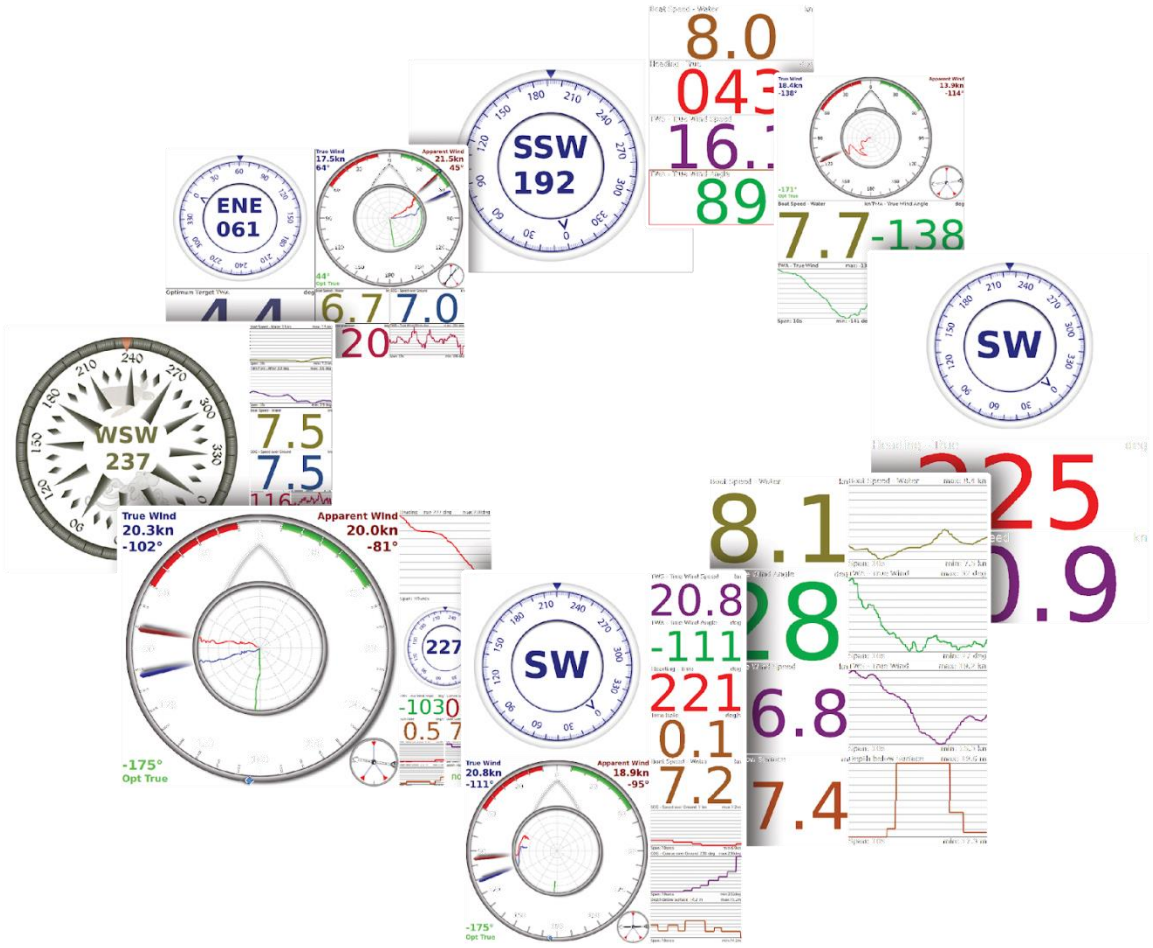


SAILMON

INSTALLATION MANUAL

2023 – VERSION 3.5.2

Table of Contents

DISCLAIMER

The owner of Sailmon products is responsible for installing and using the instruments in a way that will not cause any accidents, personal injury or property damage. It is the user's obligation and responsibility to comply with the standards of safe boat handling.

Sailmon B.V. disclaims all liabilities for any use of this product in a way that may cause accidents, damage or that may violate the law.
Sailmon are an aid to navigation but do not replace conventional navigation. It is the owner's responsibility to practice safe boating practices and navigation. All precautions should be taken to ensure the yacht is not placed in any danger.

Calibrating the Sailmon system is an electronic aid and is designed to assist in navigation and reading measurement values. Incorrect calibration can lead to false and inaccurate readings placing the yacht into possible danger.

COPYRIGHT

LIABILITY AND SAFETY WARNING

It is the user's responsibility to ensure that under all circumstances the equipment is used for the purposes for which it has been designed.

ELECTRICAL HAZARD:
Using the equipment enlarges the possibility of electrocution. Contact with high voltages may result in injury and/or loss of life.

CALIBRATION:
Accurate and correct calibration is of paramount importance for a safe use of the equipment. The yacht may be placed in danger when incorrect calibration of the equipment has occurred.

OPERATIONAL:
Sailmon systems are designed for assistance during navigation proceedings. It is not designed to replace conventional navigation procedures. Precautions should be taken to avoid placing the yacht/boat into danger

Sailmon systems are capable of running on power sources up to 30VDC. A higher or different power supply can and will lead to permanent damage to the system and equipment.

NMEA 2000 equipment is designed for use with a power supply source of 12VDC. The application of any other power supply may result in permanent damage to the NMEA 2000 equipment.

CAUTIOM: DISPLAY INSTALLATION

Displays installed into locations manufactured from conductive materials (e.g. Steel, Carbon Fibre etc.) should be insulated from the structure to prevent damage to the casings as a result of the effects of electrolysis.

IMPORTANT: CUTTING OFF A SNET CONNECTOR FROM A DISPLAY WILL VOID ALL WARANTY TO THAT DISPLAY.

CAUTION: PROCESSOR INSTALLATION

All Sailmon processors should be installed below decks in a dry location protected from water and moisture.

POWER OFF DISCLAIMER

When in standby mode, the E4 still consumes a little power. If you leave it for too long without shore power, it could drain the battery.

CAUTION: CLEANING

When cleaning this product:

- Use a clean soft dry cloth to wipe the screens and ideally use isopropyl alcohol (IPA) for removing oil-based pollution.
- Do NOT wipe the display screen with a dirty or rough cloth, as this could scratch the screen coating.
- Do NOT use abrasive, acid or ammonia-based products.
- Do NOT use a jet wash.

ABOUT THIS MANUAL

As Sailmon is continuously improving their products, we retain the right to make changes to our products at any time which may not be reflected in this version of the manual.

This manual is exclusively for the installation of Sailmon products. We will not be responsible for any faulty installation. In this manual we assume that the Installer has basic knowledge of DC electrical systems, wiring and common installation practices.

If in doubt always ask **SAIL**MON or your dealer for assistance.

INTRODUCTION

SYSTEM INTRODUCTION

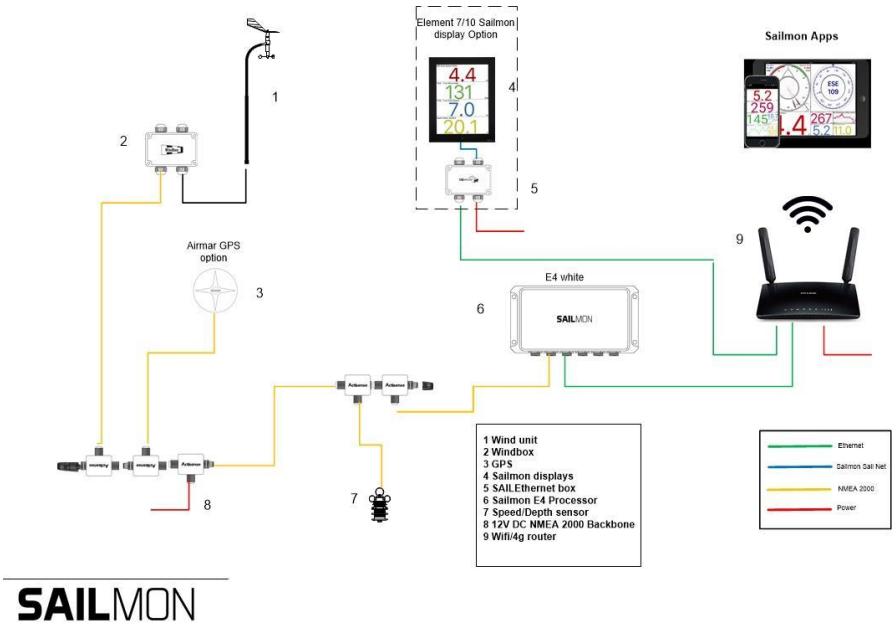
Sailmon system provides a whole new look to yachting electronics for a wide range of vessels, from top end racing yachts to weekend cruisers. Sailmon products are developed to bring, combine and view all data on board, anywhere, anytime.

The heart of the Sailmon network is the E4 processor. This small but powerful central processor unit provides all the navigation information that is needed. With more than six data compatibilities, it is the smartest and most advanced CPU on the market. Powered with either 12 or 24VDC it is possible to install the E4 nearly anywhere on board. With the use of WiFi, data is accessible everywhere.

The sunlight viewable displays enable all data to be selected and displayed at all locations. Using the standard 100BASE-TX fast Ethernet communication network, all displays can be connected to one E4 processor. Sailmon displays use our proprietary S-NET cable and connector system, which contain power and data wiring, made from waterproof components to survive the harsh conditions found at sea. Power and ethernet is combined in our dedicated SAIL Ethernet.

To complete your system, sensors from any manufacturer can be added using our interfacing boxes, including load cell, wind instruments, through hull transducers and linear inputs. You can also use existing sensors when you upgrade to the E4.

SAILMON SYSTEM EXAMPLE



1. PRODUCT OVERVIEW

The Sailmon model E4 processor will provide your vessel with the possibility to view all your data everywhere on board. Combining sailing data with advanced racing technology, the processor enables you to configure, calibrate and view your boat data everywhere. This way, when installed in either an existing system or working on its own, the processor will connect to different data protocols and stream all data to our wired display or any smart device using our USB wifi dongle or on board access point.

Due to its number of data ports, the E4 can be connected to almost any network or can be set up as a standalone CPU to run your Sailmon equipment.

The Sailmon E4 processor will work as a high end calibration system for different vessels. The E4 provides the following capabilities:

1.1 FUNCTIONALITY

- To receive raw data from a wide range of sensors such as wind, boat speed, compass and mast rotation, GPS, linear sensors, loadcells.
- Provide very sophisticated multidimensional calibration of data.
- Produce calibrated and derived data such as: True Wind Speed & Angle, calibrated Apparent Wind Speed & Angle, calibrated Boat Speed, derived tidal information and drift.
- To (re)publish sensor-calibrated and derived data on the various networks
- To calculate values based on the data and your polars such as Target Speed or performance ratio.
- To receive and re publish data from other applications. For example, to publish Bearing & Distance To Waypoint (BTP & DTP) from NMEA,NMEA2000, UDP or Modbus TCP/IP interfaces.

1.2 INSTRUMENT INTEGRATION

The E4 system can use a wide range of sensors based on NMEA, Modbus TCP/IP, NMEA over UDP, NMEA2000, B&G, Nexus protocols. Sailmon can provide support for various other sensors via optional Sailmon boxes such as WindBox, LoadcellBox, Buttonbox and LinearBox. The Sailmon E4 system is very flexible:

- It supports various interfaces for existing hardware on board such as B&G, Raymarine and other sensors or hardware.
- It can even support and bridge different legacy networks simultaneously and upgrade their capabilities.

- It allows the re use of old system displays from many manufactures, so no need to replace them. For example, Garmin GNX, B&G Fastnet or Sailmon Element Model X and VII can be connected to the system.

1.3 SOFTWARE

Many other applications interface with E4 via Ethernet. Expedition, Adrena and Deckman all can be combined into the Sailmon system. Besides this, Sailmon offers E4 users the following software functionality:

- NavDesk on PC (Windows) or Tablet (IOS, Android) for system control.
- Screen view to enable a tablet or PC to act as Sailmon Display.
- Crew View on mobile / tablet (IOS, Android) to act as a preset display.

1.4 CONNECTIVITY

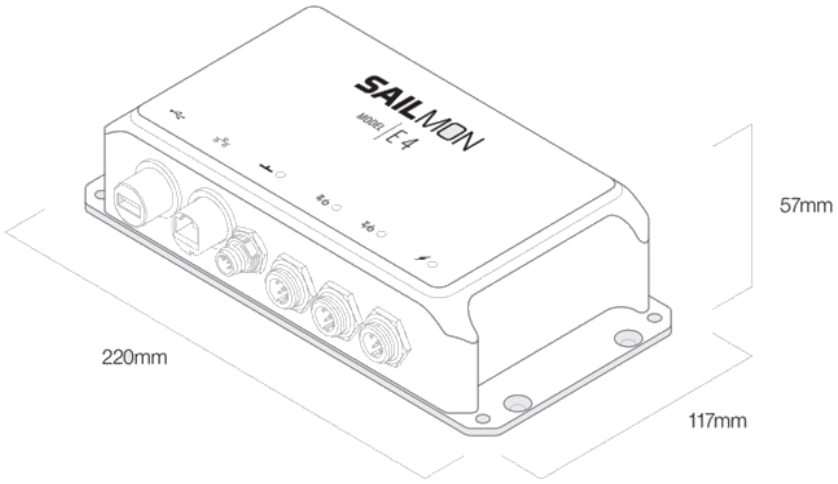
Supported protocols:

- NMEA 2000
- NMEA 0183 at 4800 and 38400 b/s.
- Seatalk
- B&G Fastnet
- Ethernet
- NMEA over UDP
- Modbus TCP/IP Client and Server
- Modbus TCP/IP data out

The Sailmon instruments communicate using standard 100Mbps ethernet allowing for fast and flexible integration. Each device is a DHCP client which allows our system to be integrated in the yachts network. All system control is done using our Navdesk application.

1.5 TECHNICAL SPECIFICATIONS E4

Power supply 12-30VDC
Power consumption 3W
Weight 1.5 kg
Processor: A9 dual core processor.

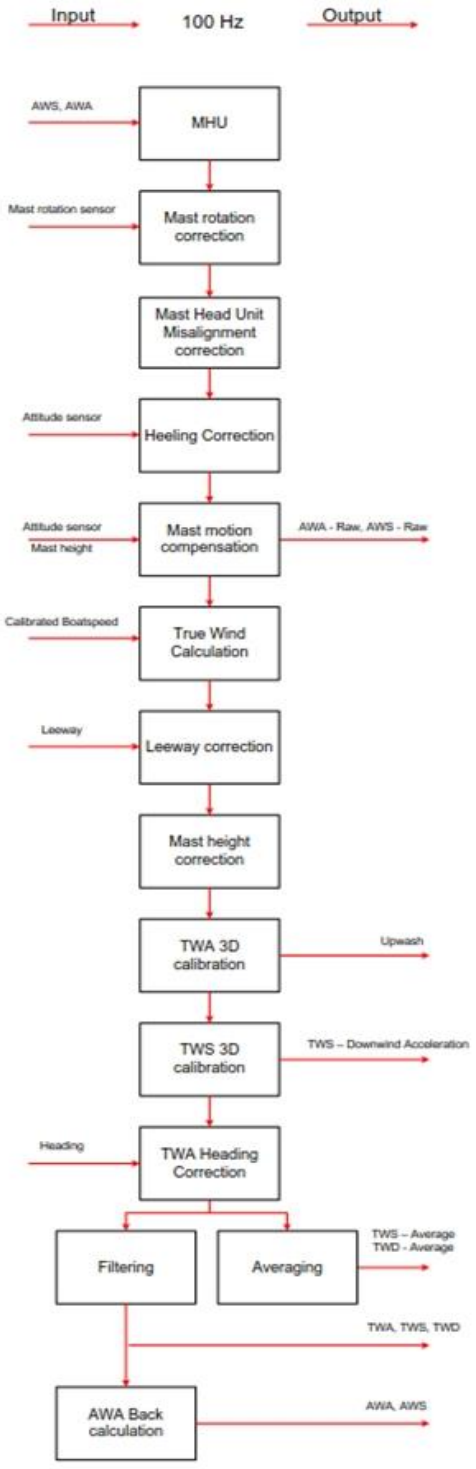


1.6 SYSTEM ARCHITECTURE

The system architecture varies in practice on each boat. It is very important to have a clear overview of the architecture in which the E4 system is placed. Multiple examples can be found on the website.

WIND CALCULATION FLOW CHART

SAILMON



The data from the mast head unit are corrected for mast rotation and mast head misalignment. Misalignment usually occurs when the MHU is not mounted 100% straight to the bow. If a heeling sensor is connected, AWA will be corrected for the skewed flow due to an inclined MHU. In case a Sailmon inertial sensor is connected, the apparent wind will be corrected for mast head movement.

The direct values for AWA – Raw and AWS – Raw are generated now.

In the next step, true wind is calculated from the boatspeed value. The module takes the calibrated boatspeed and apparent wind and calculated the respective vectors for true wind data.

Since most polars are referenced to true wind including leeway, leeway is added in the next stage.

Most polars are referenced to a wind speed in 10m altitude. If a mast height is given, the system will correct the true wind speed for mast height.

Now, TWA is calibrated for upwash, this module gives the upwash value as an output.

In the next stage, TWS is corrected for downwind acceleration. This module outputs the TWS – Downwind acceleration value.

If TWA heading correction is enables, the next stage will use the heading sensor to calculate a very stable while still highly dynamic TWA.

The true wind values are now filtered and averaged, and are used for back calculating apparent wind.

2. INSTALLATION

2.1 NMEA2000

The system consists of a linear backbone from which drop cables connect the components to the E4 processor.

Setup a NMEA2000 backbone using Micro-C connectors, 2 terminator plugs and required number of T -pieces to connect NMEA2000 equipment.

WIRING

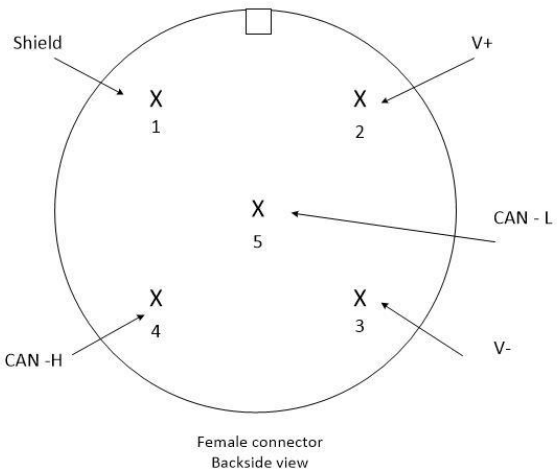
- The E4 does not power the NMEA 2000 backbone, it needs a separate fused 12V power connection.
- A drop cable, the cable that connects NMEA 2000 devices to the backbone, cannot be longer than 6 m (19.5ft).
- A maximum of 50 devices can be connected on a NMEA 2000 backbone and it cannot be longer than 100m. If the network is larger, use a network bridge.
- The maximum current is 5A on the NMEA 2000 backbone.
- Do not make sharp bends in the cabling.
- Do not route cabling in area's with high voltage cabling.

If the NMEA2000 backbone malfunctions multiple methods of troubleshooting are available. See par 5.2.1

Connect a NMEA 2000 drop cable with a standard female NMEA 2000 connector to the E4. The port is a NMEA 2000 node and does not power the bus.

IMPORTANT: never connect the NMEA 2000 backbone power cable to a 24V.

NMEA2000 connector pin out



Female connector
Backside view

Pin	Sailmon Color	NMEA Color	Function
1	N/C	Shield	Shield
2	White	Red	12V
3	Blue	Black	0V
4	Black	White	CAN-H
5	Green	Blue	CAN-L

2.2 E4 INSTALLATION

Warning: Before starting the installation, make sure all electrical power is switched off, the power supply is suited for the desired installation and the right cabling is being used.
Note: Make sure the NavDesk app has been installed and registered online if there is no internet connection on the boat.

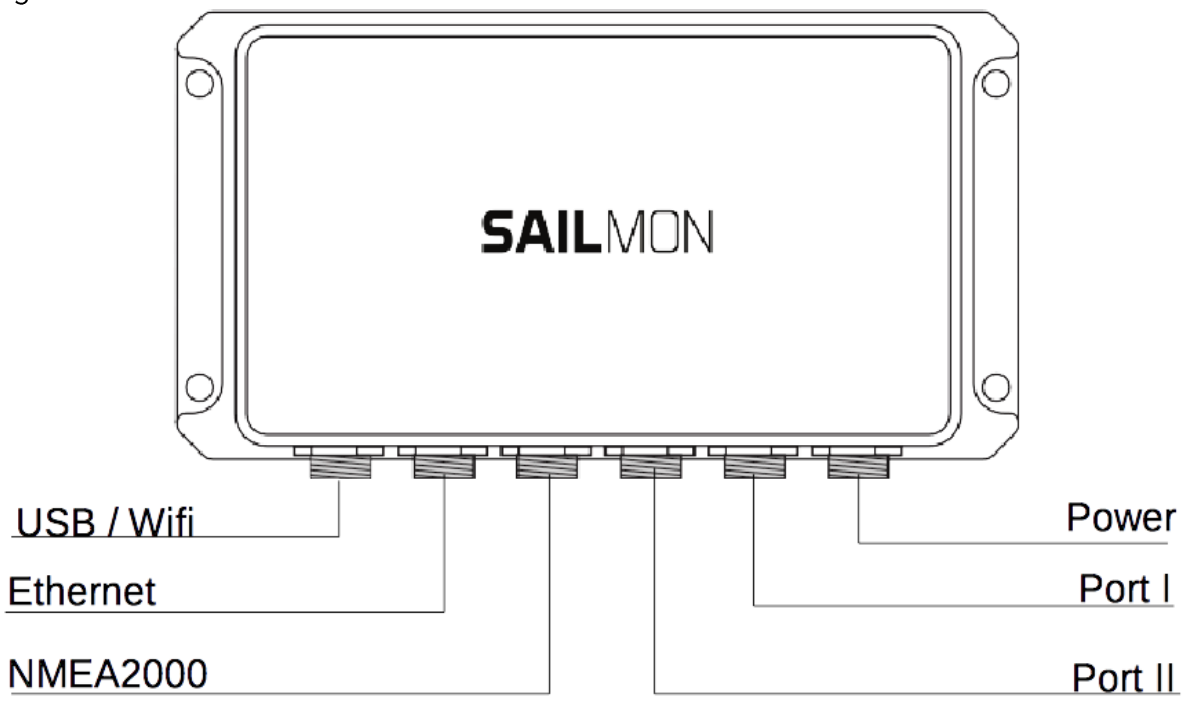
Make sure the E4 is mounted in a dry and well ventilated area., the E4 is not designed to be watertight and should therefore not be in contact with water. Securely mount the E4 in the desired location and mount with four screws.
The E4 has no orientation components so it is possible to mount the processor in any angle. However, it is recommended to place the E4 with its connection ports downwards.

Connect data connections using figure 1.2. Be sure to observe connector keyway alignment. A bad connection will lead to data loss and the system under performing.

Ensure cables are suitably supported and are located where they will not become damaged in any way. Consider cable protection in exposed cable runs.

2.2.1 E4 PORT CONNECTIONS

Figure 2.1



USB / Wifi	For connecting USB WIFI Adaptor, to connect smart devices
Ethernet	Links laptop with Sailmon software or ship's network via a wired connection
NMEA 2000	Connection for N2K backbone network
Port II	Connection between Sailmon and NMEA 0183 or Fastnet network
Port I	Connection for NMEA0183,Seatalk 1 or Nexus FDX
Power	12 / 24 VDC input

2.2.2 LED STATUS

The 4 LED's indicate sensors connection and correct operation. When connecting NMEA 2000 it can take slightly longer for the blue LED to show up due to NMEA 2000 protocol .

2.2.3 SENSOR CONNECTING

Port 1 & 2 are set in a NMEA0183 mode when the E4 is delivered. Each model E4 port must be set during commissioning using the NavDesk tool. Connect a PC to the E4 for setting the correct port option before connecting the cable to the port.

PORT I/O AND II/O

Both ports can be used for connecting several different protocols, only one protocol can be used at a time per port. You can set up which protocol to use with the Navdesk tool.

NMEA 0183

The NMEA 0183 protocol can be used in both regular (4800bps) and high speed (38400bps).
If you require more than one NMEA 0183 input you will need a NMEA multiplexer. Please contact Sailmon support if you need any assistance.

WIRING:

PORT I/O CONNCECTION TO:

- NMEA 0183 / NMEA 0183 HS in/out
- Seatalk
- NEXUS FDX

PIN #	*Supplied cable Colour*	***NMEA 0183 NMEA 0183 HS***	***SeaTalk RX only***	***Nexus FDX***
1	Red	*NMEA in +*		*RxD / D9 pin 2*
2	Blue	*NMEA out +*		*TxD / D9 pin 3*
3	Green	*NMEA out-*		
4	Yellow		*12V (red)*	
5	White		*Data (Yellow)*	
6	Black	*NMEA in -*	*GND (Black)*	*GND /D9 pin 5*

NOTE: NO POWER OUTPUT SUPPLIED IN CONNECTOR.

PORT II/O CONNECTION TO:

- NMEA 0183 / NMEA 0183 HS in
- B&G Fastnet

Sailmon Model E4 Port2 Fastnet cable

Pin	Color	B&G Fastnet function
1		NC
2		NC
3		bridge to 4
4		bridge to 3
5	Red	Fastnet + (red)
6	White	Fastnet (white)
7	Green	Fastnet (green)
8	Black	Fastnet - (black)

Sailmon E4 Port 2 to NMEA0183 & old style Buttonbox

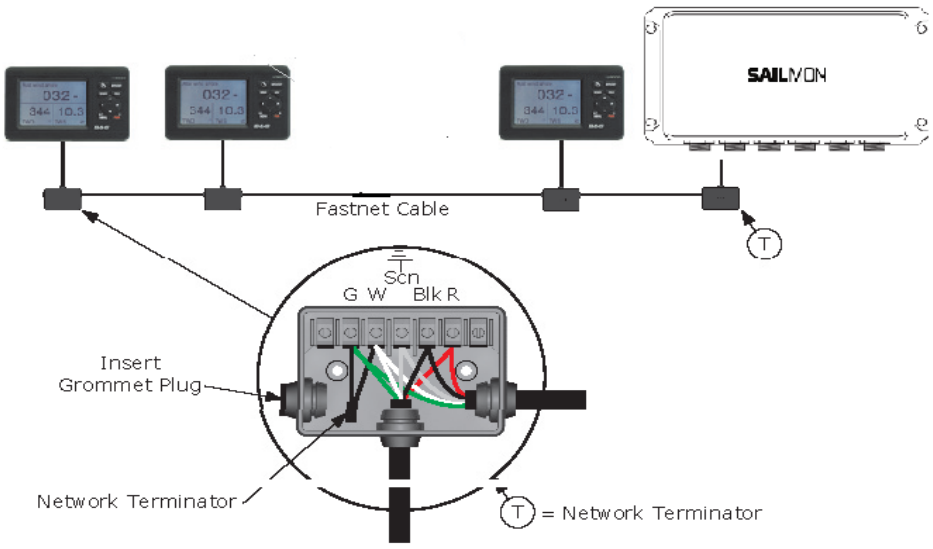
Pin	Colour	NMEA0183 function	Old Buttonbox function
1	Red	NMEA in +	12-30V DC in
2	Blue		Switch 1&2 Ground
3	Green		Switch 2
4	Yellow		Switch 3
5	White		Switch 4
6	Brown		Switch 1
7	Orange		Switch 3&4 Ground
8	Black	NMEA in -	0V

NOTE: NO POWER OUTPUT SUPPLIED IN CONNECTOR.

2.2.4 PROTOCOLS

FASTNET:

Connect Fastnet sensors and networks through port II on your E4 using the 8 pin NMEA Fastnet cable, partnumber SME4P2Fastnet_Cable. E4 data will be mapped to the custom channels on the B&G display. The Fastnet bus must be installed and configured using the correct B&G Fastnetbus topology with resistors at each and of the bus. Note that Fastnet bus needs to be powered externally.



Fastnet bus topology

SEATALK:

Seatalk 1 can be connected through port I on the E4 using the 6 pin NMEA/Seatalk cable partnumber SME4P1NMEA0183. Seatalk NG can be connected with the use of a Seatalk NG to NMEA 2000 cable partnumber RAYM-A06045.

NEXUS:

Use a Garmin GND10 unit to connect Nexus equipment the GND10 will then connect direct to the NMEA2000 bus and in turn to the E4.

GARMIN:

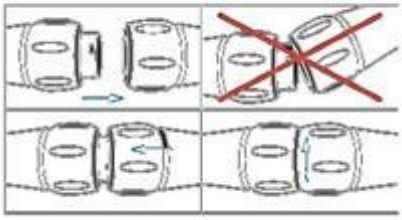
Garmin display and equipment will connect directly to the NEMA2000 bus, E4 data will be available in the custom channels list as defined in Navdesk.

2.3 SAILMON COMPONENTS

2.3.1 SNET CONNECTOR

To connect displays to the Sailmon network or to each other, a Snet connector is used. These connectors are suitable for use outside due to the IP classification. This classification is only effective when connectors are interconnected. Loose connectors can easily be damaged by moisture. Use the sealing cap when the connector is exposed and not connected.

Snet cables can be purchased in two types:

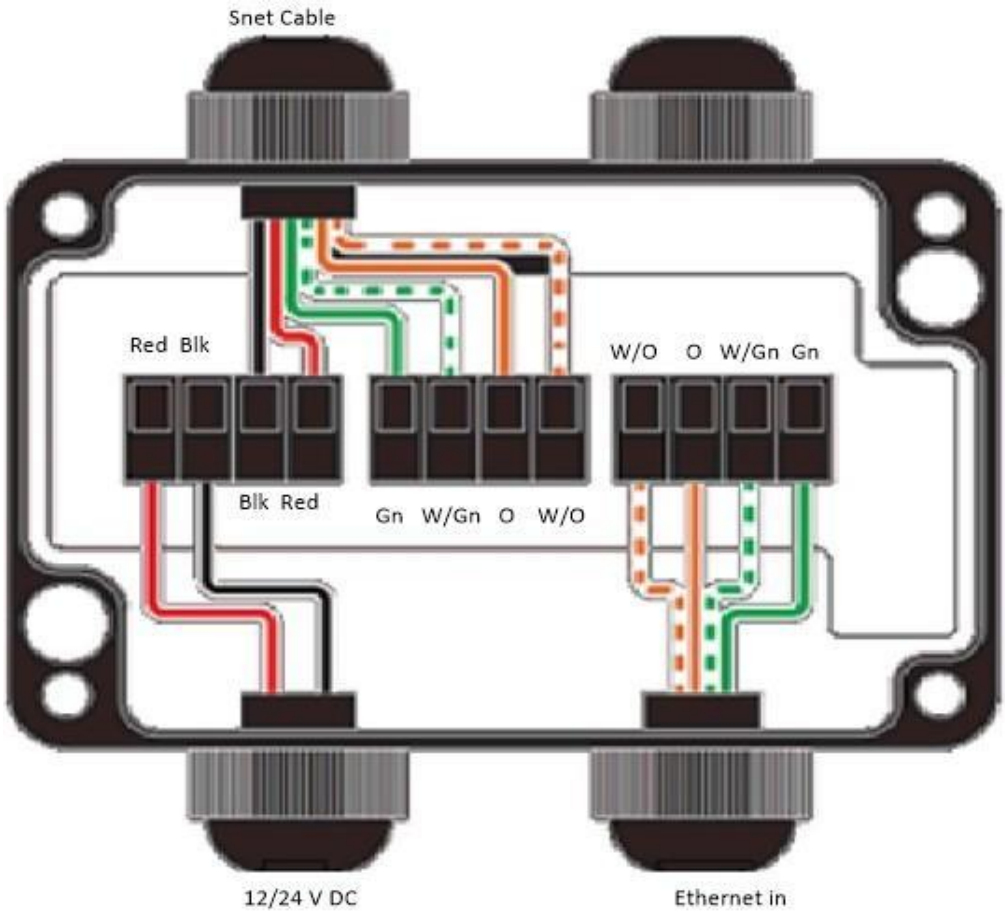


- Ready - to - go: Customers have to know the exact length of the desired cable since there will be a connector on both sides. Pulling the cable through the vessel will be harder due to the large diameter
- Self build: On one side of the Snet cable, a female connector is already attached. The male connector is provided to be mounted by the customer. Please note that for this, a special crimp tool is needed, which can be purchased from Sailmon.

IMPORTANT: Connectors should never be forced together due to the keyway in the male connector. Gently push the connectors into each other and turn. When turned correctly, a small ‘click’ should be heard. The connectors are now locked.
Make sure you put the waterproof dust-cap on the last instrument to prevent infiltration.
Do Not cut off the connector at the end of a daisychain. This will void warranty of the display and will likely cause damage to the electronics in the display.

2.3.2 SAILETHERNET

This box is connected to the ethernet port of the E4 and the ship's power supply.
The SAILethernet powers and establishes a connection between your display and model E4 over ethernet. This connection can be achieved by adding both devices to an existing network or connecting them directly together.
The SAILethernet converts a regular power cable and a regular cat-5 cable into our proprietary 6 core S-NET cable, which runs from the instruments to the SAILethernet.



Mounting

- Find a suitable location to mount the box
- Mount the box with the power and ethernet wires facing downwards.
- Pull the SNET cable from the Instrument mounting location to the SAILethernet mounting location. Leave the female connector at the Instrument end.
- Pull a power cable from the power supply location to the SAILethernet location.
- Pull a network Cable from the E4 (or network switch) to the SAILethernet location.
- The SNET cable is supplied with the outside stripped 70mm. This is the ideal length to mount it in the SAILethernet, do not shorten this.
- Unscrew the cable grommets and feed the appropriate cable through the cable grommet.
- Strip wires and crimp ferrules.
- Insert the wires in the appropriate terminals. When inserting the wires press the white push button to enable insertion.
- Fasten the cable grommets with the outside jacket 5mm inside the box (see figure 2)
- Repeat for each group of instruments.

2.3.3 RECOMMENDED FUSE RATING

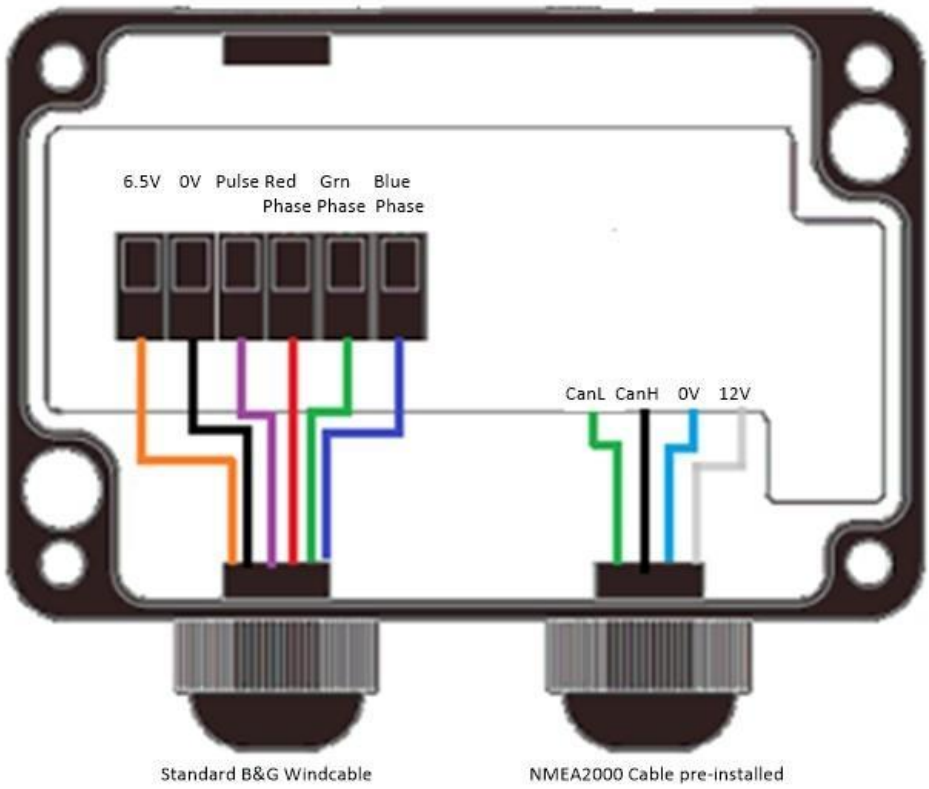
Number of Sailmon displays	Supply Battery voltage	Fuse size
1 / 2	12V	6A
3 / 4	12V	12A
5 / 6	12V	16A
1 / 2	24V	6A
3 / 4	24V	10A
5 / 6	24V	12A

2.3.4 WINDBOX

The Sailmon WindBox offers an interface for the B&G 213MHU wind sensor to the NMEA 2000 backbone and in turn connection to the E4 processor.

The NMEA 2000 interface cable is preinstalled. For overvoltage and electrostatic discharge protection the WindBox is galvanic isolated.

INSTALLATION



Choose a dry and protected place for the Wind Box. The Wind Box is designed to be installed inside the boat.

IMPORTANT: Do not install your Sailmon windbox at the masthead. This will make lighting protection impossible and the NMEA 2000 specifications for the maximum drop cable length are likely to be exceeded.

Feed the wind sensor cable into the left cable gland of the Wind Box and connect the wires according to the color layout on the diagram.

OPERATION

In case of sensor failure or incorrect connection, the blue status LED will blink 5 Times / second.

- The Wind Box is designed to be integrated into a Sailmon system. It does not provide direct offset features since Sailmon uses advanced calibration which is done in other parts of the system. Contact Sailmon support if you plan to use the Wind Box for other instrument systems.
- Since the Wind Box delivers wind data with a high update rate of 100Hz, this may be too much for some instruments. Special software is available in this case, to solve this problem contact the Sailmon support team.

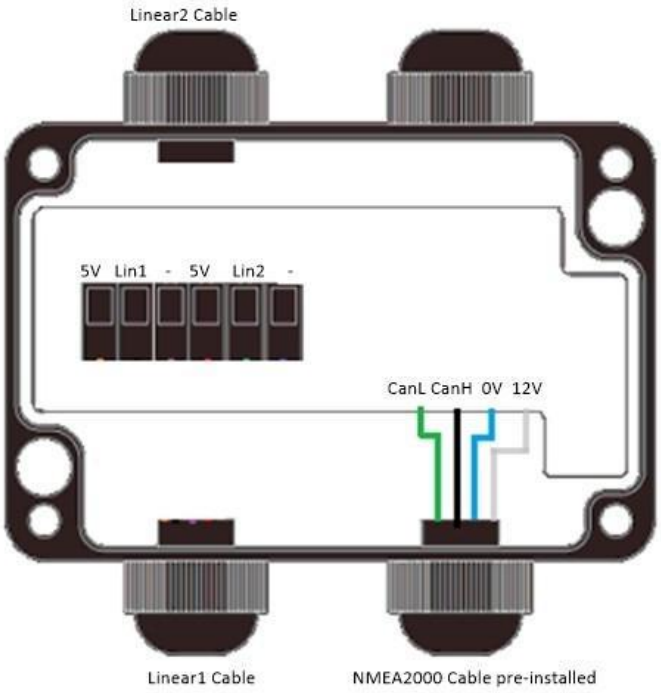
TECHNICAL SPECIFICATION WINDBOX

- Update rate: 25Hz for Sailmon.
- 5 m NMEA 2000 drop cable (pre-installed) (SeaTalk NG is available on request)
- Power Supply: 9-16V over NMEA 2000
- Dimensions (H x W x D): 98mm x 82mm x 33mm
- Weight: 160g (Cable: 240g) • Protection: IP65
- Ambient Temperature Range: -10°C to 50°C, 14°F to 122°F
- Power Consumption: 10mA at 12V
- Galvanic Isolation of MHU
- NMEA 2000 PGNs Supplied: 130306 (0x1FD02) with 10Hz, Sailmon proprietary 64231 (0xFAE7) for 100Hz MHU angle and speed

2.3.5 LINEARBOX

The Sailmon LinearBox is an interface for 3rd party linear sensors to be connected to the E4 processor by means of the NMEA 2000 backbone. Up to 16 LinearBoxes can be connected to a single E4 Processor. The linear box provides overvoltage and electrostatic protection by means of galvanic isolation.

The E4 will measure linear inputs with an update rate of 4Hz allowing monitoring and logging of all channels.



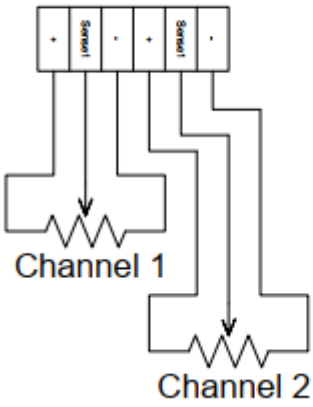
INSTALLATION

The box is designed to be installed inside the boat. The preferred installation location is as close to the sensor as possible. This will keep the analog wires between the sensor and the LinearBox short. After choosing a suitable installation location, feed the sensor cable into the left cable gland of the LinearBox and connect the wires according to the diagram.

RESISTIVE SENSORS

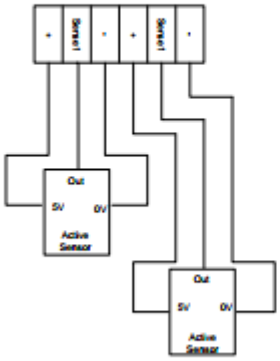
Resistive sensors can be standard positioning sensors, rudder angle sensors, rotation sensors etc.

Follow the Scheme below to connect standard resistive sensors to the Linear Box.



ACTIVE SENSORS

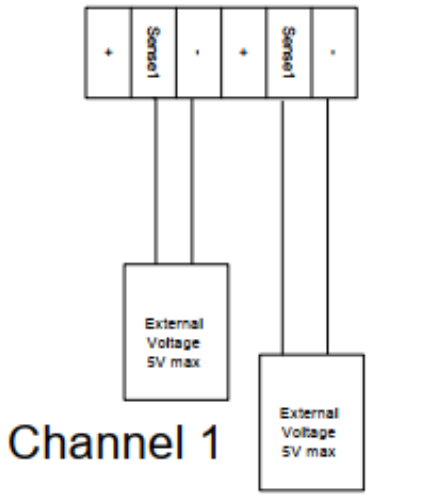
Some sensors do have internal electronics which converts measurements to an analog voltage. As long the output of such a sensor is 0-5V, these sensors can be connected to the Linear Box.



Channel 2

SENSORS FROM EXTERNAL SOURCE

It is possible to measure a 0-5V signal from any external source. Extreme care must be taken in this case to not exceed the maximum input voltage of 5V for the inputs.



Channel 1

Channel 2

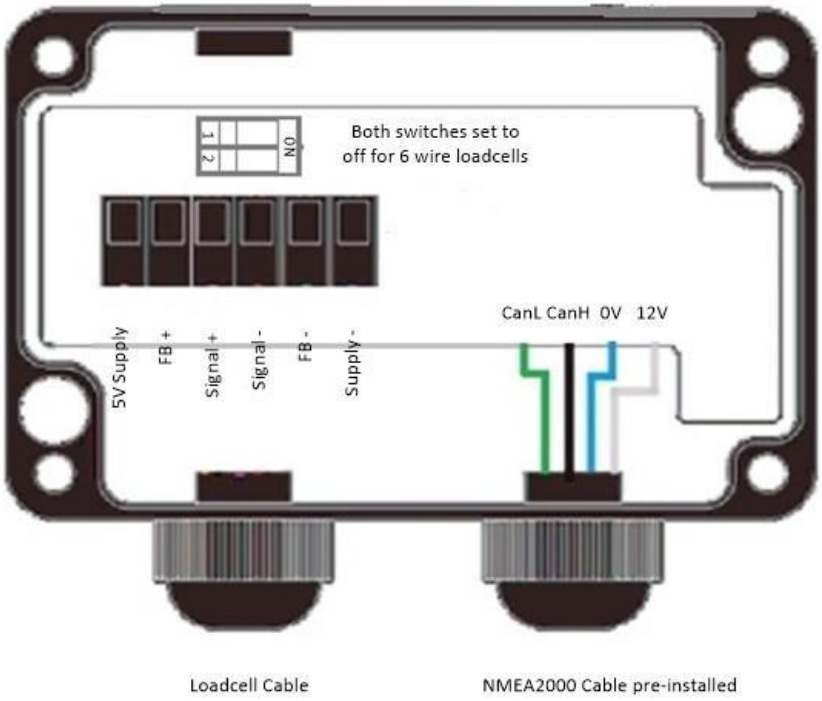
TECHNICAL SPECIFICATIONS OF THE LINEARBOX

- Update rate: 4Hz
- 5m NMEA 2000 drop cable (pre-installed)
- Accuracy: 2% over Temperature
- Maximum input Voltage: 5000mV
- Minimum input Voltage: 0mV
- Measurement resolution: 10 bit, 1024 steps
- 5V Supply capability: 50mA for both channels (minimum sensor resistance 200 Ohms on each channel)
- Dimensions (H x W x D): 98mm x 82mm x 33mm
- Weight: 160g (Cable: 240g)
- Protection: IP65
- Ambient Temperature Range: 0°C to 50°C, 32°F to 122°F
- Power Supply: NMEA 2000 compatible, 9-16V
- Galvanic Isolation of Linear Inputs to NMEA 2000, no isolation between channels
- NMEA 2000 PGNs Supplied: 64233 (0x0FAE9) Sailmon proprietary

2.3.6 LOADCELL BOX

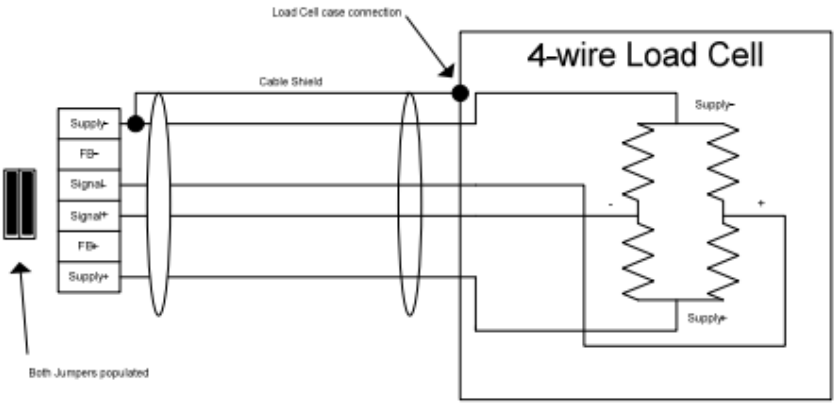
The Sailmon Loadcell Box offers connection of load cells to the Sailmon system. It can be used to interface all common 4-wire or 6-wire load cells. Calibration is done with Navdesk. For overvoltage and electrostatic discharge protection the Load Cell Box is galvanically isolated. The input can read 0-39mV input.

It will measure tension or compression with an update rate of 4Hz, allowing monitoring and logging of all loads. With the Sailmon System, the actual force can be displayed in Tonnes, N (Newton), kg, Klbf, or % of pin rated load. The Loadcell box can supply 5V to loadcells, loadcells that need 12V power need to be powered from a separate 12V powersupply.



4-WIRE LOADCELLS

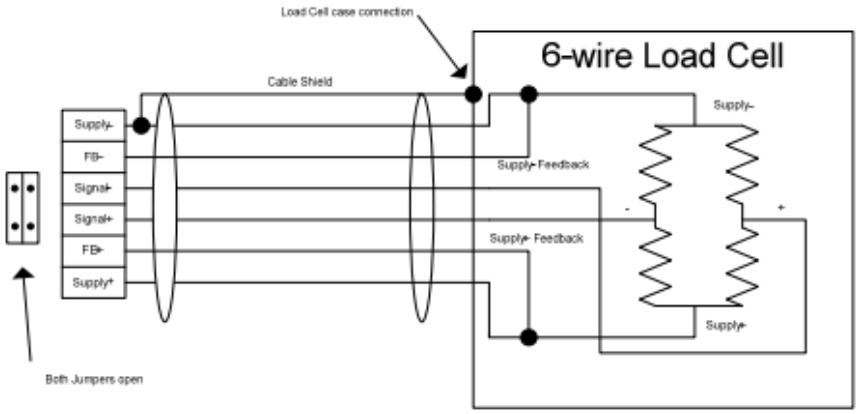
Most load cells have a 4 wire connection, where 2 wires are used for the supply of the internal strain gauges, while the other 2 wires provide the measurement signal. The proper connection for 4 wire load cells is as follows:



For 4 wire load cells, both jumpers on the back side of the connector terminal must be populated like described in the picture above.

6-WIRE LOADCELLS

High accuracy load cells have a 6 wire connection, where 2 wires are used for the supply of the internal strain gauges, 2 wires for Supply Feedback and the remaining 2 wires provide the measurement signal. The proper connection for 6 wire load cells is as follows:



For 6 wire loadcells, both jumpers on the back of the connector terminal need to be open.

TECHNICAL SPECIFICATION OF LOADCELL BOX

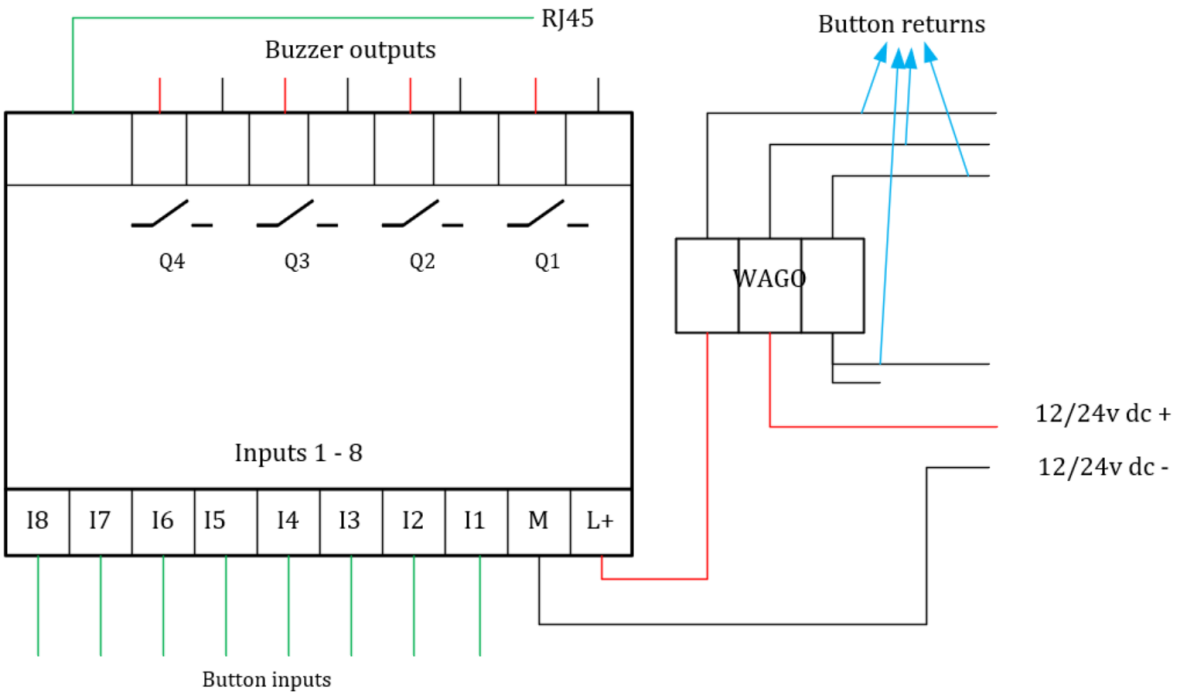
- Update rate: 4Hz
- 5m NMEA 2000 drop cable (pre-installed)
- Accuracy: 1% over Temperature
- Maximum input Voltage: 39mV
- Minimum input Voltage: 0mV
- Dimensions: 98mm x 82mm x 33mm
- Weight: 160g (Cable: 240g)
- Protection: IP65
- Ambient Temperature Range: 0°C to 50°C, 32°F to 122°F
- Power Supply: NMEA 2000 compatible, 9-16V
- Isolation: Galvanic Isolation of Load Cell
- NMEA 2000: PGNs Supplied: 64221 (0x0FADD) Sailmon proprietary

2.3.7 BUTTONBOX

Sailmon have moved to a PLC based system. This has the advantage of 8 buttons instead of 4 button connection. The system is also expandable to 16 or more channels. With Navdesk 3.5.2 it is also possible to use Piezo buzzers for audible alarms for wind and depth which can be acknowledged using a button.The Buttonbox connection is Ethernet based and needs to be in the same network range as the rest of the Sailmon system. Button boxes come pre-configured with an IP address according to customer wishes. The IP address will be printed on the label on the lid.

Connect buttons such that one wire connects to one of the Wago terminals and the other side to I1 through I8. Power connects 12-24VDC + to the Wago terminal, 0V to M on the PLC.

If Piezo buzzers are to be connected connect them to Q1-Q4 with Red lead to power.



ETHERNET CONNECTION:

Connect the button box to the same network as the Sailmon E4 using a Standard RJ45 connector.

SETUP OF BUTTON ACTIONS:

Once the system is hooked up and switched on, press all buttons once so they are recognized by the system. In the Action setting select what the action should be. If you want to select an action for only one or more displays put in the number of the display's in the position tab. The number of the display corresponds with the position it has in the Setup>Commissioning>Display Definition page.

E4 SILVER

As the E4 Silver has no Modbus input a file needs to be added on the E4 processor. This can be done using the FileZilla software by connecting to the E4 and sending a file named input.json to the E4. Please contact Sailmon if you need assistance! If a Buttonbox is already in an order to ship we will pre-conigure everything before shipping.

The file needs to be in this format regarding the Button interface, where the IP address confirms to the address of the buttonbox:

```
},
   "Modbus-TCP1": {
      "Enabled": true,
      "Address": "192.168.xx.xx",
      "Port": 502,
      "Registers": [
         {
            "Address": 0,
            "Bits": [
               "Button-1",
               "button-2",
               "button-3",
               "button-4",
               "button-5",
               "button-6"
          ],
            "RegisterType": 4
         }
```

E4 BLACK

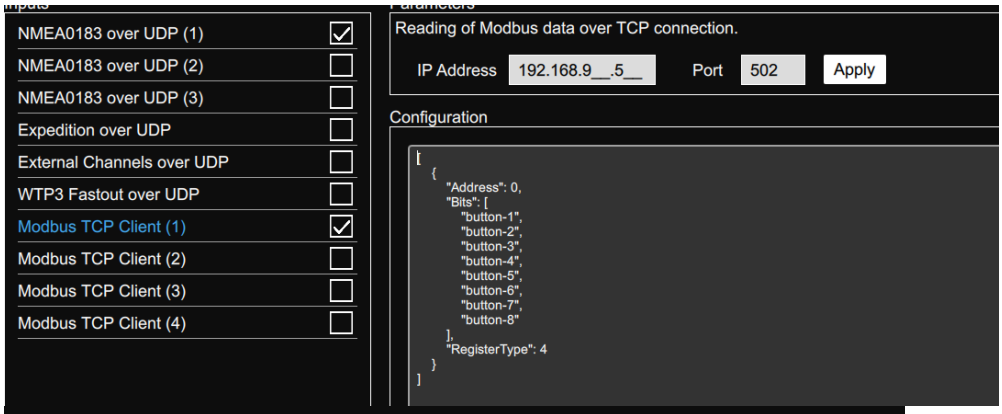
As the E4 Black has up to 10 free configurable Modbus inputs one needs to designate one of the Modbus inputs as follows:

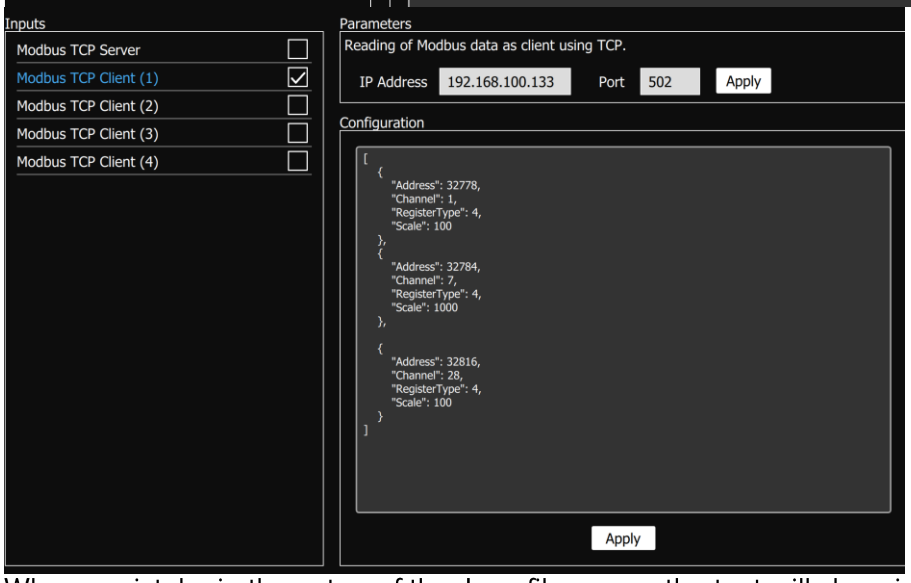
IP adress of the Buttonbox, Port: 502.
In the Configuration section put in the following Json file:

```
[
   {
      "Address": 0,
      "Bits": [
         "button-1",
         "button-2",
         "button-3",
         "button-4",
         "button-5",
         "button-6",
         "button-7",
         "button-8"
      ],
      "RegisterType": 4
   }
]
```

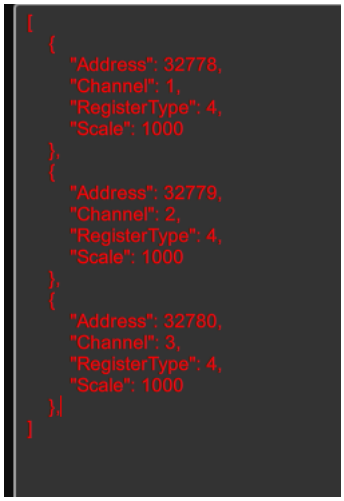
DATA FROM PLC SYSTEMS

The Sailmon E4 **Black** processor is able to receive data from PLC systems. What is needed for this is the list of addresses and names of the corresponding variables with scaling factors and possible offsets. Together with the IP address of the PLC and portnumber (usually 502).
This list is entered as a Json file in Navdesk for the correct Modbus connection.





When a mistake in the setup of the Json file occurs the text will show in Red:



Please contact Sailmon for more information on how to setup Modbus TCP/IP and the file format needed.

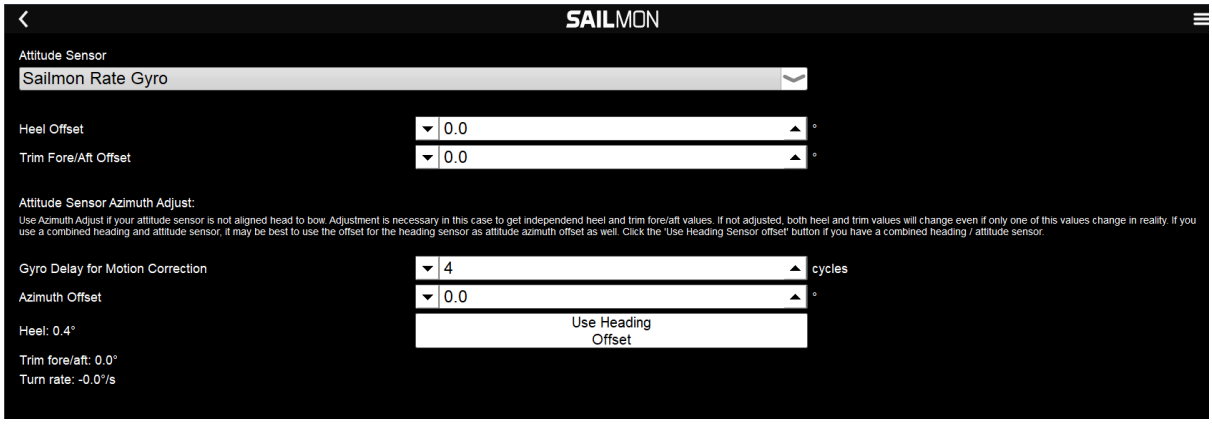
2.3.8 RATE GYRO

The new Sailmon Rate Gyro improves windreadings massively by removing boat motion in waves in the windcalculations. The Sailmon Rate Gyro collects data at 100Hz.

The unit can be mounted in 4 different ways giving a large freedom of orientation. Either horizontal, horizontal upside down, vertical facing forward and vertical facing aft.
Cable either always face aft in horizontal positions or down in vertical positions.
Please let Sailmon know which orientation the unit will be mounted so we can adjust settings in the box.

Try to mount the unit as close to centreline as possible.
Connection is established by an Ethernet cable and a 12-24VDC powersupply utilising the same type powercable as our E4 prcessor (Supplied).

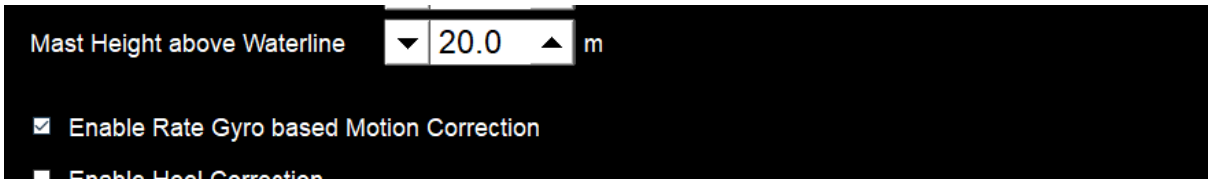
The unit is recognized automatically by the E4 and shows as Sailmon Rate Gyro in the Sensor Description list.
In Calibration> Attitude select the sensor as the attitude sensor.



Set the Heel and Trim offset with the boat being still. Set the Gyro Delay for Motion correction to 4 cycles for use with analog windsensors and NMEA183 windsensors outputting at 25Hz. For 10Hz windsensors set the delay to 10.

WIND SETUP

Go to Wind calibration and tick the box for Enable gyro based Motion Correction. Set the mastheight above Waterline as well.



2.3.9 EXTERNAL CHANNELS

OVERVIEW

Sailmon provides an interface to receive data and display it on the displays. This function is called External channels. Sailmon supports to reception of up to 256 external channels. The external channels are available inside Sailmon, and the description text can be changed by the user to fit the interface.

The data from the external channels must be sent to the following network interface:

Protocol: UDP only
Destination UDP Port: 7100
The data are available on all instruments if you send it to the server only. Don't broadcast the data! (Avoid broadcasts to reduce network load)

Due to internal calculations and calculation power limitations, make sure the following is not exceeded:

Any particular data value send 10Hz max.
Max 128 data values/s sent to Sailmon in total.

Exceeding the above might result in slower system response and excess heating of the server instrument.

The channel names, units and formats are assigned inside a Sailmon menu. The user selectable channel names are static and cannot be changed on a regular basis. (No alternating channel text).
UDP packets are parsed on a packet basis, packet data must not be started in one packet and continued in the next packet.
Large packets, containing multiple or all channels are preferred to save network overhead and parsing effort.(recommended, not obligatory)

Channel data will be displayed on the Sailmon instruments and automatically aligned to fully take use of the available space. Sending data is possible in 32bit float and 32bit integer format (see below)

External Channel Data show up in Sailmon as “External Channels”. The user can assign a unit the each channel, so the display shows the correct unit afterwards.

UDP PACKET FORMAT

Packets have to start with 32bit magic cookie 0x21431902, followed by the total number of channels, followed by random number of channel data containing

- Channel id: 1 byte channel identifier: 0-255, external Channel number
- Channel Type: 1 Byte: 0x00: 32 bit signed integer; 0x01: 32bit float;
- Channel data: 32bit field for integer and float type, random size field for text
- followed by next channel Id, type and data etc.

Description	Value	Size
Magic Cookie	0x21431902	4 Byte
Total Channels	Total # of channels in this message	1 Byte
Channel ID	ID of Channel, 0-255	1 Byte
Channel Type	Type: 0x00 = 32bit integer, 0x1 = 32bit float,	1 Byte
Channel Data	32bit Float or 32bit int according to the type field	4 Bytes
Repeating:	Channel ID; Channel Type;Channel Data	

2.3.10 WTP3 FASTOUT PROTOCOL

Sailmon can receive data from a B&G WTP3 usig the B&G fastout protocol and a serial to Ethernet device like the Moxa Nport 5110.

The file fastout.d specfiies the B&G variable to be transmitted, with a single character as identifier and baudrate. Refer to B&G WTP3 manual on how to set this up.

An example of the fastout.d file:

1 0 Channel 1
Device 4
txfreq 1
Com 2 rs232 38400 N 8 1

91 A 5 2
10 D 5 0
11 E 5 1
12 F 5 1
16 J 5 0
169] 1 0
Where the first number is the variable in WTP3, character is the identifier used by Sailmon, third number the reserved places, fourth number amount of decimals.
The last line 169] 1 0 is always needed as last in the file as it is a stripdelimeter for the packets that are sent.
Example of setup of the Moxa Serial-Ethernet device:

IP address range 192.168.1.10-192.168.1.12 if this is the range in which the E4 is operating.
UDP is 4100 reserved in the E4 to receive Fastout data.
Delimiter 1 is 5d which is character]
Serial setup equivalent as what is set in the Fastout.d file in the WTP3.

If you need assistance contact support at Sailmon.

2.3.11 FARO UDP INPUT

There are 2 ways to get Faro data into a Sailmon system. The first one is to add an E4 processor to the system and set the Faro system to output data to the Sailmon E4 over NMEA2000, NMEA183 or UDP. The second one is to ask Sailmon for a special software loaded on either an Element 7 or Element 10 display so it acts like a server that receives data from the Faro system over UDP. In this case an E4 is not needed and all calibrations are done in the Faro system. Please contact Sailmon when this is the case.

2.3.12 CAMERA'S

The Sailmon system can receive video from camera's using the RTSP (Real Time Streaming Protocol) format.

To connect a camera with ethernet connection (Webcam) make sure the camera is set to a fixed IP address and set up to output video using the rtsp protocol in H264 format.
In Navdesk>Displays select the display where video needs to be displayed and select the video button to open the playlist.

In edit playlist select custom url and click on the Right arrow, now put in the line:

rtsp://<IP-address of camera>/Channel number (Usually Channel1)

Note that actual video will never show in Navdesk, only on the selected display. Also never put more than 2 camera's on one display due to refresh speeds.

Video imagary will not be able on Screenview nor in Navdesk, the video is sent directly to the display.

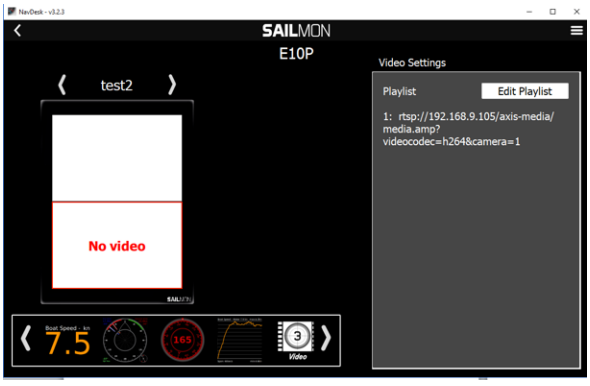
AXIS VIDEOSERVERS

When using analog camera's a video server is needed to transform the data to Networking. An Axis videoserver can be used for that.

Set the Axis up to a fixed IP address, remove passwords for the output. Set rtsp as being the output format.

Again use the custom url to put in the following line:

rtsp://<IP address of Axis server>/axis-media/media.amp?videocodec=h264&camera=1 where camera number is the channel to which the camera is connected to the videoserver.



3 NETWORK INSTALLATION

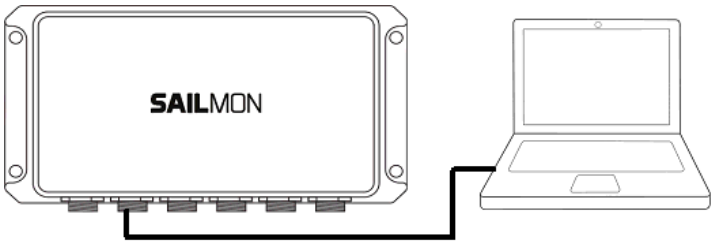
3.1 CONNECT THE E4 TO THE BOAT NETWORK

It is vital for good communication that all network cables are of good quality and are being used as designed . Ensure that all non Sailmon products are in good condition and are fit for purpose.

Connecting the E4 to a PC or tablet, several options are available.

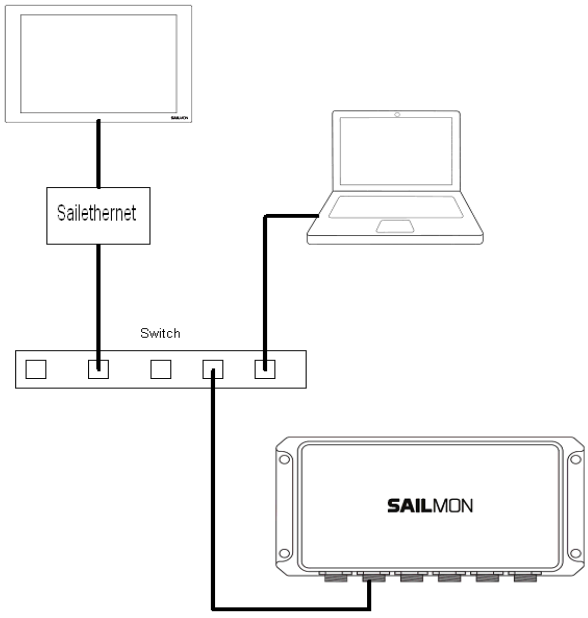
3.1.1 ETHERNET:

Network cable: Simply connect the network cable into the ethernet port of the E4 and the PC. Make sure you set the E4 in DHCP server mode using the Sailmontool.



3.1.2 SWITCH:

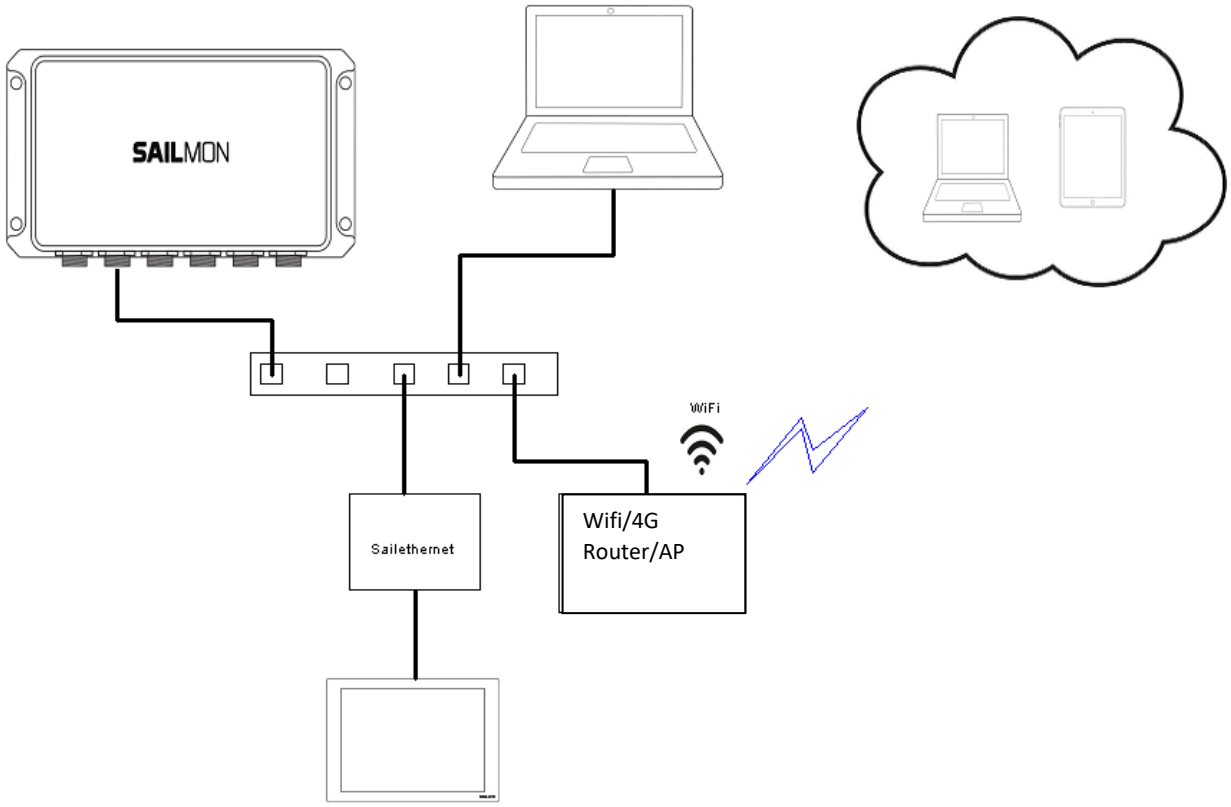
Sailmon displays are connected using the ethernet port of the E4. Because of this, no more ports are available to connect the PC. A network switch is used to extend the number of network ports in your system.



3.1.3 WIRELESS / 4G ROUTER

With a router a wireless system can be setup so tablets and computers can connect wireless to the E4.

One of the benefits is the possibility to insert a 4G SIM card so you are able to connect to the internet. Besides this, the wifi network can be used to view data on a tablet or smartphone and remotely view your boat on LOGS.
Ofcourse you can still connect the onboard PC to the boat network with a network cable.



With a wifi router or access point a wireless system can be setup so tablets and computers can connect to the E4 either wired or wireless.

3.2 SAILMON NETWORK

3.2.1 OVERVIEW

Sailmon devices (the E4 Processor and all Screens) communicate using IPv4 over a standard 100 MBit/s ethernet network. Using an S-Net box, or a direct ethernet connection to the E4, it is possible to use standard networking equipment. Sailmon devices are designed to work in any existing local area network, where they will acquire IP addresses from a DHCP server and not interfere with other devices or services. Sailmon can be deployed as a standalone as well, without a DHCP server on the network. In this case Zeroconf addressing is used. The Model E4 processor can be configured to provide a DHCP server, or act as simple Wifi access-point for convenience.

Sailmon applications (NavDesk, Mobile Apps, etc.) are designed to be connected to the same LAN as the devices and require no additional configuration. Applications will automatically detect the presence of Sailmon products using two parallel methods of discovery via UDP heartbeats and requests. The exact TCP and UDP port numbers used by Sailmon are described in the next sections.

More complex LAN configurations, as well as external Wifi access-points, are possible given they can fulfill the following requirements:

- At least 10 Mbps unicast bandwidth available between nodes
- At least 1 Mbps bandwidth for multicast or broadcast messages
- All given UDP and TCP ports must be open in both directions
- Additional ports are needed depending on the installation (see below)
- UDP multicast or broadcast packets must be able to reach every participant

3.2.2 COMPLEX NETWORK INSTALLATIONS

All Sailmon devices are required to share the same network. However, it is possible to run Sailmon applications from a remote network, given they are connected by layer 2 (switches, Wifi APs) or layer 3-4 (routers).

Unicast (point-to-point) communications generally work without issues over Wifi, and even between multiple routed LANs or VLANs, which makes the initial discovery via UDP multicast the most critical requirement. The network installation must ensure that packets to the Sailmon multicast group “239.255.83.77” on ports 4019 and 4020 are not filtered and can traverse to all desired devices. This means that switches may need to use “IGMP snooping” option if the packets are filtered otherwise. When multiple networks / IP address ranges are present, a router must be configured to forward multicast packets to the neighboring networks. Additional forwarding of UDP traffic may be required (see optional ports).

3.2.3 UDP TRAFFIC

Post required for Sailmon Apps:

4019 HEARTBEAT REQUESTS

Applications send broadcast requests to this port. Sailmon Instruments will respond by sending their heartbeat packet back to the source port on the requesting computer. This is a fallback if clients are not able to join the multicast group, and used as a quick way to discover devices on the network.

4020 HEARTBEATS

Source of heartbeat broadcasts sent every 2 seconds by Sailmon devices. Heartbeats are required by every application to find the IP of the Sailmon server in an unknown network. Heartbeats are broadcast and sent to the Sailmon multicast group. Join the multicast group to receive them. They contain the serial number, software versions, etc. for each device.

4021 SYSTEM CONFIGURATION

Sailmon tool will send broadcast packets to all Instruments for global settings and server management.

6130 INSTRUMENT COMMANDS

Receive port for commands to real or virtual Instruments. Used to trigger reload of configuration and to show or hide the help screens during initial configuration.

6150 DATA REQUESTS TO SAILMON SERVER

Used to request data values from the Sailmon data server. The client sends unicast UDP packets containing desired IDs to the server at port 6150. The server responds to the source host and port with the current values and status flags. When blocked, instruments will show “no data”.

6152 RAW DATA OUTPUT FROM SERVER

Output port of live raw data values from all sensor

Ports required between Sailmon Devices:

6000 COMMANDS / REQUESTS FOR BLACKLIGHT CONTROL

Receive port for commands / requests to the backlight controller on each screen.The backlight controller will respond to source host and port.

4001 BUTTON EVENTS SENT TO SAILMON MULTICAST GROUP

Optional ports for certain features

4044 Sailmon Cloud (Internet access)

4100 WTP3 Fastout data input (optional)

5010 Expedition data output (optional)

5011 Expedition data input (optional)

7000 NMEA0183 data output (optional)

7001 NMEA0183 data input (optional)

10001 Mer Agitee E-Tell Tales

10110 NMEA0183 data input (optional)

7100 External channels input (optional)

5353 Avahi multicast DNS (optional)

502,503,504 Modbus interface

URLs and IP addresses

Hardcoded IPv4 addresses

239.255.83.77 Sailmon Multicast Group (used instead of broadcasts)
192.168.4.1 E4 wired ethernet when E4 has DHCP server is enabled
192.168.5.1 E4 wireless interface when used as Access Point

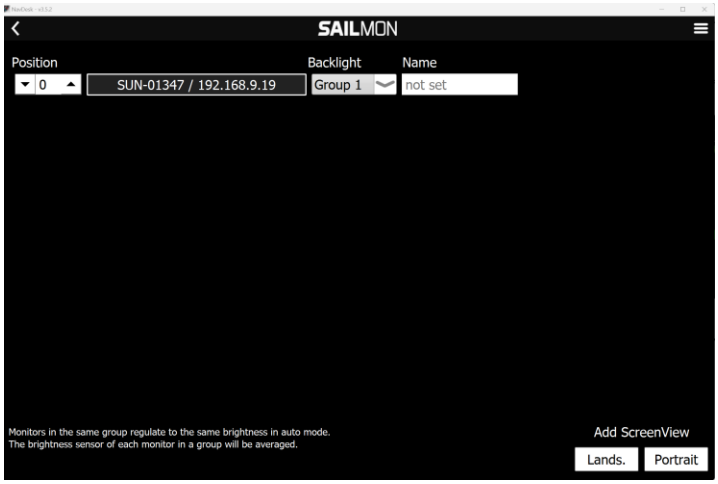
4 COMMISIONING

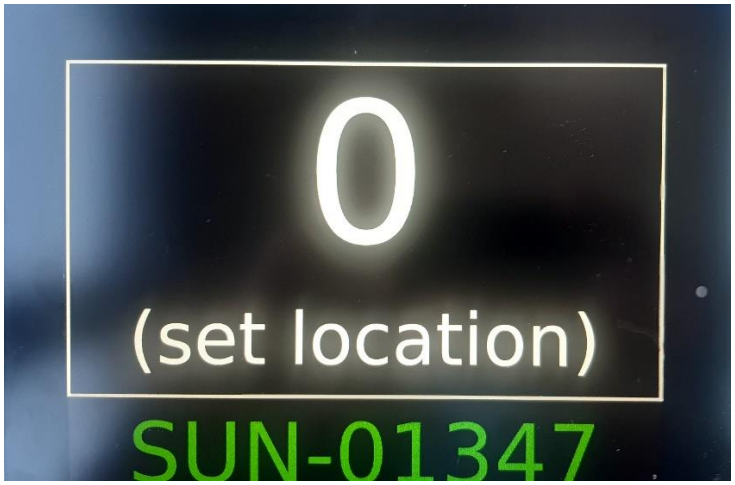
4.1 IDENTIFYING DISPLAYS

In the Setup>Commissioning>Display definition all connected displays are listed with their IP address and SUN Number. When a new system is commissioned all displays will have Position 0. This **MUST** be altered to any number other than 0. On the displays themselves this information will also be shown to make identification of each display simpler.

Each display can be given a name and a backlight group can be set here as well.

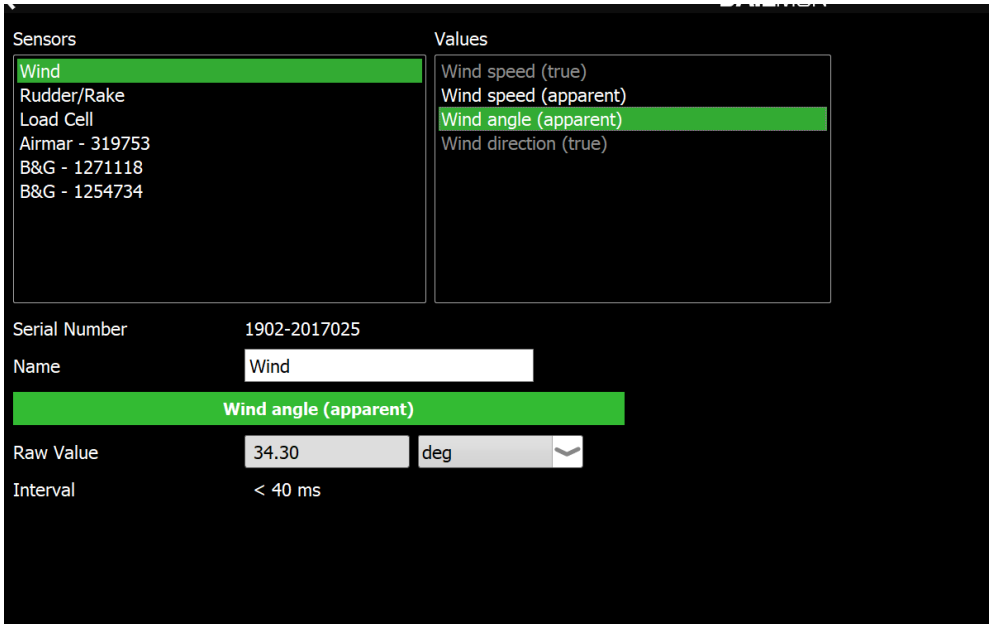
In the lower right corner Sccreenview displays can be setup and configured as they would be a real screen.





4.2 IDENTIFYING SENSORS

The sensors can be connected using the NMEA2000 network directly or by either using windboxes,linearboxes and, or loadcellboxes.
In the Setup>Commissioning>Sensor Definition section you find the sensors and sensor boxes connected to and recognized by the system. If needed the naming convention can be changed to identify relevant boxes, ie. change the serial number to Wind for a Windbox.
In this section you will also see the raw data if the sensors are connected.

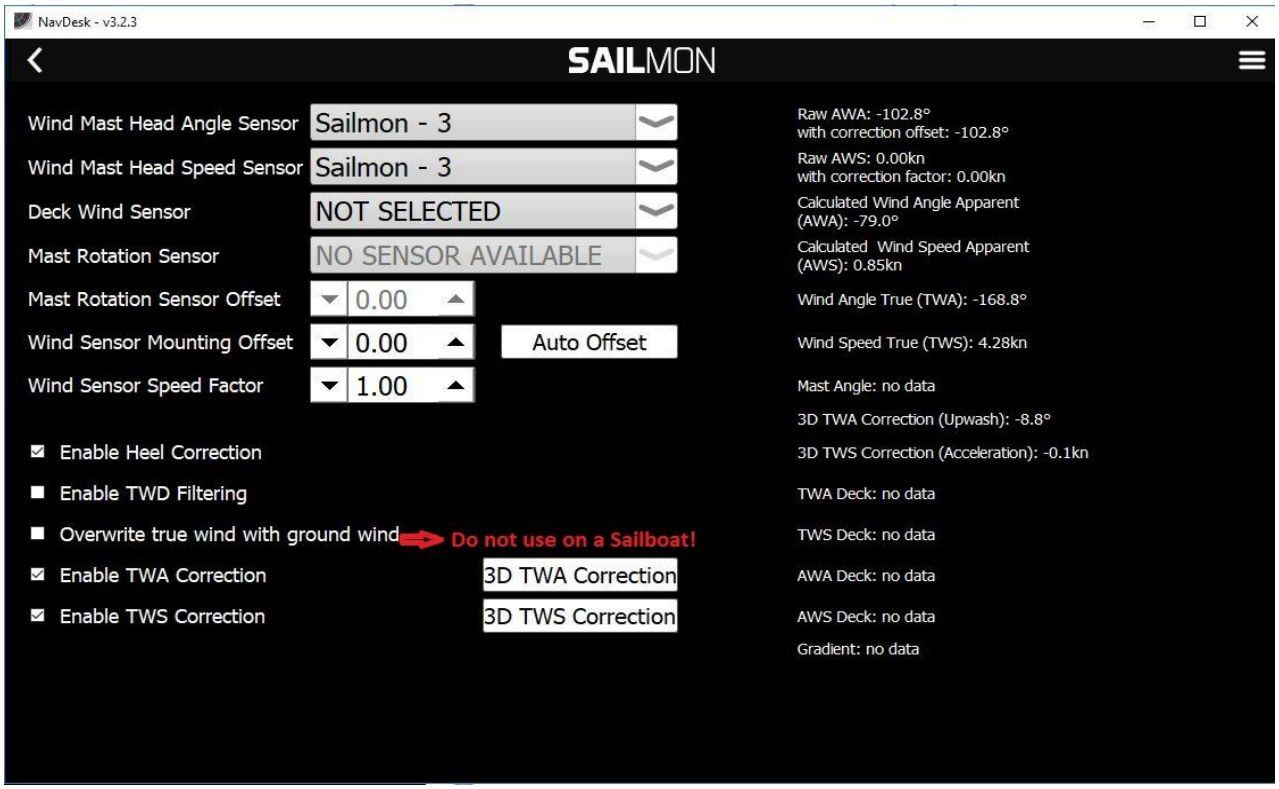


4.3 CALIBRATION

In the calibration section you find the standard variables like Depth, Heading, Boatspeed, Wind , Attitude and GPS listed. Each sensor needs to be defined in this section in order to be able to show data on the displays.
For Depth sensors the amount and offset to waterline and total draft need to be input here.

To calibrate the wind sensor, automated calibration runs and a help section are available. See the Calibration and Data Reference Manual for an extensive paragraph on wind calibration.

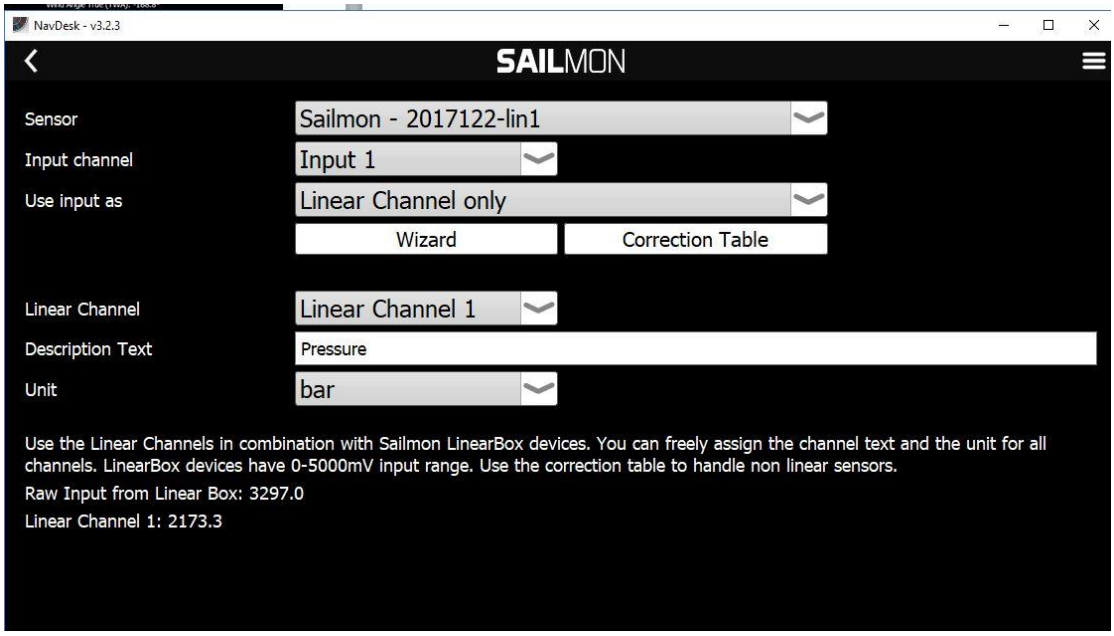
WIND CALIBRATION



***Please read the Operators Manaul for extensive calibration explanation**

4.4 MISCELLANEOUS SENSORS

In the Others.. section you find, among others, linear channels.
Here you select the relevant linear box and linear channel. If it is a non-standard variable you want to assign, select “linear channel only” and a dialog box opens where the description,title and correction table can be entered.



5 SOFTWARE

5.1 SOFTWARE DOWNLOAD

The Sailmon software can be downloaded from https://sailmon.com/support-articles/software-updates/ for your PC or Mac or from the App/Play store on your Apple or Android device.

Here you will find:

- Latest software releases
- Release notes
- Older software versions
- Manuals
- FAQ

5.2 MINIMUM SYSTEM REQUIREMENTS

- **MAC** OSX 10.10 or later
- **PC** Windows 7 or later
- **IOS** (Beta) IOS 10 or later

5.3 USING SOFTWARE TO CONNECT TO E4

You have now successfully installed the Sailmon model E4 Instrument system. If you power up then the model E4 will automatically select available sensors. If there is more than one sensor you need to select a sensor in Navdesk.

1. Download the Sailmon Apps from the App Store on your Smart device or from https://sailmon.com/support-articles/software-updates/ for your PC.
2. Power the Sailmon instruments.
3. Connect your computer or smart device directly to the E4, this can be done using a ethernet cable, with a wifi stick or connect the E4 in to your existing boat network.
4. Open the apps to show data or use your system
5. To add model E4 to your ships network disable the DHCP server and connect to the desired network.

For detailed Navdesk info see the Sailmon User manual.

6 DISPLAYS

6.1 PRODUCT OVERVIEW

Sailmon element 7, element 10 and Element Ink displays can be purchased in either Portrait or Landscape version. In all cases the dimensions are the same. The difference is in the high end polarisation filter and software settings. Casings are different shown by the Sailmon logo position.
When installing a display it will need to be connected to the Ethernet port of the E4. The SAILethernet is needed to combine both the data and power from the power supply and E4 to the display.

The displays can be connected in daisy chain, this means, only one cable is necessary from your switching panel to the mast. Using Fast-lock waterproof connectors will reduce the installation effort to a minimum. Sailmon displays includes the most powerful and intelligent technology available, including automatic backlight control with an ultra-high dimming ratio of 1:3000.

This allows absolutely perfect readability under all conditions for convenient reading during day and night. Even high contrast and intense colours are maintained during night sailing. Perfect sunlight readability is achieved with a high-performance anti glare front screen. The front glass is optically bonded to the TFT display, avoiding an air gap. Therefore, you will never experience a foggy display. The displays are further optimized for ultimate visibility with polarized sunglasses. Using polarized sunglasses will even improve the visibility of the instrument.

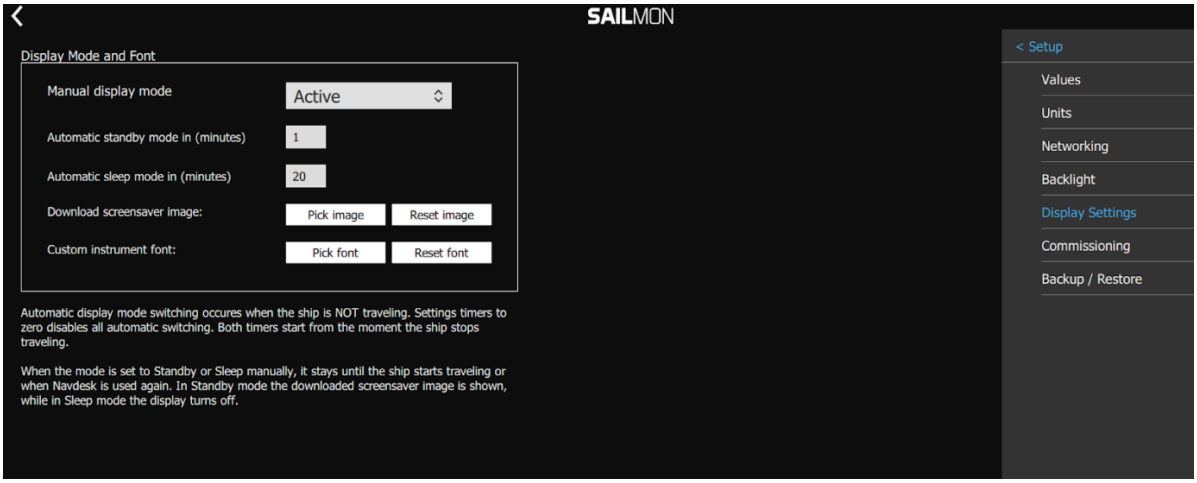
When connecting a display to the cable simply mate the plug with its counterpart and twist it on. This should take no effort and it is a twist lock system. Do not force the connectors, this is likely to damage the electronics inside.

6.2 DISPLAY SETUP

In Setup>Commissioning>Display definition connected displays are listed. Also the name of the display is shown on the relevant display to identify it. They can assigned to different backlight groups which can then be altered in the backlight section. The name of each display can be changed by typing a relevant name.
In the Setup>Display Settings section the following can be set.

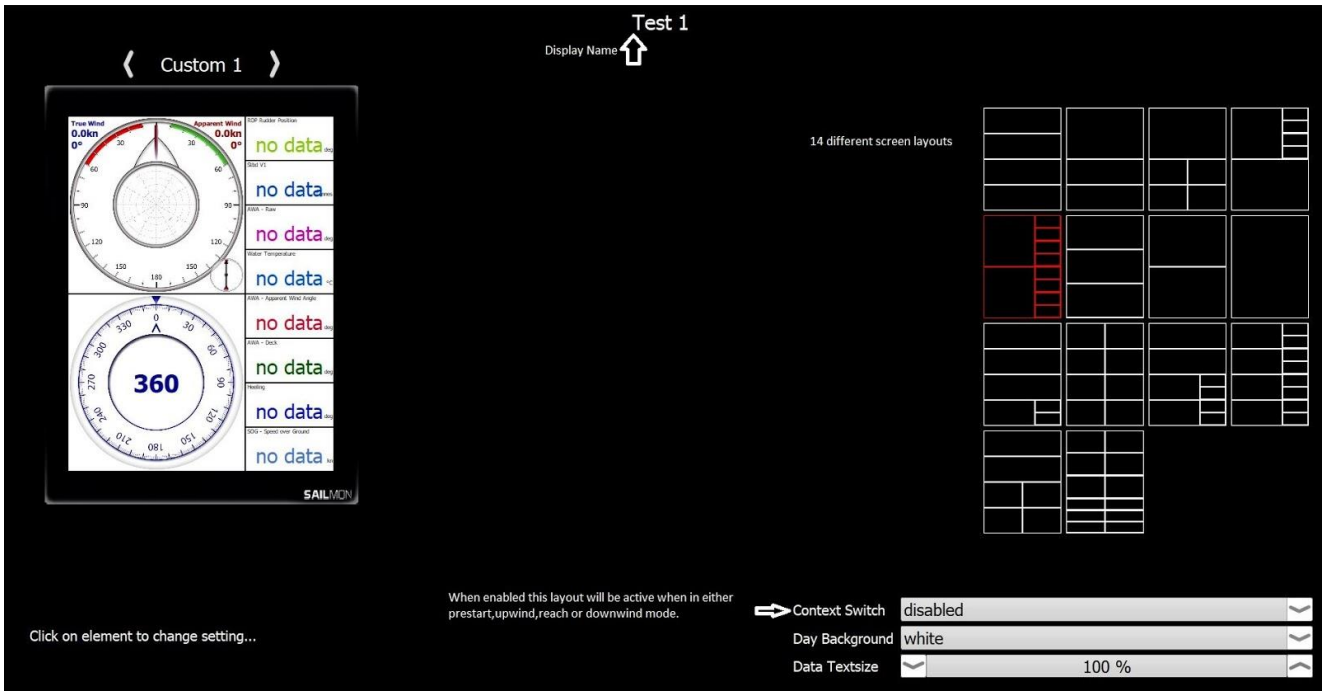
- Mode for the displays can be set to either Active, Standby or Sleep .
- Active timeouts can be set to determine the yacht is moving, motoring (with an Engine interface connected)
- Screensaver images.

- Instrument Font.



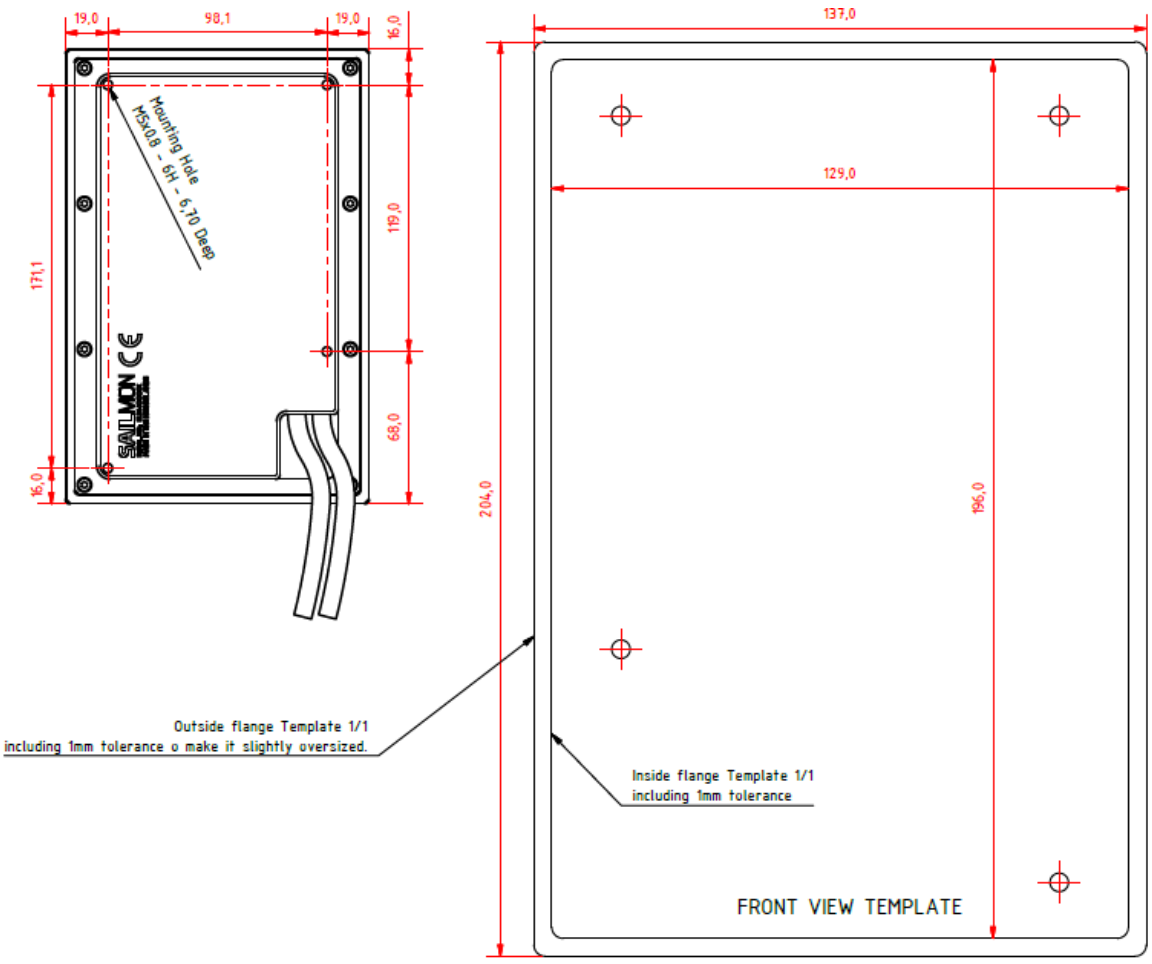
6.3 DISPLAY SETTINGS

To change layouts and variables displayed on a screen go to Displays and select the display you want to change layout or the variable on. On the right hand side 14 different layouts can be selected. Each display has 10 presets that, once changed, keep these setting for each individual display. In the presets tab a different preset can be quickly selected. The name of the preset can be changed in the preset tab. This setting will be activated on all displays.
To change a variable. Click on the area where it needs to be altered and a window will appear where variable and color can be changed.

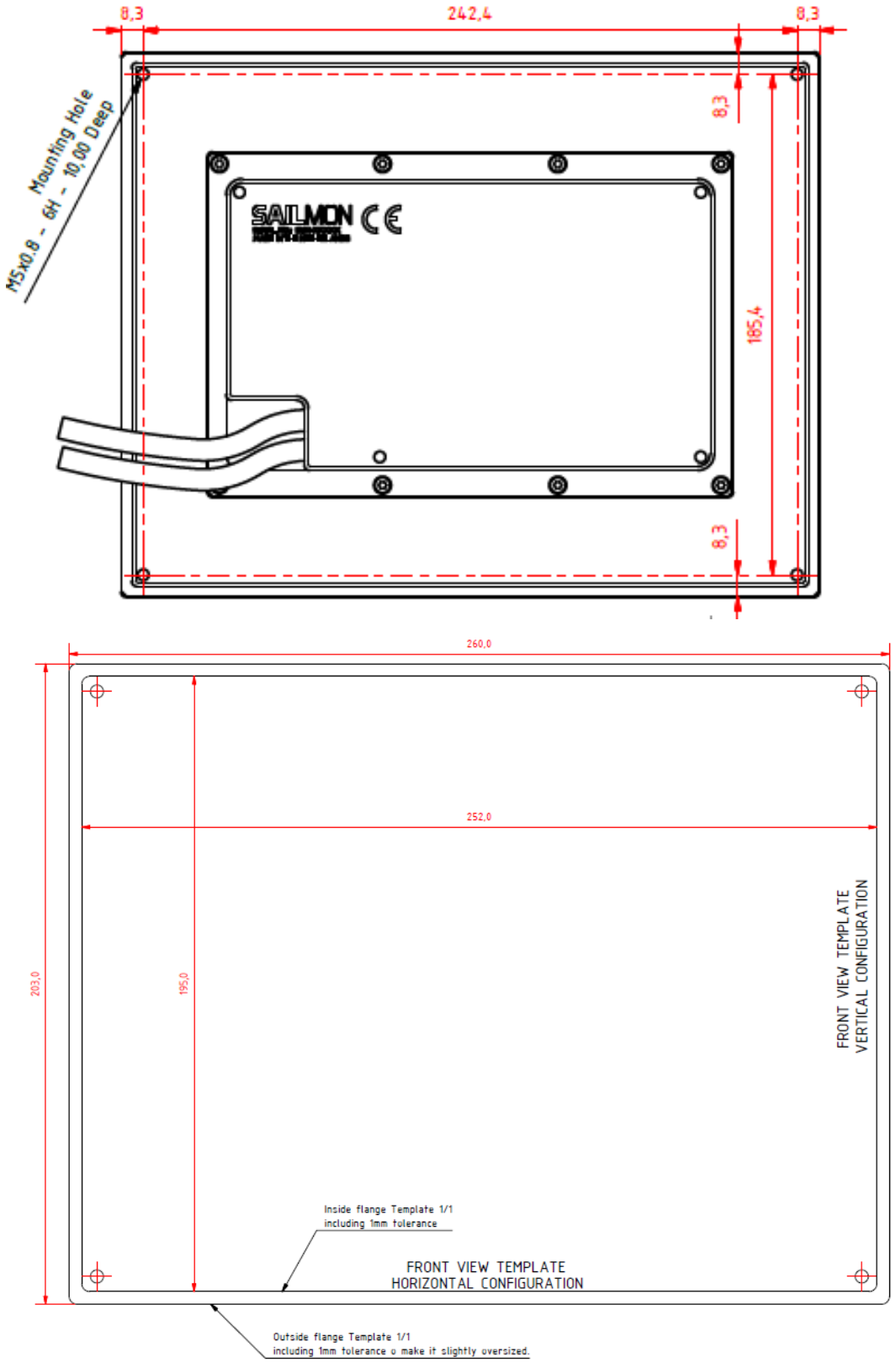


6.4 TECHNICAL SPECIFICATIONS

ELEMENT 7 MOUNTING TEMPLATE

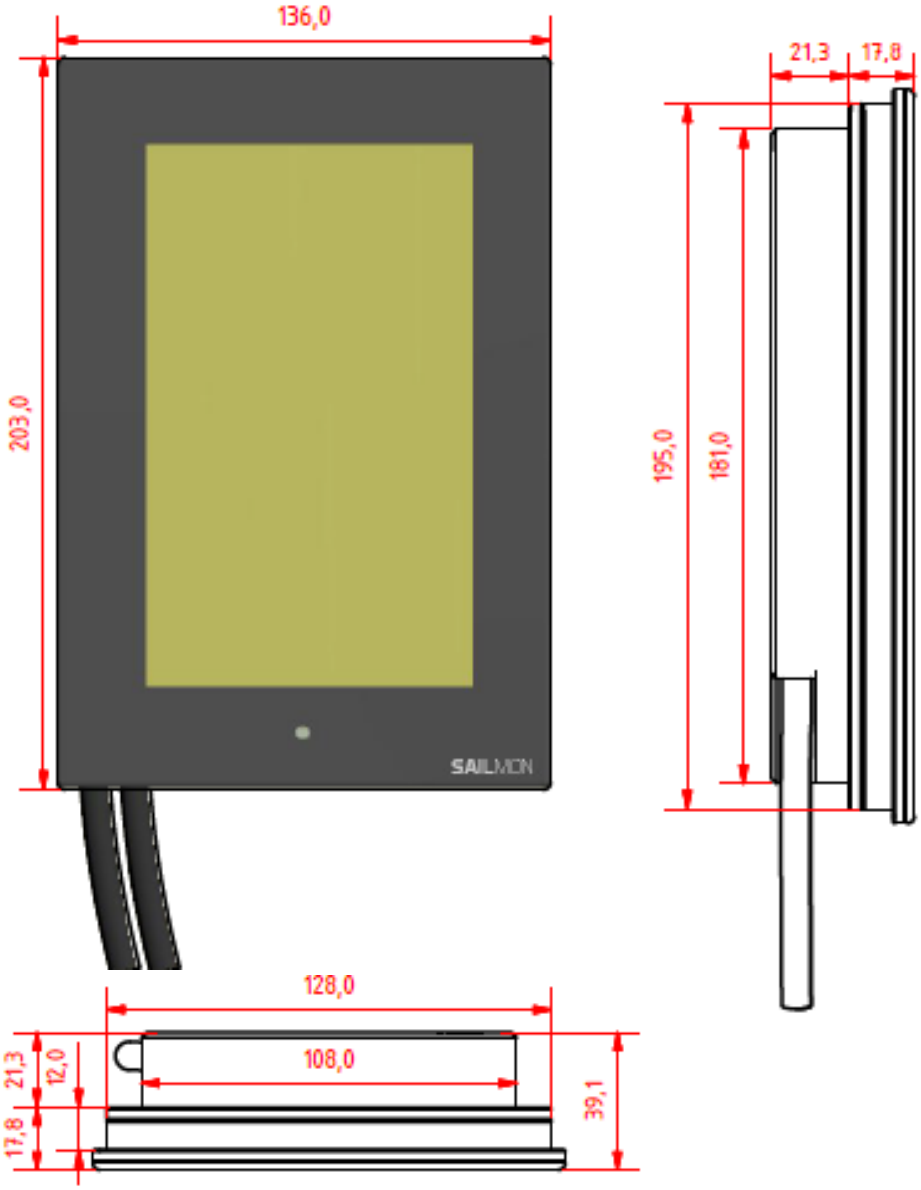


ELEMENT 10 MOUNTING TEMPLATE



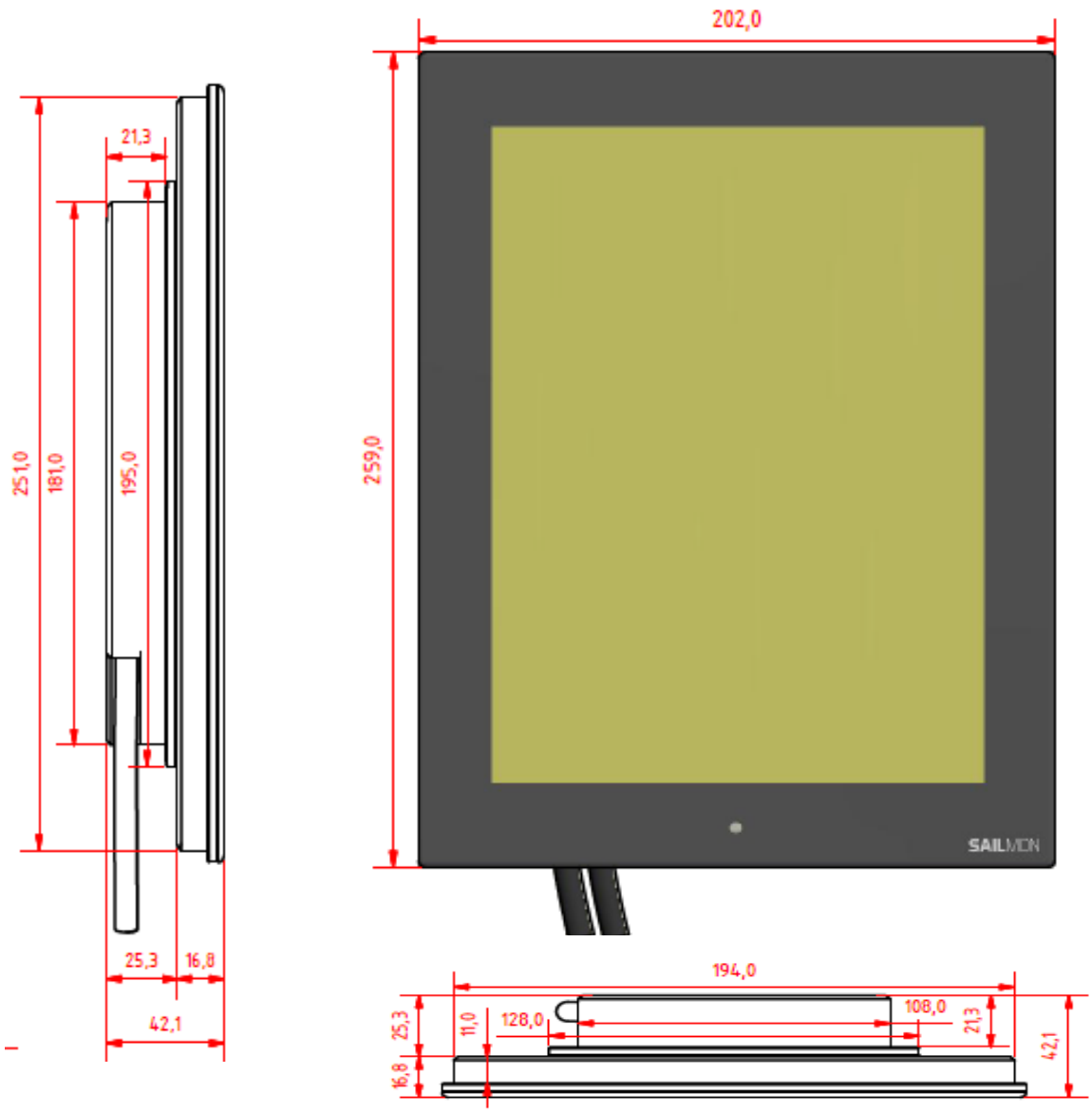
ELEMENT 7

- Display size: 800 x 480 Pixels
- Display type: LED - Backlit LCD
- Brightness: 1000cd/ m2
- Max brightness: min 0,3 / max 1000 nits
- Viewing angle: -85 + 85 degrees
- Maximum digit size: 9 cm
- Weight 1.08 kg
- Power consumption 15W at max Brightness



ELEMENT 10

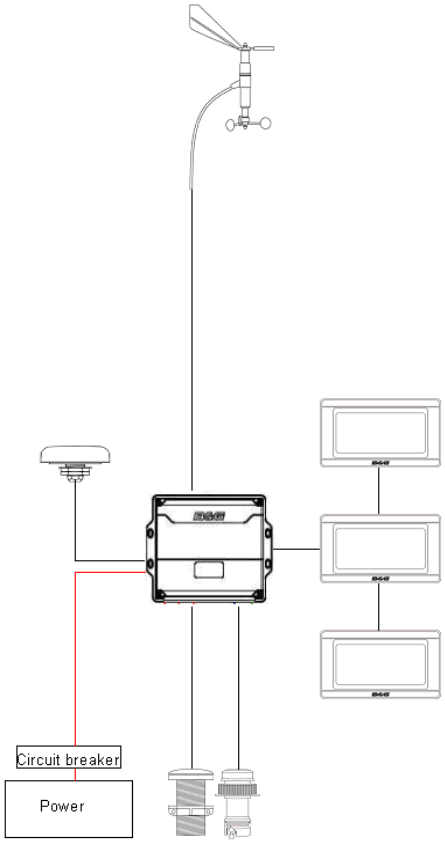
- Display size:1024 x 768 pixels
- Display type: LED - Backlit LCD
- Brightness: 1000cd/ m2
- Max brightness: min 0,3 / max 1000 nits
- Viewing angle: -85 + 85 degrees
- Maximum digit size: 12 cm
- Weight 1.55 kg
- Power consumption 20W at max brightness



7 EXISTING SYSTEM UPGRADES TO SAILMON

What are the minimum requirements of existing instrument systems that Sailmon can work with?

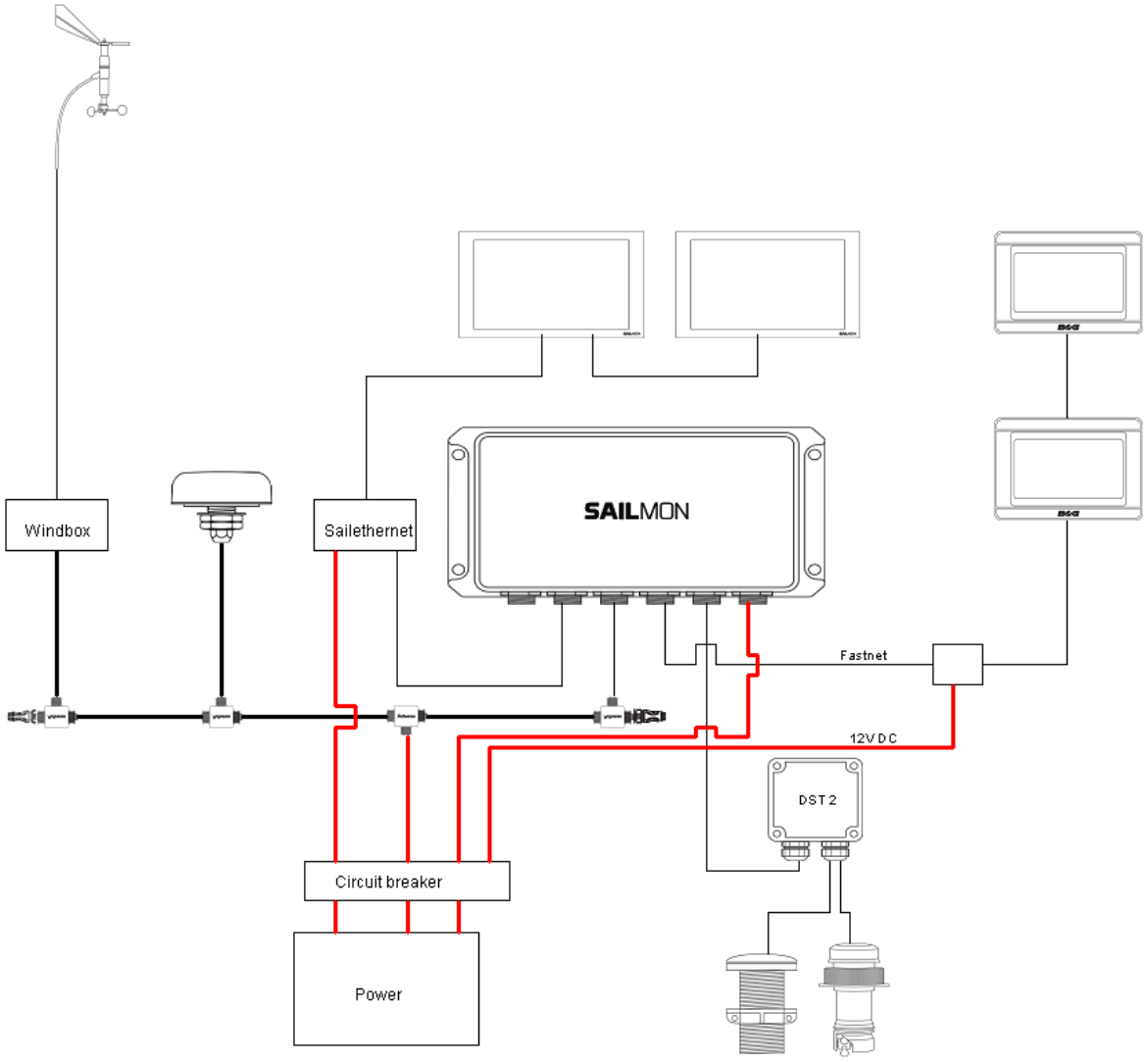
7.1 B&G H3000



BEFORE

A H3000 CPU and Fastnet network can easily be upgraded to an E4 processor.
With the E4 one can connect to the Fastnet installation and retain the B&G Displays.
A wind box will be needed and analog transducers will need to be connected with the use of a DST-2 to the E4 port 2 which is set to receive NMEA 0183.

.



AFTER

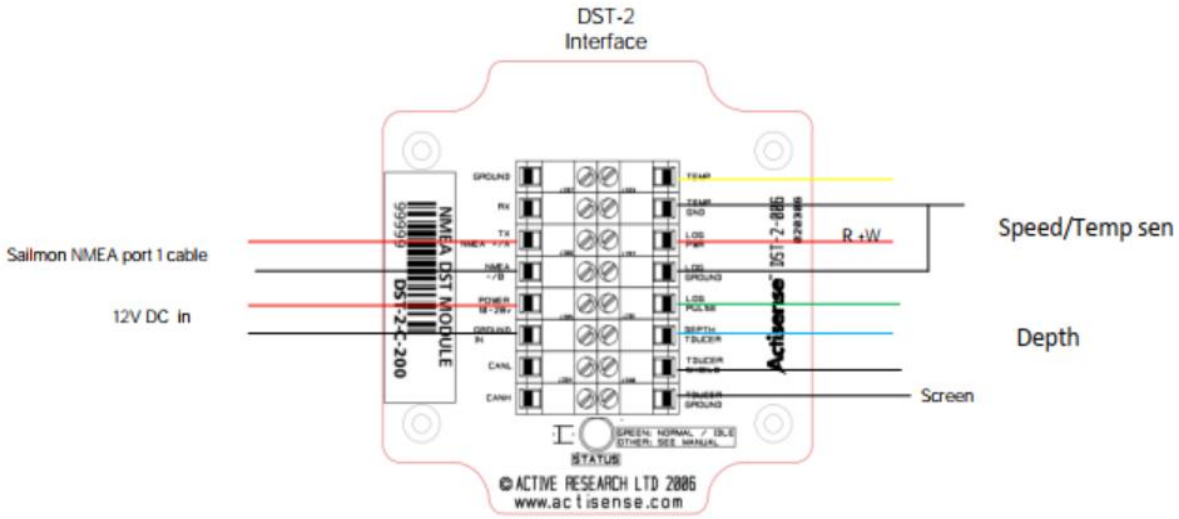
The Schematic shows how the E4 can replace the H3000 CPU and still retain 20/20 displays and through-hull transducers.

Upgrade benefits:

- Reuse of existing transducers with use of an Actisense DST – 2.
- Reuse of existing displays.
- Wifi connectivity to stream data to any wifi enabled device
- Greatly improved calibration capabilities of existing sensors
- The ability to add Sailmon displays

For interfacing with Fastnet displays, a GFD or FFD is still needed. Sailmon will receive and send all data over the Fastnet network but will be unable change display fields.

DST-2 connections



7.2 H5000

Upgrading a H5000 system is very straightforward, resulting in greater usability and connectivity. All existing sensors can be connected directly to the NMEA 2000 backbone or with the use of Sailmon interface boxes.
Calibration and configuration are completed using Sailmon Navdesk.

7.3 GARMIN GNX DISPLAYS

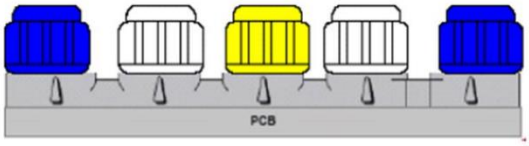
Due to the Garmin GNX displays use of NMEA 2000 data format they can be connected directly to the NMEA 2000 backbone where the E4 processor can send data to the displays as configured in the Sailmon Navdesk.Sailmon has 18 custom channels available for “Exotic” data to be snet to Garmin displays.

7.4 RAYMARINE

ST1:

Seatalk 1 is an older Raymarine protocol, The E4 processor is capable of converting this data format via the Port I/0 connection. However, to be assured of a steady data flow we recommend the use of a STng - St1 converter. With this device, Seatalk 1 is converted to SeatalkNG and then connected to the NMEA 2000 backbone.

If this conversion is required, the following items have to be purchased:



SEATALK 1 – SEATALK NG CONVERTER

this kit includes: converter, power cable, Stng drop cable, ST1 connection cable

SEATALK NG TO NMEA 2000 ADAPTER

RAYMARINE SEATALK NG

Due to the SeaTalk NG's use of the NMEA 2000 data format, the E4 is a simple upgrade, gaining greater usability and connectivity. All exciting system sensors can be connected directly to the NMEA 2000 backbone. Calibration and configuration is all completed through the Sailmon Navdesk tool

Due to Raymarine custom connectors a STng - NMEA 2000 adapter cable will need to be used.

7.5 NEXUS

To upgrade an existing Nexus FXD instrument system a Garmin GND 10 will be needed to convert the data to the NMEA 2000 protocol, this in turn can then be connected to the MNEA 2000 Backbone which is connected to the E4. Calibration and configuration is done through the Sailmon Navdesk tool.

8 TROUBLESHOOTING

8.1 GENERAL

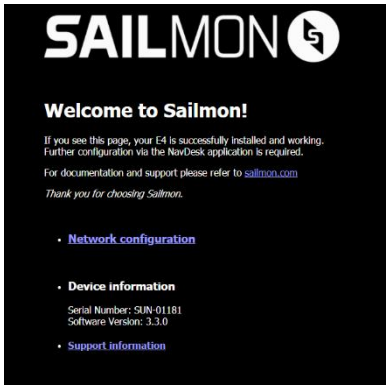
If the E4 works but the displays keep displaying “connecting to server” the displays,E4 and controlling device (PC) are not connected to the same DHCP server. Also check the SAILethernet connections and connections in the junction box are correct.

SENSORS

- When existing Speed and Depth sensors are analog a Actisense DST-2 can be supplied to convert the analog signal to NMEA0183.
- B&G 213 Mast head units can be connected using the WindBox which converts the signal to 25Hz NMEA 2000 wind sensors
- Loadcells can be connected to the Loadcell Box which can interface with most 4 or 6 wire load cells and send the signal to NMEA 2000.
- Linear sensors van be connected using the Linear Box. Each box takes 2 Inputs from 0-5V sensors to measure any value you would like.
- Chartplotters can be connected using NMEA2000 while Navigation software like Expedition and Adrena can connect using either UDP or NMEA183
- Sailmon can assist when custom variables need to be displayed. 128 channels are available to send any data string over UDP, please contact us for the user guide!
- Custom projects can be tailored to.
- When the blue status LED blinks 5 times per second, check the windsensor connection and the sensor cable for errors. In case all connections are working, the MHU sensor is most likely damaged.
- The Wind Box is designed to be integrated into a Sailmon system. It does not provide direct offset features since Sailmon uses advanced calibration which is done in other parts of the system. Contact Sailmon support if you plan to use the Wind Box for other instrument systems.
- Since the Wind Box delivers wind data with a high update rate of 25Hz.

8.2 SAILMONTOOL

The Sailmontool is a very importanttool for general troubleshooting. For us to help you solve an issue with the Sailmon system we need information on the status of the system. To do this we have something called Support information. This can be grabbed by opening Sailmontool, go to the E4 Setup and Updat etab. In there click Open Webinterface you will see this page:

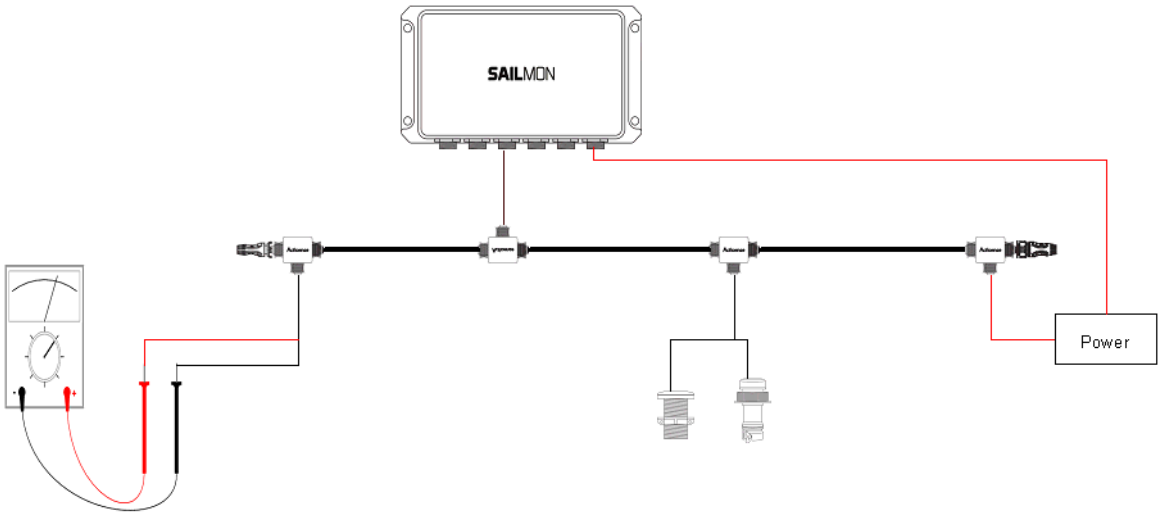


Then click the Support Information link, a second page will open with lots of information. Copy this text and email it to Support@sailmon.com, ideally with a back up of the system:

Setup>Backup/Restore>Backup.

8.3 NMEA 2000 PROBLEMS

In the event the system is up and running, but no data is visible on the displays check the NMEA bus has correct power.
Please see the image below to have a clear view of a NMEA2000 test setup.



For this setup to work, some backbone changes have to be made:

- Look for the terminator which is farthest away from the power supply.
- Place a T - piece between this terminator and the backbone, reconnect the terminator to this junction.
- Connect the modified NMEA 2000 cable to the T-piece.
- Test voltage (red and black wires from NMEA 2000 cable)

A range between 11.5VDC and 14.4VDC is acceptable.

A higher voltage may indicate a possible malfunction of the vessels charging system.
A lower voltages may indicate the presence of faulty connectors or / and a voltage drop in the vessel's power supply.

FURTHER TROUBLESHOOTING NMEA 2000 CABLING
The pin assignments for NMEA 2000 are the following:

Pin 1: Shield (Bare)
Pin 2: NET_C (+12VDC, Red)
Pin 3: NET_S (Ground, Black)
Pin 4: NET_H (CAN High, White)
Pin 5: NET_L (CAN Low, Blue)

Please verify that:
1) All are secure on the NMEA2000 bus.
2) The bus has power.
3) The bus has two terminators attached.

Make the following measurements on the network to verify the integrity of the cabling.

With NMEA2000 devices attached and terminators connected with power supplied to the network, please make sure that you measure 12 VDC between pins 2 (Red) and 3 (Black) of all available open connectors.
.
Next, turn the network power off on the NMEA 2000 network.
Keep all devices disconnected, and verify the following resistance measurements:

1) You should measure about 0 (short) ohms betweens pins 1 (Bare) and 3 (Black) of all connectors (This verifies that the shield is connected to ground).

2) The shield should be grounded at one and only one point on the network. Disconnect that connection(at the powertap connection), and measure the resistance between pins 1 (Bare) and 3 (Black) of a network connector. This measurement should be very high

resistance (OPEN). Reconnect the shield after this measurement is made.

3) You should measure about 60 ohms between pins 4 (White wire) and 5 (Blue wire) of all drop connectors (This verifies that both terminators are connected in the BUS. If you measurement is 120 ohms, then only one terminator is connected. If you measure a very high resistance, then no terminator is connected.

Remove both terminators from the NMEA2000 network.

4) Keep a single multimeter lead on pin 4 (CAN+/white wire),You should measure a very high resistance (open) ohms between pins 4 (White wire) and any of the four conductors on the network cable. If you measure a low resistance or zero resistance between pins 4 and other conductors, you have a short somewhere in the cabling.

5) Place a single lead on pin 4 (Blue wire) You should measure a very high resistance (open) ohms between pins 5 (blue wire) and any of the four conductors on the network cable. If you measure a low resistance or zero resistance between pins 4 of any two connectors, check the cabling in between for a possible break.

If all of these measurements are okay, now we should check for any short circuits on powers. All of the following measurements should be very high resistance. If one of these is a low resistance or a zero resistance, check for a possible short in the cable.
1) Pins 1 and 2
2) Pins 1 and 4
3) Pins 1 and 5
4) Pins 2 and 4
5) Pins 2 and 5

Ensure that:

The two terminators are installed at the each end of the “trunk” of the network.

node has a drop from the trunk of no more than 6 meters.
The sum of the length of all drops is less than 78 meters.

If you have gone through all of these steps free from issues, try adding components one by one to the NMEA2000 network to bring the network up slowly.

(NOTE: there must always be at least two components in a NMEA 2000 network (or any CAN network) in order for data communication to take place.

8.4 FASTNET BUS

No signal on the Fastnet bus or no light on the E4:

- Make sure that the Fastnetbus is wired correctly using the Fastnetbus topology.
- Port 2 on the E4 is set to B&G Fastnet in Navdesk.
- Disconnect the power from the Fastnet bus, and measure the resistance between green and white, it should be 50 Ohms. If it reads 70 Ohms there is just one resistor, if it reads 30 Ohms there are 2.
- Model E4 can work with or without the B&G H2000 and H3000 processor, Fastnet output is disabled as default. Make sure to enable it.
- B&G processor still in the network Make sure the Fastnet output is disabled, you can do this through Navdesk.

8.5 NO NETWORK DETECTED

When a router is connected to the system which is used as a switch for the SAILethernet and no network is detected on smart devices.

Take the router out of the network. Then connect the SAILethernet to the E4 and check if the displays work. If so, Sailmon works and the problem lies somewhere in the router.