SAILSENSE

HUB PRO V5

USER MANUAL

Version 1.0 — 2025

Smart LTE Vessel Gateway & Data Processing Unit

Embedded LTE Connectivity • dual NMEA2000 / J1939 CAN • GPS • Ethernet • Zigbee • Bluetooth • Advanced Data Logging • Cloud Synchronisation • Motion & G-Shock Sensors Analog Inputs (0−36 V) • Multi-Network Integration

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SUMMARY

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1. General Information

1.1 Purpose of this Manual

This manual provides all information required for the correct installation, commissioning, operation and long-term supervision of the Sailsense HUB Pro V5, the central data and communication gateway of the Sailsense ecosystem. It describes the HUB's functional role, network interfaces, electrical and environmental requirements, configuration workflow, LED states, and diagnostic procedures necessary for reliable operation onboard.

Although the HUB interacts with Powerail modules, keypads, IO boxes and NMEA2000 devices, this document focuses exclusively on the HUB Pro V5. Separate manuals must be consulted for installation and configuration of these other devices.

The goal of this manual is to ensure that installers, system integrators and operators understand:

- how the HUB collects, processes and distributes vessel data,
- how it interfaces with CAN networks, GPS, Ethernet, Zigbee and cellular systems,
- how to install and configure the HUB safely,
- how to interpret its indicators and troubleshoot communication or sensor issues.

1.2 Description of the HUB Pro V5

The HUB Pro V5 is the intelligence and communication centerpiece of a Sailsense-equipped vessel. It continuously gathers data from all onboard networks — CAN1 (J1939), CAN2 (NMEA2000 listen-only), GPS, analog inputs, Zigbee sensors, Ethernet and cellular networks — and transforms these data into actionable information for both onboard systems and the Sailsense cloud.

Key characteristics include:

- **Embedded 4G modem and SIM card** for cloud communication.
- **Real-time GPS tracking** using an external antenna.
- **Tri-channel analog acquisition** for monitoring batteries, pumps, sensors (0–36 V).
- **Full duplex CAN1 interface** providing command, telemetry and HUB power capability.
- **Dedicated CAN2 channel** for NMEA2000 navigation and engine monitoring (read-only).
- **Zigbee radio** for integration of wireless sensors (temperature, intrusion, humidity, etc.).
- **Ethernet interface** enabling Starlink connectivity or display of the onboard application.
- **Internal motion, G-shock and altitude sensors** for safety monitoring.

- **Local data storage** of vessel information for up to **45 days** in absence of network connectivity.

The HUB does not perform electrical switching. It acts as the core logic unit, orchestrating the Powerail modules, interpreting sensor readings, storing configuration, and maintaining synchronicity across the system.

1.3 System Architecture

Within the Sailsense ecosystem, the HUB Pro V5 functions as the central coordination and data-processing node. Its role is to interface with multiple subsystems simultaneously and ensure deterministic behaviour across the vessel.

Primary functions within the architecture

- **Data Acquisition**
  - CAN1: Powerail modules, IO boxes, keypads, lithium chargers (J1939).
  - CAN2: engine & navigation data (NMEA2000).
  - Analog signals: batteries, switches, bilge floats, pumps.
  - Zigbee sensors: wireless environmental sensors.
  - GPS: position, motion, speed, heading.

- **Data Processing & Logic Execution**
  - Application of the vessel configuration downloaded from Sailsense.io.
  - Management of automation rules, alarms, and system behaviours.
  - Synchronisation of states across all Powerail modules.

- **Communication Gateway**
  - Cloud synchronisation through embedded 4G modem.
  - Local communication with onboard displays via Ethernet.
  - Wireless access via Bluetooth for initial setup.
  - Zigbee pairing and routing logic for wireless devices.

- **Data Storage & Redundancy**
  - Up to **45 days of offline data buffering** when 4G is unavailable.
  - Automatic upload once connectivity is restored.

Position in the network

The HUB is always placed at the logical center of the vessel network, receiving and distributing information to:

- Powerail V8 / V7 modules
- Blink keypads
- Blink IO modules
- Sailsense mobile app

<!-- SAILSENSE logo -->

- Onboard displays (Ethernet)
- Remote cloud services (4G)

It therefore ensures system integrity, synchronisation and data continuity.

1.4 Delivery Scope

A standard HUB Pro V5 delivery typically includes:

- The **HUB Pro V5 unit**
- The **1.5 m molded Sailsense cable** incorporating:
  - M12 male connector
  - Dual power inputs
  - CAN1 and CAN2 branches
  - Ethernet and accessory terminations (depending on kit)

- The **external GPS antenna**
- Mounting screws (depending on variant)
- Quick-start documentation or reference card

Any optional hardware — Ethernet adapters (Raymarine, B&G), NMEA2000 adapters, Starlink integration parts — must be supplied separately depending on the installation.

1.5 Intended Use

The HUB Pro V5 is designed exclusively for:

- Centralised data collection and processing aboard recreational or professional vessels.
- Integration into 12 VDC or 24 VDC marine electrical systems.
- Operation within Sailsense digital ecosystems as the primary logic and telemetry unit.
- Remote monitoring, alarm reporting, and vessel tracking when cellular coverage is available.

It must **not** be used to control high-current loads directly, nor be exposed to harsh environments or incorrect supply voltages.

The HUB is intended to be installed by qualified marine electricians familiar with CAN bus networks, NMEA2000 standards, and marine electronic installation practices.

1.6 Regulatory Information and Warranty

The HUB Pro V5 complies with applicable marine electrical and environmental regulations. Installation outside the conditions described in this manual, modification of wiring,

inappropriate power supply, or exposure to conditions beyond specified environmental limits may void the warranty.

Servicing of the HUB may only be performed by Sailsense-certified personnel. Unauthorised opening or repair attempts immediately void the product warranty.

2. Safety Information

The HUB Pro V5 is an electronic communication and data-processing device designed for integration into marine environments. Although it does not distribute power or switch electrical loads, improper installation may compromise network integrity, affect system behaviour, or lead to loss of monitoring functions. All personnel installing or servicing the HUB must read and fully understand this chapter before energising the unit.

2.1 Safety Symbols and Conventions

The following symbols are used throughout this manual to draw attention to critical safety information.
 These definitions mirror conventions used in marine electrical standards and comparable digital switching systems.

- ⚠ **CAUTION** — Indicates a situation which, if not avoided, *could result in equipment damage or degraded operation*.

- 📖 **NOTICE** — Highlights recommended practices or operational guidance important for correct system behaviour.

2.2 General Safety Requirements

The HUB Pro V5 must only be installed, commissioned, and serviced by qualified marine electricians familiar with:

- low-voltage DC installations on vessels,
- CANbus networks (J1939 and NMEA2000),
- antenna placement for GPS and wireless systems,
- environmental constraints applicable to onboard electronics.

Before performing any work on the system:

- isolate all relevant power sources,
- verify that the installation area is dry and free of conductive contamination,
- prevent accidental re-energisation of supply circuits,
- ensure adequate mechanical support for all cabling and connectors.

The HUB must not be operated or installed if the device shows signs of mechanical damage, deformation, overheating, or moisture ingress.

2.3 Electrical Safety

Although the HUB is a low-power electronic module, several electrical precautions are essential:

- The HUB operates only from 12–24 VDC. Applying voltages outside this range may cause irreversible damage.
- When powered through CAN1, ensure that the CAN backbone is correctly terminated, shielded, and wired with proper polarity.
- The Ethernet port must never be connected to PoE (Power over Ethernet). The HUB does not support externally powered Ethernet networks.
- Always use the supplied Sailsense cable or approved equivalents. Modifying the M12 connector or extending conductors incorrectly may degrade CAN or power integrity.
- The analog inputs accept a maximum of 36 VDC. Each monitored circuit must be fused upstream, as required by marine wiring standards.

The HUB enclosure contains no user-serviceable components. Opening the device will void the warranty and may compromise environmental protection.

2.4 Environmental Conditions

The HUB Pro V5 must only be installed in controlled interior spaces that meet the following requirements:

- inside your boat
- a dry, protected location, shielded from spray, bilge vapours, and condensation;
- a stable mounting surface with limited vibration;
- no exposure to direct sunlight or excessive heat sources;
- > 1m above water level
- minimum distance > 0.5m from metallic structures or tanks to ensure optimal GPS and wireless performance;
- avoidance of electromagnetic interference zones (large motors, high-current conductors, inverters, radar scanners);
- Avoid areas with high vibration

Operating the HUB outside its specified temperature or humidity limits may lead to degraded performance or intermittent communication.

2.5 Communication Network Safety (CAN, Ethernet, 4G, Zigbee)

The HUB Pro V5 interfaces with several independent communication networks.
Incorrect wiring, poor shielding, or improper antenna placement may compromise system behaviour or result in intermittent data loss.
The following precautions must be observed during installation and operation.

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CAN1 − J1939 Network Safety

CAN1 is the HUB's primary communication and, when configured, its power input.

- E**n**sure correct polarity: CAN-H / CAN-L must never be reversed.
- The network must be terminated with 120 Ω resistors at both ends of the backbone.
- Shielding must remain continuous from device to device; the drain wire must be bonded as recommended by marine standards.
- Avoid routing CAN cables parallel to high-current conductors (bow thrusters, windlasses, inverters).
- Do not splice, crush, or excessively bend the CAN harness.
- Only marine-grade twisted-pair CAN cable must be used.

Any deviation from correct termination or shielding may result in:

- loss of communication with Powerail modules,
- delayed keypad response,
- missing engine or navigation data,
- CANbus error flooding (dominant/recessive faults).

CAN2 − NMEA2000 (Listen-Only) Safety

CAN2 receives navigation or engine information but does not transmit.

- CAN2 must never be used to power the HUB.
- Ensure that the NMEA2000 backbone is internally powered by the vessel's existing network.
- Only certified NMEA2000 adapter cables may be used when interfacing with third-party networks (Raymarine, B&G/Simrad, etc.).
- The HUB must not be inserted into a backbone without proper T-connectors and terminators.

Ethernet Interface Safety

The Ethernet port supports network communication and onboard display integration.

- Do NOT connect the HUB to PoE (Power-over-Ethernet) equipment. Applying PoE voltage will permanently damage the device.
- Use only shielded RJ45 cables of marine grade or equivalent.
- Maintain separation from high-interference equipment such as radar power lines, HF radios, and high-amperage AC conduits.
- When connecting to Starlink or onboard routers, ensure that adapters used are approved for your marine electronics suite.

Cellular (4G) Safety

The HUB includes an embedded SIM and 4G modem.

- Do not obstruct the internal antenna zone with metallic panels or enclosures.
- Avoid installing the HUB in compartments with thick metallic shielding, which would degrade signal strength.
- If remote connectivity is critical, ensure Ethernet-to-Starlink routing is available as redundancy.

Zigbee Network Safety

Zigbee sensors form a low-power wireless mesh. Their function depends on proper HUB placement.

- The HUB must not be installed inside fully metal-lined compartments.
- Maintain at least 0.5 m separation from large metal masses (fuel tanks, battery banks).
- Avoid placing Zigbee devices near sources of RF noise (inverters, chargers, radar).

2.6 GPS & Antenna Safety Considerations

The HUB relies on its external GPS antenna for all position-related functions, which include navigation tracking, mooring alerts, cloud reporting, and motion detection correlation.

To ensure optimal GPS performance:

- Install the antenna inside the boat
- Install the antenna horizontally, with the black surface facing upward.
- Choose a location with the widest possible view of the sky.
- Avoid installing under metallic structures, thick decks, sunbeds, gangways, or areas with laminated foam cores.
- Keep at least 0.5 m away from large metallic objects or tall vertical surfaces.
- Secure the antenna using adhesive pads, screws (if applicable), or silicone to prevent displacement.

Do not operate the device with a damaged coaxial connector or antenna cable. Reduced GPS performance may impair safety functions and cloud reporting accuracy.

2.7 Use Restrictions

The HUB Pro V5 must not be used in the following situations:

- as a power distribution or switching device;
- as a substitute for mandatory navigation equipment;
- in explosive or hazardous atmospheres;
- connected to AC electrical systems;
- exposed to water ingress, chemical vapours, or continuous vibration beyond specified limits.

Any modification to the firmware, hardware enclosure, connectors, or antennas is strictly prohibited.

2.8 Maintenance and Servicing

The HUB contains **no user-serviceable components**.

Routine maintenance is limited to:

- checking connector integrity and absence of corrosion;
- verifying correct mounting and cable strain-relief;
- ensuring the GPS antenna remains firmly attached;
- confirming CAN cabling is undamaged and terminators are present;
- cleaning the exterior housing with a dry cloth only.

Do **NOT**:

- open the enclosure,
- apply solvents or cleaners,
- attempt to replace internal components,
- bypass protective circuitry.

Only Sailsense-authorised personnel may perform firmware recovery or hardware servicing.

2.9 Liability and Compliance Responsibilities

Sailsense Analytics SA cannot be held liable for:

- damage resulting from improper installation,
- failure to observe guidelines in this manual,
- use of non-approved accessories or cabling,
- modification of the HUB or its firmware,
- integration with unvalidated third-party systems or networks.

Installers are responsible for ensuring that:

- all work complies with local marine electrical standards,
- CAN and NMEA2000 networks are properly terminated and powered,
- antennas and sensors are installed within environmental limits,
- the HUB is used exclusively within the scope defined in this manual.

3. Product Overview

3.1 Functional Role of the HUB Pro V5

The HUB Pro V5 is the central logic, communication, and data-processing unit of the Sailsense ecosystem. While Powerail modules handle electrical switching and load protection, the HUB coordinates all supervisory, analytical, and connectivity functions on board.
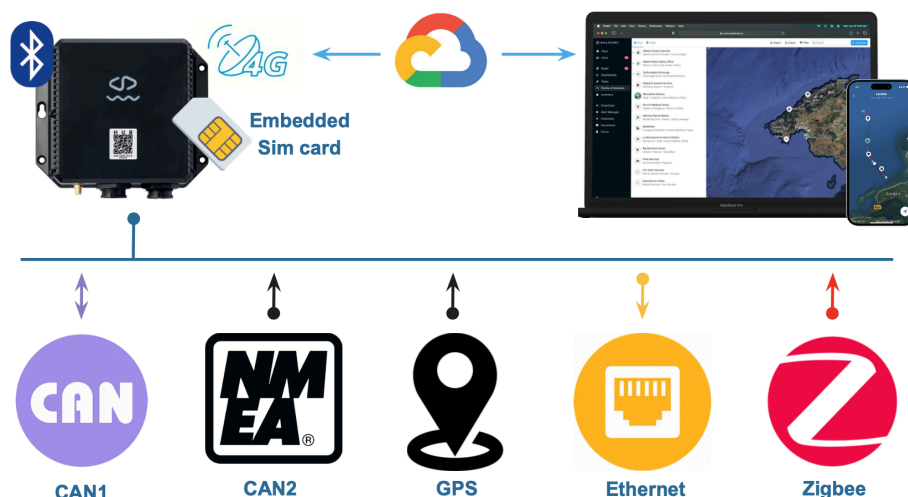
Its primary roles include:

- **Collecting data** from multiple onboard networks (CAN1, CAN2, analog sensors, Zigbee devices, embedded motion sensors).
- **Processing and interpreting** navigation, engine, battery, and system status information.
- **Synchronising system configuration** across all connected Sailsense modules.
- **Ensuring communication** with the Sailsense cloud via embedded 4G, or via Ethernet when connected to Starlink or an onboard router.
- **Providing user interfaces**, either through the Sailsense mobile app, Bluetooth initial setup, or through onboard MFDs connected by Ethernet.
- **Storing operational data** locally for up to 45 days when cellular service is unavailable.

In a complete Sailsense installation, the HUB acts as the **brain** of the vessel: it receives all signals, interprets system logic, and ensures coherent behaviour across all peripherals.

3.2 Key Features

The HUB Pro V5 integrates a wide range of technologies into a single compact module. Its design reflects the need for high reliability, low consumption, and multi-network interoperability in marine environments.

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Communication Interfaces

- **CAN1 (J1939)** full-duplex communication and optional power input.
- **CAN2 (NMEA2000)** listen-only channel for engine and navigation data acquisition.
- **4G Cellular Modem** with embedded SIM for cloud synchronisation and remote alerts.
- **Ethernet Interface** enabling Starlink connectivity or local display integration.
- **Bluetooth Low Energy** for commissioning and app pairing.
- **Zigbee Radio** for wireless environmental and security sensors.

Positioning & Motion

- External GPS antenna ensuring accurate vessel tracking and geofencing.
- Embedded accelerometer and motion sensors for impact detection, intrusion monitoring, and anchor-drag logic support.

Data Acquisition

- **Three analog inputs (0–36 V)** for monitoring:
    - battery voltages,
    - bilge pump circuits,
    - tank sensors,
    - switch outputs or any DC logic source.

System Coordination

- Central storage and distribution of vessel configuration.
- Cloud synchronisation of usage logs, alarms, and telemetry.
- Offline data buffering for up to **45 days**, ensuring no information is lost when connectivity is intermittent.

Mechanical & Electrical

- Compact footprint designed for installation in protected interior spaces.
- Low power consumption with deep-sleep and standby modes.
- Rugged construction suitable for marine environmental conditions.
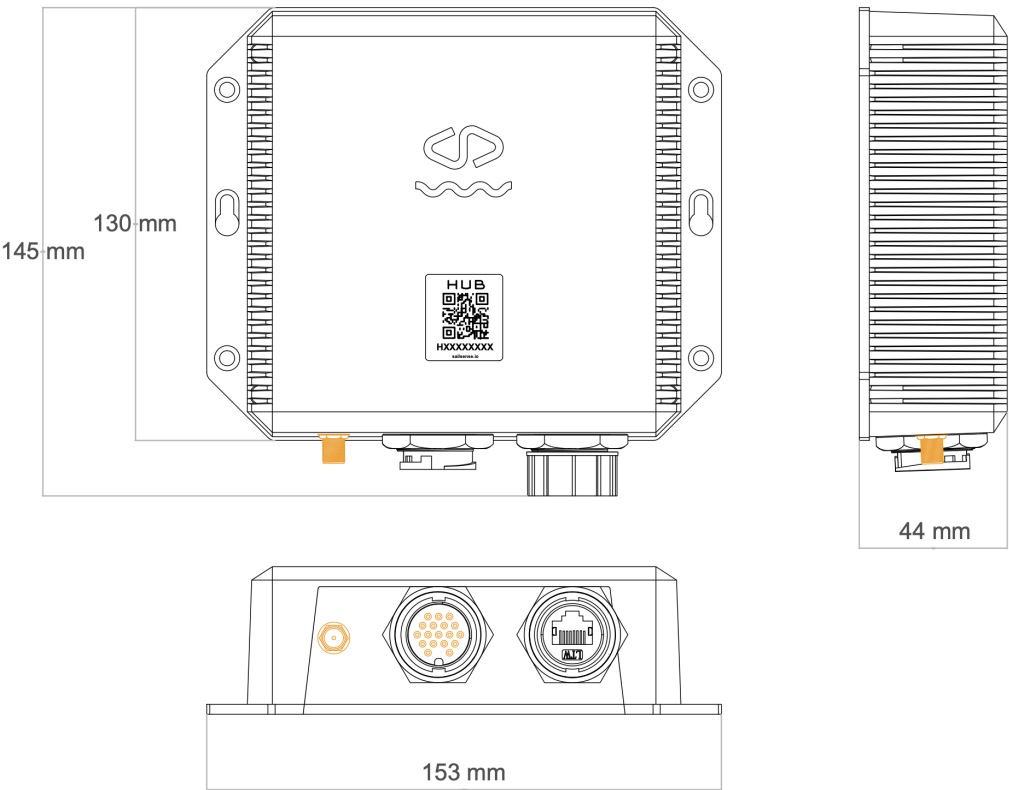
The HUB Pro V5 unifies vessel data into a single coherent system and enables advanced automation, remote monitoring, and real-time operational awareness.
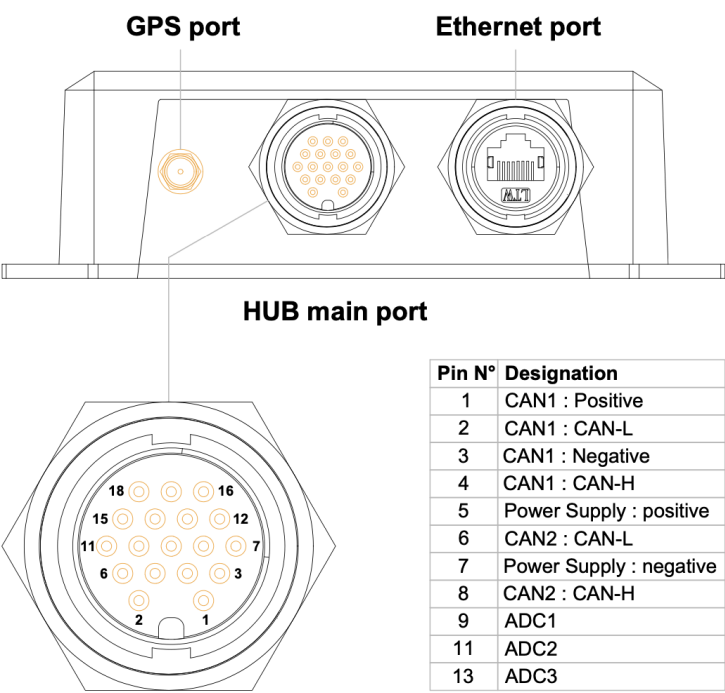
3.3 Mechanical Characteristics

The HUB Pro V5 is housed in a compact, robust enclosure designed for quick installation and stable long-term operation.
Its geometry and mounting layout follow marine installation standards to ensure mechanical resilience and simplified cable routing.

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Dimensions:

130 mm
145 mm
44 mm
153 mm

HUB's ports:

GPS port

Ethernet port

HUB main port

Pin N°	Designation
1	CAN1 : Positive
2	CAN1 : CAN-L
3	CAN1 : Negative
4	CAN1 : CAN-H
5	Power Supply : positive
6	CAN2 : CAN-L
7	Power Supply : negative
8	CAN2 : CAN-H
9	ADC1
11	ADC2
13	ADC3

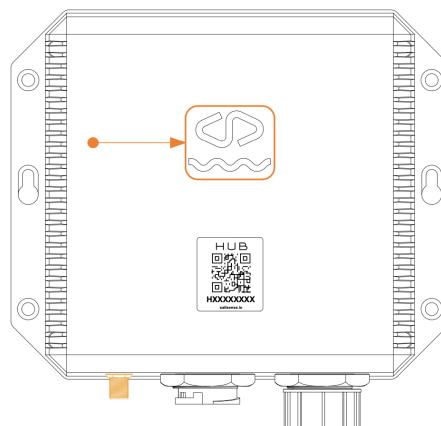## 3.4 Hardware Architecture Overview

Internally, the HUB Pro V5 is composed of several subsystems designed to operate together as the vessel's central processing engine:

- **Main microcontroller** managing logic, communication, and data storage.
- **4G modem with SIM** providing cloud connectivity.
- **Dual CAN transceivers** (CAN1/J1939 and CAN2/NMEA2000).
- **GNSS receiver** interfacing with the external GPS antenna connector.
- **Local flash memory** for configuration storage and offline data buffering.
- **Motion and shock sensors** enabling safety alerts.
- **Zigbee radio module** forming or joining a wireless mesh network.
- **Ethernet PHY** for local IP networking with onboard devices.

All subsystems operate under tightly controlled firmware to ensure deterministic timing and reliable communication with each Sailsense component.

3.5 Status LEDs

The HUB Pro V5 includes a multi-colour status LED designed to indicate the device's operational state, connectivity health, and diagnostic status.

A detailed table of LED codes is provided in **Chapter 8 – Diagnostics and Troubleshooting**.
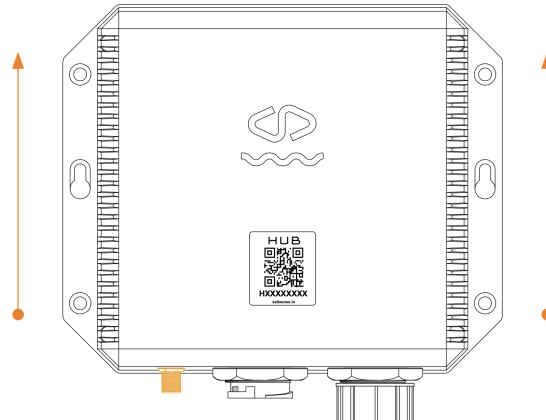
4. Installation Overview

4.1 Installation

⚠️ *First you choose carefully where you'll install the HUB following advices contained in section "2.4 Environmental Conditions".*
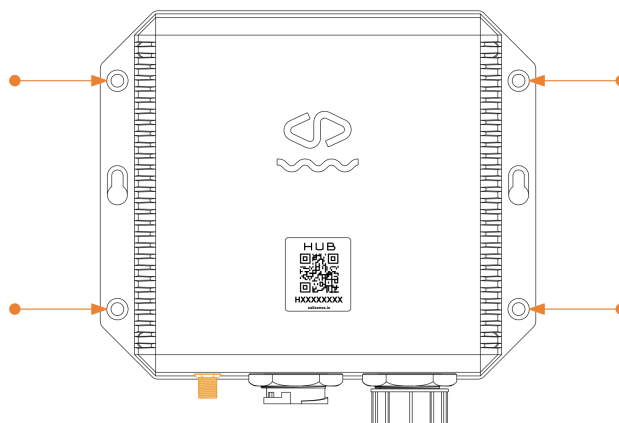
- Close to a free slot on the NMEA2000 backbone
- Close to a DC power source (if not powered from CAN backbone)
- > 3m from GPS antenna location

The HUB should be installed (if possible) with the connectors facing downwards leaving enough space to access the device's connectors later:

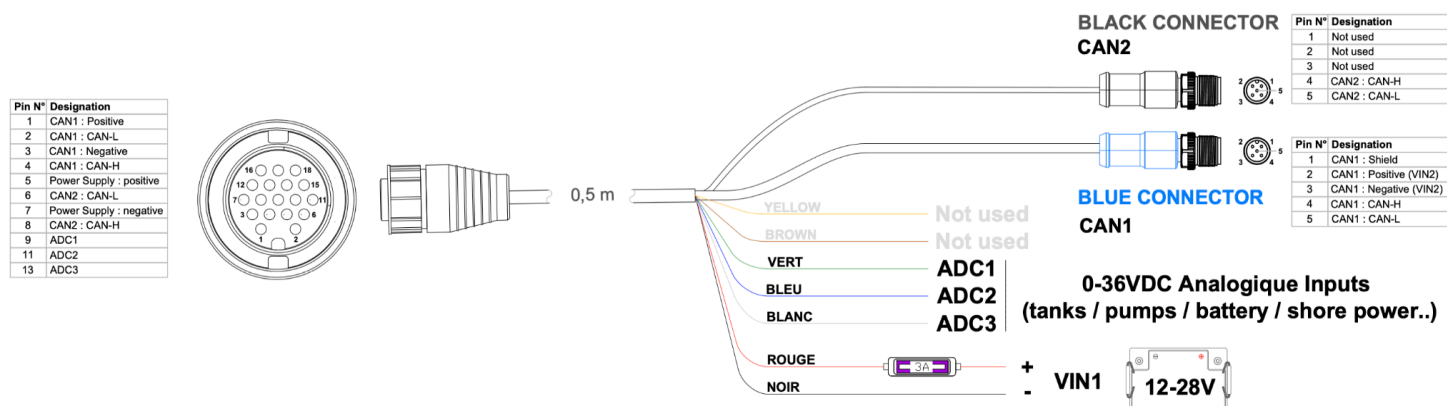⚠️ *This is to prevent any moisture from entering the connectors.*

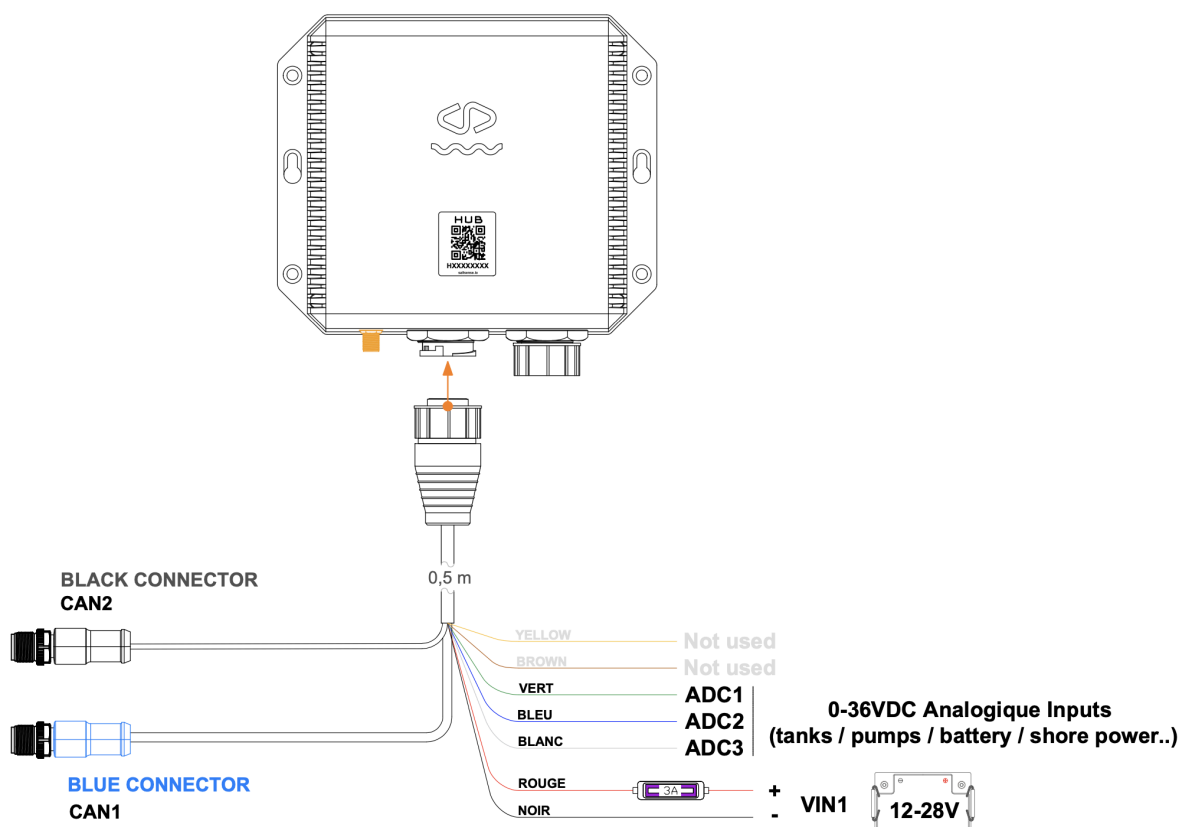Screw the hub onto a healthy and solid support

4.2 Main Cable

The main cable allows you to connect the hub to your boat:

- Battery : VIN1
- CAN networks : CAN1 & CAN2
- Any device compatible with a 0-36V DC analog signal : ADC1-2-3

Pin N°	Designation
1	CAN1 : Positive
2	CAN1 : CAN-L
3	CAN1 : Negative
4	CAN1 : CAN-H
5	Power Supply : positive
6	CAN2 : CAN-L
7	Power Supply : negative
8	CAN2 : CAN-H
9	ADC1
11	ADC2
13	ADC3

BLACK CONNECTOR
CAN2

Pin N°	Designation
1	Not used
2	Not used
3	Not used
4	CAN2 : CAN-H
5	CAN2 : CAN-L

BLUE CONNECTOR
CAN1

Pin N°	Designation
1	CAN1 : Shield
2	CAN1 : Positive (VIN2)
3	CAN1 : Negative (VIN2)
4	CAN1 : CAN-H
5	CAN1 : CAN-L

0,5 m

YELLOW — Not used
BROWN — Not used
VERT — ADC1
BLEU — ADC2
BLANC — ADC3

0-36VDC Analogique Inputs
(tanks / pumps / battery / shore power..)

ROUGE — 3A — + VIN1 — 12-28V
NOIR — -

Connect the main cable to the main port of the HUB:

BLACK CONNECTOR
CAN2

0,5 m

YELLOW — Not used
BROWN — Not used
VERT — ADC1
BLEU — ADC2
BLANC — ADC3

0-36VDC Analogique Inputs
(tanks / pumps / battery / shore power..)

BLUE CONNECTOR
CAN1

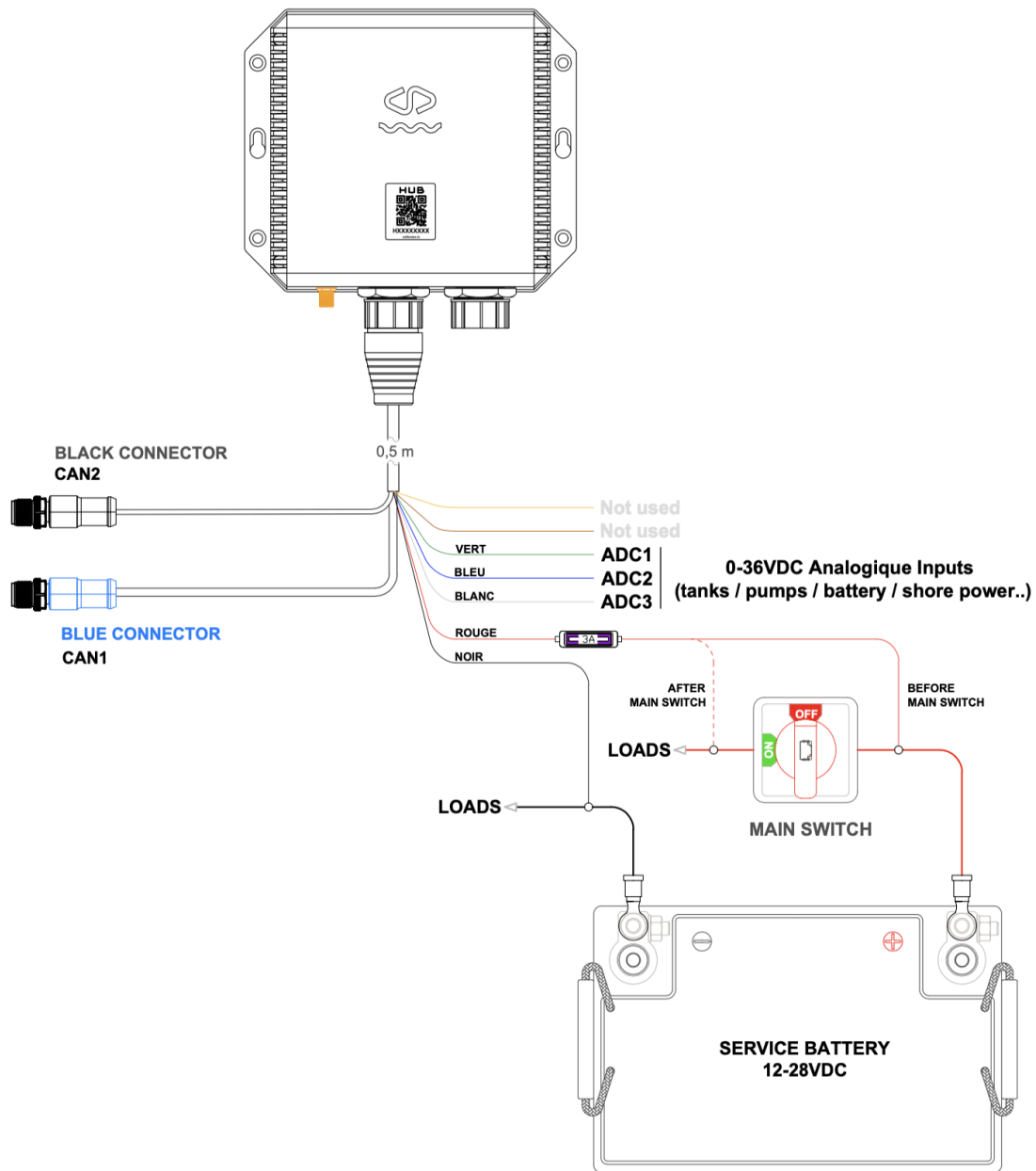ROUGE — 3A — + VIN1 — 12-28V
NOIR — -

4.2.1 Power Supply

⚠️ *First, carefully follow the instructions in section "2.3 Electrical safety".*

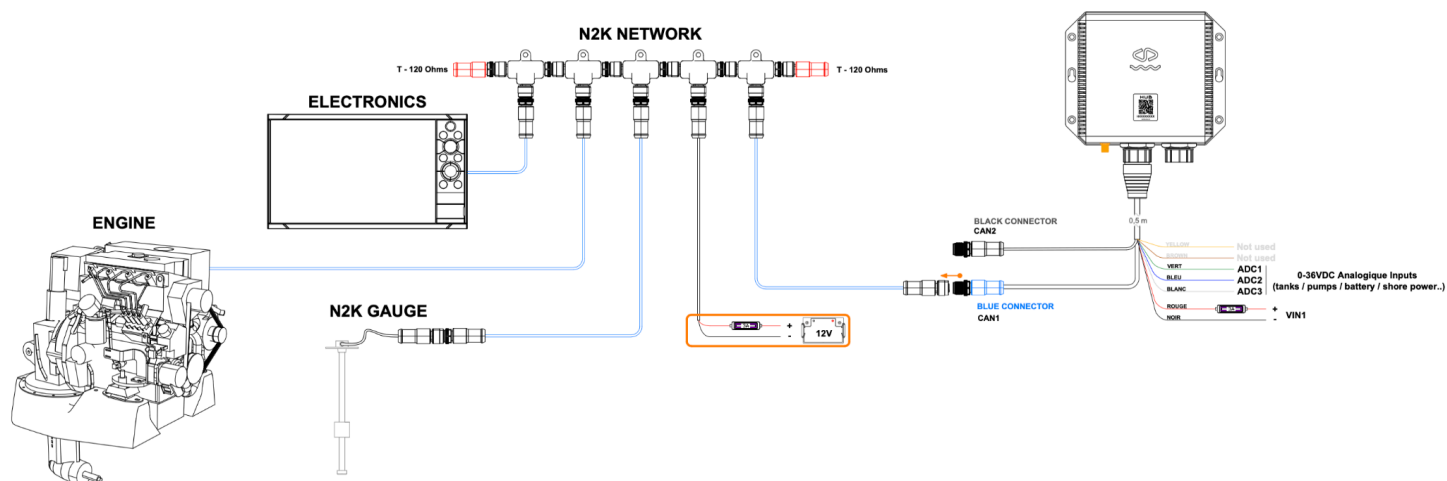To power the hub, you have several options depending on your intended use:

Power Supply Options	Variants	Advantage	Disadvantages
Via the positive and negative wires of the HUB main cable: **VIN1**	Connected before battery main switch (direct battery)	Boat accessible at all times (subject to 4G coverage). No data is missing: the HUB collects all available data, allowing you to understand what's happening on board even when you're not there.	Even though the HUB has low power consumption, you will still need your boat to be equipped with an independent charging solution (solar panel for example) to preserve the health of your battery.
	Connected after battery main switch	If you do not need data when you are not on board, this solution is energy efficient; the HUB is OFF when the main switch is OFF.	If a problem occurs (with your battery for example) in your absence, you will not be able to understand/diagnose what happened.
Via power supplied by CAN1: **VIN2**		This power supply method for the hub is practical for small boats such as Ribs that are not necessarily equipped with solar panels. The hub is powered when the CAN network is powered.	If a problem occurs (with your battery for example) in your absence, you will not be able to understand/diagnose what happened.

⚠️*If you connect VIN1 before the main switch (directly to the battery), do not connect the main cable to the hub yet. This is to prevent the hub from being powered during installation. You can connect the main cable once the installation is complete; see section "5.7 Start Up".*

Power Supply Via VIN1 - Connect the power wires from the HUB to your boat's battery.

BLACK CONNECTOR
CAN2

0,5 m

Not used
Not used

VERT — **ADC1**
BLEU — **ADC2**
BLANC — **ADC3**

0-36VDC Analogique Inputs
(tanks / pumps / battery / shore power..)

ROUGE — 3A
NOIR

BLUE CONNECTOR
CAN1

AFTER
MAIN SWITCH

BEFORE
MAIN SWITCH

OFF

ON

LOADS

LOADS

MAIN SWITCH

SERVICE BATTERY
12-28VDC

Power Supply Via VIN2 - Connect the CAN cable (CAN1) to your boat CAN network

In this case, the N2K network powers the HUB once the network is powered ON.

Having VIN1 and VIN2 connected provides power redundancy.

4.2.2 CAN1

CAN1 is the primary CAN communication port of the HUB.

⚠️*Carefully follow the instructions in section "2.5 Communication Network Security / CAN1 – Network Security J1939".*

Depending on your installation, you may need an adapter or T-connector / multi joiner to connect your HUB to the CAN network. See section "9.1 CAN Adapter"

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CAN1 connector:

BLUE CONNECTOR

CAN1

Pin N°	Designation
1	CAN1 : Shield
2	CAN1 : Positive (VIN2)
3	CAN1 : Negative (VIN2)
4	CAN1 : CAN-H
5	CAN1 : CAN-L

In addition to powering the HUB, CAN1 allows you to:
- **Collect data** (depending on your boat's configuration) such as:
  - Navigation; speed/orientation/wind speed & angle/depht (depending on navigation devices installed onboard)
  - Engine; rpm/oil and water coolant t° (if equipped of N2K gateway)
  - Batteries levels (if equipped of N2K batteries or gateway)
  - Tanks levels (if equipped of N2K sensors)
  - …
- **Send and receive messages to control consumers on board** (depending on your boat's configuration). In the case of a boat equipped with Powerail(s), CAN1 serve to:
  - Send command to Powerail(s) and third part device(s) installed on the CAN network
  - Receive data from Powerail; outputs/input states
  - Control scenarios between third part device(s) and Powerail(s)
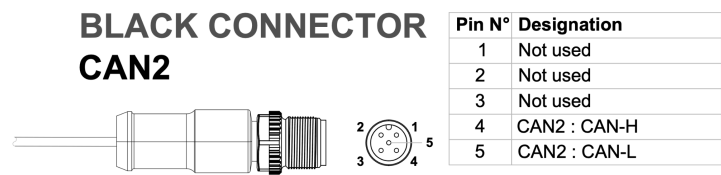 - …

4.2.3 CAN2

CAN2 is the second CAN communication port of the HUB. It is necessary if your boat is equipped with two separate CAN networks.

⚠️*Carefully follow the instructions in section "2.5 Communication Network Security / CAN2 – NMEA2000 (listen only)".*

Like for CAN1, you may need an adapter or T-connector / multi joiner to connect your HUB to the CAN network. See section "9.1 CAN Adapter"
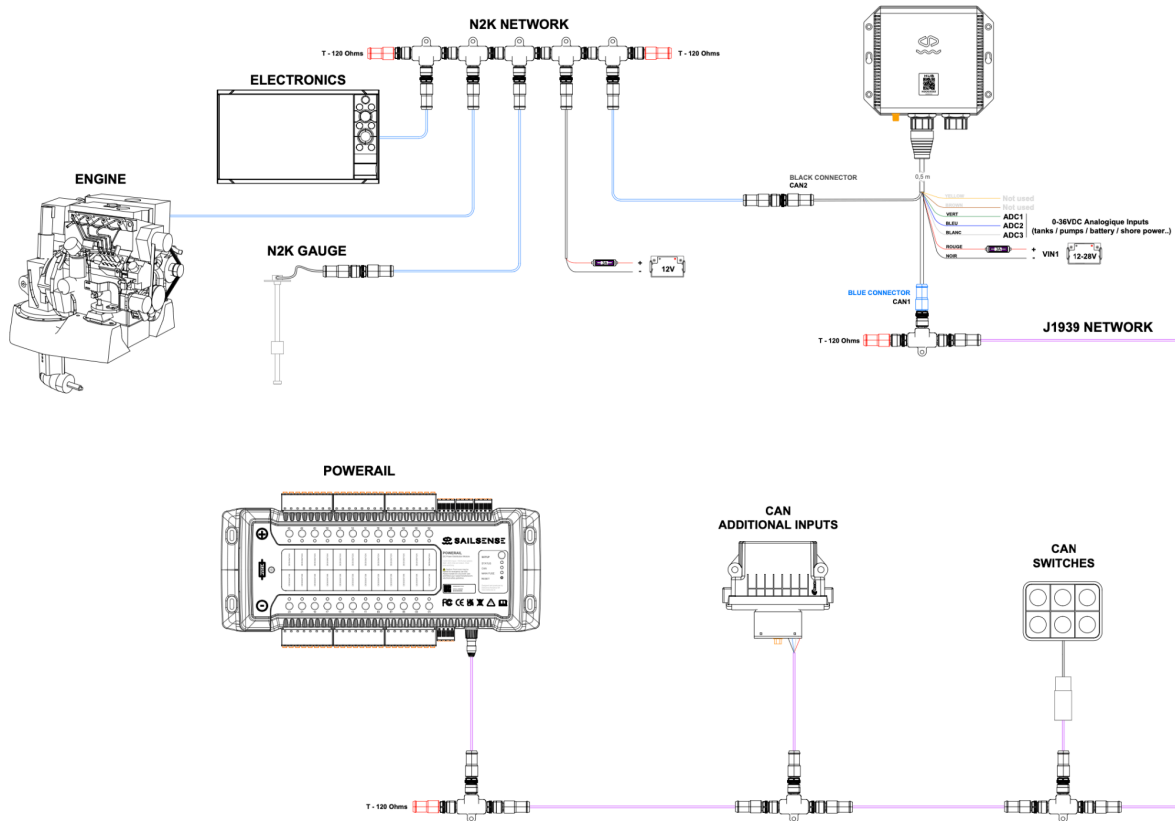
CAN2 connector:

Pin N°	Designation
1	Not used
2	Not used
3	Not used
4	CAN2 : CAN-H
5	CAN2 : CAN-L

CAN2 receives information but does not transmit any; therefore, if you check your N2K device list on your chatplotter, it will not appear in that list.
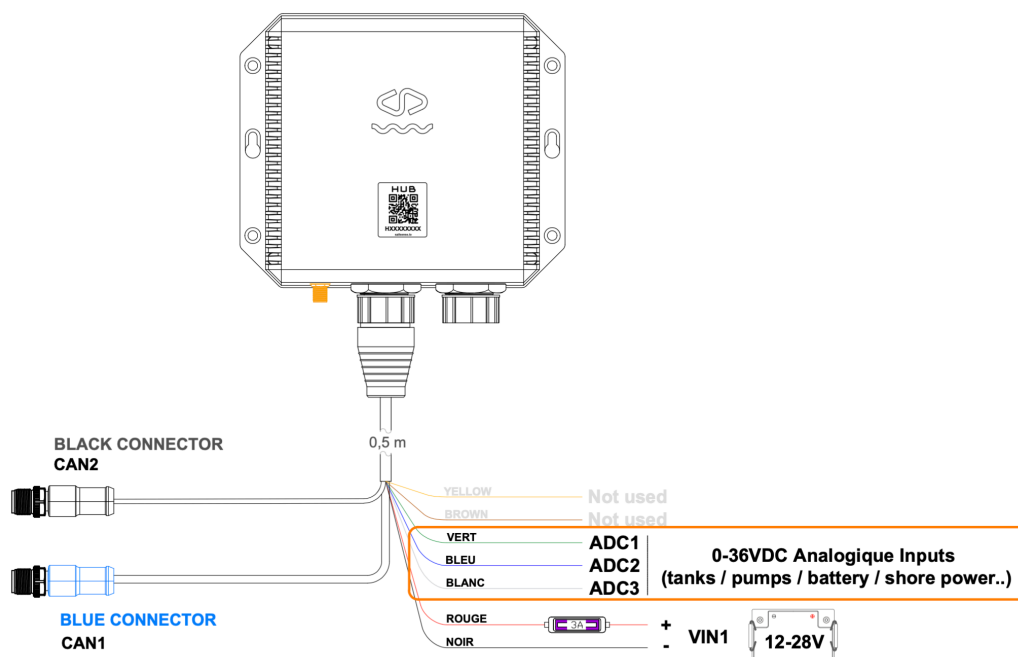
CAN1 & 2 connections example:

4.2.4 ADC1,2,3

On the main HUB cable, you can connect 3 analog inputs (ADC1 to ADC3).

⚠️ *Carefully follow the instructions in section "2.3 Electrical safety".*
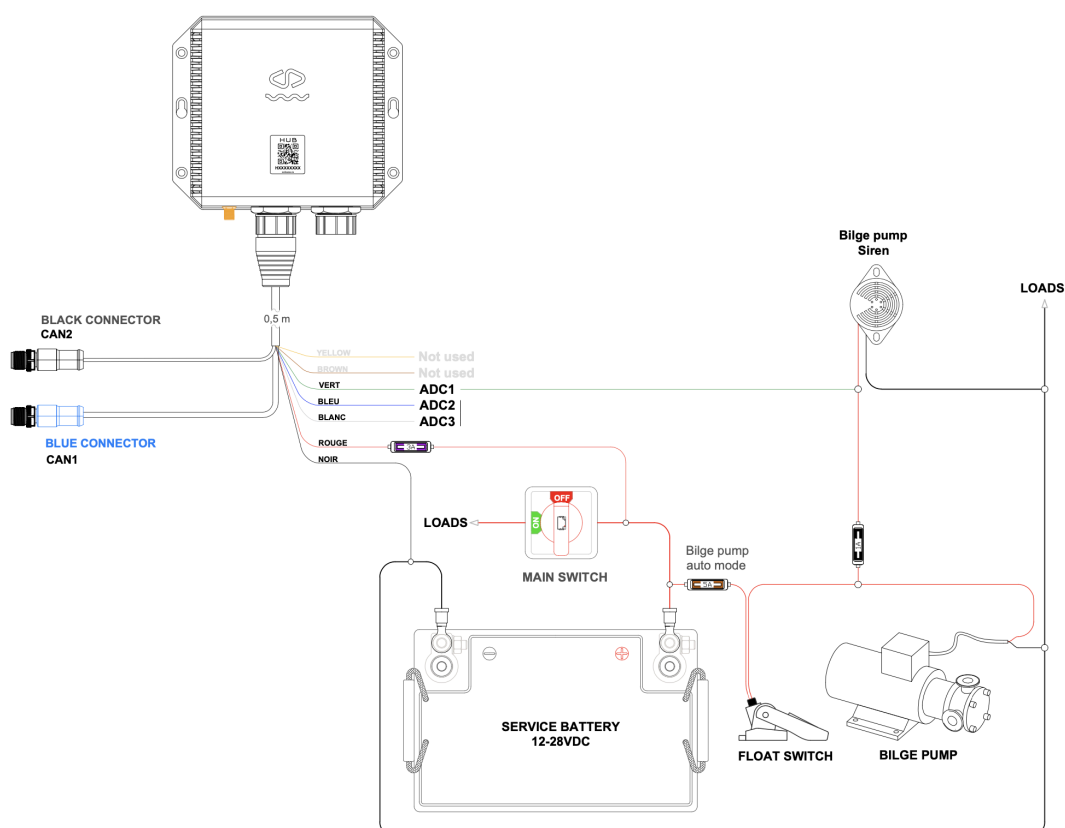
These inputs are intended for connecting additional devices such as:
- Batteries; voltage
- Pumps; operating signal
- Generator; operating signal
- Shore power; voltage via AC/DC converter
- …

Example of an ADC connection: In this example, ADC1 is connected to the positive wire of the bilge pump siren. When the float switch closes (due to the presence of water), the bilge pump starts and the siren sounds.

Simultaneously, the hub measures the voltage on ADC1 and triggers an alert. This alert is sent to the user(s) via the navigation screen application and/or mobile and web applications.
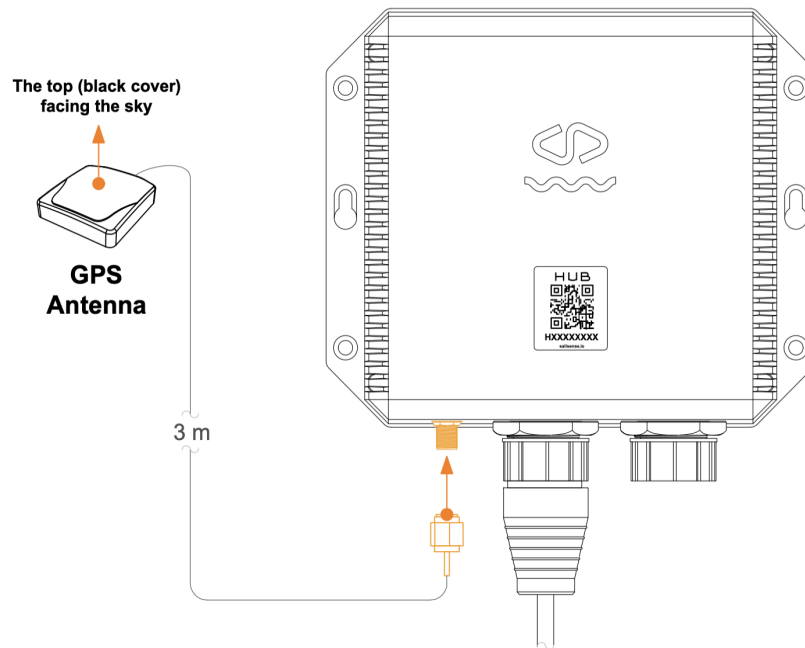
4.3 GPS Antenna

The GPS antenna is the primary means of geolocating the HUB.

⚠️ *Carefully follow the instructions in the section 2.6 GPS & Antenna Safety Considerations.*

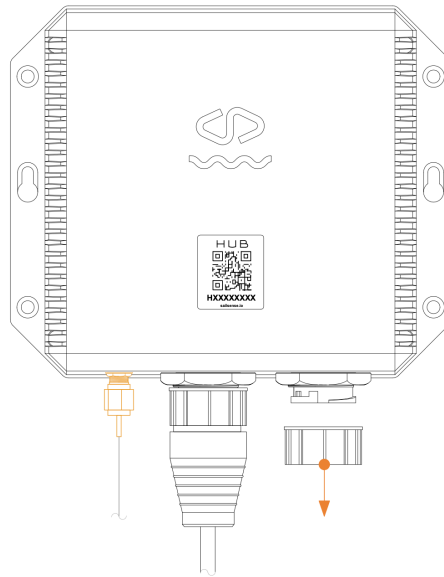Screw the antenna onto the antenna port of the HUB:

⚠️ *The GPS antenna cable is 3m long, so the distance between the HUB and the antenna must not exceed 3m.*

4.4 Ethernet Interface

The HUB's Ethernet port allows the user (or users) to connect the HUB to an external Ethernet network/external Internet service provider/a computer for diagnostic tools (only for boatyards and Sailsense suppliers).

⚠️ *First, carefully follow the instructions in the section "2.5 Communication Network Security / Ethernet Interface Safety"*
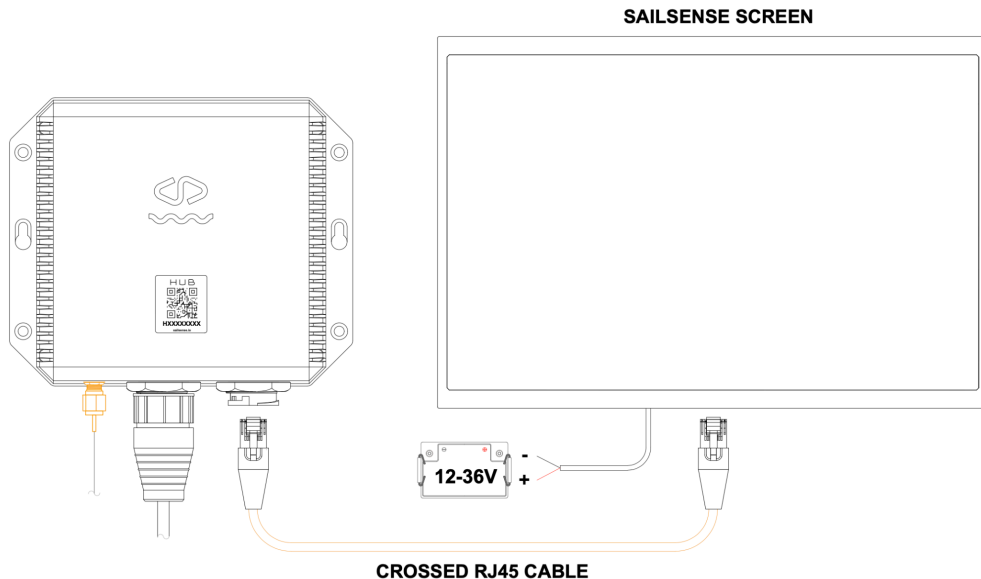
Start by removing the cap from the HUB's Ethernet port:

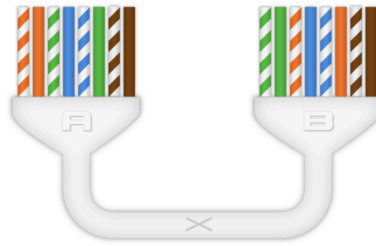## 4.4.1 External Ethernet Network

The HUB's Ethernet port allows, in the case of an installation including one or more Powerail, the embedded application to be displayed on a screen dedicated to Sailsense or on navigation screens such as B&G, Raymarine, etc.

Dedicated screen:

Installation Notes

To connect a screen **directly** to the hub, you must use a **crossover** Ethernet cable:

A	B
Orange / White	Green / White
Orange	Green
Green / White	Orange / White
Blue	Blue
Blue / White	Blue / White
Green	Orange
Brown / White	Brown / White
Brown	Brown

B&G screen:

Installation Notes

1- To connect the HUB to the B&G Ethernet network, an [adapter](#) is required

2- If multiple devices are connected to the B&G Ethernet network, you must connect the HUB

to the NEP-2

Raymarine screen:

Installation Notes

1- To connect the HUB to the Raymarine Ethernet network, an adapter Raynet/RJ45 is required

2- To connect the HUB to the Raymarine CAN network, an adapter STNG/NMEA2000 is required

4.4.2 External Internet Service Provider

If your boat is equipped with an Ethernet network (as described in the previous section), you can connect to an internet external source.
Starlink example:

Once connected, the hub prioritizes the best available connection between its SIM card and the external internet source.

IP address management
The HUB can be configured in "master" or "slave" mode on the Ethernet network. This means that it can set the IP addresses of all devices connected to the Ethernet network, or that its own IP address can be set by the modem or another device.

4.5 Zigbee Devices

⚠️*Carefully follow the instructions in section "2.5 Communication Network Security / Zigbee Network Safety".*

ZigBee is the name of a wireless communication protocol using a specific network. It has low energy consumption, as it sends signals at very low frequency (2.4 GHz).
Zigbee smart devices communicate with each other using radio transceivers. The protocol being the same as that used by Wi-Fi and Bluetooth.

To understand how ZigBee works, let's use a metaphor :
Let's imagine that in your boat there is a huge spider web whose center is a ZigBee coordinator (the Sailsense HUB) and whose wires escaping from it connect each connected object installed in your boat.
All those compatible with the protocol can be integrated into the web, until forming what is called a "mesh network". Some devices (camera/thermostat) act as relay points, and others act as terminals (switch/sensors).
In other words: the more equipment there is connected to the web, the greater the range of the signals sent.

Sailsense is gradually integrating Zigbee devices; you can find the list of devices here.

5. Preliminary Check and Power-Up

It is important to carry out checks before any commissioning. In this section, we outline the main verification measures for each critical component of the installation.

5.1 HUB Check

Users and technicians should confirm the following:

- the HUB is accessible for control;
- the HUB is well fixed;
- all connectors are properly seated and locked;
- no harness strain or sharp-edge contact is visible.

5.2 HUB Power supply Check

Users and technicians should confirm the following:

Power Supply Options	Variants	Check
Via the positive and negative wires of the HUB main cable: **VIN1**	Connected before battery main switch (direct battery)	- Are the wires correctly connected to the battery using the appropriate connectors/terminals? - If wires were needed to extend VIN1, is there a 3A fuse present to protect the wires between the battery and the hub?
	Connected after battery main switch	- Are the wires correctly connected to the battery using the appropriate connectors/terminals? - If wires were needed to extend VIN1, is there a 3A fuse present to protect the wires between the battery and the hub?
Via power supplied by CAN1: **VIN2**		Are the connectors accessible and correctly connected to each other?

5.3 CAN Network(s) Check

CAN network being one of the most important part of the installation, users and technicians should confirm the following before energising the system:
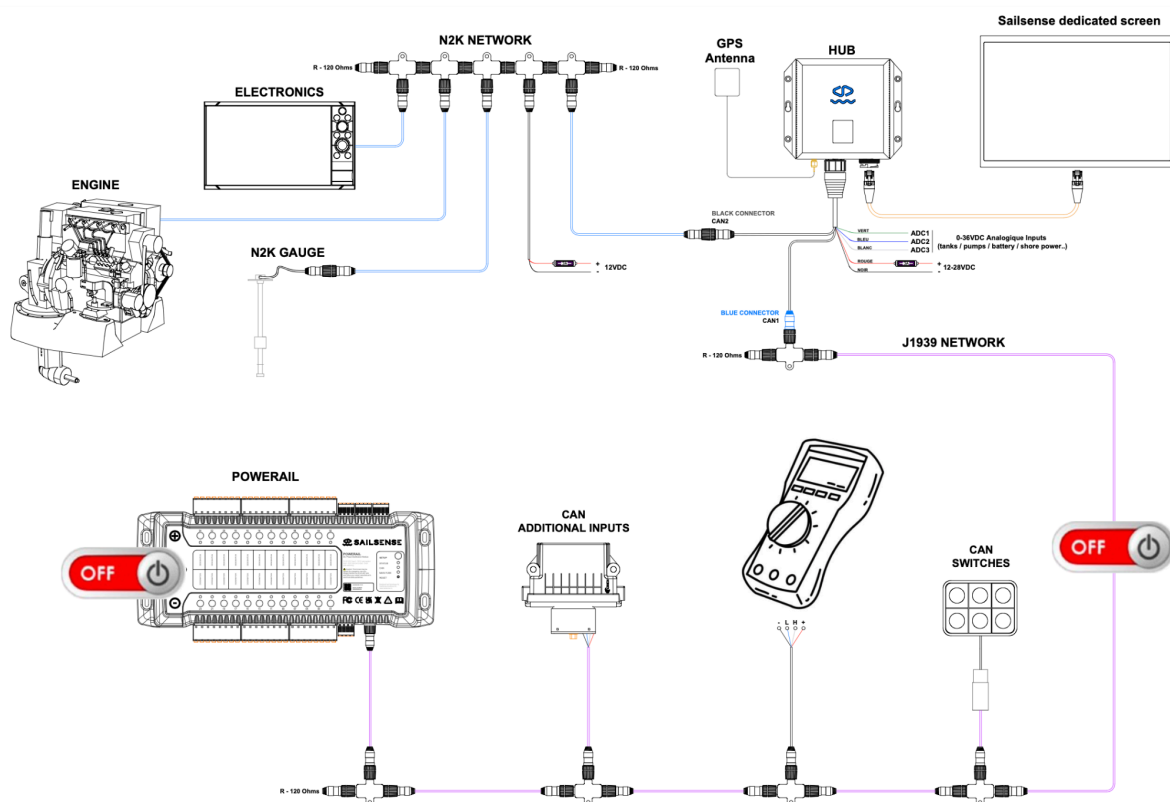
- Does the installation conform to the CAN bus wiring diagram of the boat?

- Are the cables correctly labeled?
- Are the connectors accessible and correctly connected to each other?

Connect a CAN cable to the network using a T-connector or available connector. This cable must be stripped at the other end, and the +/-/H and L wires must be electrically insulated. Then, take measurements with your multimeters.
The readings should be taken with the Powerail(s) and the CAN bus switched off.

CAN1 readings example:

- Tension must be equal to 0V between + (red wire) and - (black wire).
- Resistance must be equal to 60 Ω between L (blue wire) and H (white wire).
  - If not equal to 60 Ω check your network and *120 Ω termination*
    - 120 Ω = missing one termination
    - 40 Ω = 3 terminations on the CAN bus
    - 0 Ω = short circuit on the CAN bus
    - ∞ = No terminations on the CAN bus

5.4 ADC Check

Depending on your installation configuration, ensure that for each analog ADC input:
- The wire is correctly connected to the device you wish to monitor, using the appropriate connectors/terminals.
- If wires were needed to extend ADC1,2 or 3, is there a 1A fuse present to protect the wires between the devices and the hub?

5.5 GPS Antenna Check

The HUB allows you to locate the boat live and provides an anchorage alert so it is imperative to have a correct antenna connection and a location allowing reception of as many satellites as possible. Check that:
- Antenna is well fixed
- Antenna is well connected to the HUB

5.6 Ethernet Network Check

Since the Ethernet network is important for:
- displaying embedded application;,
- ensuring external internet connection;
- operation of diagnostic tools,

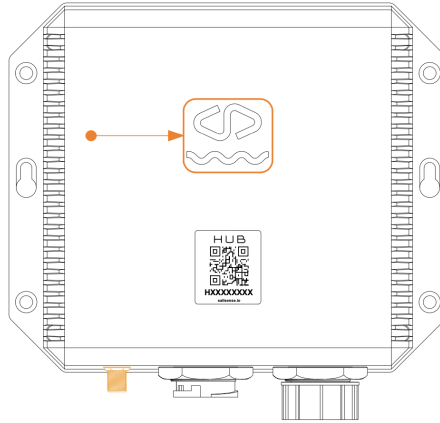Users and technicians should check the following points before powering on the system:
- Does the installation conform to the Ethernet wiring diagram of the boat?
- Are the cables correctly labeled?
- Are the connectors accessible and correctly connected to each other?

5.7 Start Up

After verifying that the entire installation is compliant and that the batteries and switching devices are properly wired and connected, activate the installation following the way you want to power your HUB:

Power Supply Options	Variants	Start Up Process
Via the positive and negative wires of the HUB main cable: **VIN1**	Connected before battery main switch (direct battery)	As indicated in the section "**4.2.1 Power Supply**", you can now connect the HUB main cable to the HUB.
	Connected after battery main switch	Turn the main battery switch ON
Via power supplied by CAN1: **VIN2**		Turn the main battery switch ON and then your CAN network (depending on the configuration of your boat)

Once the HUB is powered ON, the **LED provides information** on the power, communication, and connectivity status:

- **White flashing** – startup sequence
- **White/Green flashing** – CAN communication active
- **Blue/Green flashing** – remote connectivity established and CAN communication active

Connectivity note:
Upon initial power-up, the HUB may take some time to connect to the 4G network (subject to 4G coverage at the time of commissioning).

⚠️ *If you notice a different LED color or no LEDs lit, please refer to the table in section "**8.1 HUB LED Status**".*

SAILSENSE

6. Configuration

The configuration of a HUB is performed exclusively through the Sailsense cloud platform. The HUB acts as the secure bridge between the onboard electrical system and the configuration tools hosted on Sailsense.io.

To configure a vessel for the first time, users must follow the standard Sailsense workflow:

6.1 Account Creation on Sailsense.io

Configuration requires a user [account](#) on [www.sailsense.io](#), where all project documents, configuration files and system states are stored securely. This account identifies the installer, shipyard or vessel owner responsible for the commissioning process.

6.2 Creating or Selecting a Vessel Profile

Within the Sailsense platform, users may either:

- [create](#) a new boat profile from scratch, defining its electrical architecture, or
- duplicate an existing vessel configuration, which is common in production environments where multiple identical boats are built.

6.3 Pairing the HUB with the Vessel Profile

The onboard HUB must be [paired](#) with the vessel profile using its unique identifier. Once paired, the HUB becomes the active configuration host for the entire electrical system. This pairing ensures that any Powerail modules connected to the J1939 backbone automatically receive their configuration from the correct vessel project.

SAILSENSE

7. Operation

7.1 Mobile Application

Stay connected to your boat, wherever you are. Monitor critical systems, receive instant alerts, and maintain complete control of the vessel:

7.1.1 Home screen

The [Home](#) screen of the Sailsense app provides access to all its functionalities, allowing you to monitor and manage your boat efficiently.

7.1.2 Controls module

The [Controls](#) module in our mobile app enables you to remotely manage onboard equipment such as lights, pumps, fridges, freezers and more. This module offers a convenient way to manage onboard systems remotely, ensuring efficiency and ease of use. By categorizing equipment and providing intuitive toggles, this feature helps you maintain control over your boat's essential functions.

7.1.3 Location module

The [Location](#) module in our mobile app allows you to monitor your boat's physical location, check its last connection time, and access live data when available. It is a powerful tool for keeping tabs on your boat's position and operational status. With real-time tracking, historical connection data, and live telemetry, you can stay informed and prepared for any situation.

7.1.4 Boatguard module

The [BoatGuard](#) module focuses on your boat's safety. It combines advanced security monitoring using Zigbee sensors with geofencing technology, allowing you to track your boat's location and detect unauthorized access or onboard hazards—all from your mobile device.

7.1.5 Logbook module

Each time you set sail, the HUB automatically records a new navigation session. The [Logbook](#) module allows you to relive your voyages in detail thanks to navigation data and the key events that took place.

7.1.6 Checklist module

The [Checklist](#) module allow you to create and Follow procedures to enhance your navigation safety

7.1.7 Tasks module

The [Tasks](#) module is a digital to-do list designed to help you manage maintenance and other activities on your boat. You can use it to:

- Create tasks and assign them to crew members.
- Set due dates and track progress.
- Attach photos, videos, and documents.
- Filter tasks by status, due date, and other criteria.

7.1.8 Ticketing & Support module

The Ticketing & Support module allows you to report issues to the boatyard and communicate directly with the Customer Service team. You can create new tickets, track progress, and exchange messages with the support team regarding reported issues.
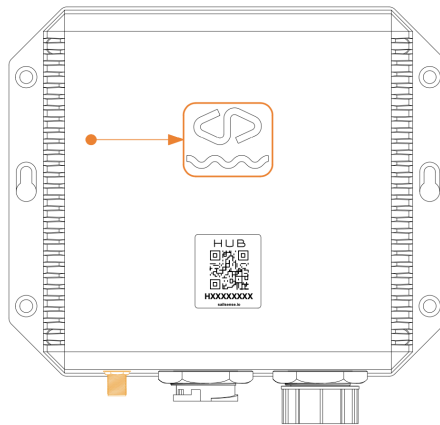
7.2 Web Application

The use of the web application is reserved for professionals in the nautical sector (boatyards/charter/etc.). Sailsense supports each project according to its individual specifications. For more information, please contact Sailsense.

7.3 Zigbee Sensor Pairing

To be able to pair a Zigbee sensor, you need to be on board of your boat with a Zigbee sensor that belongs to the compatible sensors list. Then follow the instructions contained here.

SAILSENSE

8. Diagnostic And Troubleshooting

8.1 LED Status

COLOR	DESCRIPTION	ROOT CAUSES & SOLUTIONS
BLUE with green flashes	All is OK: the HUB is connected to our servers and there is NMEA data flowing on the CANbus.	
Steady BLUE	The HUB is connected to our servers, but there aren't any NMEA data flowing on the CANbus.	• No data is flowing on the NMEA2000 network --> check that other NMEA2000 instruments on the NMEA2000 network are powered ON • The HUB is not physically connected to the NMEA2000 network --> Check that the NMEA plug of the HUB cable is connected to the NMEA2000 network of the boat

WHITE with green flashes	NMEA data are flowing on the CANbus, but the HUB is not connected to our servers.	- There is no mobile coverage at your present location / or the coverage is very weak --> check if you have coverage on your mobile phone. If not, move the boat to an area where you have coverage on your phone. - The HUB is in the process to connect to a network --> if the problem persists after 30 minutes, remove the power cable of the HUB for 2 minutes and then plug it back. - If the problem persists, the HUB is most likely located in an area where it is not allowed to connect --> please contact our **support team** for further assistance.
Steady WHITE	The HUB is not connected to our servers and there aren't any NMEA data flowing on the CANbus.	See potential root causes above
Flashing WHITE	The HUB is booting.	It's normal! --> Wait a few minutes for the LED to change color.
RED	The HUB is in ERROR mode.	You can try to force a [hard reset](#) of the HUB by removing the power cable for 2 minutes and then plug it back. If after the next reboot the HUB's led stays red, get in contact with our **support team.**

No led	The HUB is not powered on.	• The HUB does not get 12-24VDC power --> Please check that the power source is ON. If the problem persists, please check the voltage of the power source (via the red and black cables of the cabling kit). It should be > 11V for the HUB to boot. • Please contact our **support team** for further assistance.

9. Appendices

9.1 CAN adapter

Depending on your installation, you may need an adapter or T-connector / multi joiner to connect your HUB to the CAN network. Here are some references for Raymarine and B&G:

B&G	RAYMARINE
SIMNET ADAPTER • 24005729 (short) • 24006199 (long) 	N2K SEATALK • A06045 (short) • A06075 (long)
N2K SEATALK - MULTI JOINERS T CONNECTORS AND DORSAL CABLE • 000-0119-79 • 24005860 • 24005829 	N2K SEATALK - MULTI JOINERS T CONNECTORS AND DORSAL CABLE • A06028 • A06064 • A06033

10. Sailsense contacts

For any question or feedback, please contact Sailsense via :

Mail : hello@sailsense.io / support@sailsense.io
WhatsApp (message only) : +44 7418 310794

Sailsense knowledge base : https://help.sailsense.io/en

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