Extra. USB is always available, while WiFi channels depend on the corresponding configuration on the WIFI webpage. UDP Extra and TCP1 Extra use the configured UDP and TCP1 port numbers plus one.

NMEA 0183 ↔ N2K Conversion

The multiplexer automatically converts many common NMEA 0183 sentences into equivalent N2K PGNs whenever compatible routing paths are enabled. Conversion in the opposite direction is also supported for many navigation message types.

This allows legacy NMEA 0183 equipment and modern N2K devices to exchange navigation information transparently through the multiplexer.

SeaTalk1 ↔ N2K Conversion

The multiplexer also supports conversion between SeaTalk1 datagrams and N2K PGNs, allowing integration of older SeaTalk1 instruments within modern N2K networks.

Conversion behavior depends on the availability of equivalent information in both protocols and on the enabled routing configuration.

Conversion Limitations

The multiplexer provides protocol conversion between NMEA 0183, SeaTalk1 and N2K networks. Not all N2K PGNs have direct equivalents in NMEA 0183 or SeaTalk1. Some proprietary or specialized PGNs may therefore remain unsupported or may only be partially converted.

Detailed conversion tables and protocol mapping information may be provided separately depending on firmware version and enabled conversion modules.

Routing Interaction

The N2K interface participates fully in the routing matrix described in Chapter 10 and may therefore operate simultaneously with serial ports, USB, WiFi and SeaTalk1 routing paths.

When RAW communication is configured to use the normal UDP or TCP1 channels, RAW data shares the corresponding WiFi interface with NMEA 0183 traffic. Alternatively, the UDP Extra and TCP1 Extra channels may be used to dedicate separate WiFi ports to RAW communication.

N2K information may therefore function both as a navigation data source and as a destination for converted information originating from other protocol families.

15. SIM MODE Page

Overview

The SIM MODE webpage activates the internal navigation data simulator of the multiplexer. Simulation Mode is particularly useful for testing routing configurations, validating protocol conversions and configuring navigation software such as OpenCPN, Navionics and other applications, without requiring real onboard sensor data.

When Simulation Mode is enabled, the multiplexer temporarily ignores incoming traffic on the P1, P2, P3 and USB inputs and instead generates realistic test NMEA 0183 sentences internally, using the current routing configuration.

A full screenshot of the SIM MODE webpage is provided in Appendix A.

Simulation Banner and Status

Whenever Simulation Mode is active, a warning banner is displayed at the top of all webpages to remind the user that simulated navigation data is currently being generated.

The banner remains visible while navigating between webpages and provides a direct method for disabling Simulation Mode.

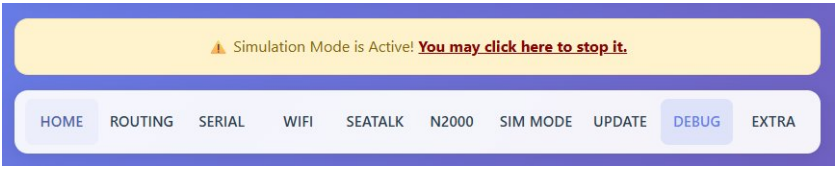


Figure 10: Simulation mode warning banner.

GPS and Instrument Simulation

The simulator generates synthetic navigation data including GPS position, speed, heading, depth, water temperature, wind information and AIS targets. These simulated messages are routed through the multiplexer exactly as if they originated from real external devices.

Simulated GPS data is internally associated with input port P1, simulated AIS

data with P2 and simulated instrument data with P3. The corresponding routing activity LEDs therefore blink according to the active routing configuration exactly as they would during normal operation.

Simulation Mode is particularly useful for verifying routing behavior, validating protocol conversions and testing compatibility with navigation software applications. Note that Simulation Mode requires at least one of the P1, P2 or P3 inputs to be routed to one or more outputs.

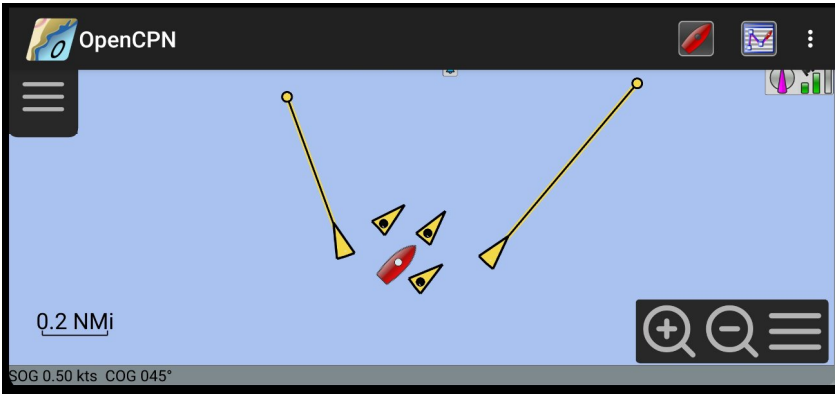


Figure 11: Simulated AIS targets displayed in OpenCPN.

AIS Target Simulation

The simulator also generates synthetic AIS targets, allowing navigation software to display realistic vessel traffic during testing and configuration procedures.

Figure 11 shows an example of simulated AIS targets displayed in OpenCPN while the multiplexer operates in Simulation Mode.

DEBUG Interaction

Simulation Mode interacts fully with the DEBUG webpage. Simulated NMEA 0183 sentences and converted protocol messages may therefore be monitored in real time together with routed output traffic.

This behavior allows verification of routing paths, filtering configurations and protocol conversion operation without requiring external navigation equipment.

Typical Software Testing Applications

Simulation Mode is particularly useful for configuring chartplotters, mobile applications and navigation software such as OpenCPN without requiring access to a complete onboard installation.

The simulator may also be used for demonstrations, training, troubleshooting and validation of routing configurations and protocol conversion behavior.

Simulation Routing Requirements

Simulation data follows the same routing rules as real navigation information and therefore requires appropriate routing paths to be enabled in the ROUTING webpage.

Filtering rules associated with serial ports, WiFi channels, SeaTalk1 and N2K communication paths also remain active while Simulation Mode is operating.

16. UPDATE Page

Overview

The UPDATE webpage allows firmware upgrades to be performed directly through the web interface. Firmware updates provide access to new features, performance improvements, protocol enhancements and bug fixes.

The currently installed firmware version is displayed in the header area of all webpages. It is recommended to keep the multiplexer firmware updated whenever a newer stable version becomes available.

A full screenshot of the UPDATE webpage is provided in Appendix A.

Firmware Update Procedure

Firmware updates are performed by selecting a firmware image file and uploading it to the multiplexer through the UPDATE webpage.

During the update process, the firmware image is transferred to the multiplexer, validated and programmed into flash memory. A progress indicator shows the upload status. Once the upload is complete, the multiplexer verifies the new firmware and displays a confirmation message before automatically restarting.

The update process should not be interrupted by removing power or closing the browser window.

Configuration Preservation

Normal firmware updates preserve all user configuration parameters, including routing settings, serial port configuration, WiFi settings, filters and protocol conversion options.

However, firmware versions that introduce changes to the internal memory structure may require the multiplexer to restart with factory default settings. It is therefore good practice to keep a record of important configuration settings before performing firmware upgrades.

Recovery from Failed Updates

The multiplexer includes recovery mechanisms that allow firmware reinstallation even if a previous update was interrupted or failed.

In the rare event of an unsuccessful update, the recovery procedures described in Part 5 may be used to restore normal operation.

17. DEBUG Page

Overview

The DEBUG webpage provides a real-time view of the navigation data being processed by the multiplexer. It may be used to verify incoming messages, routing operation, filtering behavior and protocol conversion activity.

The debug display supports NMEA 0183, SeaTalk1 and N2K traffic and is particularly useful during installation, troubleshooting and system integration.

A full screenshot of the DEBUG webpage is provided in Appendix A.

Input and Output Message Monitoring

When DEBUG mode is active, the multiplexer continues to operate normally while the DEBUG window monitors actual traffic. Accepted input messages are displayed in black, while messages that are actually transmitted are displayed in red and indented relative to the corresponding input. This presentation allows routing operation, filtering and protocol conversion to be observed without affecting normal multiplexer operation.

Protocol Conversion Monitoring

During SeaTalk1-to-N2K and N2K-to-SeaTalk1 protocol conversion, the intermediate NMEA 0183 messages used internally by the multiplexer are displayed in blue and prefixed with **[STK>N2K]** or **[N2K>STK]**. These messages provide additional visibility into protocol gateway operation and can assist when validating or troubleshooting protocol conversions.

ALL_N2K Option

When the ALL_N2K option is enabled from the EXTRA page, the DEBUG window displays all N2K messages present on the backbone. Because a typical N2K network carries a large volume of traffic, this option should normally remain disabled and only be used when detailed N2K analysis is required.

Simulation Mode Interaction

The DEBUG webpage operates fully with Simulation Mode. Simulated GPS, AIS and instrument data may therefore be observed exactly as if they originated from real external devices.

This capability allows routing paths, filtering rules and protocol conversions to be tested without requiring connected navigation equipment.

Practical Debugging Example

The next figure shows the DEBUG webpage operating with Simulation Mode enabled. In this example, simulated GPS data from P1 is routed to P4, simulated AIS data from P2 is routed to N2K and UDP outputs, and simulated instrument data from P3 is routed to UDP.

The example illustrates the simultaneous display of input messages, routed output messages and protocol conversion activity.

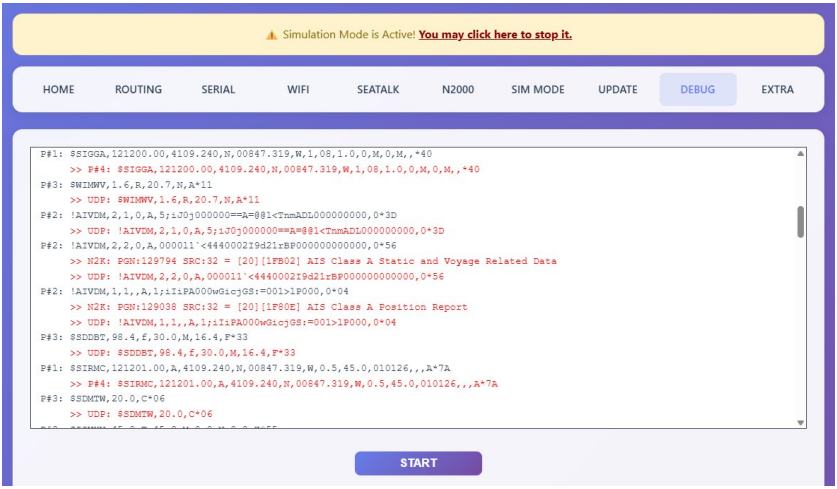


Figure 12: DEBUG webpage showing routed simulated navigation data.

18. EXTRA Page

Overview

The EXTRA page contains advanced configuration options, diagnostic utilities and links to supporting resources. Most users will rarely need to modify the settings found on this page, as several options exist primarily to provide compatibility with specific equipment, software applications or installation requirements.

Unlike the HOME, ROUTING or SERIAL pages, the EXTRA page does not contain parameters directly related to normal multiplexer operation. Instead, it groups advanced functions that do not naturally belong elsewhere in the web interface.

A full screenshot of the EXTRA page is provided in Appendix A.

Advanced Configuration Options

The upper section of the page contains advanced configuration parameters. These options are grouped into three categories:

Network Advanced Options
NO_GATEWAY, WIFI_ON and OPEN_AP affect WiFi network operation. These options are described in the WIFI Page section.

ALL_N2K
Controls the display of N2K traffic in Debug Mode. This option is described in the DEBUG Page section.

SeaTalk Compatibility Options
SOG_TO_STW, SAILGRIB_VHW, ST26_INVALID and DATAGRAM_58 affect SeaTalk1 operation and SeaTalk/NMEA 0183 conversions. These options are described in the SEATALK Page section.

Utilities

The lower section of the page provides access to several utility functions.

LEDs opens a window displaying activity indicators for the multiplexer ports and communication interfaces. A complete description of these indicators is provided in the LED Indicators section.

MANUAL opens the complete Nme3Pro User Manual stored locally on the multiplexer.

DEVELOPMENT displays internal configuration and diagnostic information that may be useful for troubleshooting and technical support.

PART 4 — TECHNICAL REFERENCE

19. Hardware Description

The **Nme3Pro Gateway** hardware is based on an ESP32-S3-WROOM-1 module and is implemented entirely using modern surface-mount technology (SMT), primarily with 0603 passive components. The design integrates NMEA 0183, SeaTalk1, N2K, USB and WiFi connectivity within a compact and robust platform specifically designed for marine environments.

The power supply is based on a TPS5430 switching regulator operating at 500 kHz. The multiplexer can be powered from the SeaTalk1 bus, the NMEA 2000 bus, or both simultaneously. Protection diodes and EMI filtering circuitry allow both power sources to be connected safely. The switching regulator reduces the incoming voltage to 5 V, which is then further regulated to 3.3 V by an AMS1117 low-dropout regulator that supplies the ESP32-S3 module and associated circuitry. The 5 V rail can also be powered from the USB-C connector, allowing the multiplexer to operate solely from USB power.

The NMEA 0183 input interfaces are implemented using high-speed Toshiba optocouplers and protected by polarity-protection diodes. Ports P1 and P2 use a dual-channel TLP2161 optocoupler, while Port P3 uses a dedicated TLP2361 device. This arrangement protects the circuitry against incorrect wiring and provides reliable operation at baud rates up to 115200 bps without noticeable signal degradation. The optocoupler outputs are connected directly to the three hardware UARTs available within the ESP32-S3, ensuring efficient and reliable reception of NMEA 0183 data.

The NMEA 0183 output interface shares the UART associated with Port P3, which is the reason why Ports P3 and P4 always operate at the same baud rate. A distinctive feature of the P4 output is its complete galvanic isolation. The RS-422 output driver and its associated TLP2361 driving optocoupler are powered from an isolated DC-DC converter, providing good noise immunity and reliable compatibility with connected NMEA 0183 listeners.

The USB interface uses a USB Type-C connector connected directly to the native USB port of the ESP32-S3. This provides high-speed communication at up to 12 Mbit/s, independent of the virtual COM port baud rate selected on the connected computer.

The SeaTalk1 interface is based on a proven discrete transistor design and makes use of dedicated ESP32-S3 hardware timers and interrupt-driven processing to ensure accurate reception and transmission of SeaTalk1 data.

The N2K interface uses a TJA1050 CAN transceiver connected to the

ESP32-S3 CAN controller, providing full access to the NMEA 2000 network and enabling protocol conversion and data routing functions.

Two pushbuttons are provided on the circuit board. The RESET button performs a hardware reset of the ESP32-S3 module and is equivalent to cycling power. The BOOT button is primarily intended to place the module into programming mode when firmware recovery or low-level maintenance operations are required. During normal operation, pressing and holding the BOOT button for approximately 10 seconds restores all configuration parameters to their factory default values.

Visual indication of system activity is provided by ten LEDs distributed throughout the hardware. In addition, eight ESP32-S3 GPIO signals are available on the H3 expansion connector, allowing future hardware extensions and experimental functions to be implemented without modifications to the main circuit board.

Particular attention has been given to reliability and electromagnetic compatibility during the hardware design. The NMEA 0183 input ports are opto-isolated to reduce the risk of ground loops and improve noise immunity, while transient suppression devices protect external interfaces against electrical disturbances commonly encountered in marine installations. The PCB layout incorporates a continuous ground plane, short signal paths and careful separation of sensitive and high-frequency circuitry. The ESP32-S3 wireless module is integrated in accordance with the manufacturer's recommendations, including antenna placement and PCB clearances, while the power supply follows the reference designs provided by Texas Instruments and incorporates filtering intended to reduce switching noise and improve overall system stability.

The following figures show the complete electrical schematics of the **Nme3Pro Gateway**.

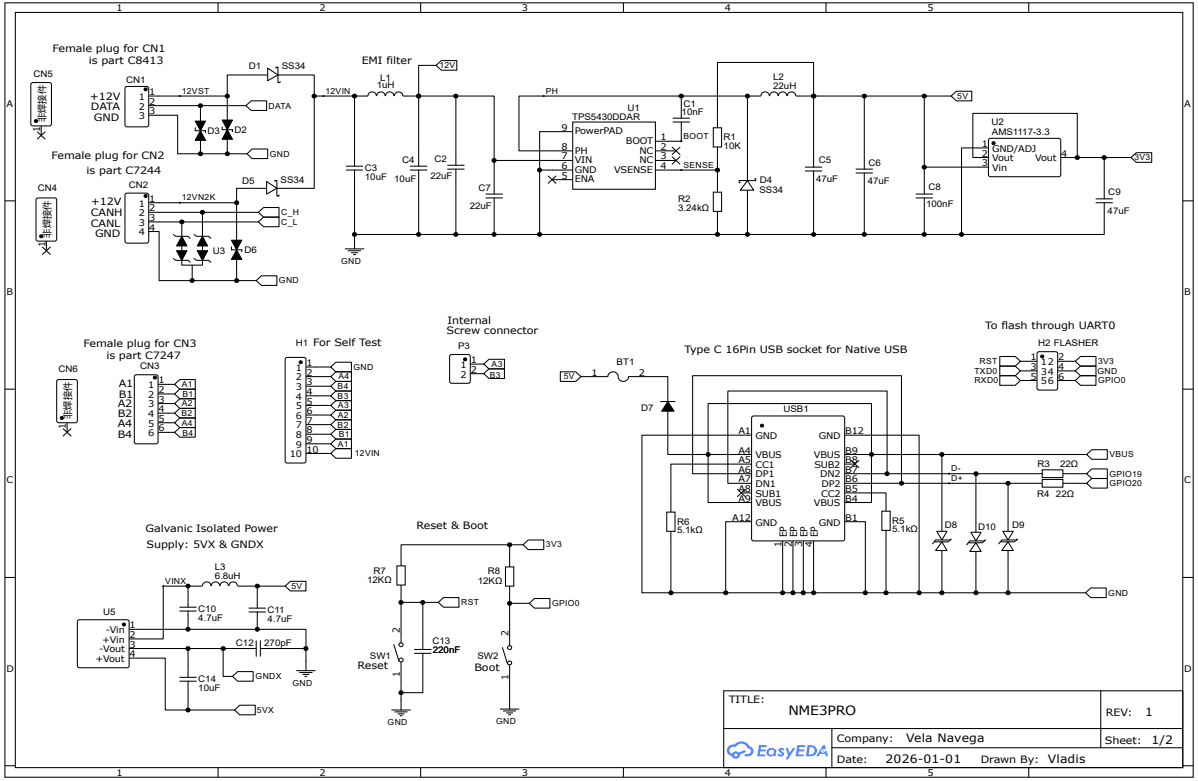


Figure 13: Hardware Schematic – Sheet 1

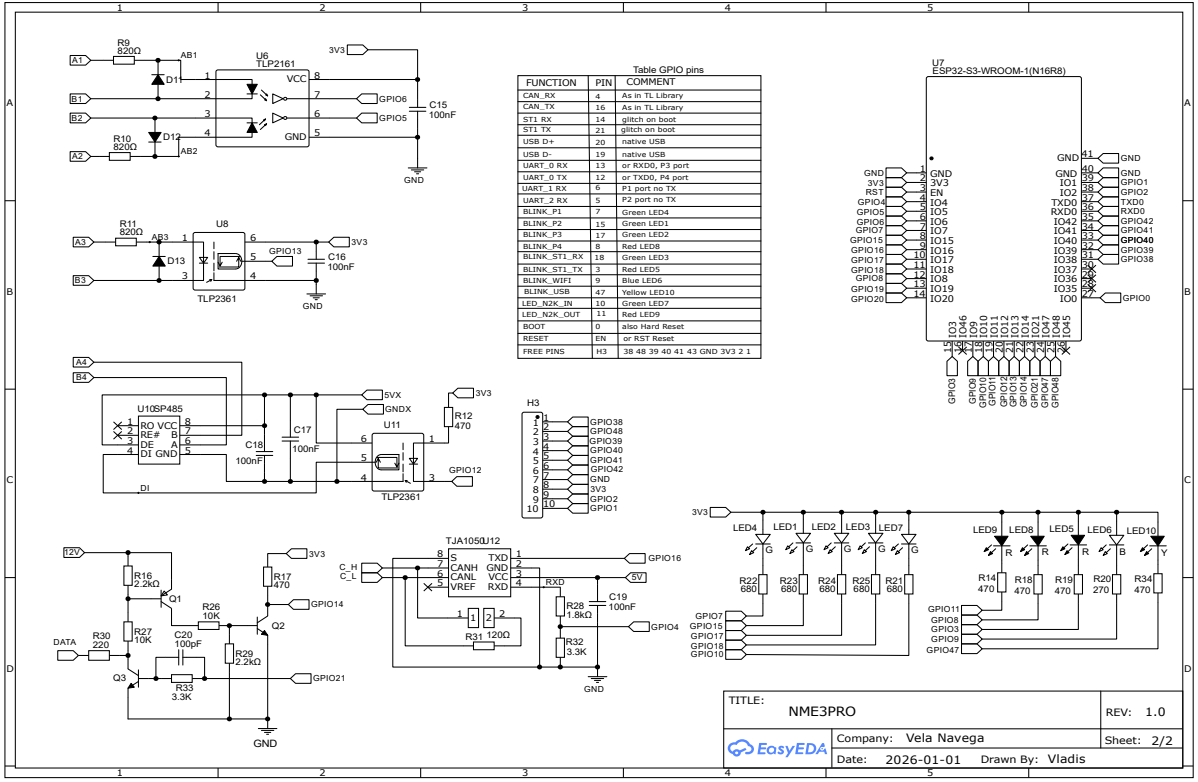


Figure 14: Hardware Schematic – Sheet 2

20. Filter Configuration

Overview

The Nme3Pro provides filtering facilities for NMEA 0183 sentences, SeaTalk1 datagrams and N2K PGNs. Filters may be applied independently to inputs and outputs and can be used to block unwanted messages, reduce traffic levels or isolate specific information for diagnostic purposes.

Filtering is one of the most powerful features of the multiplexer. By allowing only the required messages to pass through each communication interface, filters simplify system integration, improve compatibility between connected equipment and reduce unnecessary traffic on serial ports, WiFi channels and the N2K network.

Although the three filtering systems operate on different message types, they share the same operating principles and are configured using popup windows accessed by clicking the corresponding filter field on the configuration page.

Filter Popup Windows

Clicking a filter field opens a popup window where the filter can be created or modified. For NMEA 0183 and SeaTalk1, entries are selected from a list of available messages. For N2K, rules are created by entering a PGN number and, optionally, a source address.

Each filter may contain a maximum of six entries. This limitation is sufficient for most practical installations and helps keep filter configuration simple while remaining flexible.

NMEA 0183 Filters

NMEA 0183 filters are created by selecting sentence types from the available list. Optional Talker ID filtering, checksum validation and rate reduction settings allow the filter to be adapted to a wide range of installation requirements.

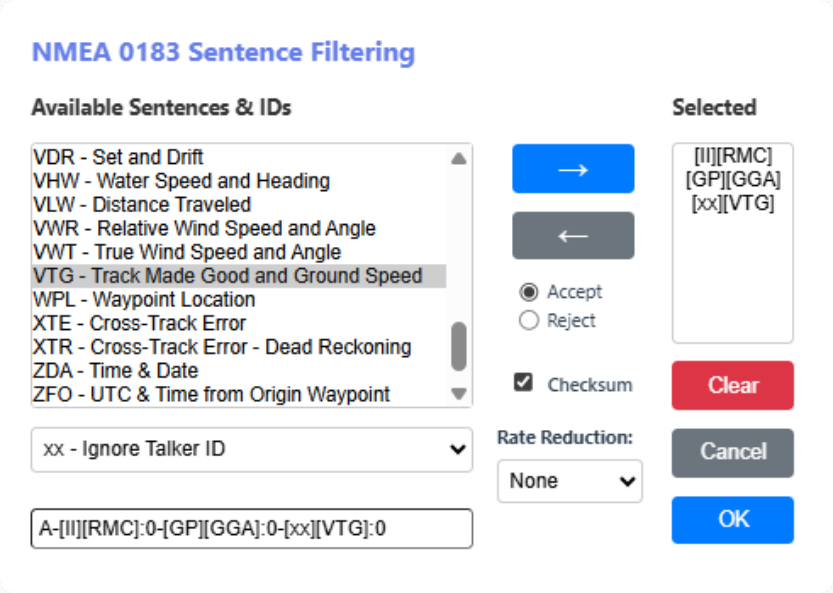


Figure 15: NMEA 0183 Filter Popup Window

The filter configuration shown above generates the filter string,

A-[II][RMC]:0-[GP][GGA]:0-[xx][VTG]:0

which allows only the selected RMC, GGA and VTG sentences to pass through the filter while rejecting all other NMEA 0183 sentences.

Each entry contains a Talker ID, a sentence type and an optional rate reduction value. In this example, **[II][RMC]** accepts only RMC sentences with the **II** Talker ID, **[GP][GGA]** accepts only GGA sentences with the **GP** Talker ID, while **[xx][VTG]** accepts VTG sentences regardless of the Talker ID. The value **:0** indicates that no rate reduction is applied to that entry. The **Checksum** option is enabled, so incoming sentences with invalid checksums are rejected.

SeaTalk1 Filters

SeaTalk1 filters are created by selecting datagrams from the available list. Their operation is similar to that of NMEA 0183 filters, although Talker ID selection and checksum validation are not applicable to the SeaTalk1 protocol.

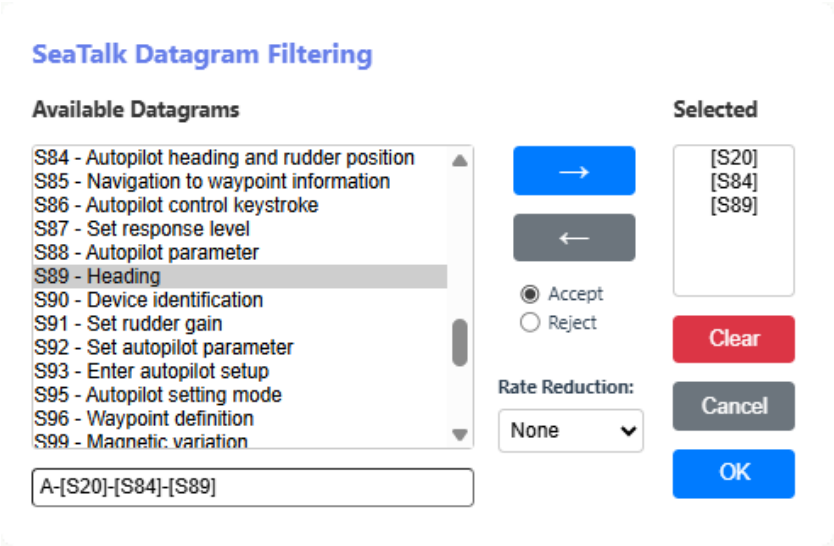


Figure 16: SeaTalk1 Filter Popup Window

The filter configuration shown above generates the filter string,

A-[S20]-[S84]-[S89]

which allows only the selected SeaTalk1 datagrams to pass through the filter while rejecting all others.

Each entry identifies a SeaTalk1 datagram by its hexadecimal code. In this example, datagrams **S20**, **S84** and **S89** are accepted, while all other datagrams are rejected. Since SeaTalk1 does not use Talker IDs or checksums, the filter string is simpler than the equivalent NMEA 0183 filter. Rate reduction may still be applied to individual datagrams when required.

N2K Filters

N2K filters are created by entering a PGN number and, optionally, a source address. Unlike NMEA 0183 and SeaTalk1 filters, which use predefined lists, N2K filter rules are entered manually. Both decimal and hexadecimal values may be used for the PGN and source address.

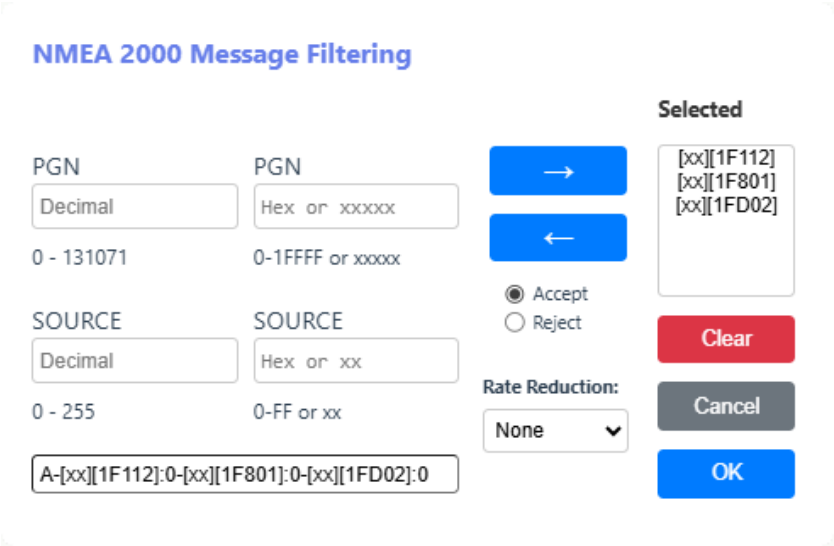


Figure 17: N2K Filter Popup Window.

The filter configuration shown above generates the filter string,

A-[xx][1F112]:0-[xx][1F801]:0-[xx][1FD02]:0

which allows only the selected N2K PGNs to pass through the filter while rejecting all others.

Each entry contains an optional source address, a PGN and an optional rate reduction value. In this example, the source address is specified as **[xx]**, indicating that messages from any source are accepted. The hexadecimal PGNs **1F112**, **1F801** and **1FD02** identify the selected N2K messages, while the value **:0** indicates that no rate reduction is applied to any of the entries.

Filter Options

All three filter types operate in either **Accept** or **Reject** mode. In **Accept** mode, only the selected entries are allowed to pass through the filter, while all other messages are rejected. In **Reject** mode, the selected entries are blocked and all remaining messages are allowed to pass.

The selected mode applies to the filter as a whole and is identified by the first character of the generated filter string. An **A** indicates Accept mode, while an **R** indicates Reject mode. It is therefore not possible for individual entries within the same filter to operate in different modes.

Each filter entry may also include an optional **Rate Reduction** value. The default setting, **None**, transmits every occurrence of the selected message. Alternative settings reduce the transmission rate by allowing only a fraction of the messages to pass through the filter. For example, selecting **1/2 (50%)** transmits approximately one out of every two messages, while **1/10 (10%)** transmits approximately one out of every ten messages. Different entries may use different rate reduction settings, allowing frequently repeated messages to be transmitted less often than others.

Checksum Validation

The **Checksum** option is available only for NMEA 0183 input filters. When enabled, Nme3Pro verifies the checksum of each incoming NMEA 0183 sentence and rejects any sentence with an invalid checksum before it is processed or routed.

Checksum validation applies to the entire filter and therefore affects all selected sentence types. It has no effect on output filters, since checksums are generated automatically by the multiplexer when transmitting NMEA 0183 sentences.

Saving Filter Changes

Pressing **OK** closes the popup window and generates the corresponding filter string, which is automatically copied to the filter field on the configuration page. The generated string normally does not need to be edited manually, although understanding its format can be useful when reviewing a configuration or troubleshooting unexpected data flow.

Important: Closing the popup window does not immediately change the active configuration. After returning to the configuration page, the new settings must still be stored using the **SAVE** button. Until the page is saved, the previous filter remains active. To help prevent this common mistake, Nme3Pro displays a reminder message when the popup window is closed.

21. LED Indicators

Overview

The Nme3Pro multiplexer includes several LEDs that provide a real-time indication of data activity and system operation. These indicators allow the user to quickly verify that data is being received, transmitted and routed correctly through the various interfaces.

The activity LEDs are mounted directly on the multiplexer PCB and remain visible through the enclosure opening. Their position and color coding are also reproduced on the label attached to the top cover of the enclosure, providing a convenient reference to the location and function of each indicator.

P1, P2 and P3 are input ports and therefore use green LEDs that illuminate briefly whenever data is received. P4 is an output port and uses a red LED that illuminates whenever data is transmitted. Since SeaTalk1 and N2K can both receive and transmit data, each interface includes separate green input and red output indicators. Dedicated LEDs also indicate USB and WiFi activity.

While the physical LEDs provide a convenient indication of activity, they may not always be visible when the multiplexer is installed inside a locker, behind a panel or in another location with difficult access. For this reason, the multiplexer provides a remote monitoring facility called **LED Mimics**.

LED Mimics

The LED Mimics window can be opened by pressing the **LEDS** button on the EXTRA page. A popup window then displays a graphical representation of all communication activity within the multiplexer.

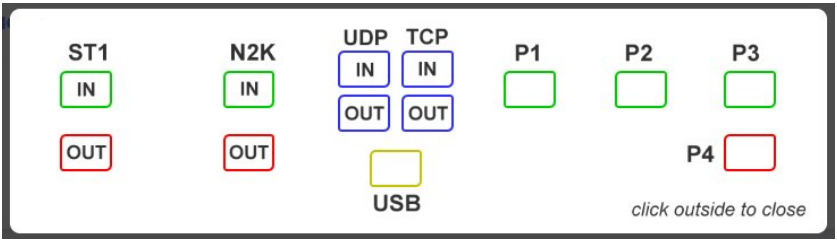


Figure 18: LED Mimics Window

The LED Mimics window reproduces the activity of the physical indicators and additionally provides more detailed information about WiFi communications. Instead of the single blue WiFi LED present on the hardware, the popup window displays four blue indicators that separately show UDP input, UDP output, TCP input and TCP output activity. This additional information allows the user to determine not only that WiFi communication is taking place, but also the direction of the data flow and the communication method being used.

The LED Mimics window is particularly useful during installation, configuration and troubleshooting. It allows routing rules to be verified, communication problems to be diagnosed and overall system operation to be monitored without requiring physical access to the multiplexer.

PART 5 — PRACTICAL GUIDES

Configuring OpenCPN with Nme3Pro

OpenCPN is one of the most widely used navigation programs for Windows, Linux and macOS. It can receive navigation data from Nme3Pro through either a USB or WiFi connection, allowing charts, AIS targets and instrument information to be displayed in real time.

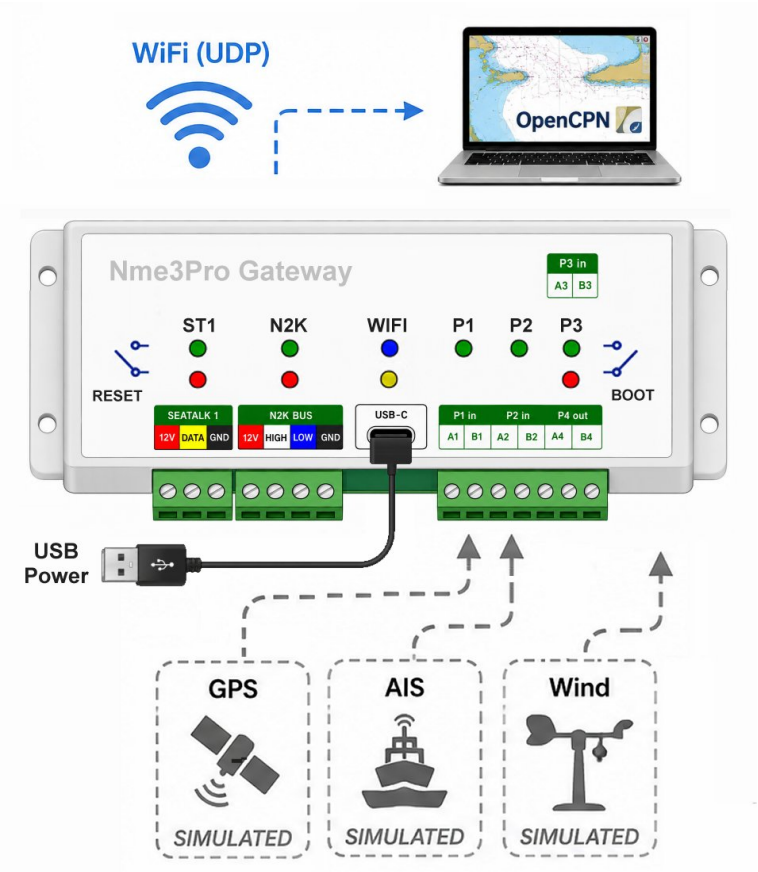


Figure 19: Typical OpenCPN WiFi configuration using SIM MODE.

For a first installation, enable **SIM MODE** before configuring OpenCPN. The simulator generates GPS, AIS and instrument data on P1, P2 and P3 respectively. On the **ROUTING** page, ensure that P1 → UDP, P2 → UDP and P3 → UDP are enabled so the simulated data reaches OpenCPN through WiFi without external navigation equipment.

The previous figure illustrates a typical WiFi communication between Nme3Pro and OpenCPN. During this initial test, the USB connection is used only to power the multiplexer, while all navigation data is transmitted to OpenCPN through WiFi.

Creating the OpenCPN Connection

Open the **Connections** page from the OpenCPN Options dialog and create a new **Network** connection. Select **UDP** as the protocol and enter the same UDP port number configured on the Nme3Pro **WIFI** page. Unless it has been changed, the factory default port is **2000**.

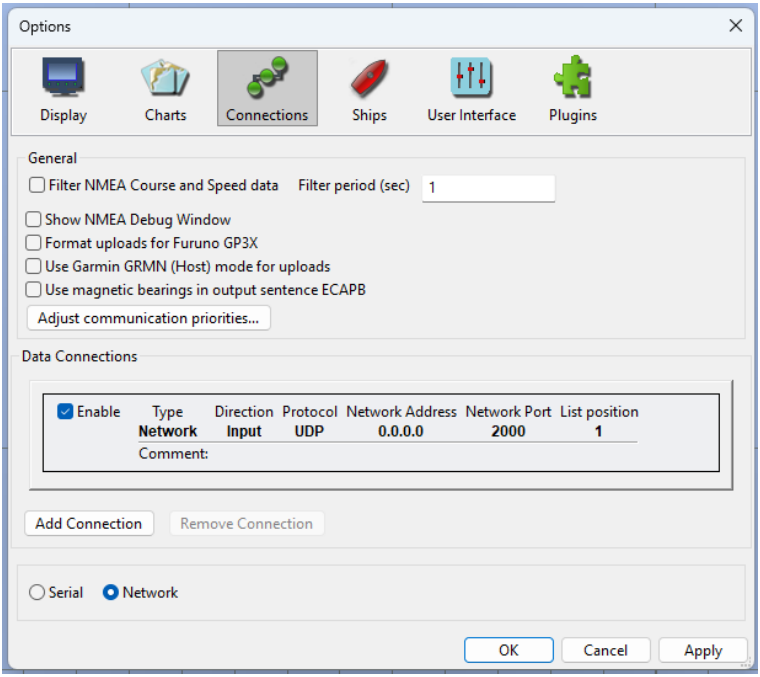


Figure 20: OpenCPN network connection configured to receive UDP data from Nme3Pro.

Verifying Communication

Once the UDP connection has been created, open the NMEA Debug Window for the newly created connection. When the connection has been configured correctly, the simulated GPS, AIS and Wind sentences generated by SIM MODE should begin appearing immediately.

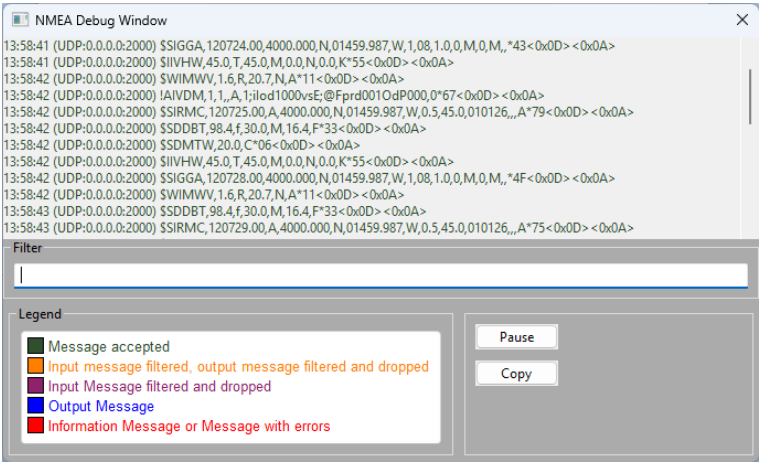


Figure 21: OpenCPN NMEA Debug Window showing simulated NMEA 0183 sentences received from Nme3Pro.

Once communication has been verified, close the NMEA Debug Window and return to the chart display. The simulated vessel position, AIS targets and instrument data should now appear automatically. The **SIM MODE** chapter illustrates the expected OpenCPN display during this test.

Using the RESET and BOOT Switches

The Nme3Pro Gateway provides two recessed pushbuttons that can be accessed through a single opening in the enclosure:

- **RESET** restarts the gateway without modifying any stored settings.
- **BOOT** provides access to several recovery and factory reset functions described later in this guide.

Because the switches are recessed, they cannot normally be operated with a finger. A pen or similar pointed object may be used to actuate either switch.

The photographs below show the location of the RESET and BOOT switches inside the enclosure. The following page illustrates a convenient method for operating either switch. By sliding the pen along the left side of the enclosure opening, the tip is guided onto the RESET switch. Sliding the pen along the right side similarly guides the tip onto the BOOT switch.

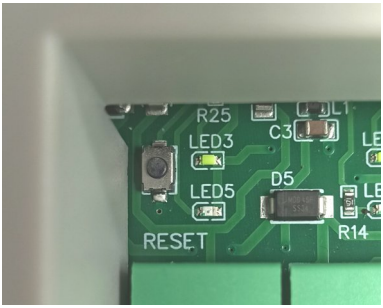


Figure 22: RESET switch

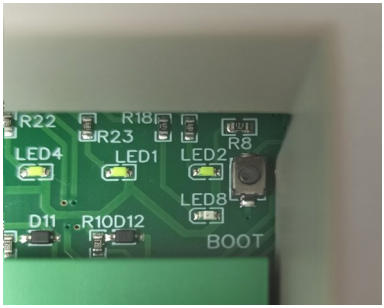


Figure 23: BOOT switch

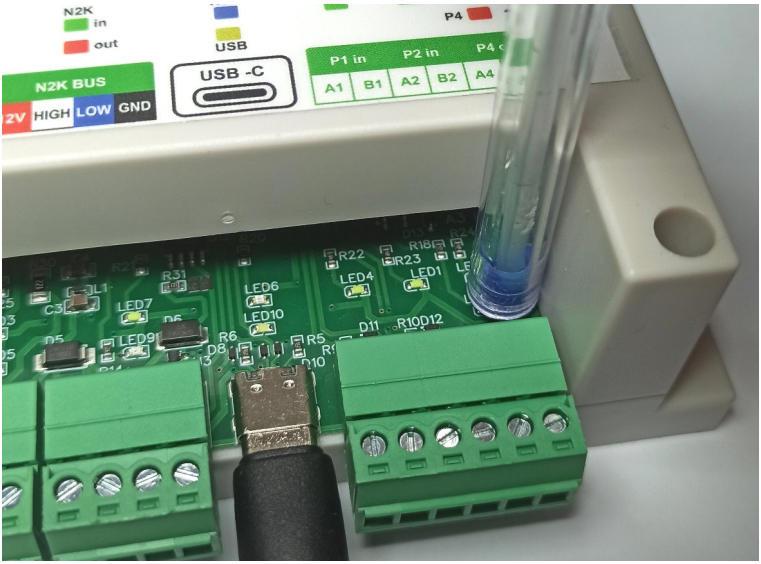


Figure 24: Operating the BOOT switch with a pen

How do I view the startup diagnostic log?

The **Nme3Pro** Gateway provides two complementary methods of obtaining diagnostic information.

For most situations, the recommended method is the **DEVELOPMENT Report**, available from the **EXTRA** page. This report summarizes the current configuration, routing table, filter settings, WiFi status and many other operating parameters in a compact format that can easily be copied into an email or attached to a technical support request.

For advanced troubleshooting, the gateway also generates a detailed **Startup Diagnostic Log** whenever it is powered up or reset. Unlike the DEVELOPMENT Report, this log contains information that is available only during the boot process, including hardware initialization, flash partition information, WiFi startup events, N2K initialization messages and other low-level diagnostic information.

The Startup Diagnostic Log is transmitted through the **USB-C** port and may be viewed using any serial terminal program connected to a computer. Since the USB interface operates independently of the NMEA 0183 serial ports, the terminal baud rate setting is not critical.

The following listing shows a typical Startup Diagnostic Log produced after a power-up or reset. The information displayed reflects the actual configuration stored in the gateway at the time of startup.

=== REAL PARTITION INFO ===

```
Running OTA slot: app0
Partition size: 6.0 MB
Your sketch: 4.9 MB
Actual usage: 81.9%
Free space in running slot: 1.1 MB
Free OTA slot: app1
Free space in free slot: 1.1 MB
Core Dump partition: coredump
Core Dump size: 64.0 KB
Filesystem partition: spiffs
Filesystem address: 0xC40000
Filesystem size: 3.75 MB
=== SETUP STARTED ===
Reading General Settings ...
   Firmware Version: 1.0.19
   WiFiMode: AP_AND_STA
   doSelfTest: 0
   hasAcceptedTerms: 1
   currentLanguage: 0
```

```
Reading Connections Settings ...
   ssidAP: NMEA-PRO
   passAP: 12345678
   ipAP: 192.168.4.1
   ssidST: MARINA_WIFI
   passST: password123
   ipST: DHCP

Reading Routing Table ...
       P4   USB  ST1  N2K  UDP  TCP1 TCP2
   P1   1    0    0    0    0    0    0
   P2   0    0    0    1    1    0    0
   P3   0    0    0    0    1    0    0
   USB  0    0    0    0    0    0    0
   ST1  0    0    0    0    0    0    0
   N2K  0    0    0    0    0    0    0
   UDP  0    0    0    0    0    0    0
   TCP1 0    0    0    0    0    0    0
   TCP2 0    0    0    0    0    0    0
Reading Serial Settings ...
   P1 baud: 4800
   P2 baud: 38400
   P34 baud: 4800
   filterP1_In: A
   filterP2_In: A
   filterP3_In: A
   filterP4_Out: A
   filterUSB_In: A
   filterUSB_Out: A
Reading WiFi Settings ...
   UDP port: 2000
   TCP1 port: 0
   TCP2 port: 0
   filterUDP_In: A
   filterUDP_Out: A
   filterTCP1_In: A
   filterTCP1_Out: A
   filterTCP2_In: A
   filterTCP2_Out: A
Reading SeaTalk Settings ...
   filterSTK_In: A
   filterSTK_Out: A
   ST_Mode: 0
Reading N2K Settings ...
   filterN2K_In: A
   filterN2K_Out: A
   rawtyp: 0
   rawchannel: -1
   SendRawDisabled: NO
Reading Simulation Location ...
   Latitude: 41.00
   Longitude: -10.00
```

```
Reading Extra Settings ...
   IsNullGateway: 1
   IsWiFiAlwaysOn: 1
   IsNoAPpass: 0
   IsShowAllN2K: 0
   SOG_to_STW: 1
   SailGrib_VHW: 1
   ST26_Inv_Ignore: 1
   Datagram 58?: 1
Readings complete!

Soft-AP creation success!
   ssidAP: NME3-PRO
   passAP: 12345678
   IP address: 192.168.4.1
Starting Wi-Fi station connection …
NMEA 2000 initialization ...
    Unique N2K ID: 377386
Nmea2000 Initialization complete!
SETUP COMPLETE!
   not found <MARINA_WIFI> on Ch<1> in 52ms - trying next channel
   not found <MARINA_WIFI> on Ch<6> in 52ms - trying next channel
   FOUND <MARINA_WIFI> Ch<11> in 52ms - comprehensive scan
Station connected on channel 11!
   ssidST: MARINA_WIFI
   IP Address: 192.168.1.203
   UDP broadcasting: 192.168.1.255
   Gateway: 192.168.1.1
   SubnetMask: 255.255.254.0
```

For most support requests, the DEVELOPMENT Report provides all the information required. The Startup Diagnostic Log is primarily intended for advanced troubleshooting or when specifically requested by technical support.

Recovery and Factory Reset

The **Nme3Pro** Gateway provides several methods for recovering access to the web interface or restoring the factory configuration. The appropriate recovery procedure depends on the desired outcome and whether access to the web interface is still available.

Creating an Unprotected Access Point

To create an unprotected Access Point while preserving all other configuration settings, enter **NULL** as the Access Point password on the **WIFI** page and save the configuration. The Access Point will then operate without password protection while all other settings remain unchanged.

Factory Reset from the Web Interface

Press the **Factory Reset** button at the bottom of the **HOME** page. The gateway will restart using the factory default configuration, including the default Access Point password **12345678**.

Factory Reset Using the BOOT Switch

If the web interface is no longer accessible, the same factory reset may be performed using the **BOOT** switch. Press and hold the switch until all LEDs turn off, then release the switch. The gateway will restart using the factory default configuration, including the default Access Point password **12345678**.

Factory Reset with an Unprotected Access Point

To restore the factory configuration while simultaneously creating an unprotected Access Point, continue holding the **BOOT** switch after the LEDs turn off. When the LEDs illuminate again (approximately 10 seconds later), release the switch. The gateway will restart using the factory default configuration with the Access Point password automatically set to **NULL**.

Using the NO_GATEWAY Option

The **NO_GATEWAY** option is available on the **EXTRA** page and is intended primarily to improve compatibility with Apple iPhone and iPad devices.

Many navigation applications require both NMEA data from the boat instruments and Internet connectivity for services such as weather information, online charts or cloud-based AIS services. When a mobile device connects to the Nme3Pro Access Point, the operating system must decide how Internet access will be handled.

When **NO_GATEWAY** is enabled, the gateway does not advertise itself as an Internet gateway. Apple iOS devices may recognise this condition and remain connected to Nme3Pro for NMEA data while using the cellular network for Internet access. Behaviour may vary according to the device, operating system version and network settings.

Android devices generally do not use **NO_GATEWAY** in the same way. Depending on the device and its settings, Android may continue to prefer the WiFi connection, request confirmation from the user or require mobile data to be temporarily disabled.

The **NO_GATEWAY** option is enabled by default. It affects only the network information presented to connected devices and does not modify routing tables, serial port configuration, WiFi communication, SeaTalk1 operation or N2K operation.

Using a Fixed IP Address for TCP Connections

When the **Nme3Pro** connects to an external WiFi network as a **Station**, it normally obtains its IP address automatically using **DHCP**. This is the recommended configuration and is suitable for most installations.

Some navigation programs using **TCP** connections require the gateway IP address to be entered manually. In these situations, assigning a fixed IP address to the gateway may simplify the configuration.

A simple procedure is:

- Configure the Station connection using **DHCP**.
- Allow the gateway to connect to the WiFi network.
- Note the IP address assigned to the gateway. This address is displayed on the **HOME** page.
- Open the **WIFI** page.
- Replace **DHCP** in the **Station IP Address** field with the assigned IP address.
- Save the configuration and restart the gateway.

The gateway will then request the same IP address each time it connects to that WiFi network, simplifying the configuration of TCP clients and navigation software.

> **Note:** The selected IP address must be valid for the target network and must not conflict with addresses assigned to other devices. If connection problems occur, restore the **Station IP Address** setting to **DHCP**.

Verifying Correct Hardware Operation

Before concluding that the **Nme3Pro** is faulty or returning it for repair, perform the built-in self-test described in this guide. A successful self-test provides a useful check of several main hardware paths and indicates that any remaining problem is likely related to configuration, wiring, network settings or connected equipment.

The self-test requires a 12 V power supply and four temporary wire connections. The photograph below shows the required setup.

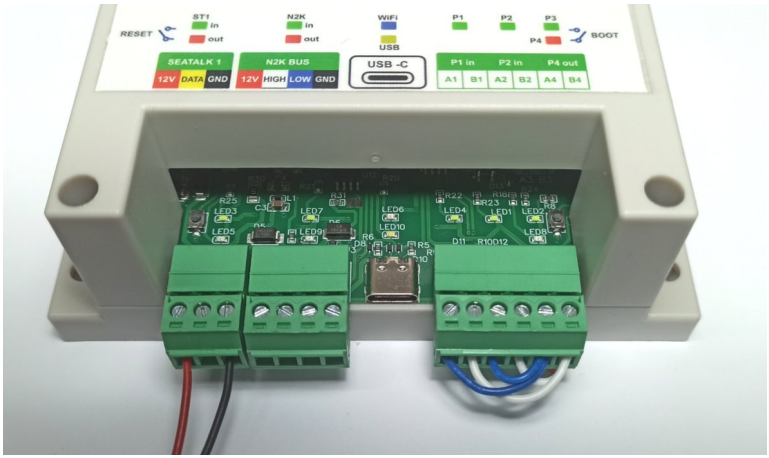


Figure 25: Temporary wiring required for the built-in hardware self-test.

Test Procedure

- Connect a 12 V power supply to the **SeaTalk1** connector as shown in the photograph.
- Connect the **P4** output port to both the **P1** and **P2** input ports using the temporary wire links shown.
- Apply power to the gateway.
- Press and hold the **BOOT** switch.
- When all LEDs turn off, release the switch.

The gateway will enter its built-in self-test routine. During the test, predefined data patterns are repeatedly transmitted and verified.

The sequence begins with the **P4** red LED, indicating that a test pattern is being transmitted. When the transmitted data is successfully received, the corresponding **P1** and **P2** green LEDs illuminate in succession, confirming correct operation of both input channels.

The test then continues with the **SeaTalk1** and **N2K** interfaces, followed by the WiFi and USB indicators. Each indicator remains illuminated for approximately 500 ms before the next stage begins. The complete sequence repeats continuously until the **RESET** switch is pressed or power is removed.

A successful self-test verifies the correct operation of:

- the switching regulator power supply circuit;
- the processor and firmware;
- the NMEA 0183 interfaces;
- the SeaTalk1 interface;
- the N2K interface;
- all status LEDs.

The **P3** input is not included in the standard self-test because its connector is located inside the enclosure and is not accessible without removing the top cover.

If all LEDs operate as described above and shown in the demonstration video, the gateway hardware is functioning correctly. Any remaining communication problems are therefore likely to be caused by configuration, wiring, network settings or connected equipment rather than by a hardware fault.

A demonstration video showing the complete procedure and the expected LED sequence is available at:

https://www.vela-navega.com/nme3pro/hardware_test.mp4

Analysing Network Traffic

Nme3Pro provides several facilities for inspecting the traffic present on **SeaTalk1** and **N2K** networks. These tools are useful when diagnosing installation problems, identifying transmitted messages, verifying protocol conversions, or collecting information for technical support.

SeaTalk1 Traffic

When troubleshooting a SeaTalk1 installation, it is often useful to examine the individual datagrams present on the bus and how they are interpreted by Nme3Pro. This can help identify faulty instruments, unexpected datagrams, missing information or conversion problems.

Open the **SEATALK** page and set **ST > NMEA0183 MODE** to **2 (Always add $STALK)**. In this mode, Nme3Pro performs the normal conversion of supported SeaTalk1 datagrams to NMEA0183 sentences while also generating a proprietary **$STALK** sentence for every datagram received.

Route **ST1** to **USB**, **UDP** or **TCP**, then monitor the resulting traffic using the **DEBUG** page or any suitable terminal program.

The following figure shows three typical examples. Datagram **11** is converted to a single **MWV** sentence, datagram **9C** generates both **HDG** and **RSA** sentences, while datagram **90** has no standard NMEA0183 equivalent and is therefore represented only by a **$STALK** sentence.

```
STK: ST=11 01 0C 03 - Apparent wind speed 12.3 kts
     >> UDP: $WIMWV,123.5,R,12.3,N,A*16
     >> UDP: $STALK,11,01,0C,03*30
STK: ST=9C 31 18 00 - Heading 318.0 Rudder 0
     >> UDP: $GPHDG,318.0,,,2.0,W*2F
     >> UDP: $IIRSA,0,A,,V*67
     >> UDP: $STALK,9C,31,18,00*30
STK: ST=90 00 22 - Device identification
     >> UDP: $STALK,90,00,22*64
```

Figure 26: SeaTalk1 traffic in the Debug Window

Displaying all datagrams in this way allows the complete contents of the SeaTalk1 bus to be examined, including proprietary Raymarine datagrams and messages generated by autopilots. It also provides a convenient method

of verifying that SeaTalk1 to NMEA 0183 conversion is operating correctly.

This technique is particularly useful for:

- Verifying that a SeaTalk1 instrument is transmitting data.
- Identifying the datagrams present on the network.
- Confirming correct SeaTalk1 to NMEA 0183 conversion.
- Investigating unsupported or proprietary datagrams.
- Capturing traffic when requesting technical support.

After completing the analysis, the **ST > NMEA0183 MODE** setting should normally be returned to **0**, the default operating mode, which generates only standard NMEA 0183 sentences.

N2K Traffic

Nme3Pro can forward raw **N2K** traffic to a computer, allowing all messages present on the N2K bus to be monitored and analysed. This can be useful when diagnosing network problems, identifying PGNs transmitted by connected devices, or capturing data for technical support.

Open the **N2K** page and select **Actisense Binary** as the **RAW TYPE**. This format is intended for USB communication and is compatible with several N2K analysis tools, including the free **Actisense NMEA Reader** utility.

When **Actisense Binary** is selected, Nme3Pro automatically forwards all N2K traffic through its **USB-C** port. No routing configuration is required.

Connect the Nme3Pro **USB-C** port to a computer and start a compatible N2K analysis program. The software should immediately begin displaying the PGNs present on the network together with their associated data fields.

The captured traffic can be used to:

- Verify that N2K devices are transmitting correctly.
- Identify the PGNs present on the network.
- Diagnose communication problems.
- Confirm that Nme3Pro is receiving N2K traffic.
- Record data for later analysis.
- Capture information when requesting technical support.

When the analysis is complete, restore the normal **RAW TYPE** setting if required.

Appendix A — Web Interface Reference

The following pages contain screenshots of every Nme3Pro web interface page in its default English configuration.

They are provided as a quick visual reference to help identify pages, controls and menus while using the multiplexer.

Detailed descriptions of each page, its controls and operating procedures are given in Part 3 of this manual. This appendix is intended only as a visual reference.

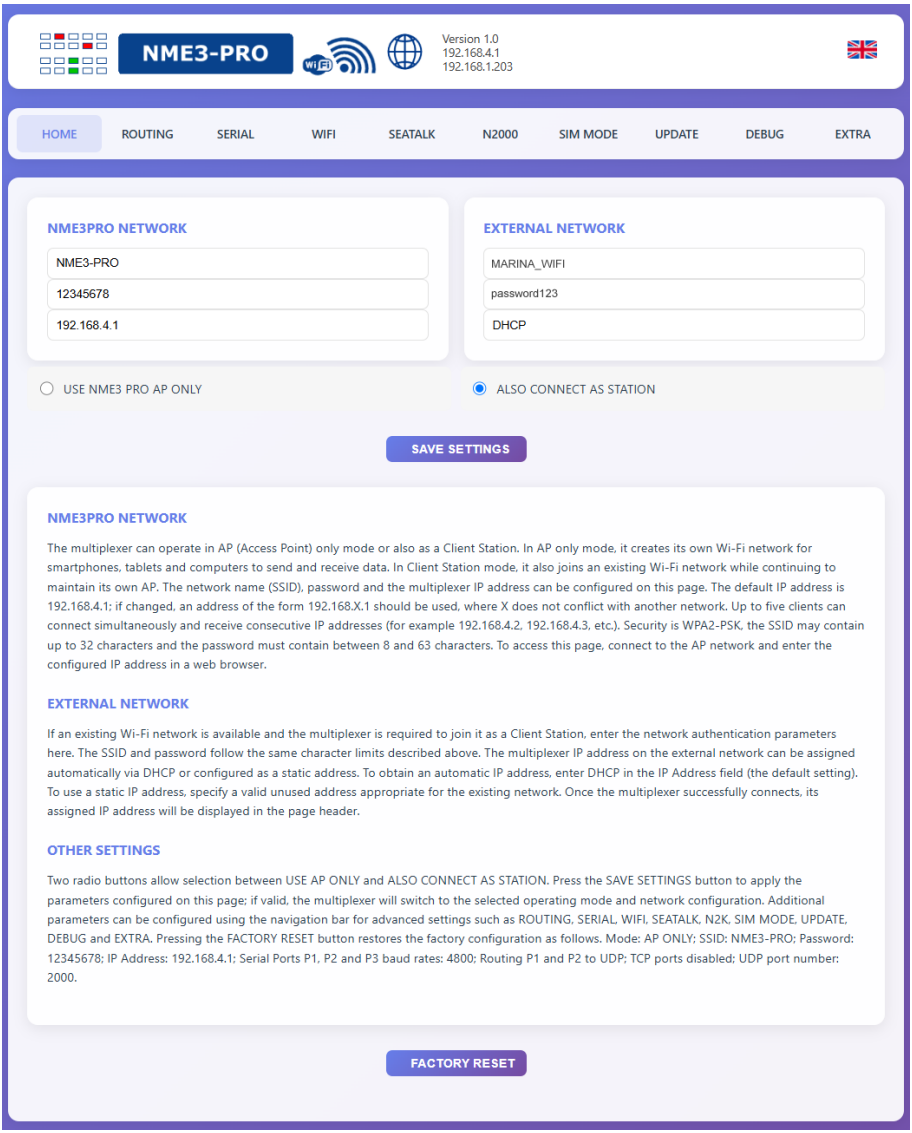


Figure 27: HOME page.

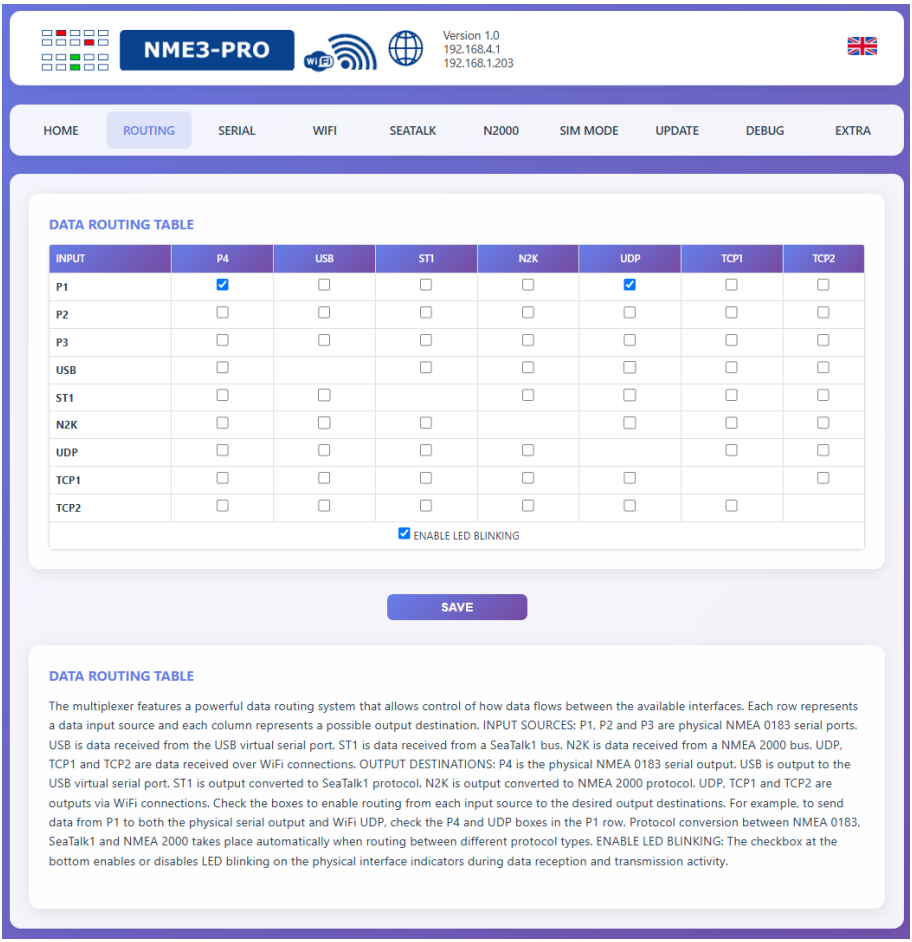


Figure 28: ROUTING page.

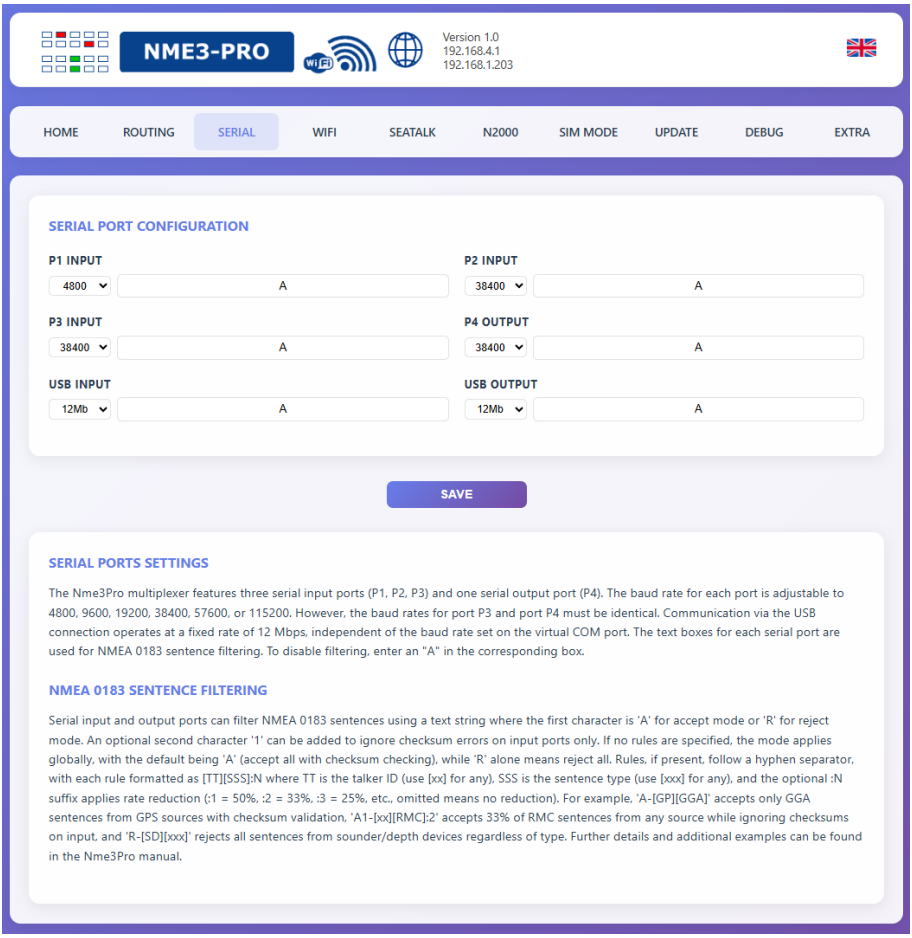


Figure 29: SERIAL page.

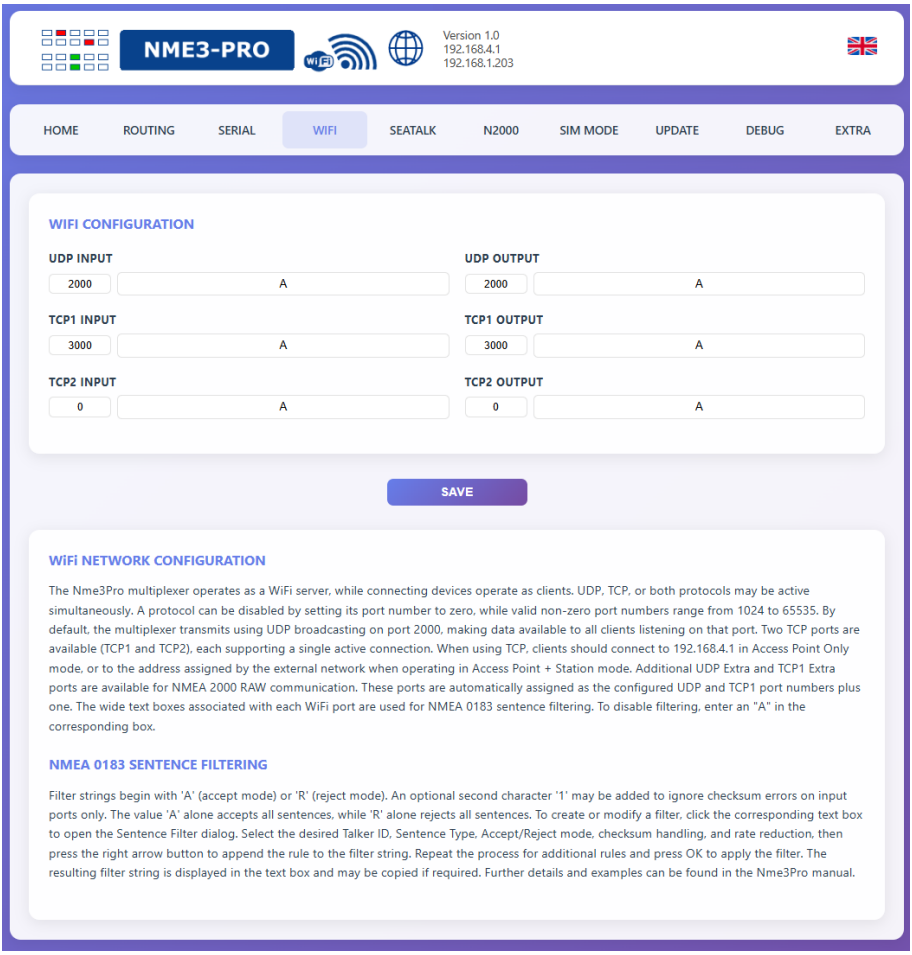


Figure 30: WIFI page.

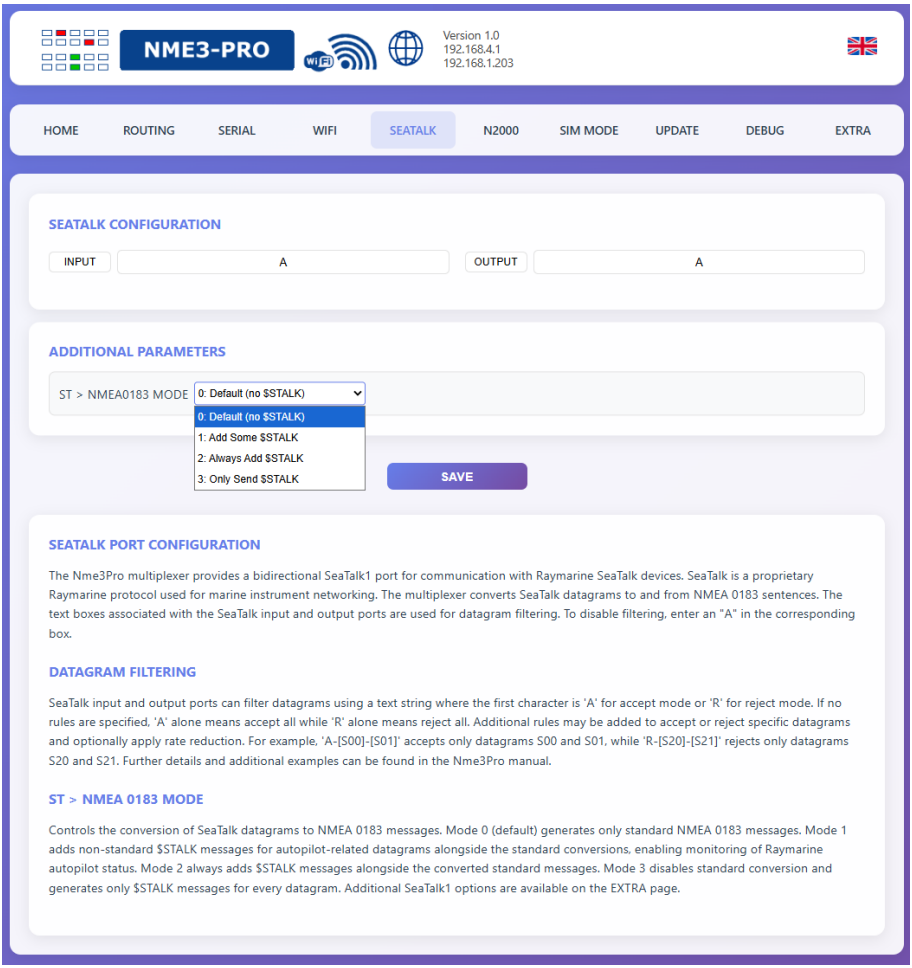


Figure 31: SEATALK page-

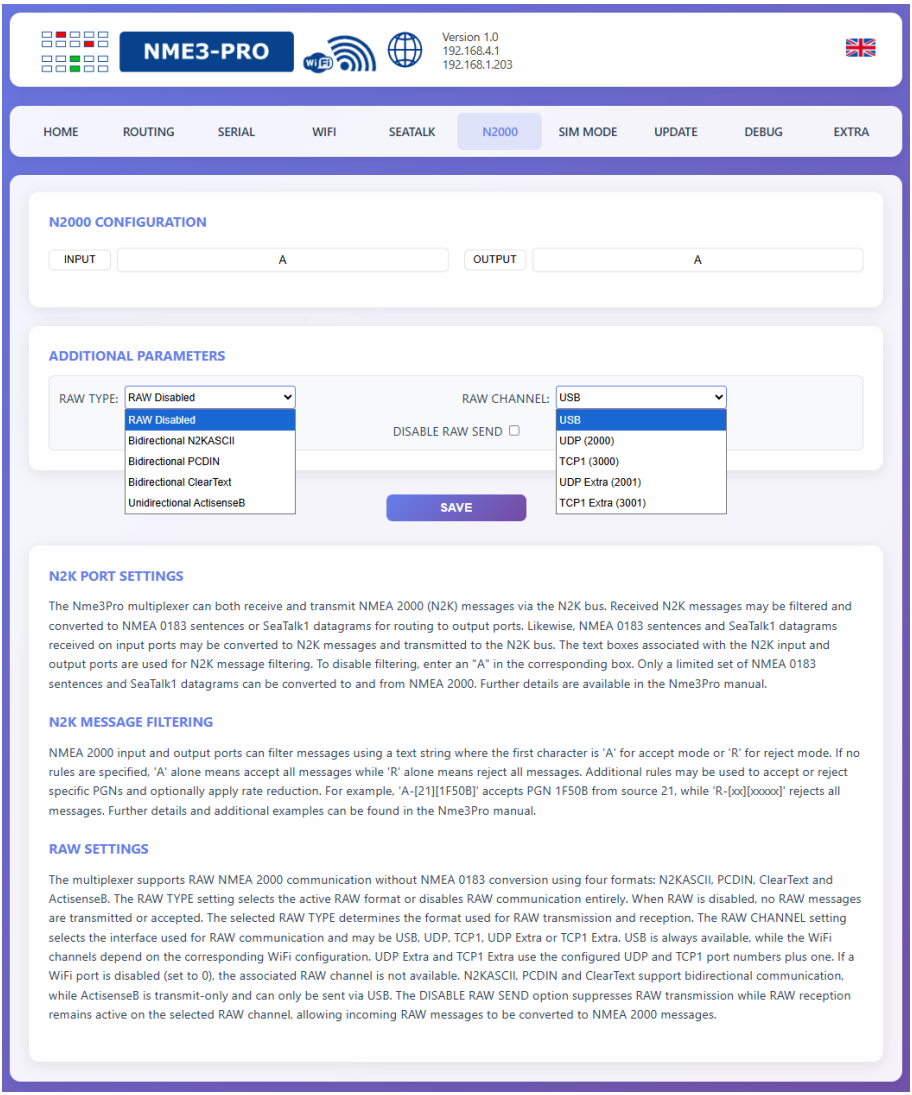


Figure 32: N2000 page.

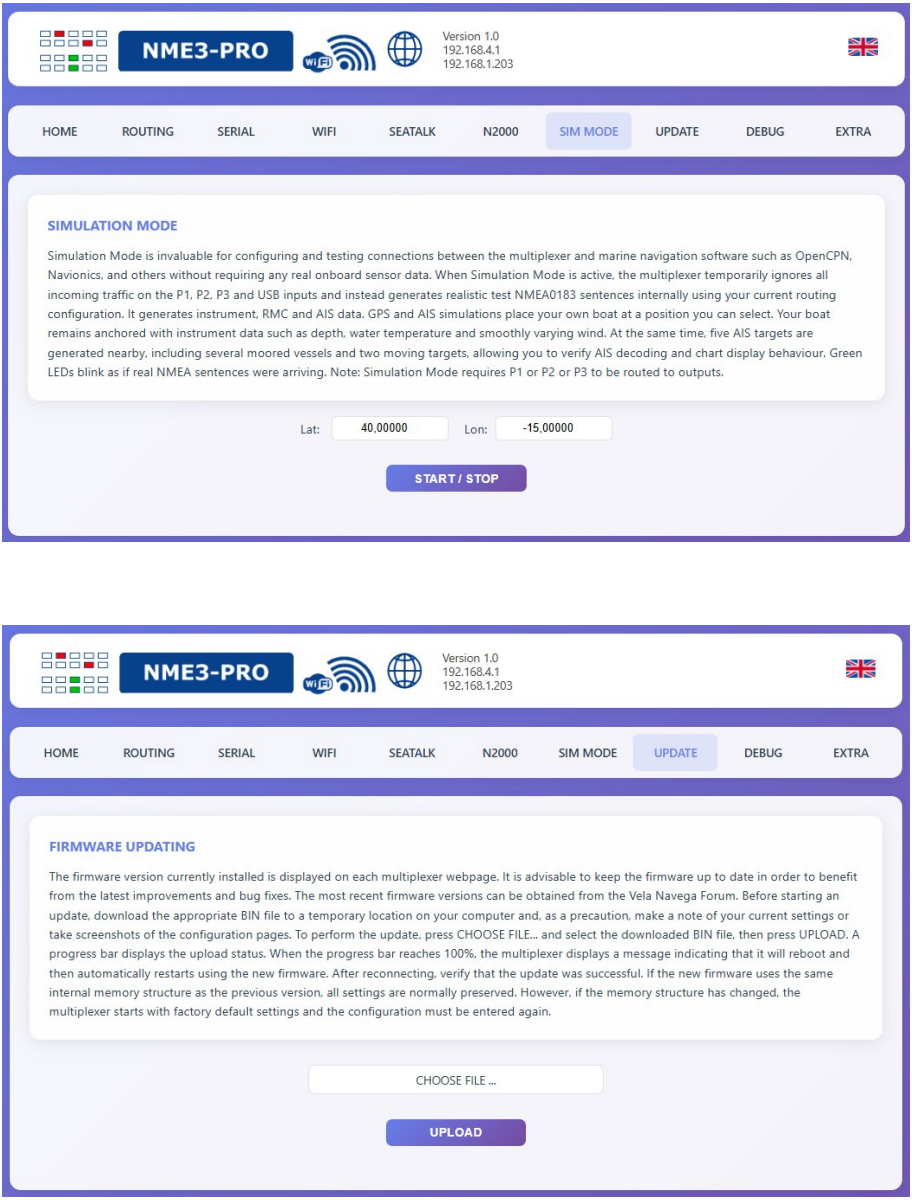


Figure 33: SIM MODE (top) and UPDATE (bottom) pages.

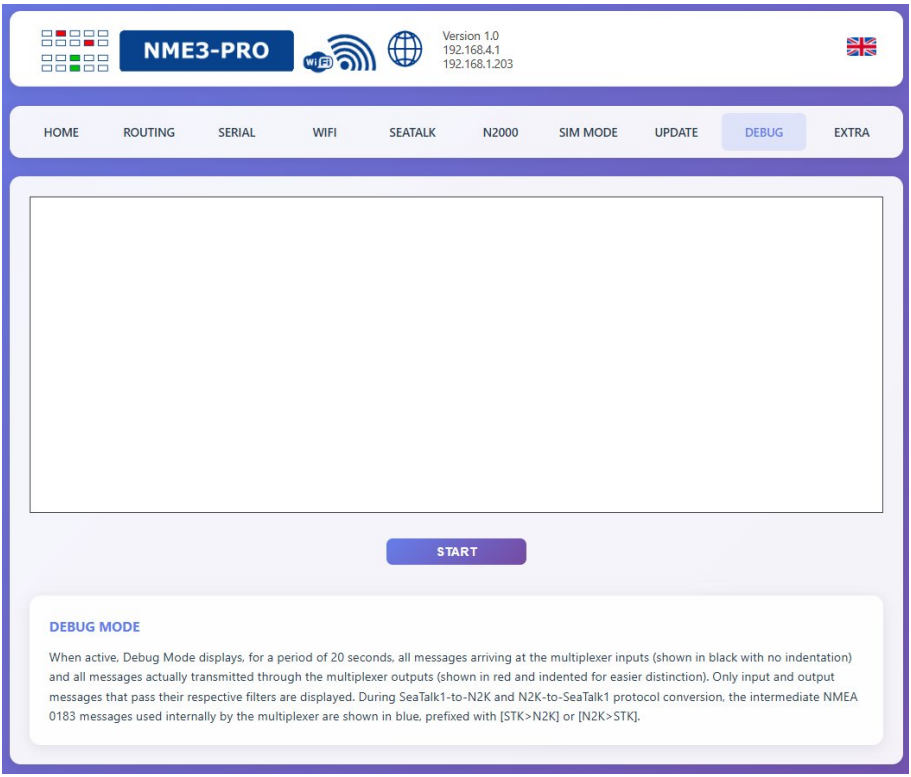


Figure 34: DEBUG page.

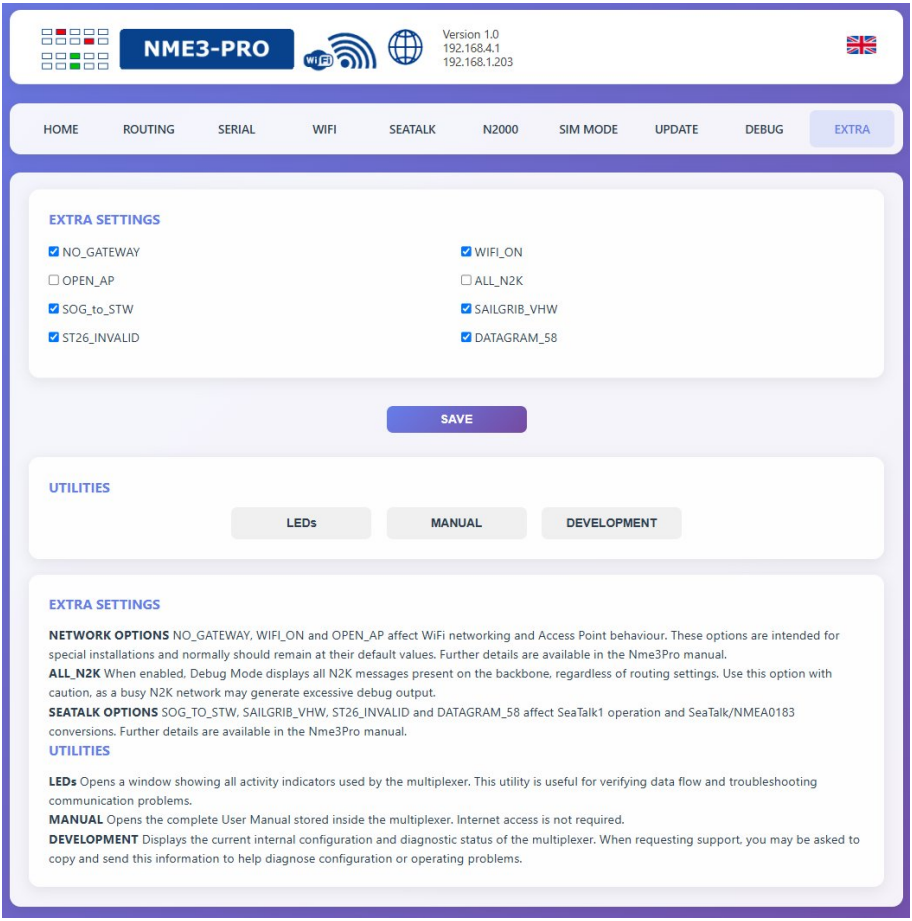


Figure 35: EXTRA page.

Appendix B — SeaTalk1 → NMEA 0183 Conversions

ST1 Datagram	Information	0183 Output
00 – Depth	Depth below transducer	DBT
10 – Apparent Wind Angle	Apparent wind angle	—
11 – Apparent Wind Speed	Apparent wind angle and speed	MWV
20 – Speed Through Water	Speed through water	VHW
21 – Trip Mileage	Trip distance	VLW
22 – Total Mileage	Total distance	VLW
23 – Water Temperature	Water temperature	MTW
25 – Total and Trip Mileage	Total and trip distance	VLW
26 – High-Resolution STW	Speed through water	VHW
27 – High-Res Temperature	Water temperature	MTW
50 – GPS Latitude	Latitude	—
51 – GPS Longitude	Longitude	—
52 – Speed Over Ground	SOG	—
53 – Course Over Ground	COG	—
54 – GPS Time	Position, date, time, COG, SOG	RMC
56 – GPS Date	UTC date	—
58 – GPS Position	Position and time	GLL
84 – Autopilot Heading	Heading and AP status	HDG, HDM
89 – Compass Heading	Magnetic heading	HDG, HDM
99 – Magnetic Variation	Magnetic variation	—
9C – Heading and Rudder	Heading and rudder angle	HDG, HDM, RSA

Table B: SeaTalk1 to NMEA 0183 Conversions

Appendix C — NMEA 0183 → SeaTalk1 Conversions

0183 Sentence	Notes	ST1 Datagrams
AAM	Arrival/perpendicular passed	A2
APB	Autopilot steering	85, 82, A1
BWR/BWC	Bearing & range	85, 82, A1
DBT	Depth	00
DPT	Depth (meters)	00
GGA	GPS fix	54, 57, 58
GLL	Position + time	54 + 58 or 50 + 51
HDG	Heading + variation	99, 89
HDM	Magnetic heading	89
MTW	Water temperature	27
MWV	AWA + AWS	10, 11
RMB	Waypoint navigation	85, 82, A1
RMC	Full navigation	54, 50, 51, 52, 53, 99, 56
STALK	Raw SeaTalk	Raw SeaTalk
VHW	STW + optional heading	20, 89
VTG	COG/SOG	52, 53
WPL	Waypoint definition	9E
XTE	Cross-track error	85

Table C: NMEA 0183 to SeaTalk1 Conversions

Appendix D — N2K → NMEA 0183 Conversions

This appendix lists all N2K to NMEA0183 conversions currently supported in Nme3Pro. The tables identify the N2K PGNs supported by Nme3Pro and the corresponding NMEA 0183 sentences that may be generated. The tables are intended as a reference when verifying protocol compatibility and conversion behaviour.

N2K PGN	Boat-Data Fields	0183 Output
126720 – Raymarine Pilot	Pilot Mode, Submode, Keystrokes	ALK (SeaTalk1)
127237 – Heading/Track Control	Partial; no full 0183 implementation	HDG (future)
127245 – Rudder	Rudder Angle	RSA
127250 – Vessel Heading	Heading, Deviation, Variation	HDG, HDM, HDT
128259 – Speed (Water-Referenced)	Water Speed	VHW (heading if available)
128267 – Depth	Depth, Offset	DPT, DBT
128275 – Log/Trip Log	Log, Trip Log	VLW
129026 – COG/SOG Rapid Update	Course Over Ground, Speed Over Ground	VTG
129038 – AIS Class A Position	AIS Messages 1/2/3	AIVDM/AIVDO
129039 – AIS Class B Position	AIS Message 18	AIVDM/AIVDO
129040 – AIS Class B Extended	AIS Message 19	AIVDM/AIVDO
129041 – AIS AtoN Report	AIS Message 21	AIVDM/AIVDO
129283 – Cross Track Error	XTE	XTE
129284 – Navigation Data	BTW, BOTW, DTW, VMG, ETA, Bearing Reference	RMB/APB (timed)
129285 – Route/WP Data	Waypoint Names, Positions	RMB/APB (timed)

N2K PGN	Boat-Data Fields	0183 Output
129794 – AIS Class A Static	AIS Message 5	AIVDM/AIVDO
129809 – AIS Class B Static A	AIS Message 24A	AIVDM/AIVDO
129810 – AIS Class B Static B	AIS Message 24B	AIVDM/AIVDO
130306 – Wind	Wind Angle, Wind Speed	MWV
130310 – Environmental (10)	Water Temperature	XDR
130311 – Environmental Parameters	Air Temperature, Water Temperature, Pressure, Humidity	XDR
130312 – Environmental (12)	Water Temperature	XDR
130316 – Environmental (16)	Water Temperature	XDR
65359 – Raymarine Heading	True Heading, Magnetic Heading	HDT, HDM

Table D-1: Event-Driven N2K to NMEA 0183 Conversions

The conversions listed in Table D-1 are event-driven and are generated immediately when the corresponding N2K PGN is received. The conversions listed in Table D-2 are timer-driven and generated periodically using navigation data previously stored by Nme3Pro. Several N2K PGNs may contribute information to a single NMEA 0183 sentence.

N2K PGN	Boat-Data Fields Updated	Timed 0183 Output
126992 – System Time	UTC Time	RMC, GGA
127258 – Magnetic Variation	Variation	RMC, HDG, VTG, APB, RMB
129025 – Position Rapid Update	Latitude, Longitude	RMC, GLL, GGA
129026 – COG/SOG Rapid Update	COG, SOG	RMC, VTG
129029 – GNSS Position Data	Latitude/Longitude, UTC, COG, SOG, HDOP, Satellites	RMC, GGA, VTG
129283 – Cross Track Error	XTE	XTE (timed)
129284 – Navigation Data	BTW, BOTW, DTW, VMG, ETA	RMB, APB (timed)
129285 – Route/WP Data	Waypoint Names, Positions	RMB, APB (timed)

Table D-2: Timer-Driven N2K to NMEA 0183 Conversions

Appendix E — NMEA0183 → N2K Conversions

0183 Sentence	N2K PGNs Produced
APB	129283 (Cross Track Error) 129284 (Navigation Data)
BWC	129284 (Navigation Data)
BWR	129284 (Navigation Data)
DBK	128267 (Water Depth)
DBT	128267 (Water Depth)
DPT	128267 (Water Depth)
GGA	127258 (Magnetic Variation) 129029 (GNSS Position Data) 129025 (Position Rapid)
GLL	129025 (Position Rapid)
HDG	127250 (Vessel Heading)
HDM	127250 (Vessel Heading)
HDT	127250 (Vessel Heading)
MTW	130310 (Environmental Parameters) 130316 (Temperature, Extended)
MWV	130306 (Wind Data)
RMC	127258 (Magnetic Variation) 129029 (GNSS Position Data) 129026 (COG/SOG Rapid)

0183 Sentence	N2K PGNs Produced
VDO (AIS Own)	129038 (AIS Class A Position) 129039 (AIS Class B Position) 129040 (AIS Class B Extended) 129041 (AIS AtoN); 129793 (AIS UTC/Date) 129794 (AIS Class A Static) 129798 (AIS SAR Aircraft) 129802 (AIS Safety Broadcast / Type 27) 129809 (AIS Class B Static Part A) 129810 (AIS Class B Static Part B)
VDM (AIS Other)	129038 (AIS Class A Position) 129039 (AIS Class B Position) 129040 (AIS Class B Extended) 129041 (AIS AtoN); 129793 (AIS UTC/Date) 129794 (AIS Class A Static) 129798 (AIS SAR Aircraft) 129802 (AIS Safety Broadcast / Type 27) 129809 (AIS Class B Static Part A) 129810 (AIS Class B Static Part B)
VHW	128259 (Speed, Water Referenced)
VWR	130306 (Wind Data)
VTG	129026 (COG/SOG Rapid)
XTE	129283 (Cross Track Error)

Table E: NMEA0183 to N2K Conversions