SAILOR 100 GX
SAILOR 100 GX High Power
SAILOR 100 GX-R2, 4.5 W and 9.0 W

Installation manual

SAILOR 100 GX
Quick guide

Configuration tasks (minimum)

This quick guide aims at experienced service personnel who have installed the SAILOR 100 GX system and connected power. It lists the minimum configuration tasks you have to make before the system can be used on-air on a satellite.

1. Switch on the Antenna Control Unit only.

   Important | Do not switch on the modem at this point.

2. Connect a PC to LAN3 connector at the rear of the Antenna Control Unit.
3. On the ACU keypad, push and hold the left arrow key for 5 seconds and wait for the very short display of **Local administration**, followed by the event text: **0807F-0 WARNING Local administration enable**. This gives you temporary administrator access for 1 hour or until next restart
4. Open an Internet browser to access the web interface of the SAILOR 100 GX: IP address: http://192.168.0.1. (default on LAN Port 3), user name: admin, password: leave empty or type in new (minimum 8 characters).

Configuration task	What to do and where to find more information
Heading input	Configure the heading input to **External** under **SETTINGS > Navigation**. For more information see *Select the desired heading input, see the following table.* on page 6-4. Connect the ship's heading (NMEA0183, RS-422/RS-232) to the NMEA 0183 multi-connector. For more information see *NMEA 0183 connector* on page 4-3.
Azimuth calibration	Make an azimuth calibration under **SERVICE > Calibration** to ensure that the antenna can point and receive a signal from the satellite. For more information see *Calibration* on page 6-8.
Cable calibration	Make a cable calibration under **SERVICE > Calibration** to ensure that the cable loss is calculated properly. For more information see *Cable calibration* on page 6-12.
Satellite profile	Activate the satellite profile with the GX modem selected modem.

5. Switch on the modem and wait for the modem to boot and perform the initial BUC calibration.
6. Verify that the SAILOR 100 GX acquires the GX satellite. Check that the ACU display shows **ACQUISITION**.
7. Verify that the system is operational. Check that the status in the ACU display shows **TRACKING** and the upper status line **MDM: NETOK**.

Potential issues

Symptom	Cause	Remedy
The display shows BUC CALIBRATION OUTDATED.	The GMU has been connected to the antenna before the cable calibration was done.	Use the GMU dashboard to perform OTC manually.
Status does not show MDM: NETOK.	Check if the GMU has RX locked status Locked, TX allowed YES and BUC TX ON (ACU Dashboard).	If yes, consult your provider to confirm that the GMU is provisioned.

SAILOR 100 GX

including SAILOR 100 GX High Power, GX-R2 4.5W and GX-R2 9.0W

Installation manual

Document number: 98-141779-G
Release date: 16 February 2021

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Safety summary

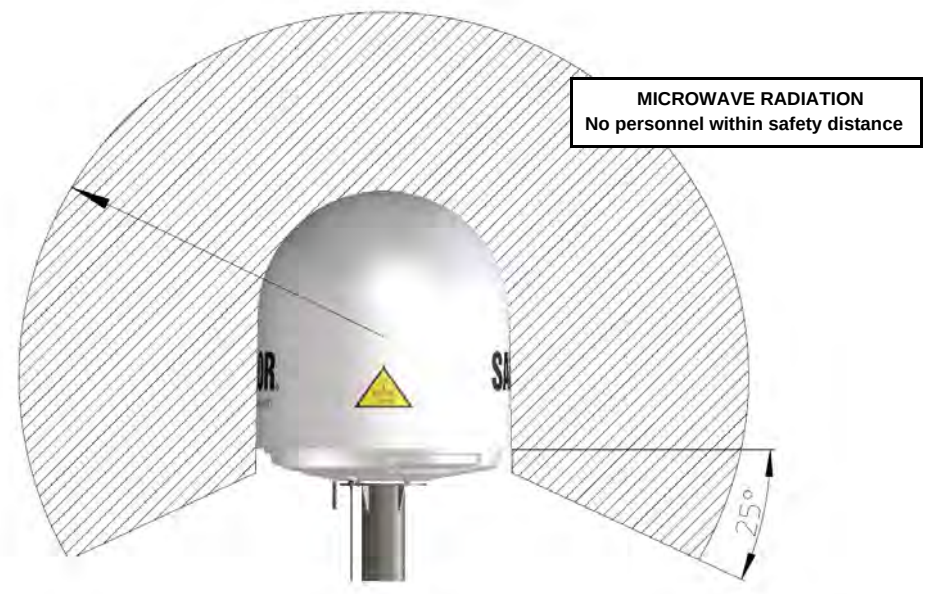
The following general safety precautions must be observed during all phases of operation, service and repair of this equipment. Failure to comply with these precautions or with specific warnings elsewhere in this manual violates safety standards of design, manufacture and intended use of the equipment. Thrane & Thrane A/S assumes no liability for the customer's failure to comply with these requirements.

Microwave radiation hazards

During operation the Above Deck Unit (antenna) in this system radiates Microwave Power.This radiation may be hazardous to humans close to the Above Deck Unit. During transmission, make sure that nobody gets closer than the recommended minimum safety distance.

The minimum safety distance to the Above Deck Unit reflector on the focal line is 30 m for SAILOR 100 GX and 44 m for SAILOR 100 GX High Power, based on a radiation level of 10 W/m^2. No hazard exists >25° below the Above Deck Unit's mounting plane. Refer to the drawing below.

Safety distance:
SAILOR 100 GX and SAILOR 100 GX-R2 4.5W: 30 m, 10 W/m^2
SAILOR 100 GX High Power and SAILOR 100 GX-R2 9.0W: 44 m, 10 W/m^2



No-transmit zones
In order to protect personnel no-transmit zones can be programmed. For further information see *Blocking zones with azimuth and elevation* on page 3-5.

Distance to other equipment
Do not move the Above Deck Unit closer to radars than the minimum safe distance specified in section *Interference from radar, GPS, L-band and other transmitters* on page 3-12 – it may cause damage to the Above Deck Unit.

Compass Safe Distance:
SAILOR 100 GX and SAILOR 100 GX High Power Antenna (ADU): min. 140 cm (IEC 60945).
SAILOR 7016C Antenna Control Unit (ACU): min. 30 cm (IEC 60945).

Service
User access to the interior of the ACU is not allowed. Only a technician authorized by Cobham SATCOM may perform service - failure to comply with this rule will void the warranty. Access to the interior of the Above Deck Unit is allowed. Replacement of certain modules and general service may only be performed by a technician authorized by Cobham SATCOM.

Grounding, cables and connections
To minimize shock hazard and to protect against lightning, you must connect the equipment chassis and cabinet to an electrical ground. Ground the ACU to the ship. For further details see Appendix C, *Ground and RF protection*.

Do not extend the cables beyond the lengths specified for the equipment. The cable between the ACU and Above Deck Unit can be extended if it complies with the specified data concerning cable losses etc.

Rx and Tx cables for the SAILOR 100 GX system are shielded and should not be affected by magnetic fields. However, try to avoid running cables parallel to high power and AC/RF wiring as this might cause malfunction of the equipment.

Power supply
SAILOR 7016C Antenna Control Unit: voltage range 100-240 VAC.
The ACU provides power for the Above Deck Unit.

The voltage range for the SAILOR 100 GX modem is 100 – 240 VAC. The socket-outlet shall be installed near the equipment and shall be easily accessible.

Do not operate in an explosive atmosphere
Do not operate the equipment in the presence of flammable gases or fumes. Operation of any electrical equipment in such an environment constitutes a definite safety hazard.

Keep away from live circuits
Operating personnel must not remove equipment covers. Component replacement and internal adjustment must be made by qualified maintenance personnel. Do not replace components with the power cable connected. Under certain conditions, dangerous voltages may exist even with the power cable removed. To avoid injuries, always disconnect power and discharge circuits before touching them.

Failure to comply with the rules above will void the warranty!

After installation make this manual available to the user for further reference.

Record of Revisions

Rev.	Description	Release Date	Initials
A	Original document	22 September 2014	UFO
B	The following sections have been edited: Quick guide, 3.3.4, 5.3.2, 6.1.2, 6.2.1, 6.2.3, 6.2.5, App. D The following figures have been edited: 6-3, 6-5, 6-14, 6-18 The following tables have been edited: 6-1, 6-8, 6-14, 6-19, 7-3	15 December 2014	UFO
C	The following sections have been added: 3.5.3, 3.6.1, 4.1.2, 6.2, 8.1.2, 8.1.3, 8.1.4, 8.8 The following sections have been edited: 1.3, 2.1.1, 2.1.3, 3.1.1, 3.4.2, 3.5, 4.1.1, 4.1.3, 6.3, 6.3.1, 6.3.3, 6.4.5, 6.5.1, 8.1.1, 8.2.2 The following figures have been edited: 6-1, 6-3, 6-12, 6-13, 6-22, 6-24, 6-25, 6-26, 6-30, 6-31, 8-13, 8-15, 8-16 The following tables have been edited: 2-1, 4-7, 6-7, 6-19, 7-2, A-1, C-1, C-2	22 February 2017	UFO
D	General: Sections with DC power removed. The following sections have been added: App. B The following sections have been edited: Quick guide, 3.3.3, 6.1.2, 6.3.2, 6.3.3, 6.4.4, 6.4.6, 6.5.1, 8.1.1, 8.9, App. F, The following figure has been added: 8-2 The following figures have been edited: 3-9, 3-11, 3-15, 3-16, 3-17, 3-18, 3-20, 6-2, 6-27, A-7 The following tables have been edited: 6-15	18 April 2018	UFO
E	The following sections have been added: The following sections have been edited: p. iii, 1.3, 2.1.1, 3.1.1, 3.2.4, 4.1.5, 6.3.4, 6.4.2, 6.4.4, 6.4.6, 8.1.1, 8.1.2, B.2, B.4, F-1 The following figure has been added: 6-18 The following figures have been edited: 3.4 The following tables have been edited: 2.1, 7.3, A-2, D-1, D-2, E-10 The following table has been added: 3.8	1 November 2018	UFO
F	The following sections have been edited: 3.2.6, 3.3.1, 3.4.2, 6.3.1, 3.3.2, B.3.1, E.2.9 The following figures have been edited: A-2, B-1, B-2	28 January 2019	UFO
G	GX-R2 4.5W and 9.0W antennas added	16 February 2021	UFO

Table of contents

Appendix C Ground and RF protection

Appendix D System messages

About this manual

1.1 Intended readers

This is an installation and service manual for the SAILOR 100 GX system, intended for installers of the system and service personnel. Personnel installing or servicing the system must be properly trained and authorized by Cobham SATCOM. It is important that you observe all safety requirements listed in the beginning of this manual, and install the system according to the guidelines in this manual.

Antenna systems covered in this manual:

407090C-00501 SAILOR 100 GX

407090G-00500 SAILOR 100 GX High Power

407090K-00500 SAILOR 100 GX-R2 4.5W

407090L-00500 SAILOR 100 GX-R2 9.0W

The term SAILOR 100 GX is used in general. If necessary, the explicit names are used.

1.2 Manual overview

This manual has the following chapters:

- *Introduction*
- *Installation*
- *Interfaces*
- *Power and start up*
- *Configuration*
- *Installation check*
- *Service*

This manual has the following appendices:

- *Technical specifications*
- *Antenna Diversity Solution (ADS)*
- *Ground and RF protection*
- *System messages*
- *Command line interface*
- *SAILOR VSAT – cURL commands*
- *Approvals*

1.3 Software version

This manual is intended for SAILOR 100 GX with **software version 1.64 (ADU and ACU)**.

1.4 Typography

In this manual, typography is used as indicated below:

Bold is used for the following purposes:

- To emphasize words.
  Example: "Do **not** touch the antenna".
- To indicate what the user should select in the user interface.
  Example: "Select **SETTINGS** > **LAN**".

Italic is used to emphasize the paragraph title in cross-references.

Example: "For further information, see *To connect cables* on page...".

1.5 Precautions

Text marked with "Warning", "Caution", "Note" or "Important" show the following type of data:

- **Warning**: A Warning is an operation or maintenance procedure that, if not obeyed, can cause injury or death.
- **Caution**: A Caution is an operation or maintenance procedure that, if not obeyed, can cause damage to the equipment.
- **Note**: A Note gives information to help the reader.
- **Important**: A text marked Important gives information that is important to the user, e.g. to make the system work properly. This text does not concern damage on equipment or personal safety.

All personnel who operate equipment or do maintenance as specified in this manual must know and follow the safety precautions. The warnings and cautions that follow apply to all parts of this manual.

WARNING! Before using any material, refer to the manufacturers' material safety data sheets for safety information. Some materials can be dangerous.

CAUTION! Do not use materials that are not equivalent to materials specified by Thrane & Thrane A/S. Materials that are not equivalent can cause damage to the equipment.

CAUTION! The system contains items that are electrostatic discharge sensitive. Use approved industry precautions to keep the risk of damage to a minimum when you touch, remove or insert parts or assemblies.

Introduction

This chapter has the following sections:

- *SAILOR 100 GX system*
- *Part numbers and options*

2.1 SAILOR 100 GX system

2.1.1 Overview

The SAILOR 100 GX is a unique stabilized maritime GX antenna system operating in the Ka-band (19.2 to 30 GHz). It is used with the Global Xpress service from Inmarsat, delivering consistent high-performance download speeds of up to 50 Mbps and 5 Mbps over the uplink. The following figure shows the coverage map of the GX service.

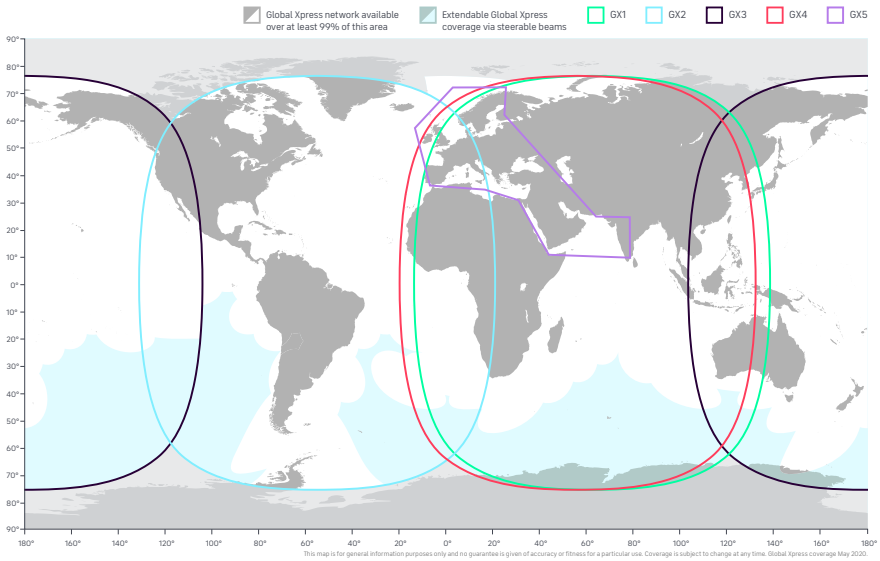


Figure 2-1: GX coverage map

The system requires a single 50 Ohm coaxial cable to provide the Above Deck Unit (ADU) with both DC power, data and control information. The radome does not have to be removed neither before nor after the installation. To protect the ADU the built-in motors act as brakes during transport and when the ADU is not powered. You can access the SAILOR 100 GX remotely and make in-depth performance analysis using the built-in web interface. The following figure shows the SAILOR 100 GX system.

Figure 2-2: ADU, ACU and GMU

2.1.1.1 SAILOR 100 GX features

- Single 50 Ohm coax cable between ADU and below deck equipment.
- One-Touch Commissioning.
- GX-R2 support.
- Easy conversion from GX to GX-R2.
- Gyro-free operation.
- SNMP traps and remote syslog support.
- Secure connection, HTTPS and SSH
- Remote access using SAILOR FleetBroadband over WAN.
- Remote or local simultaneous software update of the GMU, ADU and ACU using a PC and Internet browser.
- Full remote control and troubleshooting with built-in test equipment (BITE).
- ACU with 4 x LAN, NMEA 0183, RS-232 and RS-422.
- Global RF configuration.
- GMU with 8+2 LAN, RS-232 and RS-422 and I/O connector.
- No scheduled maintenance.
- High Power amplifier for Inmarsat High End Off Shore airtime service.

2.1.2 Above Deck Unit (ADU)

The SAILOR 100 GX ADU is a 103 cm stabilized tracking antenna, consisting of a suspended antenna with a standard global RF configuration. It is stabilized by heavy duty vibration dampers in 3-axi (plus skew)s and can be used in environments with elevations of -25° to + 125°. The ADU weighs 126 kg and is powered by the ACU. The ADU is protected by a radome. All communication between the ADU and the ACU passes through the a single standard 50 Ohm cable (with N connector) through the rotary joint. No cable work is required inside the radome.

Figure 2-3: Above Deck Unit (ADU)

2.1.2.1 Modules in the SAILOR 100 GX ADU

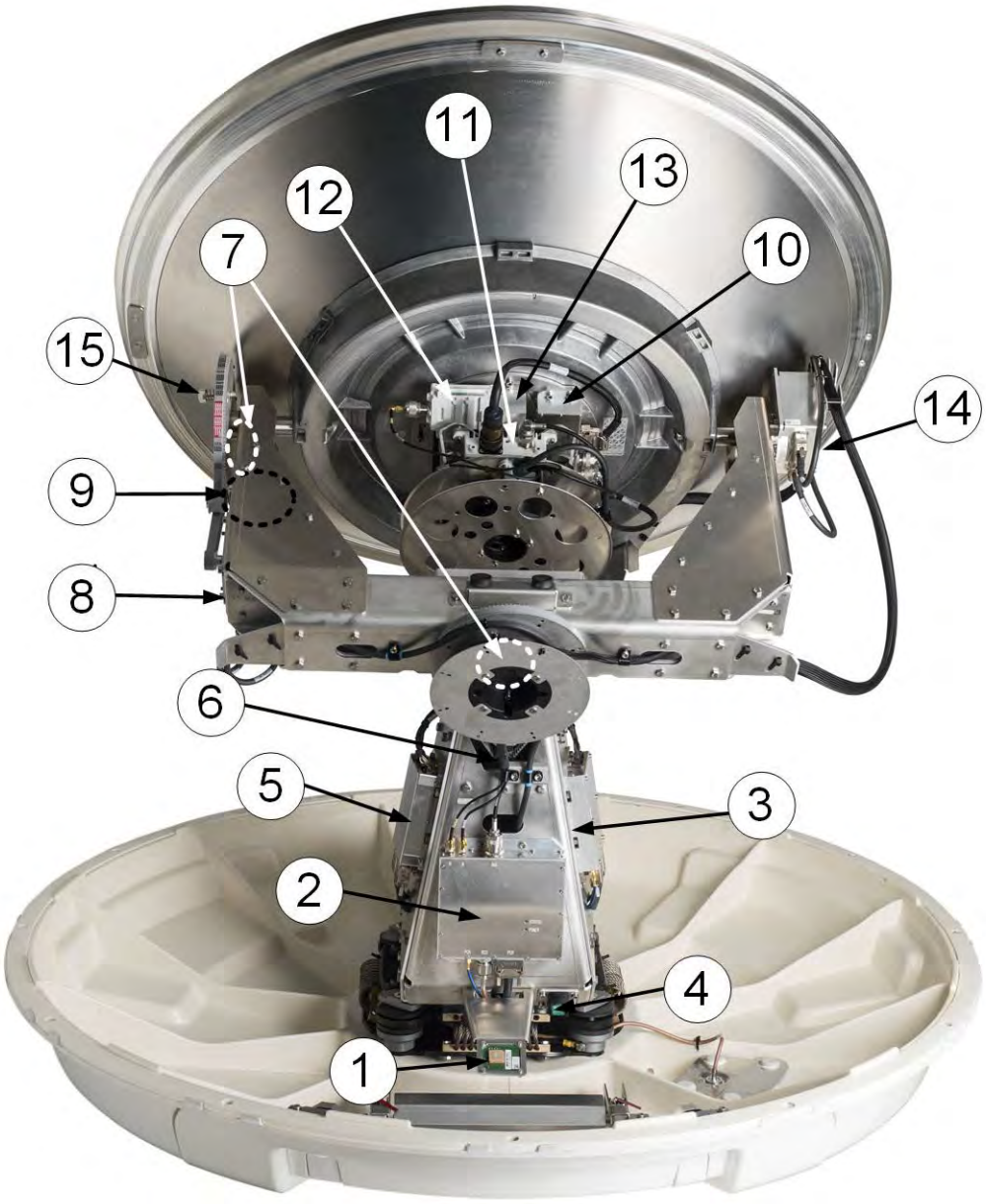


Figure 2-4: Above Deck Unit modules 1/2

1. GNSS module.
2. VSAT Interface Module (VIM).
3. Pedestal Control Module (PCM).
4. Service switch.
   In switch-off position the Motor Driver modules and the BUC are turned off for safe conditions during service and repair. The switch must be set to on for normal operation.
5. Motor Driver Module for cross elevation (DDM/SMD).
6. Cross elevation motor and encoder.

7. Zero Reference Module (x3) (ZRM) (not visible on photo), (2 in the figure above, 1 in the figure below).
8. Motor Driver Module for elevation (on the bottom) (DDM/SMD).
9. Elevation motor and encoder (not visible).
10. BUC Control Module (BCM).
11. Block Up Converter (BUC).
12. Low Noise Block downconverter (LNB).
13. Polariser.
14. Inertial Sensor Module (ISM).
15. Elevation locking pin to lock the antenna dish in a fixed position.

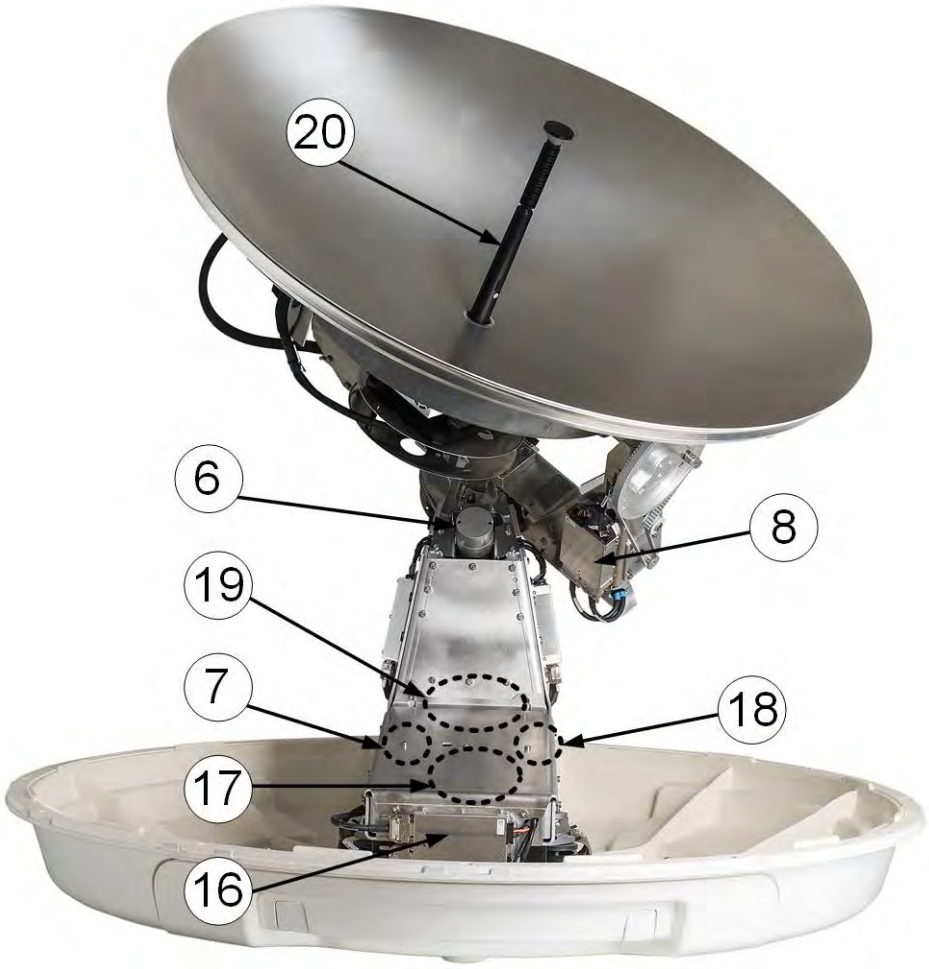


Figure 2-5: Above Deck Unit modules 2/2

16. Motor Driver Module for Azimuth (DDM/SMD).
17. Azimuth motor.
18. Azimuth encoder.
19. Rotary joint.
20. Feed horn.

2.1.2.2 Modules in the SAILOR 100 GX-R2 ADU

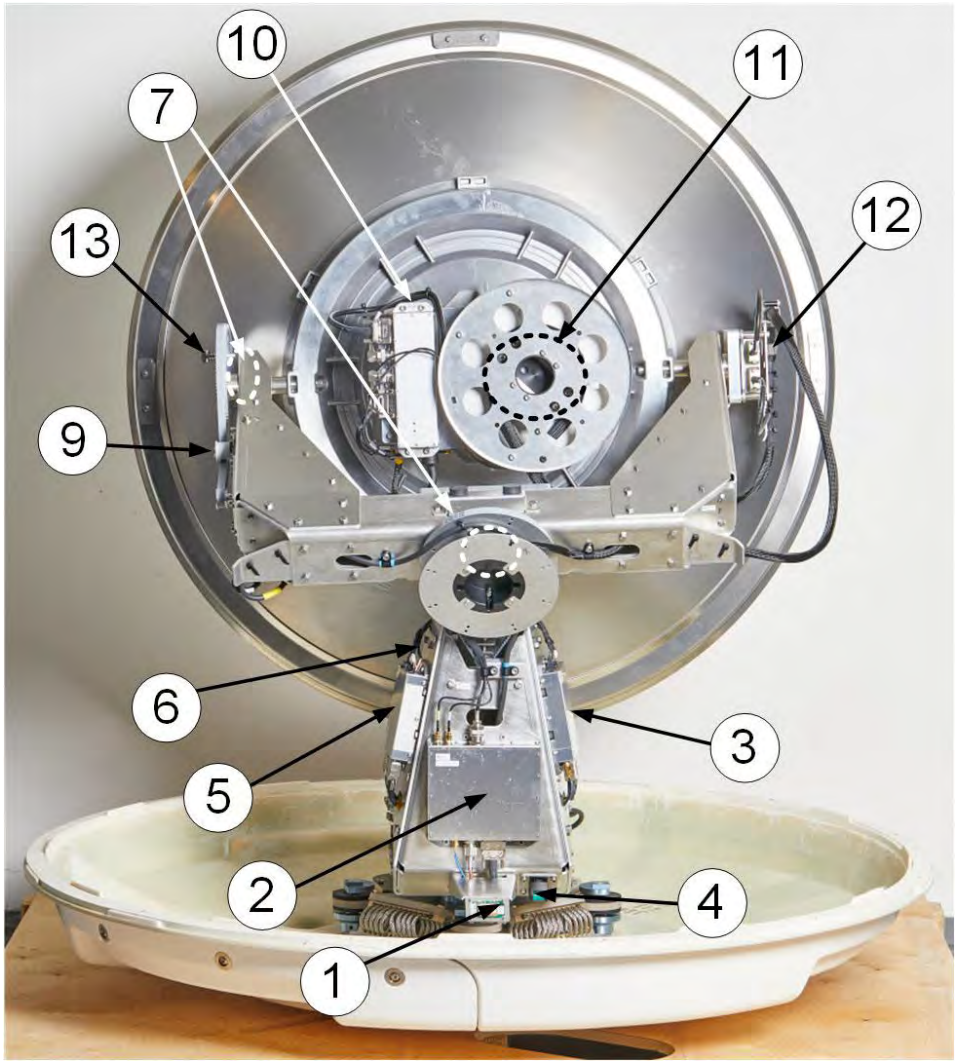


Figure 2-6: Above Deck Unit modules 1/2

1. GNSS module.
2. VSAT Interface Module (VIM).
3. Pedestal Control Module (PCM).
4. Service switch.
   In switch-off position the Motor Driver modules is turned off for safe conditions during service and repair. The switch must be set to on for normal operation.
5. Motor Driver Module for cross elevation (DDM/SMD).
6. Cross elevation motor and encoder.
7. Zero Reference Module (x3) (ZRM) (not visible on photo), (2 in the figure above, 1 in the next figure).
8. Motor Driver Module for elevation (on the bottom) (DDM/SMD).
9. Elevation motor and encoder (not visible).

10. BUC Control Module (BCM).
11. GX-R2 Transceiver.
12. Inertial Sensor Module (ISM).
13. Elevation locking pin to lock the antenna dish in a fixed position.

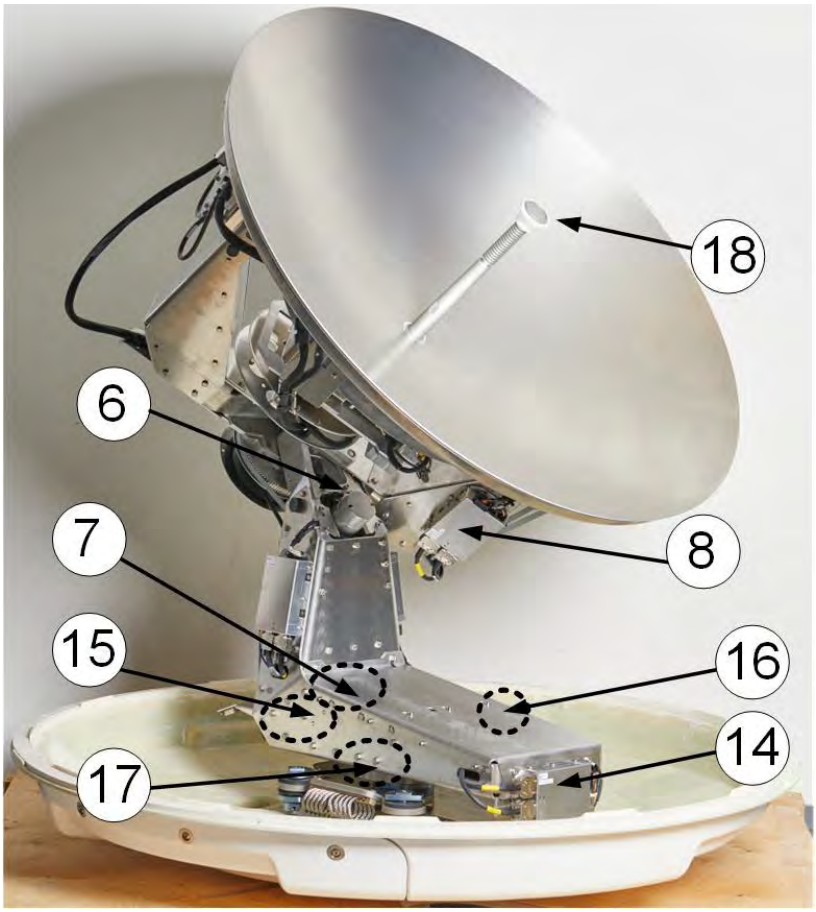


Figure 2-7: Above Deck Unit modules 2/2

14. Motor Driver Module for Azimuth (DDM/SMD).
15. Azimuth motor.
16. Azimuth encoder.
17. Rotary joint.
18. Feed horn.

Four lifting brackets (included in the delivery and reuse of packing material) help getting the ADU safely into place. Setup parameters are entered in the built-in web server of the ACU, using a PC. The system configuration is saved in two modules, there is no loss of data at repair. The large service hatch of the radome gives easy access to the ADU on site. The service switch in the ADU stops the Motor Driver modules and turns the BUC off.

All modules either have a service and power LED status indicator or support diagnostics via the web interface. Each module is encapsulated in a metal box with self-contained mounting bolts. If necessary, belts and modules can be exchanged through the service

hatch on site. The ADU software is updated automatically when you make a software update of the ACU.

2.1.3 Antenna Control Unit (ACU)

The ACU is the central control unit in the system. It contains all user interfaces and manages all communication between the ADU and the connected modem, a connected PC and an optional FleetBroadband service communication line. The ACU has a display, status LEDs and a keypad. It provides a DHCP client. During configuration you can configure heading offset, save satellite setup and enter *No Transmit Zones* (blocking zones in which the ADU does not transmit). The user PC (user WAN) for Internet access etc. is connected to the ACU, not the modem. The ACU provides DC power to the ADU through a single coaxial cable. The ACU comes in a 19" rack version.

Figure 2-8: Antenna Control Unit

You can do remote diagnostics and service with the ACU. Its built-in test equipment constantly checks the device for proper functioning. It performs POST (Power On Self Test) and you can request a PAST (Person Activated Self Test). Continuous Monitoring (CM) is also available. BITE error codes can be read out in the web interface and in the display of the ACU. You can make a software update with a connected PC and the built-in web interface of the ACU.

2.1.3.1 ACU interfaces

The ACU (SAILOR 7016C) has one LAN connector at the front and the following interfaces at the rear panel:

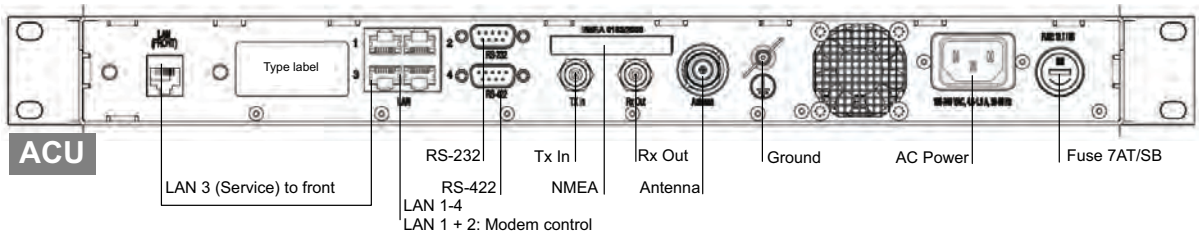


Figure 2-9: ACU (connector panel)

- N-connector for ADU cable (50 Ohm).
- 2 x F connectors for Rx and Tx cables (75 Ohm) to modem.
- Multi connector for NMEA interfaces (for input from GPS compass or Gyro compass).
- RS-422 interface for modem control.

- RS-232 interface for modem control.
- 4 x LAN ports for modem control and user equipment
- Ground wing nut.
- AC power connector.
- On/Off power switch (at the front).

2.1.4 GX Modem Unit (modem)

The modem (GMU) comes in a 19" rack version. The modem has the following interfaces and switch:

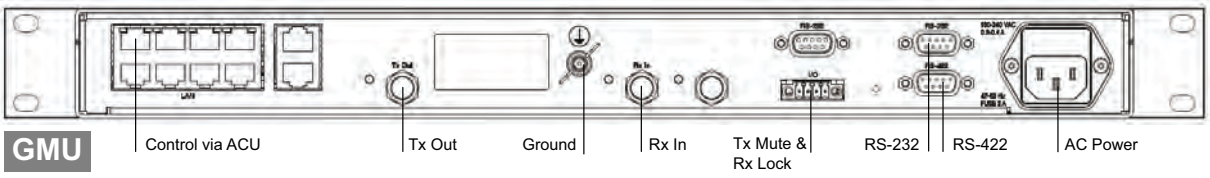


Figure 2-10: GMU (connector panel)

- 8 + 2 ports, one active for modem control and user equipment.
- 3 x F connectors for Rx and Tx cables (75 Ohm) to ACU (Rx2 not active).
- RS-422 interface for modem control.
- 2 x RS-232 interfaces, one for modem control, one not active.
- I/O connector for Tx Mute and Rx Lock.
- Ground wing nut.
- AC Power connector.
- On/Off power switch (at the front).

2.1.5 Satellite type approvals

For a list of satellite type approvals see Appendix F, *Approvals*.

2.1.6 Service activation

Before you can start using the SAILOR 100 GX, you need to activate the system for the GX service. Contact your service provider for activation.

2.2 Part numbers and options

The following model and part numbers are available for the SAILOR 100 GX system:

Part number	Description
407009C-00501	Above Deck Unit (ADU)
407009G-00500	Above Deck Unit, High Power
407009K-00500	Above Deck Unit, GX-R2 4.5W
407009L-00500	Above Deck Unit, GX-R2 9.0W
407016C-00510	Antenna Control Unit (ACU)
407023A-00500	Global Xpress Modem Unit (GMU)

Table 2-1: Part numbers for the SAILOR 100 GX system

The following options are available for the SAILOR 100 GX system:

Part number	Description
407090A-950	Antenna cable 50 m N-Conn (not mounted), male/male
407090A-925	Pigtail Cable 1.25 m, N-Conn, female/male
407090C-010	SAILOR ADS Cable Kit for Antenna Diversity Solution
407090-001	SAILOR 1m SMART Heater Kit

Table 2-2: Part numbers for options of the SAILOR 100 GX system

Installation

This chapter has the following sections:

- *What's in the box*
- *Site preparation*
- *Installation of the ADU*
- *Installation of the ACU*
- *Installation of the modem*
- *To connect the ADU, ACU and modem*

3.1 What's in the box

3.1.1 To unpack

Unpack the modem, ADUand ACU. Check that the following items are present:

- SAILOR 7009C/G/K/L ADU with 4 lifting brackets (already mounted)
- Accessory kit for SAILOR 7009C/G/K/L ADU:
  - Package with cable glands (2 sizes), bolts and washers
- SAILOR 7016C ACU
- Accessory kit for SAILOR 7016C ACU:
  - NMEA multi-connector
  - RJ45 patch cable (0.5 m)
  - Coax cable F-F, low loss, 75 Ohm (2 pcs)
  - RJ45 patch cable (2 m)
  - Power cable (1x230 VAC)
- SAILOR 7023A GMU
- Accessory kit for SAILOR 7023A GMU including
  - Wiecon 3.5 mm spacing, 4 pol connector for cable
  - RJ45 patch cable (1 pce)
  - Power cable 230 VAC
  - RS-232/RS-422 cable (2 pcs)

3.1.2 Initial inspection

Inspect the shipping cartons and wooden box immediately upon receipt for evidence of damage during transport. If the shipping material is severely damaged or water stained, request that the carrier's agent be present when opening the cartons and wooden box. Save all box packing material for future use.

WARNING! To avoid electric shock, do not apply power to the system if there is any sign of shipping damage to any part of the front or rear panel or the outer cover. Read the safety summary at the front of this manual before installing or operating the system.

After unpacking the system, i.e. removing the top and sides of the wooden box and opening the cartons, inspect it thoroughly for hidden damage and loose components or fittings. If the contents are incomplete, if there is mechanical damage or defect, or if the system does not work properly, notify your dealer.

3.1.3 Tools needed

- Torx TX 30 to open the service hatch
- Torque wrench to fasten the mounting bolts for the ADU
- Torque wrench to fasten the N connector at the ADU
- PC and Internet browser
- Crimping tools

3.1.4 Transport of the antenna

During transport the antenna must be able to move freely inside the radome. You must follow the instructions below to keep a valid warranty:

CAUTION!

Do not lock the antenna dish with the elevation locking pin during transport.

Do not strap parts of the antenna.

This might cause damage to the antenna.

Damage due to actions listed above will void the warranty.

3.2 Site preparation

The following topics have to be considered when installing the ADU:

- *General site considerations*
- *Obstructions (ADU shadowing)*
- *Blocking zones with azimuth and elevation*
- *Safe access to the ADU (radiation hazard)*
- *Ship motion and offset from the ship's motion centre*
- *ADU mast design: Mast foundation and height*
- *Interference from radar, GPS, L-band and other transmitters*
- *Condensation, water intrusion and deposits*

3.2.1 General site considerations

For optimum system performance, you must follow some guidelines on where to install or mount the different components of the SAILOR 100 GX System.

Important It is recommended to mount the ADU in a location with as much **360° free line of sight to the satellite** as possible while making sure that the support structure fulfills the requirements for the mast foundation.

1. Mount the ADU on stiffened structures with a minimum of exposure to vibrations.

You do not have to align the ADU with the bow-to-stern line of the ship. When configuring the SAILOR 100 GX system, the azimuth calibration provides the correct azimuth of the ADU.

3.2.1.1 Painting the radome

Customers may wish to paint the radome in order to match the vessel's colour. Any paint used must be non-metallic based. Painting the radome may impact RF performance and may lead to over-heating, causing the antenna to go in safe mode (switch off).

Cobham SATCOM recommends that the radome should NOT be painted. Painting the radome will not void the general warranty regarding material and workmanship etc. It is only the performance that cannot be guaranteed.

3.2.1.2 Modifying the radome or using another radome

The SAILOR 100 GX antenna comes with a type-approved radome fitted from the factory. This radome is specifically designed for a minimal loss of RF performance for this specific antenna. Insertion loss reduces the available signal and decreases the effective radiated power and G/T (the ability to receive a weak signal). Modifying the radome or using another radome may increase the antenna side lobes, resulting in interference with other communication systems and thereby void satellite operator approvals. Other electrical effects on antenna performance of another radome, or of modifying the radome, include a change in the antenna beam width and shifting of the antenna bore sight.

Cobham SATCOM recommends that the radome should NOT be modified or changed to another type. Exchanging or modifying the radome will not void the general warranty for material and workmanship etc. but the performance cannot be guaranteed, and the satellite operator approvals will not be valid.

3.2.2 Obstructions (ADU shadowing)

The ADU is stabilized in 3-axis (plus skew) and can be used in environments with elevations of -25˚ to + 125˚f to allow for continuous pointing even in heavy sea conditions. The ADU beam is approximately 1 m in diameter for the first 30 m from the ADU. Beyond 30 m the beam gradually widens so that it is approximately 5 m in diameter at 100 m distance. This beam expansion continues with increasing distance. Any obstructions, such as masts, funnels, bridge house etc. within this field can cause signal degradation or signal loss.

Note Note that due to the short wavelength at Ka band and the narrow beam width of the ADU even a **6 mm steel wire placed within 50 m** inside the beam can causes signal degradation.

For optimum performance adhere to the following guidelines:

1. Place the ADU so that it has as much free line-of-sight as possible without any structures in the beam through one full 360 degrees turn of the vessel.
2. Do not place the ADU close to large objects that may block the signal.
3. Elevate the ADU by mounting it on a mast or on a mounting pedestal on a deck or deck house top to avoid obstruction.

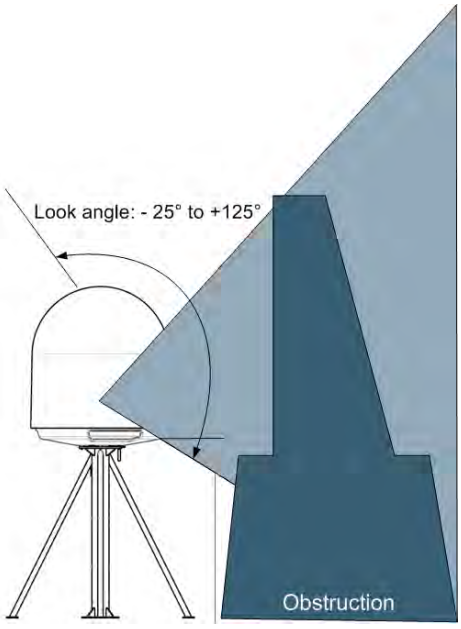


Figure 3-1: Signal degradation because of obstructing objects

3.2.3 Blocking zones with azimuth and elevation

Your installation may require that you set up blocking zones for the ADU, i.e. areas where the ADU will not transmit and areas where transmit power is potentially dangerous for persons frequently being in these zones. You can set up 8 blocking zones. Each blocking zone is set up with azimuth start and stop, and elevation angle. The blocking zones are set up in the built-in web interface of the ACU during configuration. For further information see *To set up blocking zones (RX and TX)* on page 6-22.

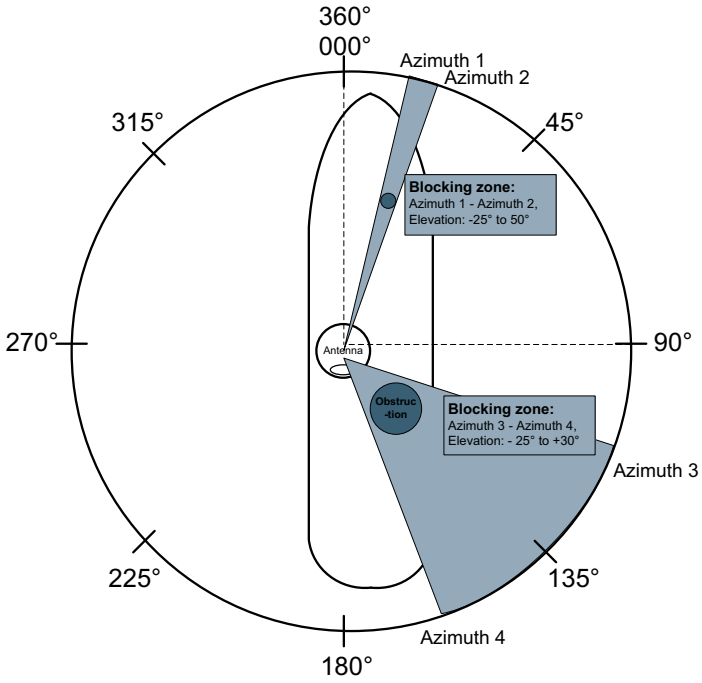


Figure 3-2: 2 blocking zones with no-transmit zones, azimuth (example)

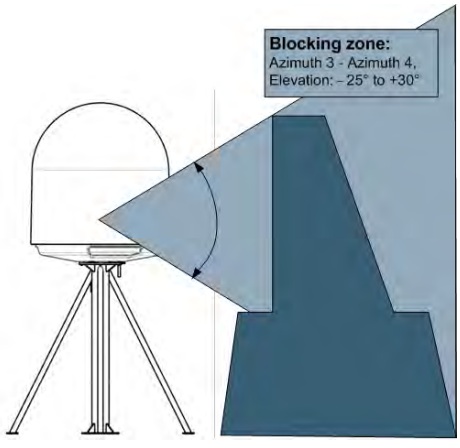


Figure 3-3: Blocking zone with no-transmit zones, elevation angle (example)

3.2.4 Safe access to the ADU (radiation hazard)

The ADU radiates up to 53.5 dBW EIRP, for High Power 56.6 dBW EIRP at 29.5 GHz.This translates to a minimum safety distance of 30 m, for High Power 55 m, from the ADU while it is transmitting, based on a radiation level of 10 W/m^2.

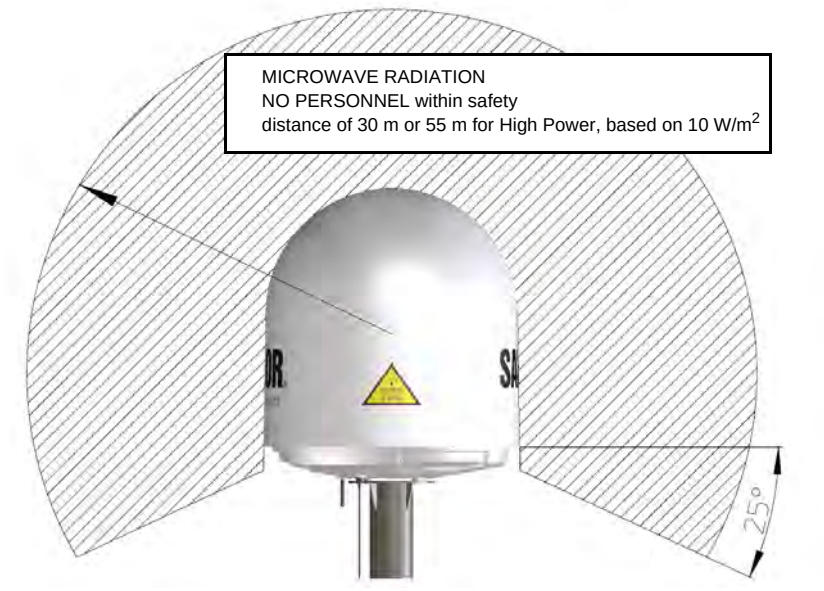


Figure 3-4: Radiation hazard, safety distance 30 m or 55 m for High Power

3.2.5 Ship motion and offset from the ship's motion centre

When installing the ADU you must consider the mounting height carefully. The higher up the ADU is mounted, the higher is the linear g force applied to the ADU. The g force also depends on the roll period of the ship, see Table 3-1. If the g force applied is too high, performance and ADU signal stabilization may be reduced and eventually the ADU may be damaged. See the following table for allowed mounting heights above the ship's motion centre.

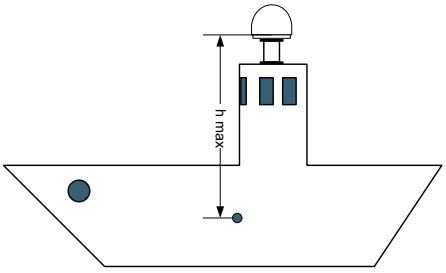


Figure 3-5: Maximum distance from the ship's motion centre (h max)

Even though it is recommended to mount the ADU high, keep the distance between the ADU and the ship's motion centre as short as possible.

Min. roll period	Maximum antenna mounting height (h max)	
	Full performance	Potential risk of damage
4 s	12 m (39 ft)	16 m (53 ft)
6 s	27 m (89 ft)	35 m (115 ft)
8 s	48 m (158 ft)	62 m (203 ft)
10 s	75 m (246 ft)	98 m (322 ft)

Table 3-1: Maximum distance from the ship's motion center versus ship's roll period

3.2.6 ADU mast design: Mast foundation and height

The antenna system is designed for harsh environmental conditions at sea, both in regards to vibration amplitude and speed. The antenna system performs optimally when mounted on a properly designed foundation. When mounting the antenna the overall goal is to establish a foundation which is as rigid as possible. However, in some scenarios establishing a very rigid foundation is difficult and inappropriate. This section aims at defining the minimum design criterion for the mast. In addition, some specific design suggestions are presented. In order to keep the presented designs to a manageable size only a sample of design suggestions is presented. Note that the design values given below depend on rigid interfaces between antenna and ship, the values are furthermore given based on a standard steel type (e.g. S235JR, S355JO).

The placement of the ADU must ensure a rigid structural connection to the hull or structure of the ship. Parts of the ship with heavy resonant vibrations are not suitable places for the ADU. A small platform or short mast shall provide rigid support for the ADU fastening bolts and a rigid interface to the ship.

If it is necessary to use a tall mast, you must stabilise the mast with bracing. Note that the design values given below depend on rigid ADU-to-ship interfaces. The cross-sectional properties and the corresponding maximum free length give a natural frequency close to 30 Hz. Shorten the mast length as much as possible to obtain higher frequencies. Preferably, mount stays or wires to stabilize the mast further.

Important An antenna mounted on a less stiff structure might be functional, however, this could lead to a decrease in the operational lifetime of the antenna system and possibly a decreased performance under operation.

The ADU mast must be designed to carry the weight of the ADU (126 kg), plus the weight of the mast flange. The mast must also be able to withstand on-board vibrations and wind speeds up to 110 knots on the radome, even in icing conditions.

Follow the guidelines in the sections:

- *ADU mast flange*
- *Mast length and diameter*

3.2.6.1 ADU mast flange

For best performance provide a mast flange with a minimum of four gusset plates. To prepare the mast flange do as follows:

1. Fit the top of the ADU mast with a flange with clearance holes matching the bushings in the radome and with minimum 4 gusset plates. No center hole is necessary in the flange.
   - **Flange thickness**: Minimum 15 mm.
   - **4 gusset plates**: Minimum 15 mm thick, must be placed as close as possible to the holes in the mounting plate and evenly distributed.

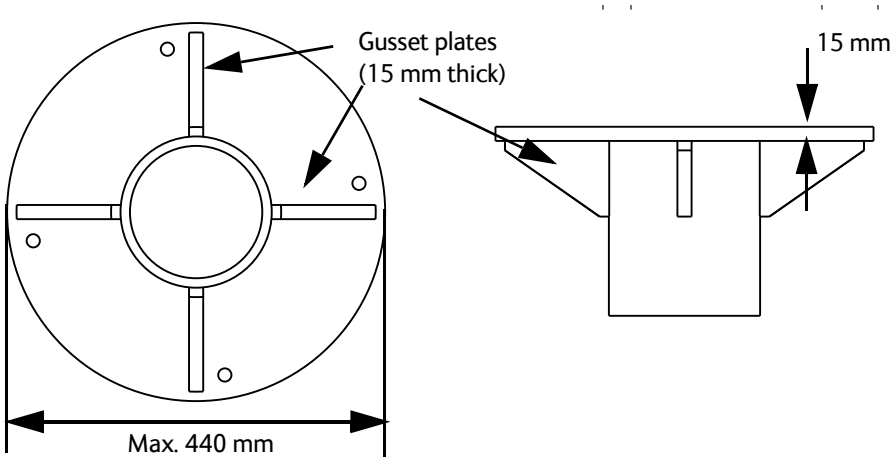


Figure 3-6: ADU mast flange, top and side view

2. Make sure that the recommended flatness on the mast mount plateau is below 3,0 mm.

Figure 3-7: ADU mast flange, recommended flatness on the mast mount plateau

CAUTION! Avoid sharp edges where the flange is in direct contact with the radome. Round all edges as much as possible to avoid damaging the surface of the radome.

3. Allow sufficient space so the nut is free of the welded seam and there is room for tools (min. 50 mm).

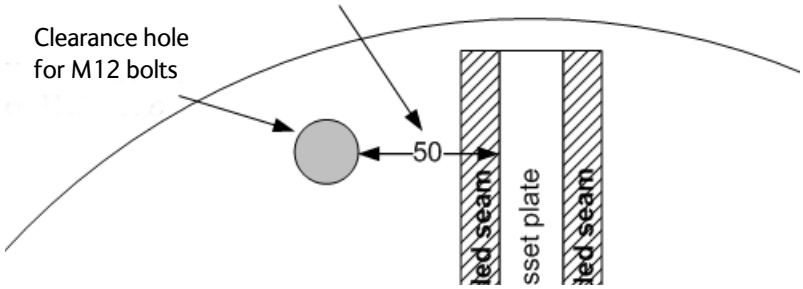


Figure 3-8: ADU mast flange, distance to the welded seam

4. Use the dimensions in the following figure to prepare the mast flange for mounting of the ADU.

The following figure shows the bottom view of an antenna.

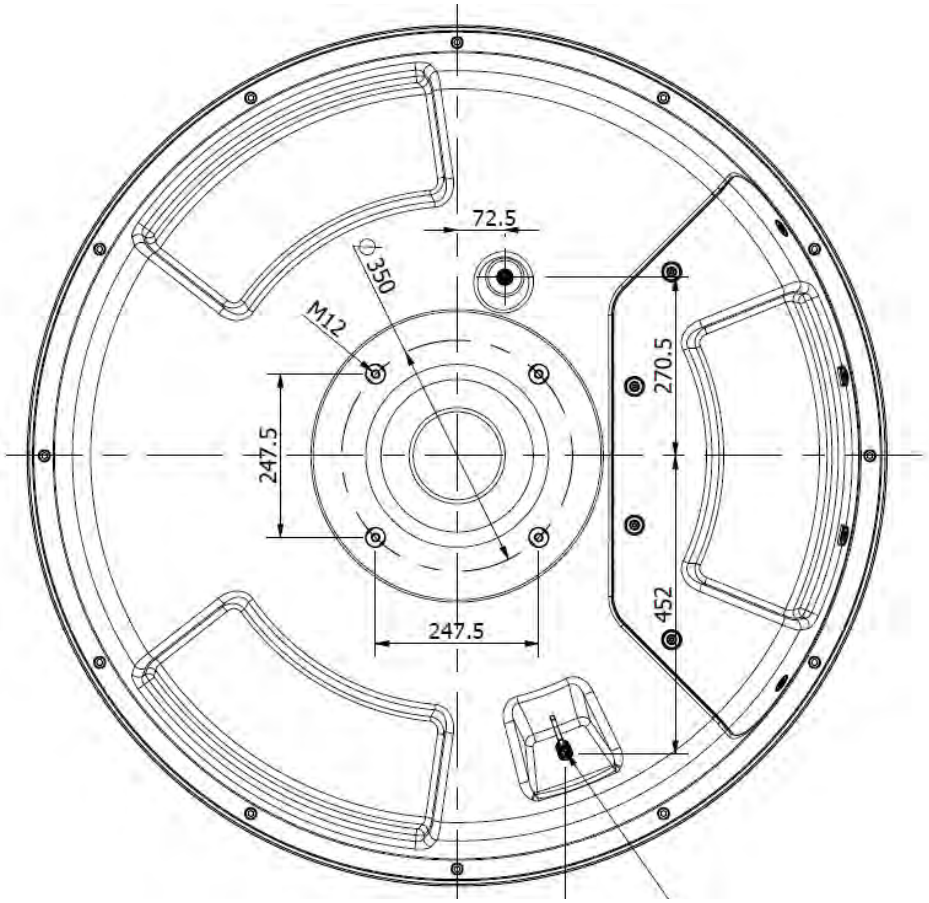


Figure 3-9: ADU, bottom view

3.2.6.2 Mast length and diameter

The mast wall thickness is in the following design examples set to 5 mm and the brace wall thickness to 4 mm. A larger wall thickness yields more stiffness (valid design) whereas a thinner wall thickness yields a weaker structure (not valid design).

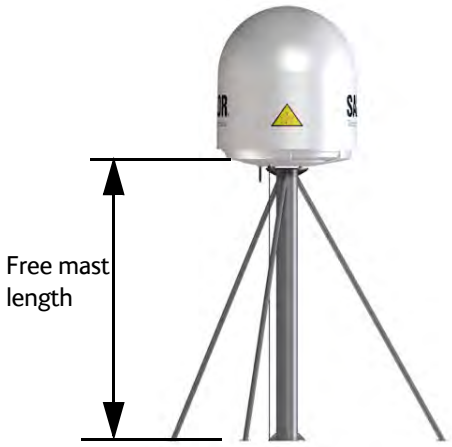


Figure 3-10: Free mast length and example bracing for a tall mast

Note Make sure that there is free space below the drain tube. See also *Condensation, water intrusion and deposits* on page 3-15.

The tables in the next sections give suggested design values for the free mast length.

Note The tables list the values for **steel masts**. For **aluminium masts**, the free mast length is reduced to 75% of the values for steel.

Note Bracing and rigid masts can still not prevent vertical vibration if the mast is attached to a deck plate that is not rigid. Make every effort to mount the mast on a surface that is well supported by ribs. If this is not possible, provide extra deck plate propping.

The following tables show the minimum dimensions for an ADU mast with and without stays or wires. Note that the values are only guidelines - always consider the environment and characteristics of the ship before deciding on the mast dimensions.

Mast without braces	Max. free mast length (steel)	Outer Diameter	Wall Thickness (mm)	Weight (kg/m)
	0.4[a] m (1.3 ft)	200 mm (8 in)	5 mm (0.2 in)	24.0
	0.6 m (2 ft)	220 mm (9 in)	5 mm (0.2 in)	26.5
	0.8 m (2.6 ft)	250 mm (10 in)	5 mm (0.2 in)	30.2
	1 m (3.3 ft)	270 mm (11 in)	5 mm (0.2 in)	32.7

Table 3-2: Mast dimensions without braces

a. The height of 0.4 m is not recommended to be used as it will make access through the ADU's service hatch difficult.

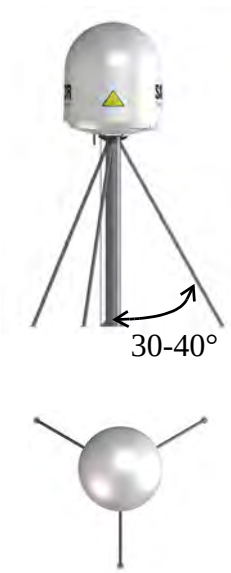
Mast with 3 braces	Max. free mast length (steel), (m)	Outer Diameter (mm)	Wall Thickness (mm)	Outer Diameter for brace (mm)	Thickness for brace (mm)
	1.2	140	10	50	5.0
	1.2	200	5	50	5.0
	1.6	140	10	70	5.0
	1.6	200	5	70	5.0
	2	160	10	70	5.0
	2	220	5	70	5.0
	2.5	180	10	80	5.0
	2.5	220	5	80	5.0

Table 3-3: Mast dimensions with 3 braces

Mast with 2 braces	Max. free mast length (steel), (m)	Outer Diameter (mm)	Wall Thickness (mm)	Outer Diameter for brace (mm)	Thickness for brace (mm)
	1.2	160	10	80	5.0
	1.2	200	5	80	5.0
	1.6	180	10	80	5.0
	1.6	220	5	80	5.0
	2	180	10	80	5.0
	2	240	5	80	5.0
	2.5	200	10	80	5.0
	2.5	260	5	80	5.0

Table 3-4: Mast dimensions with 2 braces

3.2.7 Interference from radar, GPS, L-band and other transmitters

Note Do not place the ADU close to interfering signal sources or receivers. We recommend to test the total system by operating all equipment simultaneously and verifying that there is no interference.

Mount the ADU as far away as possible from the ship's radar and high power radio transmitters, because they may compromise the ADU performance. RF emission from radars might actually damage the ADU.

The SAILOR 100 GX ADU itself may also interfere with other radio systems.

3.2.7.1 Radar

It is difficult to give exact guidelines for the minimum distance between a radar and the ADU because radar power, radiation pattern, frequency and pulse length/shape vary from radar to radar. Further, the ADU is typically placed in the near field of the radar ADU and reflections from masts, decks and other items near the radar vary from ship to ship.

However, it is possible to give a few guidelines:

1. Since a radar radiates a fan beam with a horizontal beam width of a few degrees and a vertical beam width of up to +/- 15°, you can avoid the worst interference by mounting the ADU at a different level – meaning that the ADU is installed minimum 15° above or below the radar antenna.
   Due to near field effects the benefit of this vertical separation could be reduced at short distances (below approximately 10 m) between radar antenna and the SAILOR 100 GX ADU.
2. Provide as much vertical separation as possible when the SAILOR 100 GX ADU has to be placed close to a radar antenna.

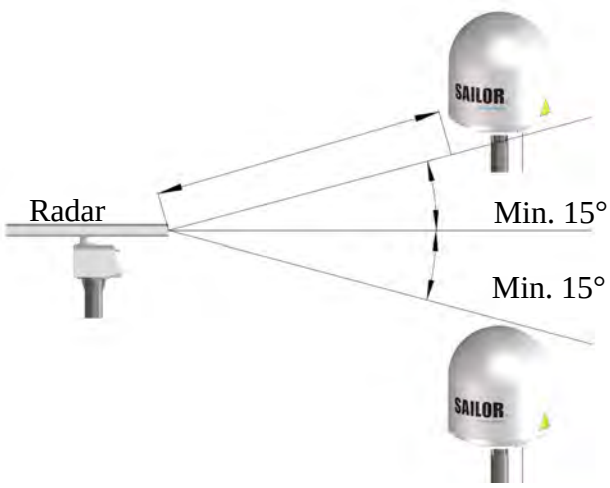


Figure 3-11: Interference with the vessel's radar

3.2.7.2 Radar distance

The minimum acceptable separation (d min.) between a radar and the ADU is determined by the radar wavelength/frequency and the power emitted by the radar. The tables below show some "rule of thumb" minimum separation distances as a function of radar power at X

and S band. If the d min. separation listed below is applied, antenna damage is normally avoided.

"d min." is defined as the shortest distance between the radar antenna (in any position) and the surface of the SAILOR 100 GX ADU.

X-band (~ 3 cm / 10 GHz) damage distance		
Radar power	SAILOR 100 GX ADU	
	d min. at 15° vertical separation	d min. at 60° vertical separation
0 – 10 kW	1.0 m (3.3 ft)	1.0 m (3.3 ft)
30 kW	2.0 m (6.6 ft)	1.0 m (3.3 ft)
50 kW	3.3 m (10.8 ft)	1.7 m (5.6 ft)

Table 3-5: Minimum radar separation, X-band

S-band (~ 10 cm / 3 GHz) damage distance		
Radar power	SAILOR 100 GX ADU	
	d min. at 15° vertical separation	d min. at 60° vertical separation
0 – 10 kW	2.0 m (6.6 ft)	1.0 m (3.3 ft)
30 kW	3.0 m (9.8 ft)	1.5 m (4.9 ft)
50 kW	5.0 m (16.4 ft)	2.5 m (8.2 ft)

Table 3-6: Minimum radar separation, S-band

The separation distance for C-band (4-8 GHz) radars should generally be the same as for SX-band radars.

3.2.7.3 Radar interference

Even at distances greater than "d min." in the previous section the radar might still be able to degrade the performance of the SAILOR 100 GX system. The presence of one or more S or X-band radars within a radius up to 100 m may cause a minor degradation of the Ka-band connection. The degradation will be most significant at high radar pulse repetition rates. As long as receiving conditions are favourable, this limited degradation is not important. However, if receiving conditions are poor – e.g. due to objects blocking the signal path, heavy rainfall or icing, low satellite elevation and violent ship movements – the small extra degradation due to the radar(s) could cause poor connection quality.

The presence of S-band radar(s) is unlikely to cause any performance degradation – as long as the minimum distances (d min.) listed in the previous section are applied.

It is strongly recommended that interference-free operation is verified experimentally before the installation is finalized. If radar interference is suspected, or the antenna is

placed inside the radar beam, configure the radar to have a blanking zone to avoid transmission towards the antenna.

CAUTION! The ADU must never be installed closer to a radar than “d min.” - even if experiments show that interference free operation can be obtained at shorter distances than “d min.” in the previous section.

3.2.7.4 GPS receivers

Good quality GPS receivers work properly very close to the ADU - typically down to one meter outside the main beam.

3.2.7.5 L-band antennas

If L-band antennas are installed on the same vessel, keep a minimum distance of 3 meters from the SAILOR 100 GX ADU to the L-band antenna.

3.2.7.6 Other transmitters

See the following figure for minimum recommended distance to transmitters in the frequency range below 1000 MHz.

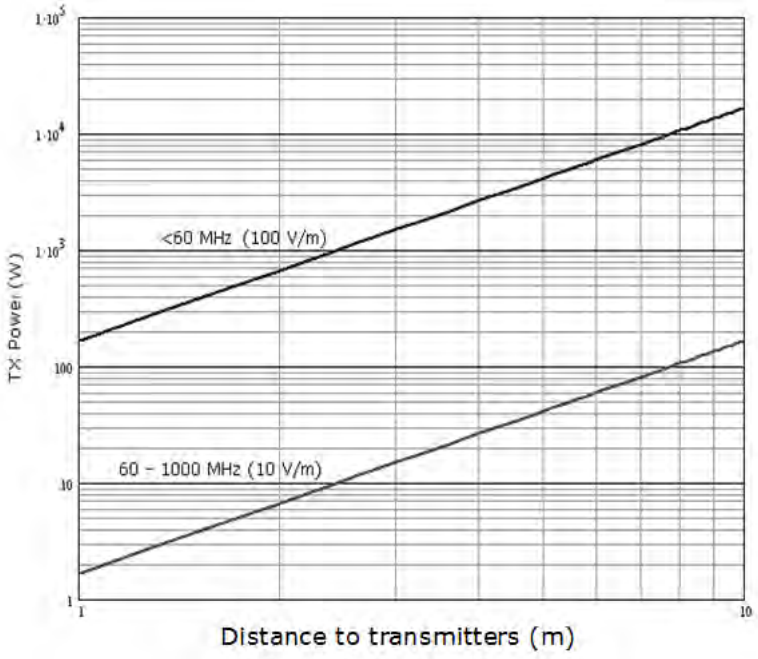


Figure 3-12: Recommended distance to transmitters (m) for frequencies below 1000 MHz

3.2.8 Condensation, water intrusion and deposits

In some weather conditions there may occur condensation inside the radome. The drain tube is designed to lead any water away from inside the radome.

Observe the following guidelines for condensation and water intrusion:

1. If possible, install the radome such that direct spray of seawater is avoided.
2. Make sure the ADU's drain tube is open and that there it free space between the drain tube and the mounting surface so water can escape and there is ventilation for the ADU.

Figure 3-13: Drain pipe with free space

3. Do not use pneumatic tools for cleaning the radome, especially at a short distance and directly at the split between top and bottom.
4. Do not place the ADU close to a funnel, as smoke deposits are corrosive. Furthermore, deposits on the radome can degrade performance.

3.3 Installation of the ADU

3.3.1 Prerequisites

- Ensure that the crane hook has a closing mechanism to prevent accidental slippage of the lifting straps.
- Check for potential interference, read more in *Interference from radar, GPS, L-band and other transmitters* on page 3-12.
- Install the ADU at a location where **vibrations are limited to a minimum**.

3.3.2 Overview

The ADU is shipped fully assembled. You have to install it on the mast and attach the ADU cable.

WARNING! Use a strong webbed sling with a belt to lift the ADU without damaging the radome. Make sure that the sling is approved for lifting of ADUs with a weight of up to 135 kg.

WARNING! The ADU may be subject to swaying motions in windy conditions. Always use tag lines to stabilise the ADU during hoisting. It is the crane operator's responsibility to determine whether the environmental conditions are suitable for a safe lift.

Figure 3-14: Use of strong sling with a belt and tag lines for safe hoisting

3.3.3 To install the ADU

3.3.3.1 Prerequisites

- Make sure that there is sufficient space underneath the ADU to open the service hatch. Through this hatch you access the ADU modules for service and maintenance.

Figure 3-15: Free space for access to the service hatch

- It is important to maintain **vertical orientation of the ADU center line**.
- Maximum allowed cable loss ≤ 20 dB at 1950 MHz. This is to ensure optimum performance of the system.

3.3.3.2 Installation procedure

To install the ADU, do as follows:

1. Install the mast with the mast flange and have the 4 M12 bolts ready.
2. Undo all shipping buckles, take off the wooden top and remove the casing.
3. Remove the wooden platform.
4. Attach a webbed, four-part sling with a belt to all 4 lifting brackets.

Figure 3-16: ADU installation, webbed sling attached to the 4 lifting brackets

5. Attach two tag lines of suitable length to 2 lifting brackets and man them.
6. With a crane lift the ADU off the wooden platform and move it on top of the mast.
   Maintain **vertical orientation of the ADU center line**.
7. Install the ADU on the mast flange with 4 M12 bolts and washers.
   Tightening torque value: 30 Nm.
   Always use **all 4 bolts** when installing the ADU.
8. Read carefully and follow instructions given in the next section on grounding.

Figure 3-17: Mounting the ADU on the mast flange

9. Attach the N connector of the ADU cable to the ADU and fasten it with 2.5 Nm

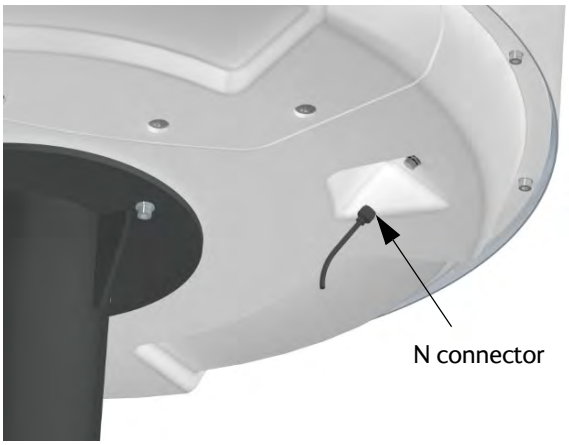


Figure 3-18: Connecting the ADU cable

10. Ensure that the connector assembly is properly protected against seawater and corrosion. As a minimum, wrap it with self-amalgamating tape.
11. Where the cables are exposed to mechanical wear – on deck, through bulkheads, etc. – protect the cables with steel pipes. Otherwise, follow standard procedures for cabling in ship installations.

3.3.4 To open the service hatch

Through the service hatch you can access the antenna modules. You can remove the hatch for better mobility when servicing the antenna.

Figure 3-19: To open the service hatch

To open the service hatch in order to access the antenna modules do as follows :

1. With a Torx TX 30 screw driver loosen carefully the 8 screws that keep the hatch in place.
2. Lower the service hatch and let it hang in the 2 strips.

Pull the service hatch free. The service hatch weighs approx. 2.5 kg. Now you can access the pedestal through the hatch.

3.3.5 To ground the ADU

The ADU must be grounded using one of the mounting bolts.

To ground the ADU do as follows:

1. Clean the metal underneath the head of **at least** one bolt of insulating protective coating and use a serrated washer to obtain a good ground connection
2. Tighten the bolt. Use stainless steel bolts and washers.
   Tightening torque value: 30 Nm.
3. Seal the area suitably to avoid corrosion of the grounding point (recommended).

For optimum grounding connect the ground wire to the bolt marked in the figure below.

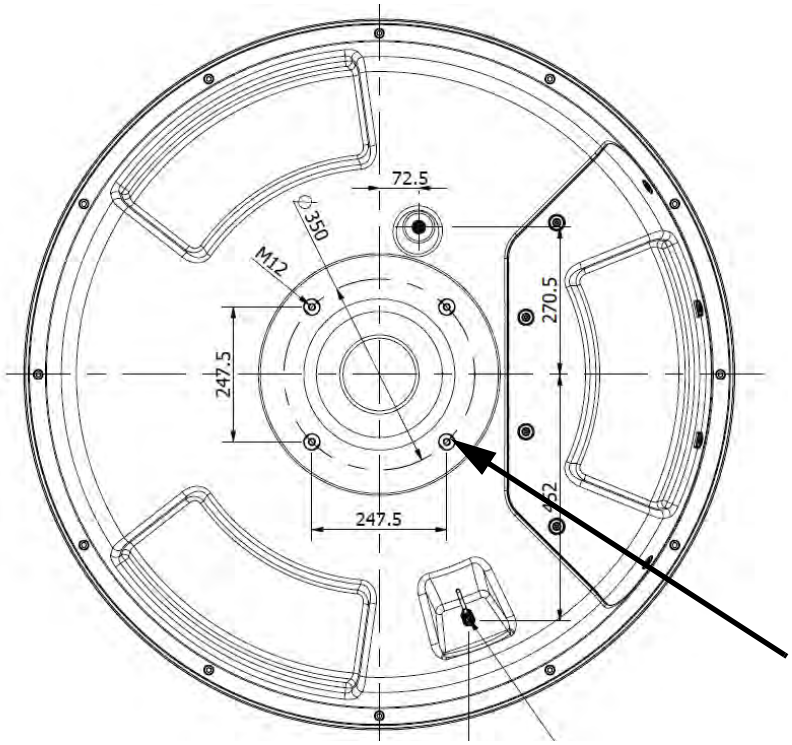


Figure 3-20: ADU, thread for optimum grounding

If the ADU cannot or should not be electrically connected directly to the mounting surface, you can use a separate grounding cable to make the connection between the ADU and the common ground to which the ACU is also connected. If grounding to the ship ground is impossible, for example if you have a fibre glass hull, see *Alternative ground for fibre glass hulls* on page C-8. For further information on grounding and RF protection see the appendix *Ground and RF protection* on page C-1.

3.3.6 Alternative ADU cable

The maximum allowed RF loss in the antenna cable is 20 dB RF loss @ 1950 MHz and maximum 35 dB RF loss @ 4450 MHz.

You can verify the cable attenuation margin with the cable calibration, see *Cable calibration* on page 6-12 for more details.

The DC-resistance loop of the antenna cable must be maximum 0.9 Ohm. This is to ensure the power requirements from ACU to the antenna and to ensure the performance of the system. Preferably choose one of the cable types listed in the table below.

Cable type	Thickness	Absolute max. length (m)	Absolute max. length (ft)
RG214	3/8”	50 m	160 ft
LMR-400-DB	0.405”	85 m	280 ft

Table 3-7: ADU cable types and maximum lengths

Cable type	Thickness	Absolute max. length (m)	Absolute max. length (ft)
LMR-600-50	1/2”	150 m	490 ft
LDF4.5-50 Andrew	5/8”	270 m	810 ft

Table 3-7: ADU cable types and maximum lengths (Continued)

If you want to use an alternative ADU cable make sure that the following requirements are fulfilled:

1. Check the data sheet from the cable supplier to verify the values:
   The RF-attenuation and the DC-resistance are below the maximum values specified below:
   - ADU cable RF-attenuation at 1950 MHz: Max. 20 dB including connector.
   - ADU cable RF-attenuation at 4450 MHz: Max. 35 dB including connector.
   - ADU cable modem-attenuation at 10 MHz: Max. 2 dB
   - ADU cable modem-attenuation at 36 and 54 MHz: Max. 4 dB
   - ADU cable loop DC-resistance max: 0.9 Ohm.
2. Respect the specified minimum bending radius, see the documentation from the cable supplier. If this is not the case, the loss in the cable will increase.

3.4 Installation of the ACU

The following sections describe the installation and grounding of the ACU.

3.4.1 To install the ACU

To install the ACU, do as follows:

1. Slide the ACU into a 1U space in a 19” rack.
2. Mount the screws in each side through the holes in the front and fasten the screws to the rack. Make sure that the unit is mounted securely according to the requirements for your 19” rack.

   Important | Make sure that the ventilation grills at the sides of the unit are not blocked.

3. Connect all cables. See *Interfaces of the ACU* on page 4-1 for a description of the ACU connectors.

For information about power source and power cable requirements see *Power and start up* on page 5-1.

3.4.2 To ground the ACU

To ground the ACU do as follows:

1. Make sure that the grounding requirements are met. See the appendix *Ground and RF protection* on page C-1 for details about grounding.
2. At the ACU end, connect the shield of the ADU cable to ship ground.
3. Make sure that the rack is connected to ship ground.
4. To ensure that the ACU is grounded – also if the ADU cable is disconnected from the ACU, connect an extra ground wire from the rack to the ground stud on the ACU. This ground wire must be a heavy wire or braid cable with a larger diameter than the coax cable.

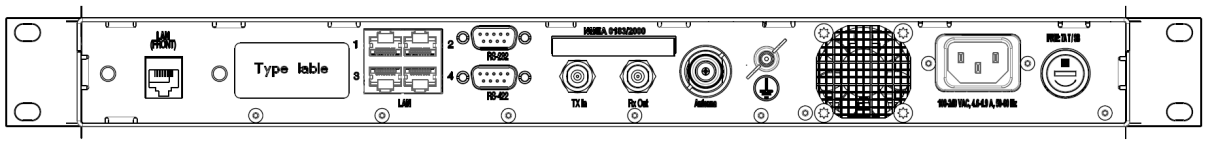


Figure 3-21: Ground stud, ACU

3.5 Installation of the modem

The following sections describe the installation and how to ground the modem.

3.5.1 To install the modem

To install the modem, do as follows:

1. Slide the modem into a 1U space in a 19” rack, preferably directly below or above the ACU.
2. Mount the screws in each side through the holes in the front and fasten the screws to the rack. Make sure that the unit is mounted securely according to the requirements for your 19” rack.

Important Make sure that the ventilation grills at the sides of the unit are not blocked.

3.5.2 To ground the modem

1. Make sure that the grounding requirements are met. See the appendix *Ground and RF protection* on page C-1 for details about grounding.

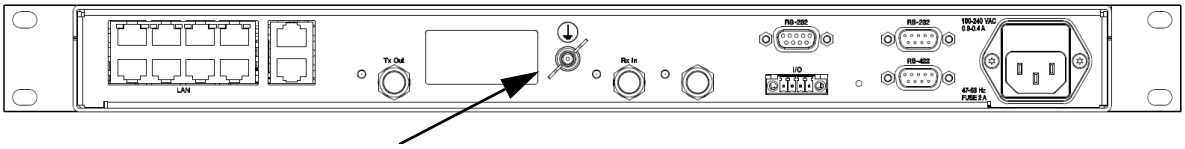


Figure 3-22: Ground stud, GMU

3.5.3 Provisioning key and terminal type

You need the Terminal Provisioning Key (TPK) and the Terminal Type to activate the modem during commissioning with Inmarsat or other GX service providers. The TPK is printed on the box label and the type label of the modem. The TPK is unique for each Core Module (GMU). The terminal type describes the terminal and the manufacturer.

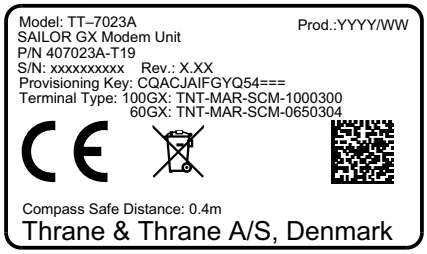


Figure 3-23: Provisioning key and terminal type (example)

3.6 To connect the ADU, ACU and modem

The following sections show how to connect the ADU, ACU and the modem.

1. **ACU** Connect the antenna cable to **Antenna** at the ACU and the antenna.

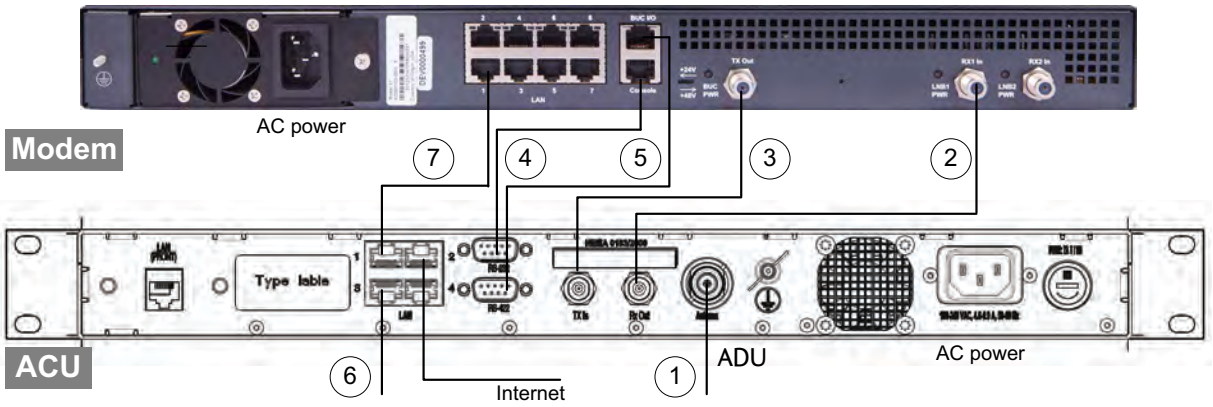


Figure 3-24: Connection between ADU, ACU and modem

2. Connect **Rx Out** at the ACU to **Rx In** at the modem with the supplied cable (75 Ohm coax, F-F, 1 m).
3. Connect **Tx In** at the ACU to **Tx Out** at the modem with the supplied cable (75 Ohm coax, F-F, 1 m).
4. Connect **RS-232** on the ACU to **RS-232** (right) at the modem.
5. Connect **RS-422** on the ACU to **RS-422** at the modem.
6. Connect a PC at the **LAN3** interface (Service port) of the ACU for access to the web interface for configuration.
7. Connect **LAN1** at the ACU to the upper left RJ45 connector at the modem.

Interfaces

This chapter has the following sections:

- *Interfaces of the ACU*
- *Interfaces of the modem*

4.1 Interfaces of the ACU

4.1.1 LEDs, display, keypad and connectors

The following figure shows the LEDs, display and the keypad of the ACU. For an explanation of the texts in the display see *ACU display and keypad* on page 6-38.

Figure 4-1: ACU: LEDs, display and keypad (detailed, example)

The following figure shows the connector panel of the ACU.

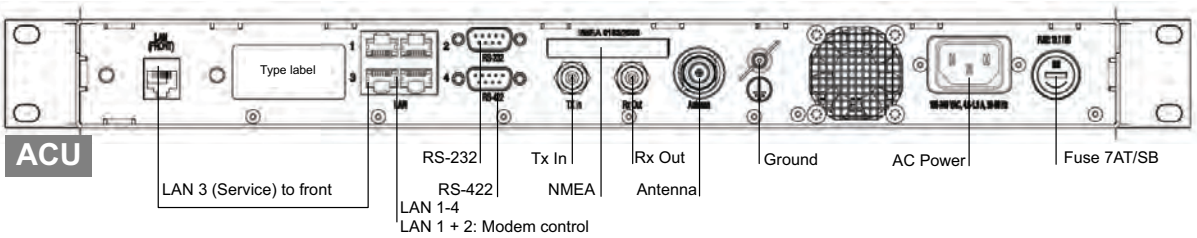


Figure 4-2: ACU (connector panel) with AC power

The connector LAN on the front panel is typically connected to the service port at LAN3 with a straight Ethernet cable. Then you can access the service port from the front of the ACU.

Important Connect the Ethernet cable between LAN 3 and LAN to provide connection to the service port (LAN connector) at the front of the ACU.

4.1.2 AC input connector

Connect the power cable to the AC power connector.

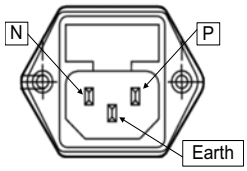
Outline (on the ACU)	Voltage range
	100–240 VAC

Table 4-1: AC power connector

4.1.3 ADU connector

The coax cable from the ACU to the ADU is used to power the ADU, supply a reference clock, handle all communication between ACU and ADU, and deliver the Rx and Tx signals.

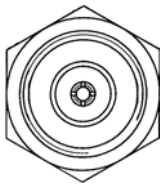
Outline (on the ACU)	Conductor	Pin function
	Inner	DC to ADU reference clock to ADU ACU to ADU internal communication GX Rx/Tx
	Outer	GND (Shield)

Table 4-2: N connector, outline and pin assignment

Important Do not use TNC connectors on the ACU, ADU antenna cable or on pigtails. TNC connectors cannot carry the DC current for operating the ADU.

4.1.4 Rx In and Tx Out connectors

Use these connectors to connect the ACU to the modem.

Outline (on the ACU)	Pin number	Pin function
	1	Inner conductor: reference clock, Rx/Tx
	2	Outer conductor: GND (Shield)

Table 4-3: F connector, Rx and Tx, outline and pin assignment

4.1.5 NMEA 0183[1] connector

Outline (on the ACU)	Pin	Pin function	Wire color
 1 11	1	Not connected	–
	2	NET-H (NMEA 2000)	White
	3	NET-L (NMEA 2000)	Blue
	4	NET-S (NMEA 2000)	Red
	5	NET-C (NMEA 2000)	Black
	6	Not connected	–
	7	RS-232 RX (NMEA 0183)	–
	8	RS-232 GND RS-422 shield, connect only one end.	
	9	RS-422 Line B (+) NMEA 0183	
	10	RS-422 Line A (-) NMEA 0183	
	11	Not connected	–

Table 4-4: NMEA 0183/2000 connector, outline and pin assignment

1. Connect the pins according to the table above.

4.1.5.1 NMEA 0183

The NMEA 0183 connection supports EN 61162-1 (baud rate 4800, format 8N1) and EN 61162-2 (baud rate 38400, format 8N1). The ACU detects the baud rate automatically, you cannot configure this interface.

Supported NMEA sentences, in order of priority:

- HEHDT (North seeking Gyro compass)
- GPHDT (GPS compass)
- HNHDT (Non-North seeking gyro compass)
- IIHDT (Integrated Instrument)
- HCHDT (Magnetic compass)

Note Any HDT sentence is supported as long as it complies with the following header format: "$xxHDT", where xx can be two characters e.g. IN for $INHDT

Recommended NMEA 0183 cable: Two-wire constructed with one enclosed shield

Network signal pair:

- Size: No. 24 AWG (0.24 sq. mm) or heavier
- Characteristic impedance: 95 - 140 Ohm
- Propagation delay: 5 nanoseconds per meter, maximum
- 15 Twists (minimum) per meter

1. (Hardware prepared for NMEA 2000, for future use). NMEA 2000 power: 9-16 VDC. NMEA 2000 LEN (Load Equivalency Number): 2 (100mA)

4.1.6 RS-232 and RS-422 connectors

The ACU has an RS-232 and RS-422 connector. They are used for GX modem control).

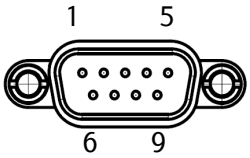
Outline (on the ACU)	Pin	Pin function
	1	Not connected
	2	RXD
	3	TXD
	4	DTR
	5	Ground
	6	DSR
	7	RTS
	8	CTS
	9	Receive Signal Strength Indicator

Table 4-5: RS-232 connector, male, outline and pin assignment, ACU

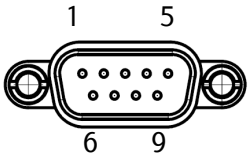
Outline (on the ACU)	Pin	Pin function
	1	Ground
	2	Line A RXD (+)
	3	Line B TXD (+)
	4	Ground
	5	Ground
	6	Not connected
	7	Line A RXD (-)
	8	Line B TXD (-)
	9	Not connected

Table 4-6: RS-422 connector, male, outline and pin assignment, ACU

4.1.7 LAN1 – 4 connectors

The ACU has four Ethernet connectors (type RJ45) for connecting to the modem, PC/lap tops, routers, wireless access points. The Ethernet interface is defined by IEEE802-3 for operation in 10Base-T and 100Base-TX modes with the exception of the connector type. Cabling for Ethernet connectivity must meet ANSI/TIA/EIA-568-A. The maximum cable length per connection is 100 m. The Ethernet cable type must be CAT5, shielded.

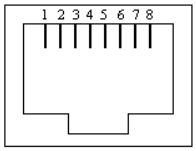
Outline	Pin	Pin function	Wire color
	1	Tx+	White/orange
	2	Tx-	Orange
	3	Rx+	White/green
	4	Not connected	Blue
	5	Not connected	White/blue
	6	Rx-	Green
	7	Not connected	White/brown
	8	Not connected	Brown

Table 4-7: Ethernet connector, outline and pin assignment

1. Connect an Ethernet cable to Port 1 at the ACU and to the upper leftmost LAN connector at the modem.
2. Use Port 2 for user WAN (Internet etc.).
3. Connect an Ethernet cable to Port 3 and to the LAN connector on the left side of the rear panel if you want to use the front LAN connector of the ACU for system control.
4. Use Port 4 (network 3) to connect the SAILOR 100 GX to the vessel's LAN.

For more details about the LAN networks see *To configure the LAN network* on page 6-24.

4.2 Interfaces of the modem

The following sections describe the connectors of the modem and how to connect to the ACU, power and other equipment.

4.2.1 Connector panel

The following figure shows the connector panel of the modem.

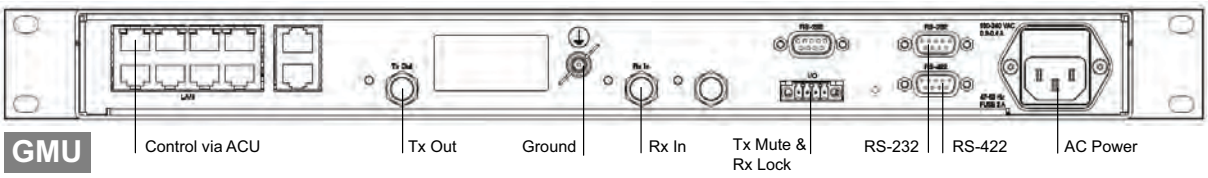


Figure 4-3: Connector panel of the modem

4.2.2 Rx In and Tx Out connectors

The modem has an Rx In and a Tx Out connector. Use these connectors to connect the ACU to the modem.

Outline (on the ACU)	Pin number	Pin function
	1	Inner conductor: 50 MHz clock, Rx/Tx
	2	Outer conductor: GND (Shield)

Table 4-8: F connector, Rx and Tx, outline and pin assignment

4.2.3 RS-232 and RS-422 connectors

The modem has two RS-232 and one RS-422 connector for control information to and from the ACU. See section *To connect the ADU, ACU and modem* on page 3-25 for details how to connect the ACU to the modem.

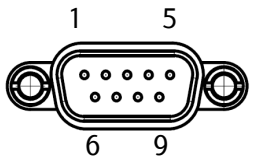
Outline (on the modem)	Pin	Pin function
	1	Not connected
	2	BUC TXD
	3	BUC RXD
	4	Not connected
	5	GND
	6	Power good
	7	GMU reset
	8	Temperature out of range
	9	Core module RSSI

Table 4-9: RS-232 connector, male, outline and pin assignment, modem

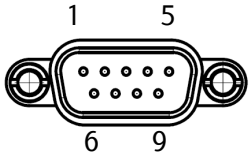
Outline (on the modem)	Pin	Pin function
	1	GND
	2	Key-line P
	3	Reset P
	4	GND
	5	GND
	6	Not connected
	7	Key-line N
	8	Reset N
	9	Not connected

Table 4-10: RS-422 connector, male, outline and pin assignment, modem

4.2.4 LAN connectors (8 + 2)

The modem has 8 Ethernet connectors (type RJ45). Port 1 connects to the ACU and is used for modem control. The other ports are not used. The maximum cable length per connection is 100 m. The Ethernet cable type must be CAT5, shielded. For outline and pin allocation see figure 4-7 on page 4-5.

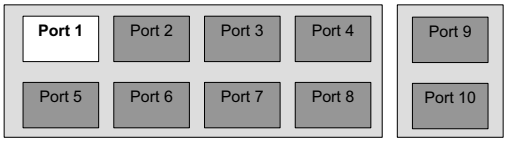


Figure 4-4: LAN connectors at the modem, Port 1 (modem control) connects to the ACU

4.2.5 I/O connector for Tx Mute and Rx Lock (future use)

The GMU has one I/O connector for Tx Mute and Rx Lock.

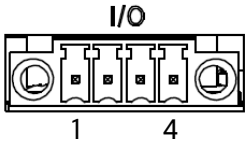
Outline (on the GMU)	Pin	Pin function
	1	GND
	2	Not connected
	3	Rx Lock out
	4	Tx Mute in

Table 4-11: I/O connector, outline and pin assignment, modem (future use)

Power and start up

This chapter has the following section:

- *Power-up procedure*

5.1 Power-up procedure

1. Connect power to the ACU.
2. Switch on the ACU. The unit starts up and goes through an initialization procedure:
   - ACU POST
   - ADU Initializing
   - ADU POST
   - READY

   This may take some time (up to a couple of minutes).
3. The SAILOR 100 GX is ready to be calibrated (for first time power up) or receive data from the modem (when in normal operation).
   The LEDs **Power** and **Fail/Pass** are **steady green**, the LED **Logon** is off. For further information on status indicators see *Status signalling with LEDs and status messages* on page 8-16.
   Make sure there are no hardware failures or error codes shown in the display of the ACU. For more information on error codes and events see *System messages* on page D-1.
4. Make an azimuth and a cable loss calibration, see *Heading input and position system* on page 6-4.
   Switch on the modem.
5. For more detailed step-by-step instructions, see the chapter *Configuration* on page 6-1.

5.1.1 Initialisation steps in daily use

Once the system is configured and a satellite profile is active, the startup sequence is as follows:

- ACU POST
- Antenna initializing
- Antenna SW upload (If the software versions in the ADU and ACU are not the same, a software update is done during startup.)
- Antenna POST
- READY
- POINTING ANTENNA
- ACQUIRING SIGNAL
- TRACKING

5.1.2 SAILOR 100 GX operational

When the display shows **TRACKING**. **MDM**: **NETOK** and the LED **Logon** is steady green the system is operational.

Figure 5-1: ACU: LEDs, display and keypad (detailed, example)

Configuration

This chapter has the following sections:

- *Introduction to the built-in web interface*
- *Heading input and position system*
- *Calibration*
- *Configuration with the web interface*
- *Keypad and menus of the ACU*
- *SNMP support*

6.1 Introduction to the built-in web interface

6.1.1 Overview

With the built-in web interface of the SAILOR 100 GX ACU you make a full configuration of the SAILOR 100 GX. You can use a standard Internet browser. Installation of software is not necessary.

For quick start instructions see *Heading input and position system* on page 6-4.

Important The SAILOR 100 GX system is not designed to be connected directly to the Internet. It must be located behind a dedicated network security device such as a fire wall.

6.1.2 Connecting to the web interface

To connect to the web interface of the ACU do as follows:

1. Switch on the ACU.
2. Wait until the LEDs on the front plate of the ACU show that the system is ready to be configured.
   - Power LED: Green
   - Logon LED: Off
   - Fail/Pass LED: Flashing green during power-on self test, after that steady green.
3. Connect a PC to LAN port 3: Service (standard Ethernet) of the ACU or to the front LAN connector of the ACU.

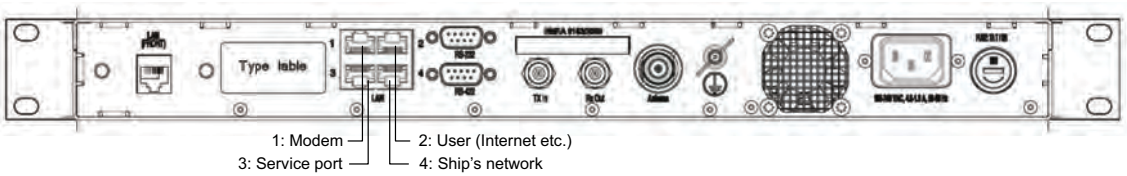


Figure 6-1: LAN 3 connector used for configuration of the SAILOR 100 GX

If you want to use another LAN port to access the web interface you must configure it as described in *To configure the LAN network* on page 6-24.

4. Open your Internet browser and enter the default IP address of the ACU http://192.168.0.1.
   When the login screen is displayed you have verified that the connection to the SAILOR 100 GX can be established. The web interface is ready for use.

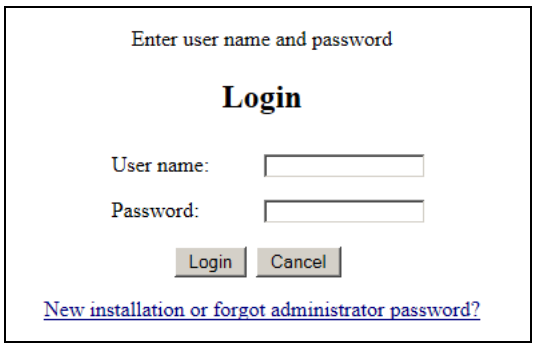


Figure 6-2: Logon screen

First time login as administrator

For a new installation you must set the ACU into local administration and set the admin password. This is also the case after a factory default. Do as follows:

1. On the ACU keypad, push and hold the left arrow key for 5 seconds.
2. Wait for the very short display of **Local administration**, followed by the event text: **0807F-0 WARNING Local administration enabled**.
   This will give you temporary administrator access **for 1 hour or until next restart**.
3. Open your browser and access the web interface.
4. Enter user name: **admin** (no password is required).
   The **DASHBOARD** is displayed.

   Note Accessing the ACU with the local administration function does not change the current administrator password.

5. To create or change the password select **ADMINISTRATION > User login** and locate the section **Change Login**.

6. Type in the new password (minimum 8 characters) and click **Change**. No old password is required.

After 1 hour or a restart the new administrator password is required.

With the guest login (user name: guest, password: configured by the administrator) you can protect the system from accidental changes of the configuration. A guest can only access the functions that are allowed by an administrator. For more information see *To set up user permissions for guest login* on page 6-35.

If you cannot establish a connection there might be problems with the Proxy server settings of your PC. See *Proxy server settings in your browser* on page 8-5 for further information.

The web interface shows the **DASHBOARD** page.

For a detailed introduction to the web interface see *Overview and dashboard* on page 6-17.

Figure 6-3: Dashboard (example)

6.2 Heading input and position system

Important Make sure that the modem is switched off at this point. Switch on the modem after the cable calibration.

Before the SAILOR 100 GX can be used you must select the heading input and the positioning system.

Important You must be logged on as an administrator. See *Administration* on page 6-33.

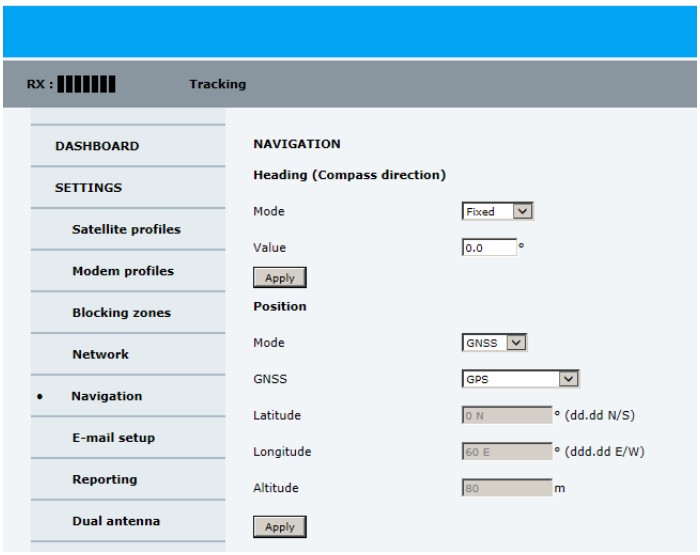


Figure 6-4: Web interface: SETTINGS, Navigation (example)

To set the heading input and the position system, do as follows:

1. Go to the page **SETTINGS > Navigation**.
2. Select the desired heading input, see the following table.

Heading input	Description
External	Heading input from the vessel's gyro compass (default). If there is no heading input due to failure, alarms are raised and the antenna continues in gyro-free mode. When heading input is available again and a new acquisition is made, alarms are cleared. See also **Operation in gyro-free mode on page 6-16**.
Fixed	Use this setting for making an azimuth and cable calibration if there is no input from the vessel's gyro compass and for permanent installations like remote areas or oil rigs, or during training and test. **Important: Fixed heading is not allowed for sailing vessels!** Enter the vessel heading in degrees.

Table 6-1: Heading input options

Heading input	Description
None	**Important: You must make an azimuth and cable calibration with Fixed before you can use this setting. This is required in order to be able to use blocking zones. After a successful azimuth and cable calibration you must change the heading input setting from Fixed to None.** Select this setting after a successful azimuth calibration with Fixed heading if the system does not have input from the vessel's gyro compass. See also **Operation in gyro-free mode on page 6-16**.

Table 6-1: Heading input options (Continued)

3. Click **Apply**.

Note If you change the heading settings from external to fixed or vice versa you must make a new azimuth calibration.

4. In the section **Position**, **Mode** select **GNSS System**, **Manual** or **External**. The **Manual** mode is used for fixed installations (fixed heading). **External** mode is used when another GPS source is required.
5. For **GNSS System**, select from **GPS**, **Beidou**, **GPS and Beidou**, **GPS and GLONASS**. The SAILOR 100 GX uses GPS by default
6. For **Manual** enter the latitude, longitude and altitude.
7. Click **Apply**.

Note If you move outside coverage of the selected system, you will eventually lose connection to the satellite network. The **Position** field in the **Dashboard** of the web interface will show **Acquiring**.

About external GPS input

External GPS input is connected to the ACU on the heading input using RS-232 or RS-422. The supported baud rates are 4800, 1N8 or 38400, 1N8. The baud rate is auto-detected by the ACU after boot up. If the baud rate has been changed during operation, the ACU must be rebooted to detect a new baud rate.

External GPS input supports NMEA 0183 Version 4.10 GPRMC string with checksum. The GPRMC string must have 12 data fields all with values in. Empty fields are not supported.

Example: $GPRMC,122801.000,A,5547.6343,N,01231.3279,E,0.00,59.75,261020,0,D,A*24

The GPS format in the GPRMC string is Degrees and Decimal Minutes (DDD° MM') e.g.: 5547.6343 N, 01231.3279 E.

The GPS format on the DASHBOARD is shown as Decimal Degrees (DDD.DDDDD°) e.g.: 55.79 N, 12.52 E.

If the checksum or format of the GPRMC string is wrong the ACU will generate following warning message:

```
B060-0 Terminal WARNING NMEA 0183 parse error (00000000)
```

If the external GPS input is lost or GPS invalid the ACU will fall back to built-in GNSS but generate following warning message:

```
8084-0 Terminal WARNING External GPS data (00000041)
```

About the acquisition process and search pattern

With heading input or fixed heading

1. The antenna starts the acquisition and searches for 10 seconds at the expected position. If RX lock is detected the antenna goes to Tracking.
2. If no RX lock is detected, a box search pattern is started and the positions where RF power can be received are stored.

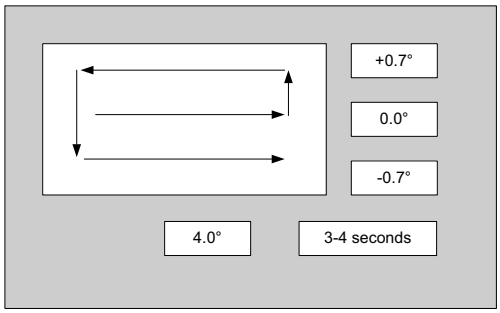


Figure 6-5: Acquisition, search pattern

3. The antenna checks each stored position for up to 10 seconds. If RX lock is detected for more than 20% of the time, the antenna goes to Tracking.

Without heading input and not fixed heading (Gyro-free)

1. A box search pattern is started and the positions with reception of RF power are checked for up to 10 seconds. If RX lock is detected for more than 20% of the time, the antenna goes to Tracking.

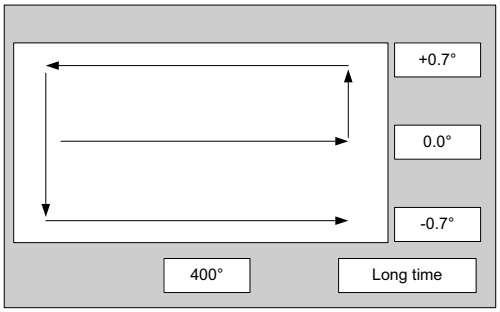


Figure 6-6: Acquisition, search pattern in gyro-free mode

Acquisition time

Activity	
Initial search	10 s
Scan box pattern	5 s
Validate result (10 s per result)	10 - 30 s
Max. total time	25 - 45 s

Table 6-2: Acquisition time

6.3 Calibration

Important Make sure that the modem is switched off at this point. Switch on the modem after the cable calibration.

Before the SAILOR 100 GX can be used you must make an azimuth and cable calibration. The azimuth calibration is required in order to determine the offset of the ADU zero direction to the bow-to-stern line of the ship. This procedure is fully automatic. The satellite data for calibration can be entered directly on the calibration page or you can define a Service profile to be used for the azimuth calibration. A cable calibration is required in order to record the cable characteristics of the antenna cable which is used in the SAILOR 100 GX fixed gain feature. See *Fixed TX IF principle* on page 6-16 for more information. After the calibration you can set up blocking zones for the specific installation.

Important You must log on as an administrator to do a calibration. See *Administration* on page 6-33.

The following sections describe the steps for a successful calibration:

1. *Azimuth calibration*
2. *Service profile for calibration*
3. *Cable calibration*
4. *Manual OTC (BUC calibration) and GX modem access*

6.3.1 Azimuth calibration

Azimuth calibration is done toward a satellite of a known position. After finding the satellite, the system can calculate the azimuth offset of the ADU installation. The satellite and transponder properties for the calibration can be selected from a list of service profiles or supplied manually.

You can make an azimuth calibration in the following ways:

- *Azimuth calibration (user controlled)*
- *Automatic azimuth calibration with an active satellite profile*
- *Azimuth calibration with a service profile*

Azimuth calibration (user controlled)

1. On the page **SERVICE > Calibration**, in the section **Azimuth calibration (user controlled)**, select **User defined** in the **Satellite** drop down list.

Note If you do not want to enter the satellite data on the calibration page you can select a dedicated satellite service profile for calibration and select it. For information how to set up a service profile see 6.3.2 .

Check that the satellite transponder is visible from the location of the installation and that it is at an elevation angle between 5 and 85 degrees.

2. Type in the longitude of the satellite.

Satellite	Position	Frequency	Satellite identifier
GX1 –IOR	62.6 E	19.707 GHz	GSC
GX2 –AOR	55 W	19.707 GHz	GSC
GX3 –POR	179.6 E	19.707 GHz	GSC
GX4 –IOR	56.6 E	19.707 GHz	GSC
GX5 –EME	11.0 E	19.701 GHz	GSC

Table 6-3: Inmarsat GSC satellite information

Important The calibration function is not able to verify the correctness or precision of the supplied longitude. It is therefore important to supply the correct longitude including the first decimal.

3. Type in its tracking frequency, 19.707 GHz.
4. Select **Satellite identifier**: GSC, NID, Orbital position (DVB-S, DVB-S2)[1].
5. Click **Start** and wait typically 5 minutes for the azimuth calibration to finish. A progress bar is shown during calibration and a message is displayed when the calibration has completed. In case of failure, see the table in the following section for a description of error codes during calibration.

Important It is strongly recommended to verify the result of a calibration performed with user defined data. This can be done by making a new calibration on a different satellite and verify that the resulting Azimuth calibration value differs less than one degree.

The following table shows the error codes that might be displayed during a calibration.

Error code	Explanation
1	The elevation of the selected satellite is too low. Select another satellite.
2	The elevation of the selected satellite is too high. Select another satellite.
4	The calibration values could not be saved. Possibly due to defective hardware.
5	The antenna could not point with sufficient precision. Check that the antenna is mounted in a stable way. Other possible causes might be electrical or mechanical faults.

Table 6-4: Possible error codes during calibration

1. Use Orbital position and NID if you want to use NID or orbital position or other KA band satellites with DVB-S2 support. The DVB symbol rate must be >5 Ms/s. For NID use preferably a unique NID (ONID). An azimuth calibration without NID can be useful in regions where the satellite operators do not broadcast NID (US, China, Australia etc.). For NID=0 the NID is not used when checking the satellite link. For NID 1 to 65535 the supplied NID is matched against the Network ID broadcast by the satellite. For orbital position the supplied longitude is matched with the orbital position broadcast by the satellite. Not all service providers broadcast the orbital position.

Error code	Explanation
6	No signal received. Check that there is free line of sight. Try again or try with another satellite.
7	RF setup error, e.g. missing or invalid TX frequency.
8	Invalid satellite, e.g. satellite not visible.
9	Unknown error

Table 6-4: Possible error codes during calibration (Continued)

Automatic azimuth calibration with an active satellite profile

You can enable automatic azimuth calibration, even if there is no line of sight to an azimuth calibration satellite or GX service satellite from the place of installation. To be able to use this feature you must have made a valid satellite profile and activate it. When the vessel leaves the harbour and gets line of sight to the GX calibration satellite, the system automatically finds and tracks the satellite and makes the azimuth calibration. After a successful azimuth calibration the ACU will automatically disable the **Azimuth calibration (active satellite profile)** on the page **SERVICE > Calibration**.

1. Create a modem profile, see *Modem profiles* on page 8-14.
2. Create a satellite profile, see *Satellite profiles* on page 8-13.
3. Click **SETTINGS** and **Activate** the satellite profile.
4. Click **SERVICE > Calibration**.

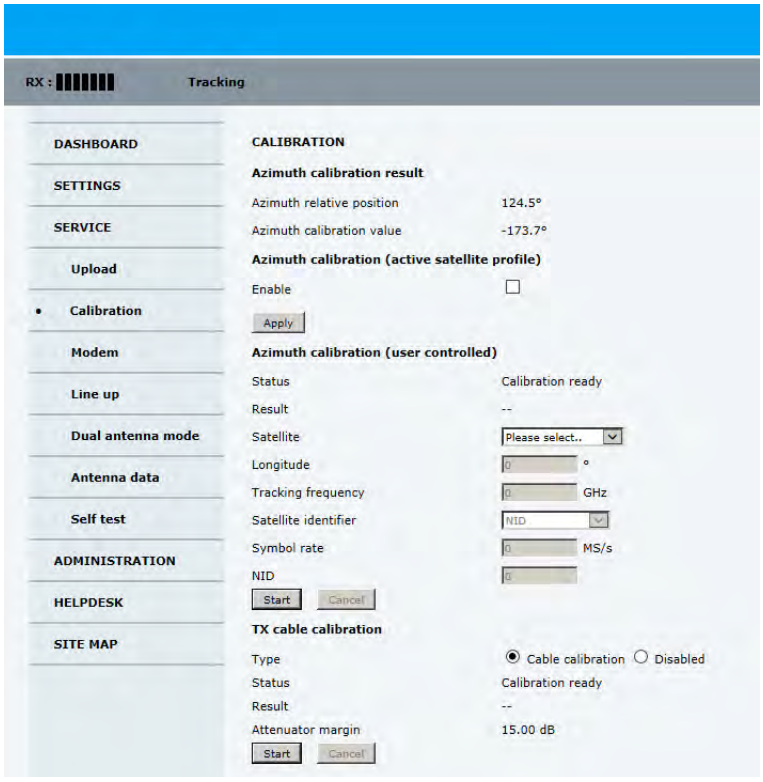


Figure 6-7: Web interface: SERVICE, Calibration (example)

5. Select **Enable** in the section **Azimuth calibration** (active satellite profile). To be able to use this feature there must be a valid satellite profile and you must activate it in **SETTINGS** > **Satellite profiles**.
6. Click **Apply**.
7. Switch on the modem.

Azimuth calibration with a service profile

1. Click **SERVICE > Calibration**.
2. Select the service profile in the drop down list **Satellite**. All profiles with the modem **Service modem** are displayed in the list. If there is no profile in the list, you must set up one, see *Service profile for calibration* on page 6-11.
3. Click **Start** in the section **Azimuth calibration** and wait typically 5 minutes for the calibration to finish. After finished calibration a message with the result of the calibration is displayed in the field **Result**.

6.3.2 Service profile for calibration

Use the service profile for calibration if you do not want to use the automatic azimuth calibration or if you want to enter the satellite parameters directly on the calibration page. To prepare for calibration you can set up a service profile for calibration. To set up a service profile do as follows:

1. Connect a PC to LAN connector 3 (Service port, standard Ethernet) of the ACU or to the front LAN connector of the ACU.
2. Open an Internet browser and enter the IP address of the ACU (Default: http://192.168.0.1).
3. Type in the user name **admin** and the administrator password to access the **Dashboard**.
4. Select **SETTINGS > Satellite profiles** > **New entry**. Enter the name of the satellite profile for calibration (a name of your own choice, e.g. IOR Inmarsat GX).
5. Select the modem profile **Service & Calibration** from the drop-down list.

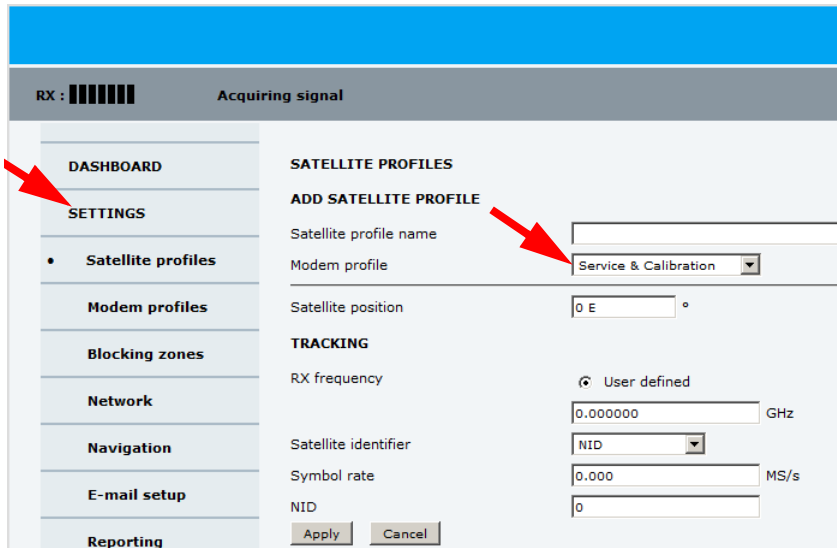


Figure 6-8: Service profile for calibration

6. Enter the data for the satellite that you want to use as a calibration reference. Note the following calibration requirements:
   Elevation angle: 5 – 70 degrees.
   Not allowed for calibration: Inclined orbit.
   Satellite identifier: GSC, NID, Orbital position (DVB-S, DVB-S2)[1]. See also Table 6-3 on page 6-9.

7. Click **Apply** to save the settings for this satellite profile for calibration. The system is ready for the azimuth calibration.

8. Click **Start** to start the azimuth calibration.

6.3.3 Cable calibration

Important

Make sure that the modem is not switched on at this point. The modem can be switched on after the cable calibration.
Make sure that **Heading**, **Mode** on the page **SETTINGS > Navigation** is set to **Fixed** or **External**.
Make sure to disable all no-tx zones if defined at this point. Otherwise the cable calibration may fail.

1. On the page **SERVICE > Calibration** click **Start** in the section **Tx cable calibration**.

1. Use Orbital position and NID if you want to use NID or orbital position or other KA band satellites with DVB-S2 support. The DVB symbol rate must be >5 Ms/s. For NID use preferably a unique NID (ONID). An azimuth calibration without NID can be useful in regions where the satellite operators do not broadcast NID (US, China, Australia etc.). For NID=0 the NID is not used when checking the satellite link. For NID 1 to 65535 the supplied NID is matched against the Network ID broadcast by the satellite. For orbital position the supplied longitude is matched with the orbital position broadcast by the satellite. Not all service providers broadcast the orbital position.

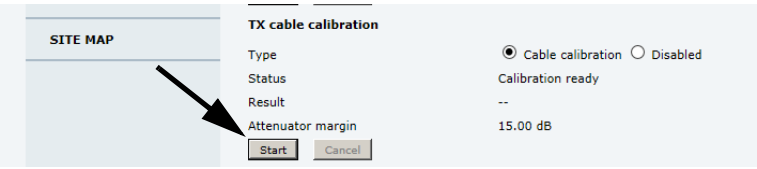


Figure 6-9: Web interface: SERVICE, Calibration, cable attenuator margin

2. Wait for the calibration to finish. After finished calibration a message with the result of the calibration is displayed in the field **Result**.This screen shows how much attenuation margin is left for the antenna cable. This indicates whether the antenna cable and connectors are in good condition and well crimped.
   It is recommended to make a cable calibration when servicing the system to check if the antenna cable is still in good order.

   Note Each time a cable calibration is made, the ACU displays the warning **BUC calibration outdated**. To clear the warning make a manual One Touch Commissioning on the GX modem.

3. After the azimuth and cable calibration switch on the modem. The modem will automatically make a BUC calibration if switched on for the first time and is then ready.
4. When commissioning is completed, test all subscribed services, see *Installation check list: Functional test in harbor* on page 7-4.
5. Enable the no-tx zones after cable calibration, if you have disabled them.

Important If there is no input from the vessel's gyro compass: Change the heading input setting from **Fixed** to **None** at **Heading** – **Input**.
Fixed heading is not allowed for sailing vessels!

6.3.4 Manual OTC (BUC calibration) and GX modem access

This section describes manual OTC and modem access configuration.

Manual One Touch Commissioning (OTC)

When the modem starts up for the first time it will automatically register with the BUC and perform P1dB compression on multiple frequencies and thereafter register with the network. During the P1dB compression the antenna will point away from the satellite and transmit on 950 MHz to 1950 MHz in 50 MHz steps. The ACU will show **BUC calibration** on the **DASHBOARD** and the ACU display. This may take up to 10 minutes.

If a new cable calibration is made, the ACU displays the warning **BUC calibration outdated**. Then you must make a manual OTC.

To make a manual OTC for the modem, do as follows:

WARNING! For your safety: Active RF transmission may occur during an OTC procedure. Software updates may also occur, yet the system is in receive-only mode during such auto-updates.

Important You must use the Internet browser **Firefox**.

1. Connect a PC to LAN1.
2. Enter the web interface (via Firefox browser) and go to **SERVICE > Modem**.

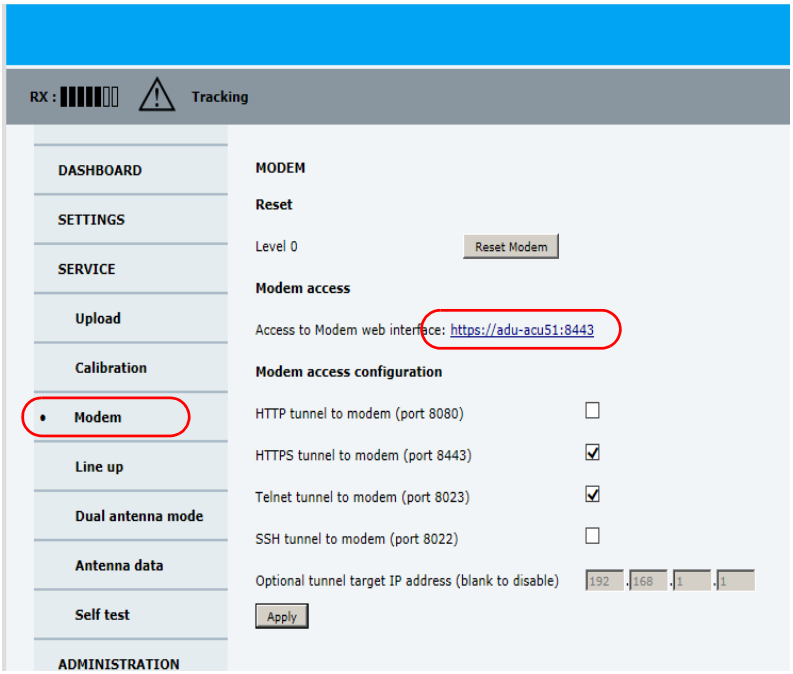


Figure 6-10: Web interface: SERVICE > Modem, for GX modem

3. At **Modem access** click the link.
4. Type the user name **admin** (default) and the password **iDirect** (default).

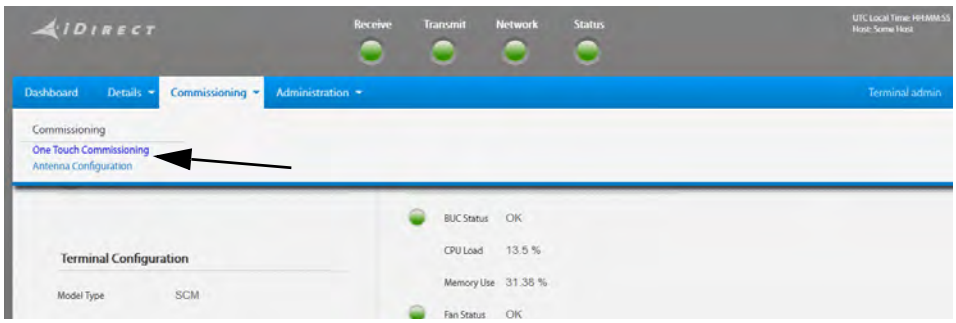


Figure 6-11: Unified web interface of the Core Module

5. In the menu **Commissioning** click **One Touch Commissioning**.

6. Click **Start**. One Touch Commissioning takes place. When commissioning is completed the antenna will search for the I5 satellite with the highest elevation.
7. The antenna will find the satellite and the modem will perform the necessary steps to enter the network (software upgrades, if available).
8. The web interface of the iDirect core module will indicate the modem in the network and the modem status is shown in the display in the menu **MODEM** of the SAILOR 100 GX web interface.
9. When commissioning is completed, test all subscribed services.
10. Exit the iDirect web interface.

Modem access configuration

If the modem is connected via Ethernet and supports the available access types, you can access the modem's web interface via the ACU using port forwarding. For a connected GMU the section **Modem access configuration** is pre filled.

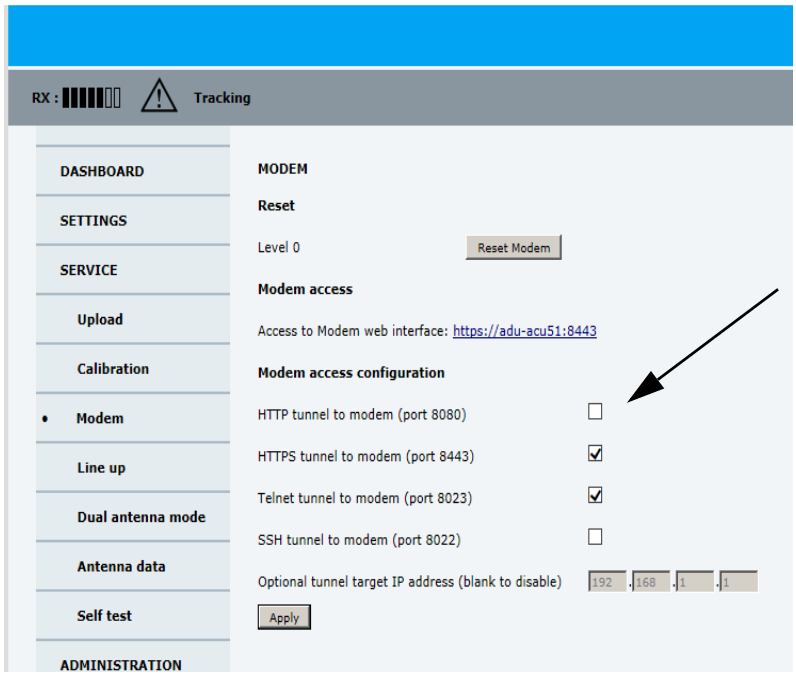


Figure 6-12: Web interface: SERVICE > Modem access configuration

To access the modem via the ACU, do as follows:

1. In the ACU web interface, select **SERVICE**.
2. Select **Modem**.
3. Select one of the following methods to access the modem.
   - HTTP tunnel to modem (port 8080)
   - HTTPS tunnel to modem (port 8443), this is the HTTPS tunnel to the GMU iDirect web interface.
   - Telnet tunnel to modem (port 8023)
   - SSH tunnel to modem (port 8022)
   - Optional tunnel target IP address (grayed out, cannot be changed)

4. Click **Apply**.

CAUTION! If you remove the check marks, there is no access to the GMU and you cannot make an OTC.

Example: To access the web interface of the modem using HTTPS, select **HTTPS tunnel to modem (port 8443)** and click **Apply**.
In the address bar of your browser, enter:
https://<ACU IP address or hostname>:8443
You should now see the web interface of your modem in your browser.

6.3.5 Operation in gyro-free mode

If input from a gyro compass is not available (Heading input: none), information from the GPS position is used when searching for a satellite. If the antenna does not have ship heading input from the vessel's gyro compass, the azimuth direction of the satellite is not known. In this case the antenna will start a 360 degrees sky scan and scan until it finds a satellite. The search time to find the satellite and start tracking is therefore increased considerably. If the ship is on a steady course and sails at a speed over ground above 5 kn, the system can use an estimated heading from the current GPS position. This will reduce the search time, but it will still be a longer search time than with heading input present.

If the system loses the signal from the satellite, for example due to blockage, and the duration of signal loss is longer than approximately 1 minute, the system without heading input must do a new sky scan to find the satellite when the antenna is out of blockage.

6.3.6 Fixed TX IF principle

The SAILOR 100 GX uses a TX IF gain concept. After calibration it provides a fixed average gain from the TX-port of the ACU to the input of the BUC. Advantages of the fixed TX IF gain principle are:

- Average TX IF gain independent of antenna cable length[1]
- Compatibility with the TX Power control feature

When installing the SAILOR 100 GX you make a cable calibration. At that point every installation adjusts to the same average TX IF gain regardless of the ADU cable length. Additionally the SAILOR 100 GX system also compensates for variations of the cable characteristics or loss over frequency.

1. You find the maximum allowed cable loss at *Prerequisites* on page 3-17.

6.4 Configuration with the web interface

6.4.1 Overview and dashboard

Topics in the web interface

The site map gives an overview over the existing menus, submenus and topics. You can click on each menu in the site map to go directly to the page or display the respective submenu.

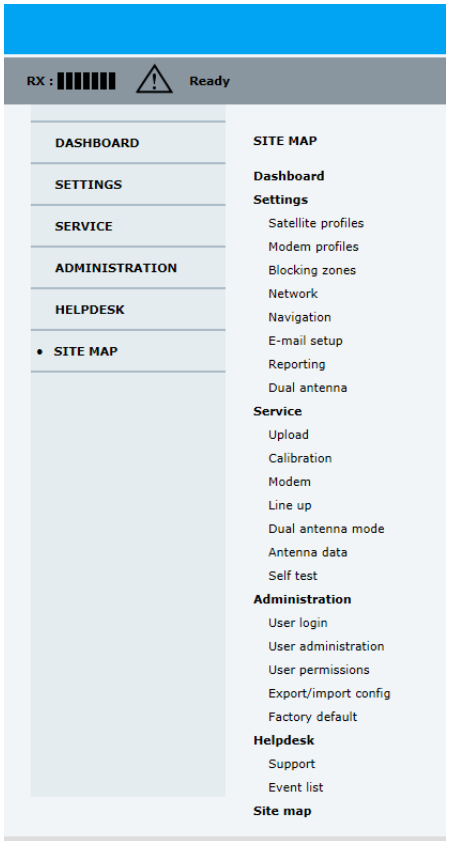


Figure 6-13: Topics in the web interface (SITE MAP)

The **Dashboard** is the first screen that is displayed when the user or administrator enters the IP address of the web interface of the ACU and the user name and password. The Dashboard is used for viewing properties and status of the ACU and ADU.

The web interface has the following sections:

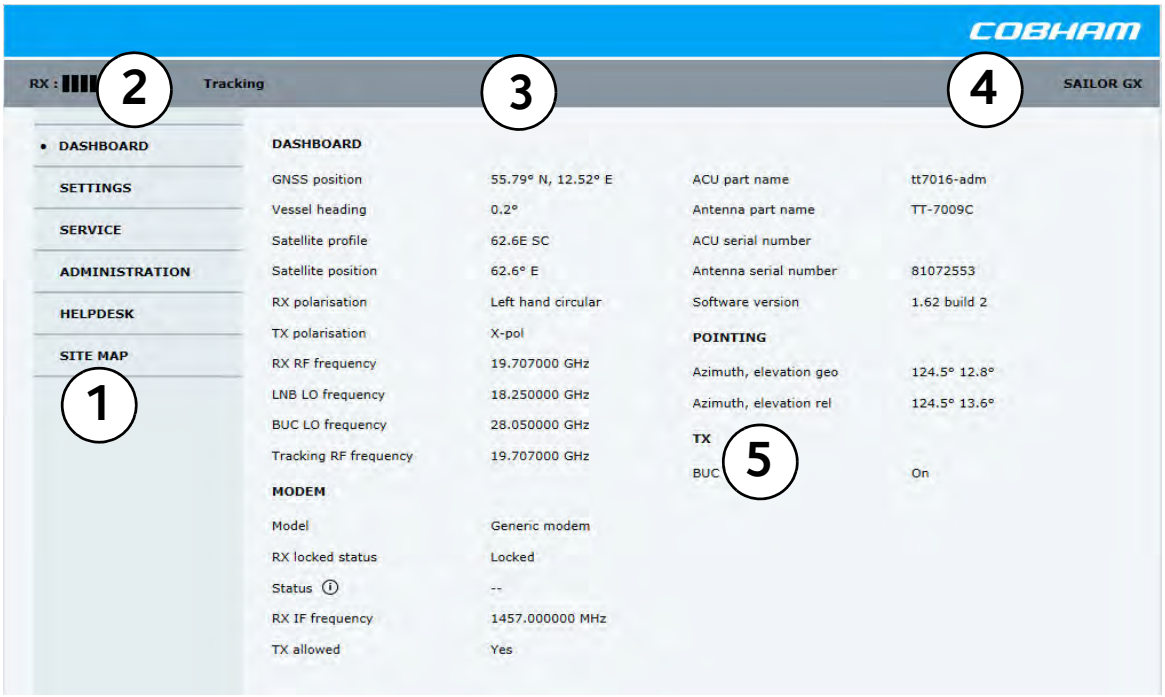


Figure 6-14: Web interface: DASHBOARD of SAILOR GX (example)

1. The navigation pane holds the main menu. Clicking an item in the menu opens a sub-menu in the navigation pane or a new page in the contents section.
2. The top bar shows the signal strength, current status and icons for events, if any, and the host name.
   The signal status field shows the tracking signal strength of the antenna. The signal strength can vary during operation, depending on the current position relative to the satellite.
3. The icon bar shows icons for active events, when relevant. The host name is shown on every page of the web interface.
4. The host name is useful for identifying the system at remote login and when requesting reports from the system. The host name is recommended to contain the name of the vessel. To change the host name see *To configure the LAN network* on page 6-24.
5. The contents section shows the page selected in the navigation pane. This section is used for viewing or changing settings, or for performing actions.
   For a description of the individual items in the contents section see *Sections on the Dashboard* on page 6-20.

The following icon may appear in the icon bar in the web interface:

Icon	Explanation
⚠	An event is active. Click the icon to see a list of active events. For explanations of the event messages, see *Event messages – overview* on page D-1. Note that this icon will remain in the icon bar as long as the event is active.

Table 6-5: Web interface: Event icon

To navigate the web interface

- **To expand a menu**, click the menu in the navigation pane.
- **To access status and settings**, click the relevant subject in the navigation pane or click the relevant icon in the icon bar. The status or settings are displayed in the contents section.
- **To get an overview over the submenus available**, click **SITE MAP** in the navigation pane. Click on items in the site map to go directly to the relevant location.

Note You can give access to some configuration settings for users that are not administrators. For information see *To set up user permissions for guest login* on page 6-35.

To access the web interface

To access the antenna web interface do as follows:

1. Connect a PC to LAN interface 3 (Service port, standard Ethernet) of the ACU or to the front LAN connector of the ACU. If you want to use another LAN port to access the web interface you must configure it according to your network requirements. See *To configure the LAN network* on page 6-24 for more information.
2. Open your Internet browser and enter the IP address of the ACU (Default IP address: http://192.168.0.1).

Status field in the icon bar

The top bar shows the current status of the antenna.

- **Antenna initializing**
- **Antenna SW upload**
- **Antenna POST error**
- **XIM data error**
- **Unrecoverable XIM data error**
- **System upgrade**
- **Antenna POST pending**
- **Antenna POST**
- **Safe Mode** (error, followed by an error description)
- **Service switch** (service switch in ADU activated)
- **Ready** (waiting for data from the modem or no satellite profile selected)
- **Pointing antenna** (locating the satellite)
- **Acquiring signal** (acquiring the satellite signal)
- **Tracking** (tracks the current satellite)
- **Lineup** (line up is activated)

- **Azimuth calibration**
- **TX cable calibration**
- **BUC calibration**
- **Test**
- **Not ready** (waiting for input from GNSS, e.g. GPS)
- **Not ready**: **Initializing**
- **Not ready**: **Need pos**
- **Blocking zone** (antenna is pointing into a blocking zone)
- **No TX zone** (antenna is pointing in a no TX zone; TX is off)

Sections on the Dashboard

DASHBOARD	Description
GNSS position	Current position of the vessel, reported by the GPS module
Vessel heading	Ship's heading in degrees with reference to North, provided by the ship's gyro.
Satellite profile	Name of the currently active satellite profile.
Satellite position	Position of the satellite selected in Satellite profile.
RX polarisation	Circular polarisation: Left-hand.
TX polarisation	X-pol
RX RF frequency[a]	Ka band receiving frequency
LNB Lo frequency	18.25 GHz (system hardware)
BUC Lo frequency	28.05 GHz (system hardware)
ACU part name, Antenna part name, ACU serial number, Antenna serial number, Software version	Part names, serial numbers for ACU and ADU, software version of the SAILOR 100 GX.

Table 6-6: Web interface, DASHBOARD, first section

a. Can be changed when using a generic modem profile.

MODEM[a]	Description
Model	Modem name, entered in **SETTINGS** > **Modem profiles**.
RX locked status	Demodulator lock of the modem.
RX IF frequency	Read out from the modem.

Table 6-7: Web interface, DASHBOARD, MODEM section

MODEM[a]	Description
TX allowed	Yes or no. Indicates if the modem supplies the 50 MHz reference signal on its TX connector (On) and if an iDirect OpenAMIP modem indicates modem Locked and Tx ON in the OpenAMIP message L (L 1 1). Yes = Terminal is allowed to transmit No = Terminal is not allowed to transmit.

Table 6-7: Web interface, DASHBOARD, MODEM section (Continued)

a. Items shown in this list may vary, they depend on the current modem.

POINTING	Description
Azimuth, elevation geo	Current value for azimuth, elevation, relative to the vessel heading.
Azimuth, elevation rel.	Current value for azimuth, elevation, relative to the vessel.

Table 6-8: Web interface, DASHBOARD, POINTING section

TX	Description
BUC TX	On or Off. Shows if the SAILOR 100 GX has enabled the BUC or not. It is the same TX ON/TX OFF as shown in the display of the ACU, see *ACU display and keypad* on page 6-38.

Table 6-9: Web interface, DASHBOARD, TX section

A satellite profile is automatically loaded by the modem. You may view the satellite profile by clicking on **Satellite profiles**.

6.4.2 To set up blocking zones (RX and TX)

You can define blocking zones, i.e. **No TX** and RX zones by entering azimuth and elevation angles for each blocking zone. The system's blocking map is built up over some weeks and shows where the actual blocking zones are. This is useful if the antenna loses the signal frequently and you might want to check whether the blocking zones are set up correctly. To enable a blocking zone and display it on the blocking map you must select **Active**. For more information about the blocking map see *Optimization of the blocking zones* on page 6-24.

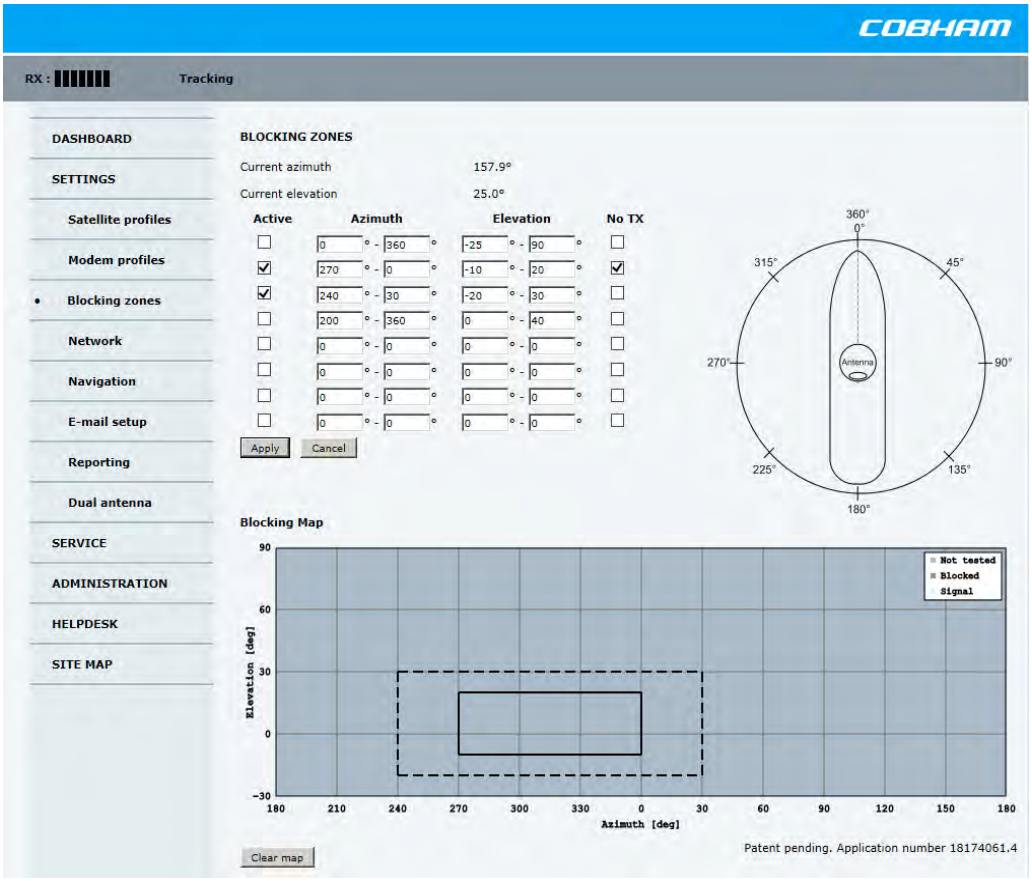


Figure 6-15: Web interface: SETTINGS, Blocking zones – azimuth, elevation and blocking map

To define and set a blocking zone, do as follows:

1. Select **SETTINGS > Blocking zones**.
2. Select **Active** to enable the blocking zone and display it in the blocking map. A dashed line shows a blocking zone, a solid line shows a **No TX** zone.

3. Enter start and stop azimuth values in degrees for the blocking zone. Values allowed: 0 to 360 degrees. Enter clockwise.

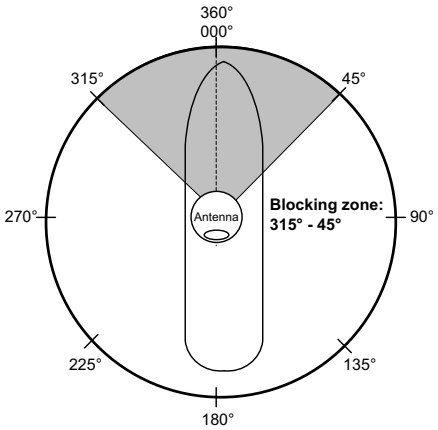


Figure 6-16: Blocking zone, example: 315 - 45 degrees

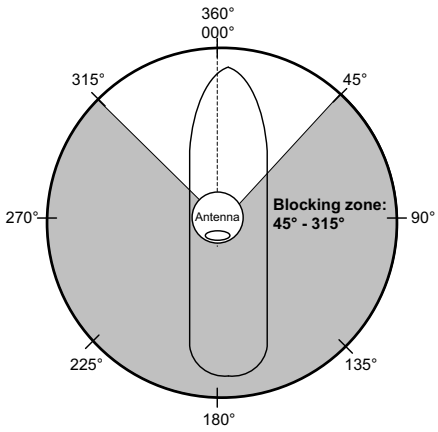


Figure 6-17: Blocking zone, example: 45 - 315 degrees

4. Enter the start and stop elevation angles for the blocking zone. If you enter nothing, there will be no blocking zone. Values allowed: -30 to 90 degrees.

Important You must enter 2 different elevation angles to have an active blocking zone.

5. Select **No TX** for zones if you do not want the system to transmit when the antenna points within this zone.
   If **No TX** is not selected, the system also transmits when pointing through areas with blocking objects. The modem will shut off for TX if no signal is received.

Note If a blocking zone is defined with TX allowed (**No TX** not checked), the modem is not informed about the blocking zone.
Modems may react differently when informed about a blocking zone, this has influence on recapturing the link. The worst case is that the modem will search the entire list of available satellites and frequencies when unaware of the blocking zone, resulting in prolonged down times until the link is recaptured.
For optimum performance it is recommended to check **No TX**.

6. Click **Apply** to save the blocking zones.

Optimization of the blocking zones

The blocking map is intended as a tool to optimise the blocking zones in order to reduce the antenna's downtime. It shows the active blocking zones and an automatic evaluation of the antenna reception. Over time the antenna can determine where the signal is blocked by structures on the ship. The blocking map helps you to set more accurate blocking zones.

To enable a blocking zone and display it on the blocking map you must select **Active**. The re-defined zones will show immediately on the map.

The antenna updates the blocking map every 12 hours, showing whether the antenna has been in a blocking zone (dark grey) or has received a signal (white). After a voyage of days, weeks, months the blocking map will display where the blocking zones are on the vessel (dark gray). The time it takes to draw a meaningful map depends on the ship's size and motions throughout the voyage. A small ship following a school of fish will have a populated map faster than a larger tanker sailing across the Atlantic ocean.

The following figure shows a populated map.

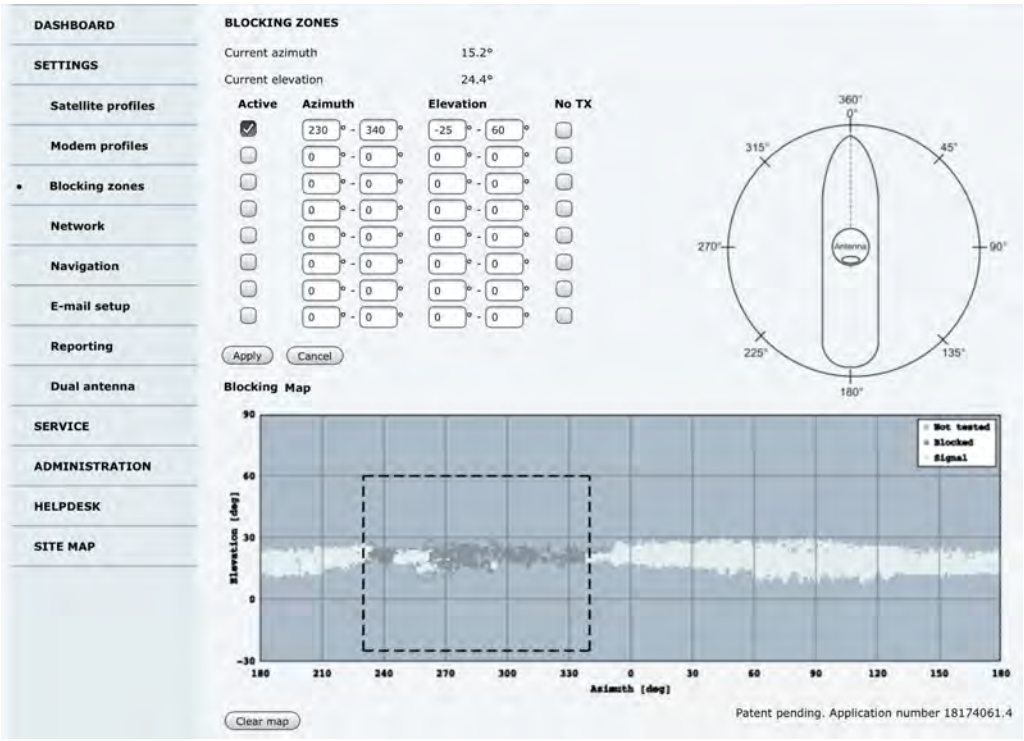


Figure 6-18: Blocking zone and blocking map (example)

6.4.3 To configure the LAN network

On this page you can enter a host name. The host name helps identifying the SAILOR 100 GX system when sending e-mail reports and remotely connecting through an external Internet connection. The ACU has four 10/100 Mbit/s Ethernet ports labeled LAN port 1, 2,

3 and 4. The ports are divided in three groups, each group operating in its own network. You can set up DNS and Gateway.

Important The SAILOR 100 GX system is not designed to be connected directly to the Internet. It must be located behind a dedicated network security device such as a fire wall.
If any ports of the SAILOR 100 GX are exposed to the Internet you must change the default passwords as anyone with access and malicious intent can render the SAILOR 100 GX inoperable.

To configure the LAN network go to **SETTINGS > Network**.

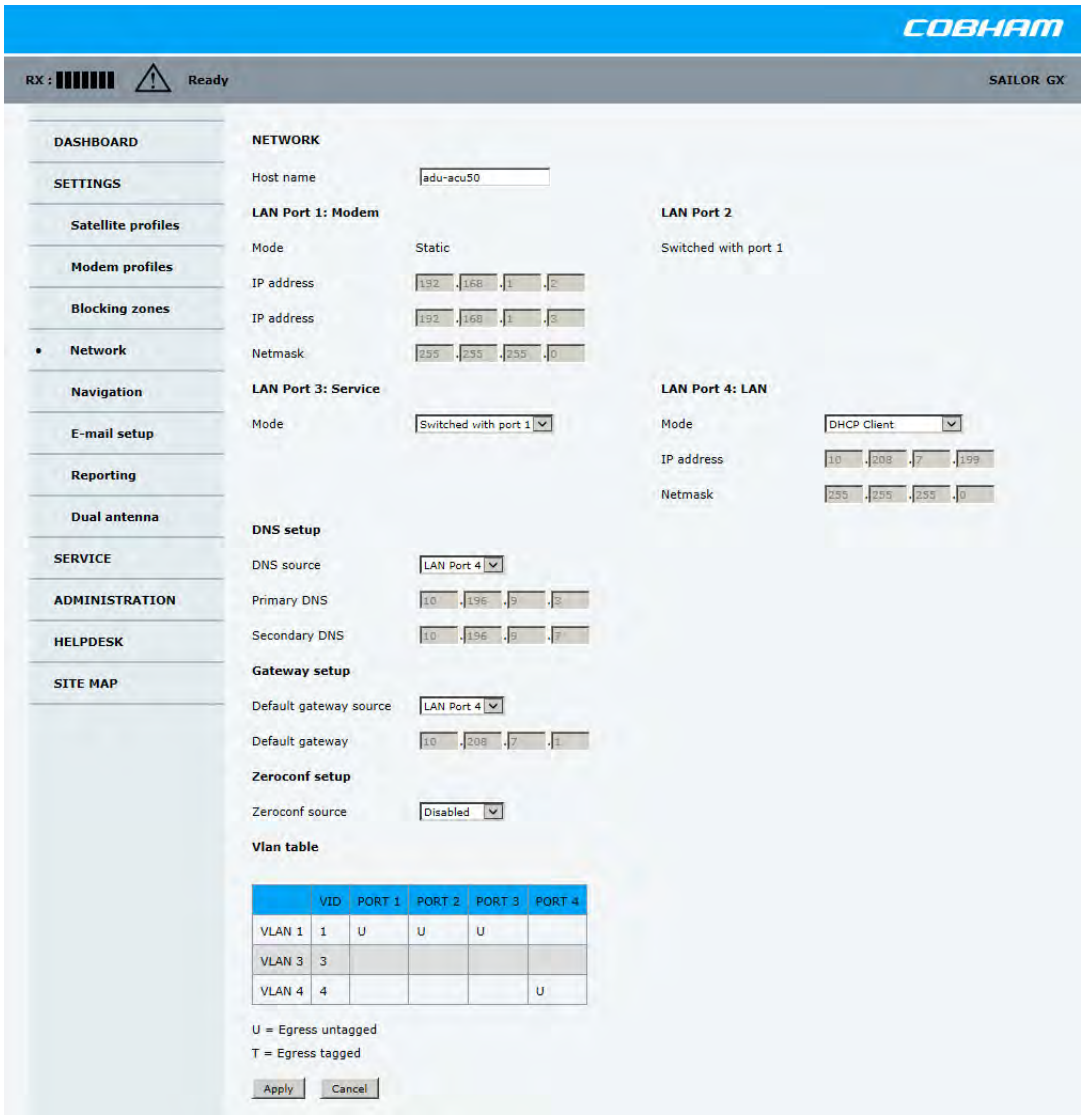


Figure 6-19: Web interface: SETTINGS, Network (default settings)

Important Make sure that the networks do not use IP address ranges that overlap.

Make the necessary changes on this page and click **Apply**.

Sections	Preferred use
NETWORK Host name	The host name is used for identifying the ACU in local networks and in reports. The default host name is acu. You can change the name. Letters (a-z), digits (0-9) and hyphen (-) are allowed. Note: The host name must start with a letter.
LAN Port 1	This network is connected to the modem. LAN port 1 mode is always Static (static IP address).
LAN Port 2	LAN port 2 is used for Internet access or Inmarsat Network Service Device (NSD) (for GX modem).
LAN Port 3	LAN port 3 is the service port. The default IP address is http://192.168.0.1; the current value can be displayed in the ACU display. It is recommended to connect LAN port 3 to the front port (via rear connector, for access to the service port from the rack front. LAN port 3 can be set to the mode **Static** or **Switched with port 1**, DHCP server can be selected (default) or DHCP client.
LAN Port 4	LAN port 4 can be used to connect to the vessel's LAN. LAN port 4 mode can be set to **Static**, **DHCP client** (default) or **DHCP server**.

Table 6-10: Setup of LAN connectors

Static IP or DHCP Client

If you select **DHCP client** the network IP address and sub-net mask must be provided by a DHCP server on that network. If you select **Static IP** address you must specify a unique IP address and a sub-net mask.

DHCP Server Settings

On LAN ports 3 and 4 you can select to run a DHCP server. Select the check box **DHCP Server**. The DHCP server settings are only displayed and can be selected when the port mode is set to **Static**, otherwise the DHCP server settings are not shown. The DHCP start and end addresses must be on the same network as the port's static IP.

DNS setup

If you have access to a Domain Name Server (DNS) you can specify the address of the e-mail server by using the server name instead of its IP address. This can be used in **Outgoing mail server** in *E-mail setup* on page 6-27. You may statically specify the address of one or two DNS. Select the DNS source as static and fill in IP address or addresses.

Alternatively, if the DHCP server can provide a DNS address and you have selected DHCP client above, then select the same LAN as your DNS source.

Gateway setup

If the ACU needs to communicate with network units outside the specified sub-nets, you must specify a default gateway (typically a router). The default gateway can be set as a

static IP address. Then set the default gateway source to static and enter the IP address of the default gateway. To remove the default gateway set it to 0.0.0.0. Alternatively, if the DHCP server is able to provide a default gateway address and you have selected DHCP client above, then select the same LAN as your default gateway source.

Zeroconf Settings

On LAN ports 1,3 and 4 you can choose to add a zeroconf address in the network (169.254.0.0). This zeroconf address will be in addition to the existing static or DHCP IP address. One port at a time can be enabled. Zeroconf allows devices to connect to a network automatically.

VLAN port membership table

The VLAN port membership table is configured by the modem as configured by the service provider. The table is useful when troubleshooting.

6.4.4 E-mail setup

If you want to send diagnostics and statistics reports through an external Internet connection using e-mail you must set up some parameters.

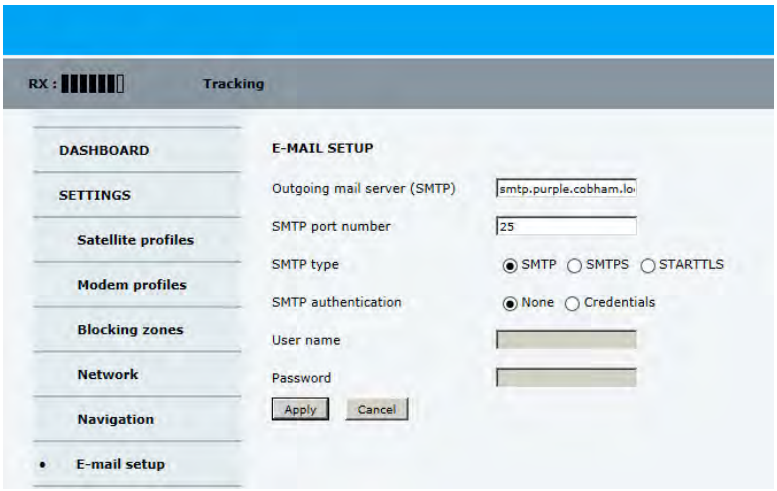


Figure 6-20: Web interface: SETTINGS, E-mail setup

To configure the e-mail setup, do as follows:

1. Go to **SETTINGS > E-mail setup**.
2. Enter the data for Outgoing mail server (SMTP), SMTP port number, SMTP authentication, User name and password. This data is typically provided by your IT department.

   Note You must set **Outgoing mail server** to an IP address if DNS has not been set up in **DNS setup** in *To configure the LAN network* on page 6-24.

3. Select the SMTP type, for secure e-mail select SMTPS or STARTTLS.
   - SMTP: SMTP over port 25
   - SMTPS: SMPT Secure usually uses port 465, SMTPS is 'deprecated' data between client and server, encrypted with SSL or TLS, this is decided beforehand.

- STARTTLS can upgrade the connection to SSL or TLS, it is not dependent on a port as SMTPS. SSL and TLS connections are encrypted, just as HTTPS, the data of the connection cannot be (easily) read.

4. Select SMTP authentication, if needed. Credentials means that a user name and password are needed to be allowed to use the given mail server (SMTP). This data is typically provided by your IT department.

6.4.5 Setup of reports, syslog and SNMP traps

The antenna can send the following reports and messages:

- *Diagnostics report*
- *Statistics report*
- *Remote syslog*
- *SNMP traps*

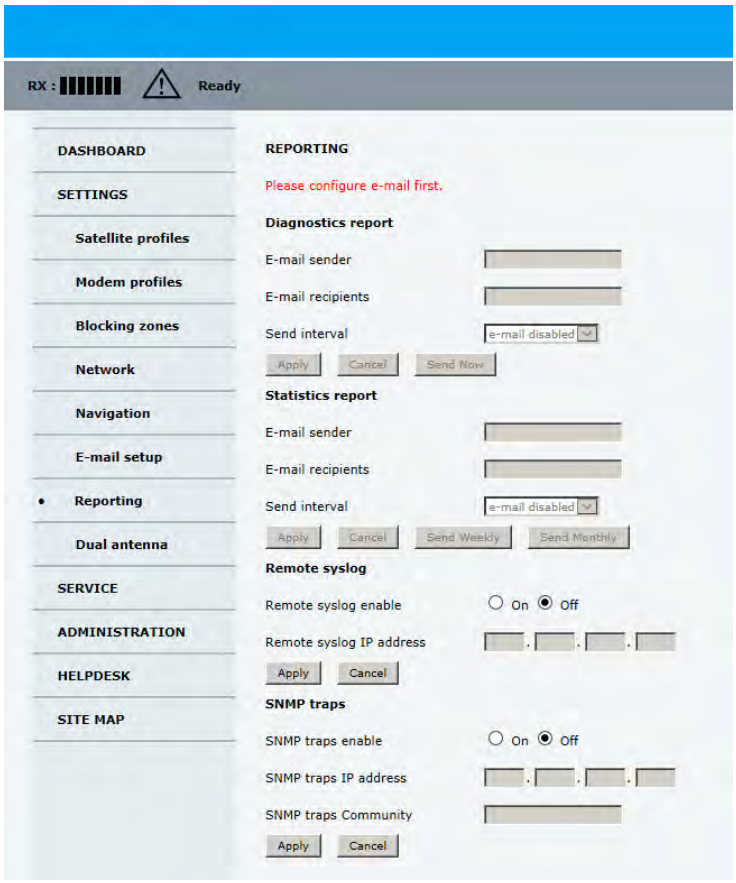


Figure 6-21: Web interface: SETTINGS, Reporting

Diagnostics report

The antenna can send automatically generated diagnostic reports at fixed intervals. The diagnostic report contains information from the ADU and ACU that are relevant for the

service personnel during troubleshooting. The report contains data for the selected download intervals.

To set up sending a statistics report, do as follows:

1. Select **SETTINGS > Reporting**.
2. In the section **DIAGNOSTICS REPORT** enter the following:
   - E-mail sender.
   - E-mail recipients (comma separated).
   - Send interval: Select **e-mail disabled**, **day** (default, 2-minute samples), **week** (hourly samples) or **month** (hourly samples).
3. Click **Apply**.

You can generate and send the diagnostic report at any time by clicking **Send now**. You can also download a diagnostics report directly to your computer, go to the page **HELPDESK** and click **Download**. See *To download diagnostics and statistics reports* on page 8-3.

Statistics report

SAILOR 100 GX can send a statistics report at fixed intervals through an external Internet connection. This report contains historical information from the SAILOR 100 GX up to 1 month. It contains statistics data for the selected intervals. The report is sent as a zipped attachment to an e-mail address. The file format is a comma-separated value file (csv). The report can then be processed in spreadsheet applications, e.g. Microsoft Excel.

To set up sending a statistics report, do as follows:

1. Configure e-mail first, see *E-mail setup* on page 6-27.
2. Go to **SETTINGS > Reporting**.
3. In the section **STATISTICS REPORT** enter the following:
   - E-mail sender.
   - E-mail recipients (comma separated).
   - Send interval: Select **e-mail disabled**, **day** (default, 2-minute samples), **week** (hourly samples) or **month** (hourly samples).
   - To send the report at weekly intervals click **Send Weekly**, or at monthly intervals click **Send Monthly**.
4. Click **Apply**.

The following parameters are recorded in the statistics report. Some of the parameters may not be relevant for the antenna described in this manual.

Parameter recorded	Description
Host name	Host name, entered in the web interface on the page SETTINGS > Network.
ACU SN	ACU serial number

Table 6-11: Statistics report, header record

Parameter recorded	Description
ADU SN	ADU serial number
SW ver.	Software version
System type	SAILOR 100 GX

Table 6-11: Statistics report, header record (Continued)

Parameter recorded	Description
UTC. (s) UTC (YYYY-MM-DD hh:mm)	UTC in seconds and date format for the data set.
RSSI.Av RSSI.Max RSSI.Min	Received signal strength (average, maximum and minimum value) for the sampling interval.
POS.Lat (degree) POS.Long (degree) POS.Valid	Latitude value of position. Longitude value of position. Fix = valid position, No Fix = invalid position.
NAV.Speed (m/s)	Speed over ground
Heading.Samp (degree) Heading.Max (degree) Heading.Min (degree) Heading.Range (+/-degree)	Ship's heading (sample, maximum and minimum value, range) for the sampling interval. See Figure 6-22: *Statistics — how to read data for a range*.
Antenna.Azi (degree) Antenna.Azi Max (degree) Antenna.Azi Min (degree) Antenna.Azi Range (+/-degree)	Current antenna azimuth (sample, maximum and minimum value, range) for the sampling interval. See Figure 6-22: *Statistics — how to read data for a range*.
Antenna.Ele (+/-degree) Antenna.Ele Max (+/-degree) Antenna.Ele Min (+/-degree)	Current antenna elevation (sample, maximum and minimum value) for the sampling interval.
Vsat.rx_lo_freq (GHz) Vsat.tx_lo_freq (GHz)	Rx LO frequency of modem for this record. Tx LO frequency of modem for this record.
Tracking.rf freq (GHz) Tracking.type	Tracking RF frequency for this record. Narrow filter, DVB-S2 decoder and modem RSSI and GSC.
Sat.long (degree)	Longitude position of the satellite.
Carrier rf.rx (GHz) Carrier rf.tx (GHz)	Rx frequency of carrier for this record. Tx frequency of carrier for this record.
Pol.rx Pol.tx	Current Rx and Tx polarisation modes
Rx Lock (%) Logon (%)	Rx locked and logon time, in percent, for the sampling interval.

Table 6-12: Parameters recorded in a statistics report

Parameter recorded	Description
Pos Ok (%)	Valid position, in percent of the sampling interval.
VMU Connection (%)	Link with modem, in percent of the sampling interval.
Blocking (%)	Ship in blocking zone, in percent of the sampling interval.
DualAntenna.mode DualAntenna.active DualAntenna.logon_remote	Shows the current mode, the time active and remote logon.

Table 6-12: Parameters recorded in a statistics report (Continued)

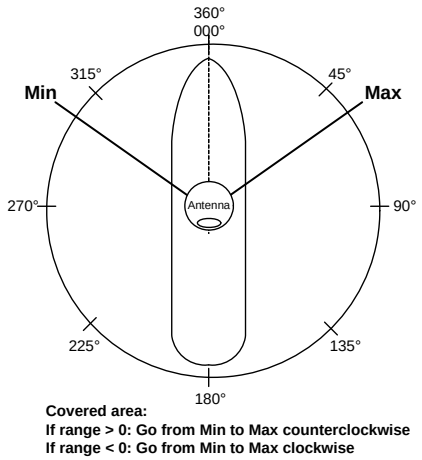


Figure 6-22: Statistics — how to read data for a range

To import the statistics report into spreadsheet applications, e.g. Microsoft Excel, do as follows:

1. Save the zipped file to your computer and extract the text file. The file name contains the identification of the system (example: adu-acu3_stat_20111021110901_day.csv).
2. Open the spreadsheet application, for example Microsoft Excel.
3. On the tab Data click the tab Import from text. import the unzipped text file and follow the instructions in the wizard.
4. When asked about the delimiter, select ‘comma’.

The following figure shows an example of a statistics report.

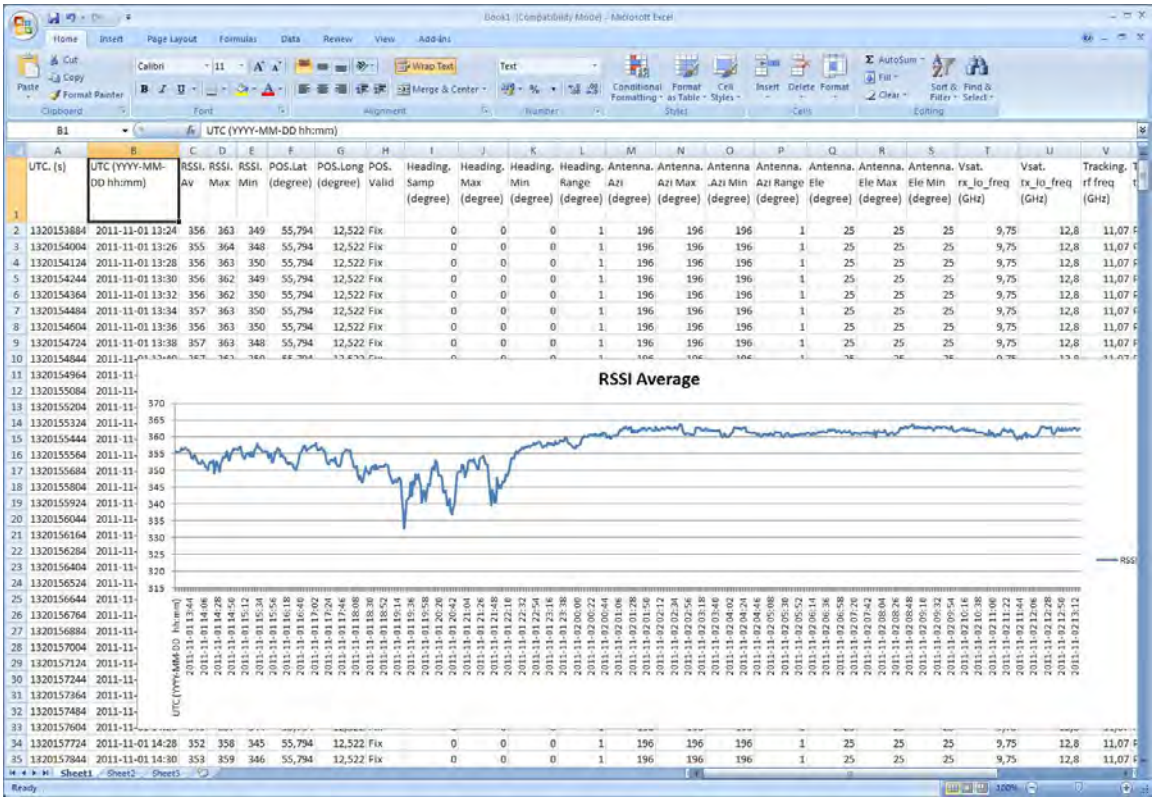


Figure 6-23: Statistics report (example, MS Excel 2007)

Remote syslog

You can set up the antenna to send each syslog message to a syslog server to advise the system administrator of the current status of the antenna. To set up sending syslog messages to a syslog server, do as follows:

1. Select **SETTINGS > Reporting**.
2. In the section **Remote syslog** select **On** to enable remote syslog (default: **Off**).
3. Enter the IP address of the syslog server to which the syslog messages will be sent.
4. Click **Apply**.

SNMP traps

SNMP traps, or notifications, are network packets which advise the system administrator about significant events in the antenna, e.g. alarms and system error messages. They are generated by the antenna and can be sent automatically to an SNMP trap receiver/manager). To set up reporting SNMP traps to an SNMP server, do as follows:

1. Select **SETTINGS > Reporting**.
2. In the section **SNMP traps** select **On** to enable sending of SNMP traps (default: **Off**).
3. Enter the IP address of the SNMP trap receiver/manager to which the SNMP traps will be sent.
4. Enter the Community name. This is the name of the SNMP trap receiver/manager. This is needed for authentication of the SNMP trap request.
5. Click **Apply**.

6.4.6 Administration

In this section of the web interface you can configure the following administrative settings:

- *To change the password and log out*
- *To set up user permissions for guest login*
- *To import and export a system configuration*
- *To reset to factory default settings*

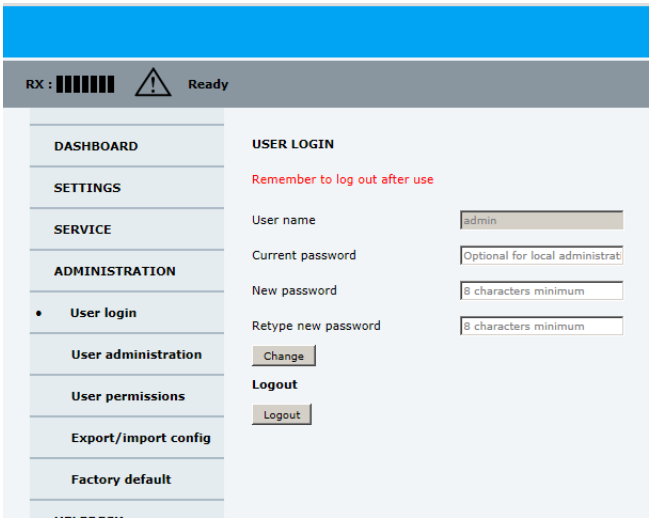


Figure 6-24: Web interface: Administration

To change the password and log out

On the page **ADMINISTRATION** and **User login** you can change the password for the currently logged in user (admin) or you can log out.

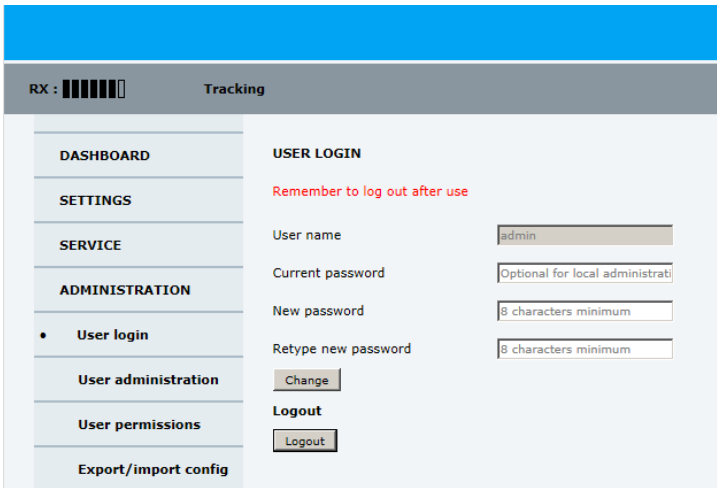


Figure 6-25: Web interface: ADMINISTRATION, change administrator logon and password

To change the current password, do as follows:

1. Enter the current password.
2. Enter the new password (minimum 8 characters) and retype it on the next line.
3. Click **Change**. At the next logon the new password is required.
4. Click **Logout** to log out of the web interface. If you have not entered anything for 30 minutes, you are logged off automatically.

If you have forgotten the administrator password, do as follows:[1]

1. On the ACU keypad, push and hold the left arrow key for 5 seconds.
2. Wait for the very short display of **Local administration**, followed by the event text: **0807F-0 WARNING Local administration enabled**.
   This will give you temporary administrator access **for 1 hour or until next restart**.
3. Open your browser and access the web interface.
4. Enter user name: **admin** (no password is required).
   The **DASHBOARD** is displayed.

   Note Accessing the ACU with the local administration function does not change the current administrator password.

5. To create or change the password select **ADMINISTRATION > User login** and locate the section **Change Login**.

1. If you have an earlier software version than 1.60, the default admin password is 1234. If you have forgotten the password, contact your service partner for a reset code.

6. Type in the new password (minimum 8 characters) and click **Change**. No old password is required.

After 1 hour or a restart the new administrator password is required.

On the page **ADMINISTRATION** and **User administration** the administrator can change the password for the guest user

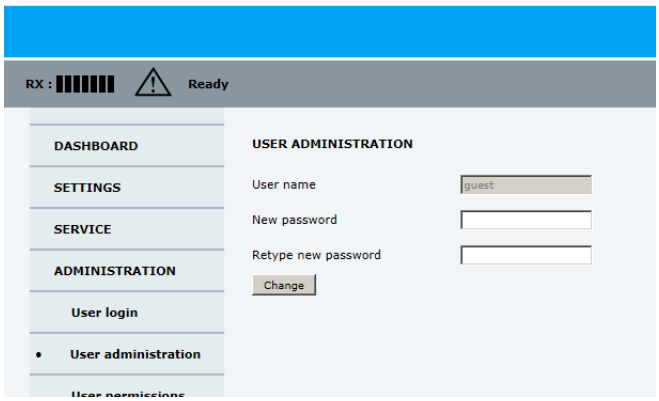


Figure 6-26: Web interface: ADMINISTRATION, change guest password

To change the current guest password, do as follows:

1. Enter the new password (minimum 8 characters) and retype it on the next line.
2. Click **Change**. At the next logon the new password is required.

To set up user permissions for guest login

You can manage user access to certain functions of the SAILOR 100 GX. You can allow or deny users that are not administrators (user name: guest, password: configured by the administrator) to access certain functions and make these pages read-only. This is useful to protect the system against unintended changes or tampering of the system. Most of the items in the list of user permissions are self-explaining.

Item	Description
Change network	Change IP configuration of the LAN connectors of the ACU. For further information see *To configure the LAN network* on page 6-24.
Change e-mail settings	Change e-mail addresses for sending reports. For further information see *E-mail setup* on page 6-27.
Modify antenna data	Only used during service and maintenance when you exchange modules in the antenna.
Control modem	Allow to reset or power cycle the modem. Allow to configure communication ports to the modem.

Table 6-13: Selected items in the list with user permissions

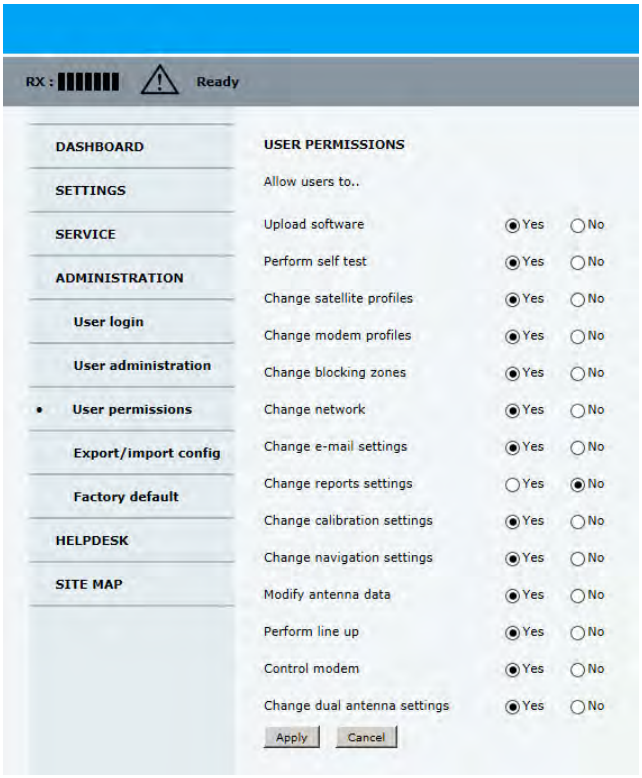


Figure 6-27: Web interface: ADMINISTRATION, User permissions

Important Study this screen thoroughly and decide which actions in the SAILOR 100 GX system configuration guest users (user name: guest) can access. If you select No, the affected pages are read-only, guest users cannot change the settings.

To set up the user permissions for guest users, do as follows:

1. From the left navigation pane, select **ADMINISTRATION > User permissions**.
2. For each item under **ALLOW USERS TO**: select
   - **Yes** to allow access to the settings.
   - **No** to block access to the settings.
3. Click **Apply**.

A message at the top of the page saying that the page requires administrator rights informs the guest user that access is denied.

To import and export a system configuration

If you need to reuse a configuration in another SAILOR 100 GX system, you can save the current configuration to a configuration file. This file can then be loaded into another SAILOR 100 GX or be used as backup. The configuration file contains all the settings you have entered during system setup: satellite profiles, modem profiles, LAN setup, blocking zones, etc.

Note The antennas involved must have the same software version.

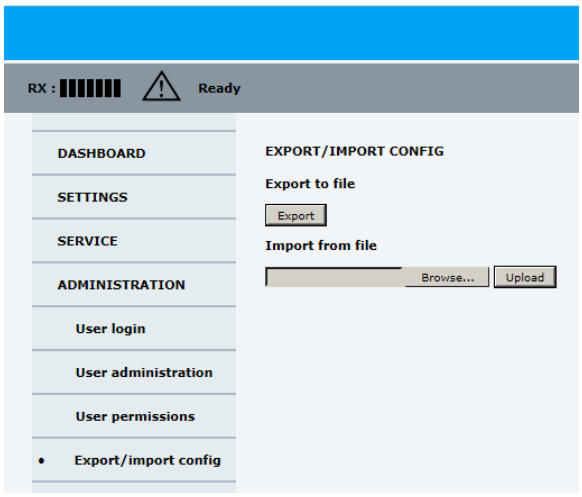


Figure 6-28: Web interface: ADMINISTRATION, Export/import configuration

To save a configuration to a file, do as follows:

1. Select **ADMINISTRATION > Export/import config**.
2. Click the button **Export**. Follow the download instructions on the screen.

To load a configuration from a file, do as follows:

1. Select **ADMINISTRATION > Export/import config**.
2. Click the button **Browse** and locate the configuration file (.cfg file) you want to upload
3. Click the button **Open**.
4. Click the button **Upload**.

To clone a system configuration, do as follows:

1. Reset to factory default, see *Reset to factory default and clear event history* on page 8-6.
2. Import a configuration from file, see section above.

To reset to factory default settings

Refer to *Reset to factory default and clear event history* on page 8-6.

6.5 Keypad and menus of the ACU

6.5.1 ACU display and keypad

In the ACU display you can see the current state of the system. You can also see events (warnings, errors and information) and how the system has been configured. Use the keypad to navigate through the menu tree.

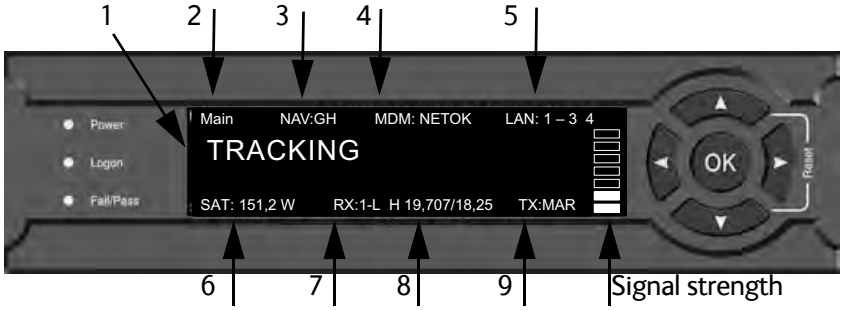


Figure 6-29: Display and keypad of the ACU (example)

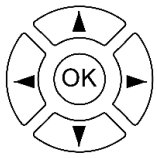
1. Current status of the SAILOR 100 GX:
   NOT READY (waiting for input from GNSS, e.g. GPS)
   ANTENNA INITIALIZING
   ANTENNA SW UPLOAD
   ANTENNA POST ERROR
   XIM DATA ERROR (PCM or VIM were serviced and may need further configuration)
   UNRECOVERABLE XIM DATA ERROR
   SYSTEM UPGRADE
   ANTENNA POST PENDING
   ANTENNA POST
   SAFE MODE (error, followed by an error description)
   SERVICE SWITCH (service switch in ADU activated)
   READY (waiting for data from the modem or no satellite profile selected)
   POINTING ANTENNA (locating the satellite)
   ACQUIRING SIGNAL (acquiring the satellite signal)
   TRACKING (tracks the current satellite)
   AZIMUTH CALIBRATION
   TX CABLE CALIBRATION
   BUC CALIBRATION
   TEST
   NOT READY (waiting for input from GNSS, e.g. GPS)
   NOT READY: **INITIALIZING**
   NOT READY: **NEED POS**
   BLOCKING ZONE (antenna is pointing into a blocking zone)
   NO TX ZONE (antenna is pointing in a no TX zone; TX is off)
2. Current menu, see *The menu tree* on page 6-39.

3. **NAV**: Navigational information
   First letter: **G** (Valid GPS signal received from the GPS module) or **g** (No valid GPS fix)
   Second letter: **H** (Valid ship heading data received from the ship's gyro) or **h** (No valid heading data).
4. **MDM**: Current status of the modem: **TEST**, **ERROR**, **READY**, **INIT**, **RXOK**, **ACQ**, **NETOK**, **RESET**, **OFF**
5. **LAN**: LAN connectors used, **1**, **2**, **3**, **4**, –.
6. **SAT**: Longitude, satellite position of the currently active satellite profile.
7. **RX**:
   1 (Rx1 Lock, **-** or **1**),
   - (Rx2 Lock, **-** or **2**),
   L (RX polarisation of currently active satellite profile: **H** (horizontal), **V** (vertical), **L** (left-hand) **R** (right-hand).
8. RF tracking frequency in GHz and LNB LO Frequency.
9. **TX**: <Extern mute> <Modem TX> <ADU TX> <TX pol>
   Read the TX status as follows: Upper case: Ok, lower case: Not ok, -: unknown
   <Extern mute> = [U,u]
   <Modem TX> = [m,M]
   <ADU TX> = [a,A]
   <Tx pol>=[-,X,C,L,R]

After 1 hour the display is dimmed to lowest intensity. Press any key to light up the display.

6.5.2 Navigating the menus

Use the keypad to navigate the menus.



- Press **OK** or ▶ to select a menu item.
- Use the arrow keys ▲ and ▼ to go through the menu items or enter a number, digit by digit.
- Use the arrow keys ◀ and ▶ to go through the settings and move from one digit to the next.
- Press **OK** to select a setting.
- Press ◀ again to move one level up. If applicable, confirm to store the new setting by pressing **OK**.

6.5.3 The menu tree

In the menu tree you can see how the system has been configured. To enter satellite information directly, use a connected PC and the web interface.

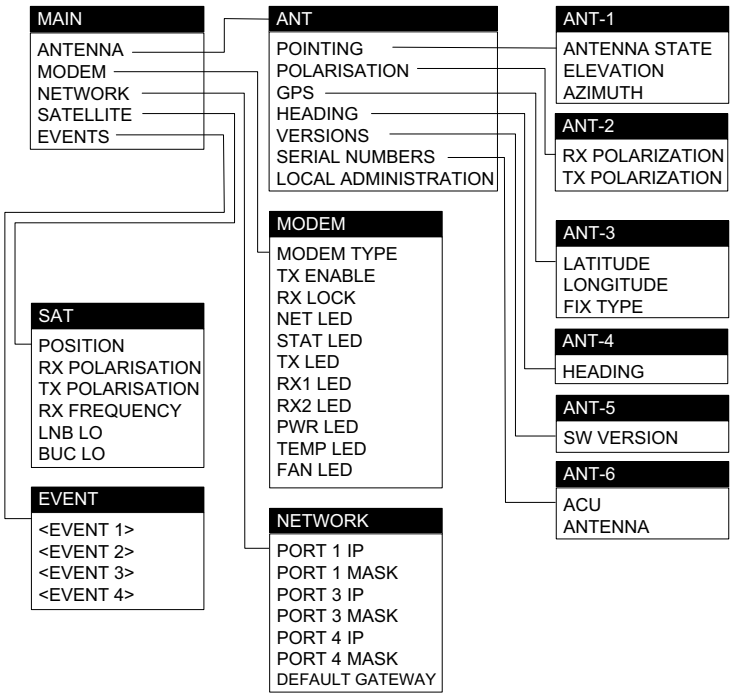


Figure 6-30: Antenna Control Unit, menu tree

Top-level menu

Top-level menu	Description
MAIN	View with current status of the SAILOR 100 GX. Example when logged on to the satellite:  This view is displayed after a time out of 10 minutes. Press any key (except left arrow) to enter the menu at **MAIN**. New events are shown in this display. If an event is displayed, press **OK** to jump directly to the menu **EVENTS** for viewing the currently active events.
ANTENNA	Current ADU parameters, position, software version and serial numbers of the ADU and ACU.
MODEM	Selected modem type and setup, including signal level.
NETWORK	IP addresses and netmasks of the LAN connectors of the ACU and the management mask.

Table 6-14: Top-level menus of the ACU

Top-level menu	Description
SATELLITE	Current satellite information. This information is selected using the web interface.
EVENTS	System events. Active events are shown as: X ACTIVE EVENTS in the **MAIN** display. Press **OK** to update the list.

Table 6-14: Top-level menus of the ACU (Continued)

Menu descriptions

ANTENNA menu	Description
POINTING	ANTENNA STATE: Current state of the antenna, e.g. TRACKING ELEVATION: Current elevation angle of the antenna AZIMUTH: Current azimuth of the antenna, with reference to North
POLARISATION	RX POLARISATION: LHC or RHC. TX POLARISATION: X-POL or Co-POL.
GPS	LATITUDE: current latitude, read from GPS module. LONGITUDE: current longitude, read from GPS module. FIX TYPE: 2D or 3D or NONE
HEADING	Ship's heading in degrees with reference to North, provided by the ship's gyro
VERSIONS	Current software version
SERIAL NUMBERS	ACU: ACU serial number ADU: Serial number of the antenna
LOCAL ADMIN	Shows that the ACU is set into local administration mode. Only user name admin is needed and the ACU is in admin mode for 1 hour.

Table 6-15: ANTENNA menu of the ACU

MODEM menu	Description
MODEM TYPE	Connected modem type
TX ENABLE	On or off, information delivered by the connected modem
RX LOCK	On or off, information delivered by the connected modem

Table 6-16: MODEM menu of the ACU

MODEM menu	Description
NET LED	LED indication from modem. Steady or flashing green/amber/red, OFF
STAT LED	
TX LED	
RX1 LED	
RX2 LED	
PWR LED	
TEMP LED	
FAN LED	

Table 6-16: MODEM menu of the ACU (Continued)

NETWORK menu	Description
PORT 1 IP	Current IP address for LAN 1
MASK 1	Current netmask for LAN 1
PORT 3 IP	(LAN 3) Current IP address of the SAILOR 100 GX web interface (default: http://192.168.0.1)
MASK 3	(LAN 3) Current netmask of the SAILOR 100 GX web interface (default: 255.255.255.0)
PORT 4 IP	Current IP address for LAN 4
MASK 4	Current netmask for LAN 4
DEFAULT GATEWAY	Current default gateway

Table 6-17: NETWORK menu of the ACU

SATELLITE menu	Description
POSITION	Position of the current satellite
RX POLARISATION	LHC or RHC
TX POLARIZATION	X-POL or CO-POL
RX FREQUENCY	Ka band receiving frequency of the active satellite, auto-selected by modem
LNB LO	18.25 GHz, system hardware.
BUC LO	28.05 GHz, system hardware
TX FREQUENCY	Current TX frequency

Table 6-18: SATELLITE menu of the ACU

SATELLITE menu	Description
LNB LO HIGH	Current LNB Local Oscillator frequency, high band (GHz), selected in the satellite profile
LNB LO LOW	Current LNB Local Oscillator frequency, low band (GHz), selected in the satellite profile

Table 6-18: SATELLITE menu of the ACU (Continued)

EVENT menu	Description
<EVENT>	In this menu all active events are listed. Use ▼ and ▲ to go through the active events. Events can be of the type WARNING or ERROR. If a new event occurs or there is a change in the event list while you are in the **EVENTS** menu, a * is shown in the upper left corner of the display, next to the menu name. Press **OK** to update the EVENTS list, the * will be removed. A **>** means the event text is longer than the display. Press **>** to see the remaining text.

Table 6-19: EVENTS menu of the ACU

Example: **EVENT 1/4***: This is the first event out of a list of 4 and there has been a change in the list. EVENT 1/4 will always be shown, the * indicates that there has been a change.

6.5.4 Brightness of the display

To adjust the brightness do the following:

1. Press and hold **OK** for a short moment until BRIGHTNESS XXX% is displayed (XXX is the current brightness value).
2. Hold OK pressed + press ▲ for lighter or ▼ for darker display.
3. Release OK to leave the brightness menu.

6.5.5 Power-cycle of the ACU and ADU

To power cycle the ACU and ADU do the following:

1. Press and hold ▲ and ▼ until the ACU display shuts down and the ACU and ADU reboots.

Figure 6-31: Reset the system

2. Wait until the system has rebooted and is operational again. The last active satellite profile will be used.

6.6 SNMP support

The SAILOR 100 GX supports SNMP v2 requests to retrieve configuration and present settings. SNMP is always enabled on all Ethernet interfaces. The SNMP community string is **public**.

The SAILOR 100 GX offers via SNMP most of the data that are available from the DASHBOARD web pages. Detailed documentation about supported OIDs can be found in the SAILOR 100 GX MIB file. This file can be downloaded from the web interface.

The MIB entries are grouped in the following sections:

- System configuration
- Navigation coordinates
- Antenna pointing
- Dashboard and profile
- Tracking receiver

Note None of the SNMP values need to be polled more often than once a minute. Polling SNMP values more frequently will impact the performance of the ACU.

To get the MIB file, do as follows:

1. Select **HELPDESK**.
2. Click the link **Download MIB file**.
3. Save the file on your computer.

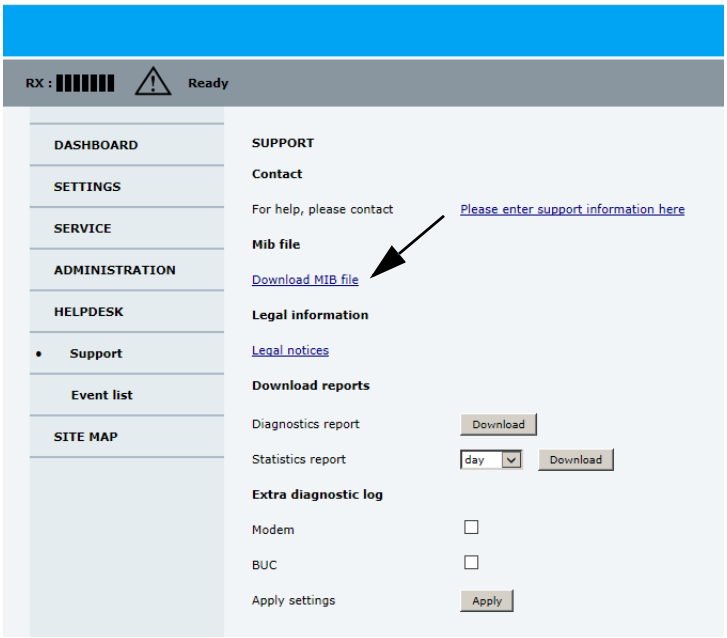


Figure 6-32: Download of MIB file

Installation check

Now that you have installed the system, you can test it to verify it is ready for customer delivery. Follow the check lists below to test the system for proper operation.

- *Installation check list: Antenna*
- *Installation check list: ACU, modem, connectors and wiring*
- *Installation check list: Functional test in harbor*

7.1 Installation check list: Antenna

Step	Task	Further information	Done
1.	Check that the antenna is free of obstructions.	See *Obstructions (ADU shadowing)* on page 3-4.	
2.	Make sure there is sufficient space for access through the service hatch.	See *To install the ADU* on page 3-17.	
3.	Make sure to maintain the vertical orientation of the ADU center line.	See *To install the ADU* on page 3-17.	
4.	Check that the ADU is installed where vibrations are limited to a minimum.	See *To install the ADU* on page 3-17.	
5.	Check that you programmed the blocking zones correctly.	See *Blocking zones with azimuth and elevation* on page 3-5 and *To set up blocking zones (RX and TX)* on page 6-22.	
6.	Make sure that the safety distance for radiation hazard is kept.	See *Safe access to the ADU (radiation hazard)* on page 3-6.	
7.	Check that the mounting height of the antenna is in accordance with the ship's min. roll period.	See *Ship motion and offset from the ship's motion centre* on page 3-6.	
8.	Make sure that the requirements for mast foundation and height, including flatness, gusset plates and distance from welding seams are met.	See *ADU mast design: Mast foundation and height* on page 3-7.	
9.	Make sure that the distances to radar, Inmarsat systems, GPS receivers and other transmitters are as required.	See *Interference from radar, GPS, L-band and other transmitters* on page 3-12.	
10.	Make sure that the drain tube is open and risk for water intrusion is at a minimum.	See *Condensation, water intrusion and deposits* on page 3-15.	

Table 7-1: Installation check list: Antenna

Step	Task	Further information	Done
11.	Check that the ADU is grounded correctly, using the mounting bolts.	See *To ground the ADU* on page 3-20 and *Ground and RF protection* on page C-1.	

Table 7-1: Installation check list: Antenna (Continued)

7.2 Installation check list: ACU, modem, connectors and wiring

Step	Task	Verification and further information	Done
1.	Check that the grounding of the ACU is correctly, using the mounting bolts and washers.	See *To ground the ACU* on page 3-23 and *Ground and RF protection* on page C-1.	
2.	Make sure that the modem is mounted close to the ACU (preferably next to it).	Visual inspections. See *To install the modem* on page 3-24.	
3.	Check that the ADU antenna N-connector is properly connected with the 50 Ohm RF cable.	Visual inspection of the bottom of the ADU. See the figure *Connecting the ADU cable* on page 3-19.	
4.	Check that the ACU antenna N-connector is properly connected with the 50 Ohm RF cable.	Visual inspection of the connector panel of the ACU.	
5.	Check that the ACU's **Rx Out** is connected to the modem **Rx in** using the included 1 m F-F 75 ohm cable.	Visual inspection of the connector panel of the ACU and the modem. See the figure *To connect the ADU, ACU and modem* on page 3-25.	
6.	Check that the ACU's **Tx In** is connected to the modem **Tx out** using the included 1 m F-F 75 ohm cable.	Visual inspection of the connector panel of the ACU and the modem. See the figure *To connect the ADU, ACU and modem* on page 3-25.	
7.	Check that the ACU's **RS-232** is connected to the modem's **RS-232** using the included serial cable.	Visual inspection of the connector panel of the ACU and the modem. See the figure *To connect the ADU, ACU and modem* on page 3-25.	
8.	Check that the ACU's **RS-232** is connected to the modem's **RS-422** using the included serial cable.	Visual inspection of the connector panel of the ACU and the modem. See the figure *To connect the ADU, ACU and modem* on page 3-25.	
9.	Check that the ACU's NMEA 0183 connector is connected to the NMEA 0183 bus of the vessel using the included multi-connector.	Visual inspection of the connector panel of the ACU connector. See Table 4-4 on page 4-3.	
10.	Check that the power cable is plugged into the ACU and that AC power is available.	Visual inspection.	
11.	Check that the AC power cable is plugged into the modem and that AC power is available.	Visual inspection.	

Table 7-2: Installation check list: ACU, connectors and wiring

7.3 Installation check list: Functional test in harbor

Step	Task	Further information	Done
1.	Check that the antenna is tracking the satellite	The logon LED in the ACU display must be steady green and the display must show: **TRACKING**. Check in the web interface: **DASHBOARD**: **System status**: **Tracking** (see *Connecting to the web interface* on page 6-1).	
2.	Check that the modem is in lock and BUC TX on.	In the web interface check: DASHBOARD, **RX locked status** must show **Locked**. The ACU display must show **MDM:NETOK**	
3.	Connect a user PC LAN (not the service PC) to the Internet LAN connector 2 of the ACU	The modemmodem needs no separate setup. See *To connect the ADU, ACU and modem* on page 3-25.	
4.	Make sure that the computer has no access to the Internet through other means (Wifi, 3G, 4G etc.). Open a command line window and type: ping 4.2.2.2.	Check that you get a response.	
5.	Make sure that the computer has no access to the Internet through other means (Wifi, 3G, 4G etc.). Open a web browser and browse to e.g. www.google.com.	Check that the web page is downloaded.	
6.	If step 4 is successful and step 5 is not then it seems that the DNS is not configured correctly.	See the page **SETTINGS** > **Network** and check the DNS setup (see *To configure the LAN network* on page 6-24.	

Table 7-3: Installation check list: Functional test in harbour

Service

This chapter has the following sections:

- *To get support*
- *Software update*
- *Satellite profiles and modem profiles*
- *Status signalling with LEDs and status messages*, s
- *Removal and replacement of the ACU*
- *Removal and replacement of ADU modules*
- *Troubleshooting basics*
- *Frequently asked questions*
- *To return units for repair*

8.1 To get support

If this manual does not provide the remedies to solve your problem or if you need help with ACU or ADU related issues call your service provider.

The section has the following subsections:

- *Options for support*
- *Reset to factory default and clear event history*
- *Reset to factory default - GMU*

8.1.1 Options for support

In this section you can enter the support contact for this installation, download the MIB file and reports.

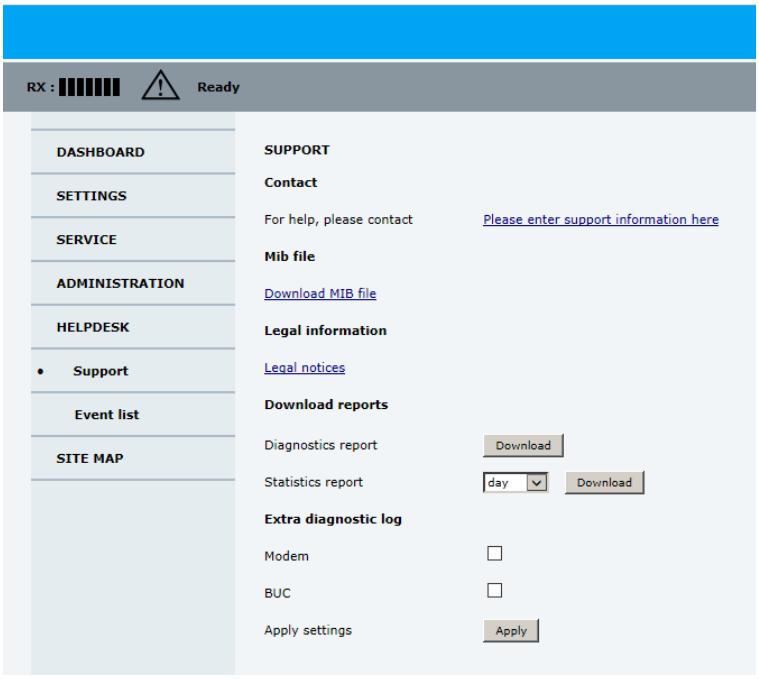


Figure 8-1: Web interface: HELPDESK

8.1.1.1 To enter contact information, download the MIB file and view legal notices

1. Select **HELPDESK** from the left navigation pane.
2. Click the link to enter support contact information and click **Apply**.
3. Click the link **Download MIB file** to download the MIB file.
4. Click the link **Legal notices** to see the license text for the source code of the parts of the SAILOR 100 GX software that falls under free and open source software.

8.1.1.2 To download diagnostics and statistics reports

You can download a diagnostics report. This report contains information relevant for the service personnel during troubleshooting situations. It is also useful documentation of the current setup. The report contains all parameters set during configuration. You can add diagnostic log information from the modem and the BUC.

The main sections of the diagnostics report are:

- Software
- System
- Hardware
- Identifiers
- Setup - System data
- Calibration - Calibration Data
- Blocking zones - Blocking zone configuration
- Network - LAN Configuration
- Modem profiles
- Satellites - Satellite profiles
- Operation - Current modem and navigation parameters.
- POST - results of the Power-On-Self-Test
- Active Events - lists the currently active events
- Events - List of all cleared events
- Statistics - including navigation data and logging of temperatures for the ACU and ADU. The temperature is measured every 5 minutes within an hour and is then averaged and incidents are logged in the diagnostic file.
- System log

You can download a statistics report. This report contains information relevant for the service personnel during troubleshooting. You can also configure the system to send statistics reports at defined time intervals.

To generate a report do as follows:

1. Select **HELPDESK** from the left navigation pane.
2. Select **Modem** and/or **BUC** to include modem and BUC information in the diagnostics report.

   Note The amount of modem data is usually large and may fill the log quickly.

3. Click **Apply**.
4. Click **Download** next to the text **Diagnostics report**.
5. Save the diagnostics report to your computer.
6. Next to the text **Statistics report** select the interval for the statistics report.

7. Click **Download** next to the text **Statistics report**.
8. Save the statistics report to your computer.

8.1.1.3 Event list

Events are registered. When an event is registered, the web interface shows an event icon ⚠ in the icon bar as long as the event is active. Active events are also displayed in the ACU display. To view the event list with active events, click the event icon from the icon bar at the top of the web interface, or select **HELPDESK > Event list** from the left navigation pane.

The **Event list** page shows a detailed list of active events and notifications including the time of the first occurrence, ID and severity of the event message, and a short text describing the error. Active events are cleared from the event list when the error is cleared. They are moved to the section **Notifications** and are displayed for 24 hours. All entries in the section **Notifications** are cleared automatically after 24 hours and after restart of the system. For a list of all events with description, error code (ID), explanation and remedy see *List of events* on page D-2. You can clear the event history in the diagnostic report, this will not change the configuration.

To clear the event history do as follows:

1. Click **Factory default** in the **ADMINISTRATION** page.
2. Click the button **Clear event history**.

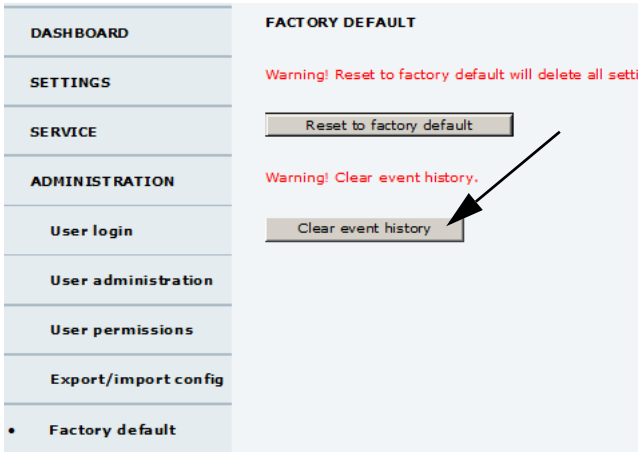


Figure 8-2: Web interface: Clear event history

8.1.1.4 Self test

You can start a self test of the SAILOR 100 GX ADU and ACU. The self test checks all vital parts of the antenna and ACU. You can restart the antenna or the terminal (ADU and ACU). If a malfunction is detected, the unit provides system messages with a description of the failing test. This is indicated in the icon bar in the web interface and in the ACU display. You find all system messages in *System messages* on page D-1. An extended antenna POST is available, this test lasts longer and checks more components than the regular self test.

To make a self test, do as follows:

1. Click the menu item **SERVICE**.
2. Click the menu item **Self test**.

Important Warning! The SAILOR 100 GX will reboot to perform the self test. Rebooting the ACU will terminate all existing connections.

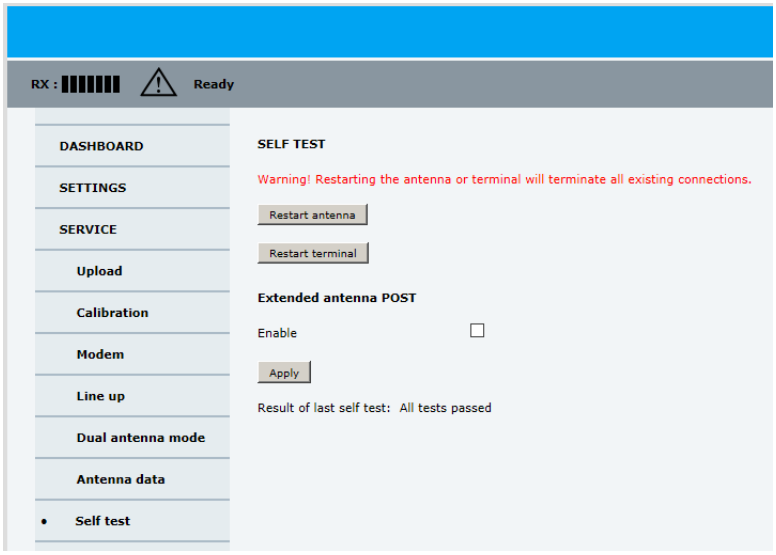


Figure 8-3: Web interface: SERVICE, Self test

3. Select **Enable** under **Extended antenna POST** for the longer self test, click **Apply**.
4. Click **Restart antenna** to restart the ADU and/or **Restart terminal** to restart the ADU and ACU.

If you want to reset the modem to factory defaults see *Reset to factory default - GMU* on page 8-7.

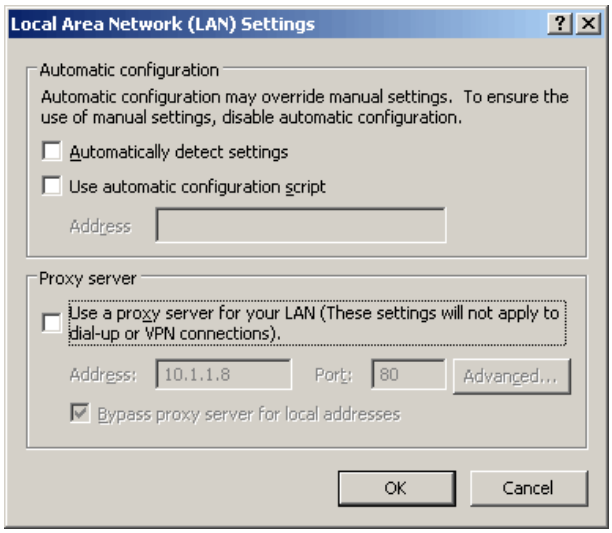
8.1.1.5 Proxy server settings in your browser

If you are connecting your computer using a LAN or WLAN interface, the **Proxy server** settings in your browser must be disabled before accessing the web interface. Most browsers support disabling of the Proxy server settings for one specific IP address, so you can disable Proxy server settings for the web interface only, if you wish. Consult your browser help for information.

To disable the use of a Proxy server completely, do as follows:

Note The following description is for **Microsoft Internet Explorer**. If you are using a different browser, the procedure may be different.

1. In Microsoft Internet Explorer, select **Tools > Internet Options > Connections > LAN Settings**.



2. Clear the box labeled **Use a proxy server for your LAN**.
3. Click **OK**.

When the proxy server settings are disabled, close and restart your browser. You may need to change this setting back on return to your Internet connection.

8.1.2 Reset to factory default and clear event history

You can reset the SAILOR 100 GX ADU and ACU to factory default.

Important A reset to factory default will delete all settings, including satellite and VSAT modem profiles, blocking zones, network setup, user permissions and ACU display brightness settings.

When resetting to factory default, the following settings are deleted:

- All satellite profiles
- All modem profiles
- Blocking zones
- Heading settings
- Azimuth adjustment
- Network setup
- User permissions
- ACU display: brightness setting

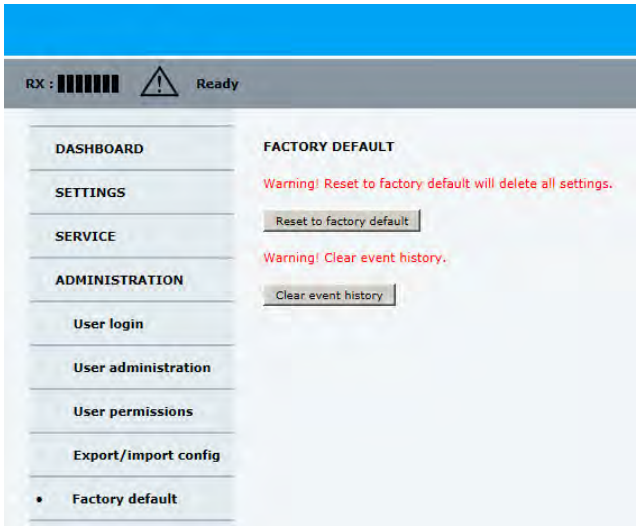


Figure 8-4: Web interface: ADMINISTRATION > Factory default, ADU and ACU

To reset to factory default settings, do as follows:

1. Click the menu item **ADMINISTRATION > Factory default**.
2. Click **Reset to factory default**.

Note | Calibration data for azimuth and cable calibration are not reset during factory default.

3. Click **Clear event history** to clear all registered events.

8.1.3 Reset to factory default - GMU

CAUTION! The system becomes inoperable if you select **Default Factory Configuration** in the drop down list on the page **SERVICE > Modem**.

To reset the GMU to factory default, do as follows:

1. Click the menu item **SERVICE > Modem**.

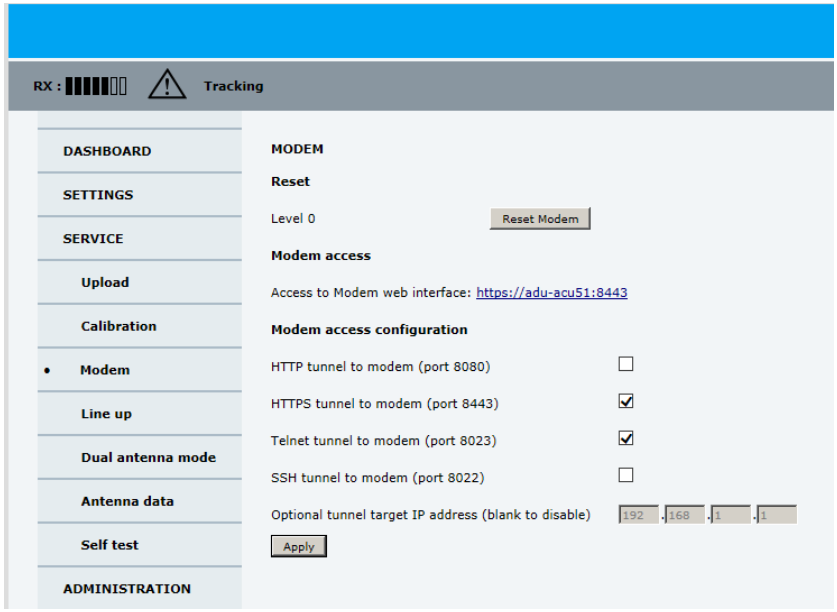


Figure 8-5: Web interface: SERVICE > Modem, Factory default

2. Click **Reset Modem**.
3. To power cycle the GMU push the power switch.

For details about **Modem access configuration** see *Modem access configuration* on page 6-15.

8.2 Software update

8.2.1 Prerequisites

The following items are required to make a software update:

- 1 computer with a standard Ethernet port available.
- Standard Internet browser.
- 1 straight LAN cable.
- Access to the file with the new software.

8.2.2 Software update (ADU, ACU)

Note Software update should only be done by qualified service personnel.

The upload procedure takes a couple of minutes. When done, the ACU automatically restarts with the new software version. The start-up procedure after a software upload takes longer than the usual start-up time, as the software in the ADU must also be updated. This is shown in the ACU display as **ANTENNA SW UPLOAD**.

To make a software update, do as follows:

1. Power up the SAILOR 100 GX system, i.e. switch on the ACU. Wait until the ACU has finished initializing.
2. Connect a PC to LAN interface 3 (Service port, standard Ethernet) of the ACU or to the front LAN connector of the ACU.

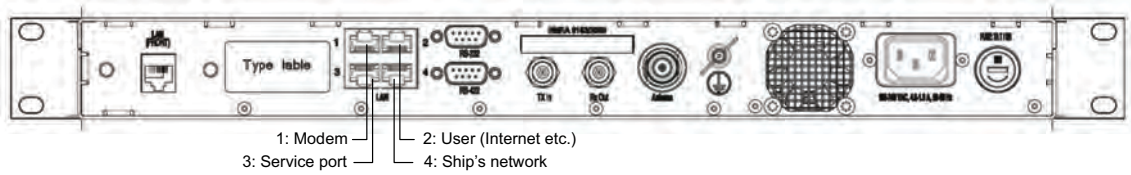


Figure 8-6: LAN 3 connector used for configuration of the SAILOR 100 GX

If you want to use another LAN port to access the web interface you must configure it according to your network requirements. See *To configure the LAN network* on page 6-24 for more information.

3. Open your Internet browser and enter the IP address. The default IP address of the ACU is http://192.168.0.1.
4. Type in the user name **admin** and the administrator password to access the web interface.
5. The web interface shows the **DASHBOARD** page.
6. Click the menu item **SERVICE**. The **UPLOAD** page is displayed.

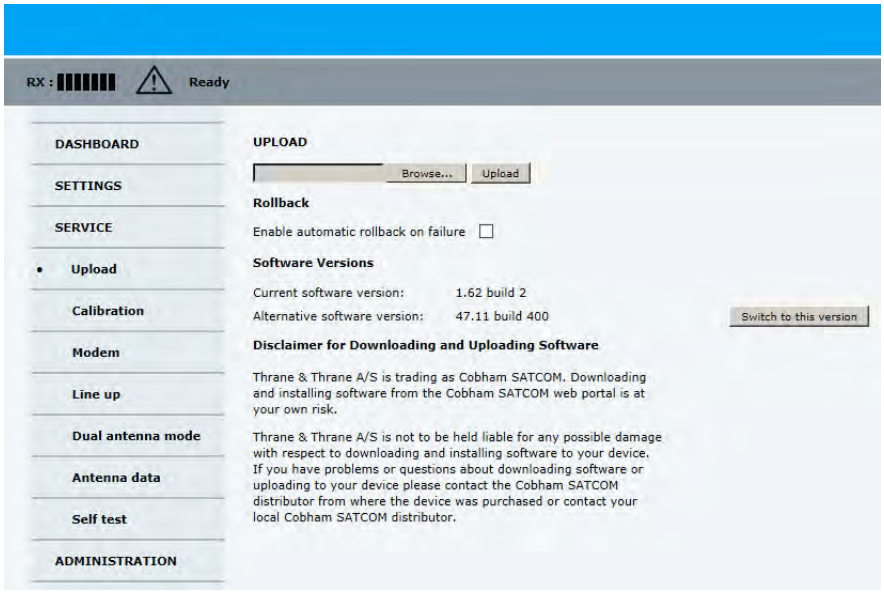


Figure 8-7: Software update with the web interface

7. Click **Browse...** and locate the new software file.
8. Click **Upload**.

Important Do not browse away from the upload page. This will terminate the upload process. Wait for the browser to reload automatically.

9. You can select **Enable automatic roll-back on failure**. Then the system returns to the previous software version if an error occurs during the POST.
10. Click **Switch to this version** if you want to force the system to use the alternative software version stated in the display.

8.2.2.1 Software recovery procedure (SAFE MODE)

To recover from a failed software upload, turn off the ACU and turn it on again. Then repeat the upload procedure as described in *Software update* on page 8-9. If this does not help use the following recovery procedure:

1. Switch off the ACU.
2. Press and hold down the arrow keys ◀ and ▶ on the keypad.
3. Switch the ACU on and wait for the display to show with a small font size **SAFE MODE** in the top left corner.

Figure 8-8: Recovery procedure after failed software upload

4. Release the arrow keys ◀ and ▶ .
5. Connect a PC to LAN port 3 of the ACU.

6. Set the IP address of the PC to static: IP:192.168.0.2, Subnet: 255.255.255.0
7. Open an Internet browser and type http://192.168.0.1 (Default IP address of the ACU)

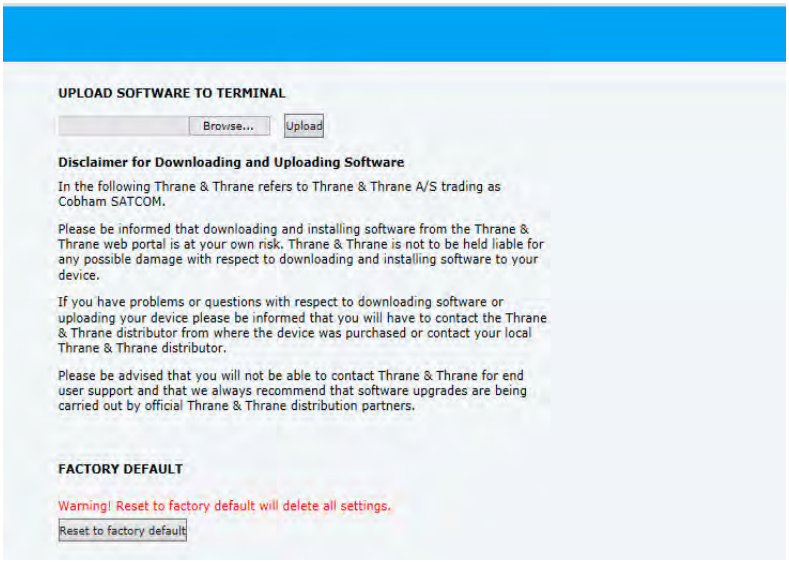


Figure 8-9: Upload software to terminal (Safe mode)

8. Click **Browse...** and locate the software file.
9. Click **Upload**.

The upload procedure takes a couple of minutes. When done, the ACU automatically restarts with the new software version.

Important Do not browse away from the upload page. This will terminate the upload process. Wait for the browser to reload automatically.

8.2.2.2 To verify the software update (ADU and ACU)

After completing the software update procedure, the ACU will perform a POST (Power On Self Test). When the POST has finished, the green Pass/Fail LED on the front of the ACU must become steadily green.

To verify the software update do as follows:

1. Verify that the Pass/Fail LED is not red nor flashing orange once every 2 seconds.
2. Wait until the Pass/Fail LED is green.
3. Verify that the software update has been completed successfully. You find the software version number in the **DASHBOARD** window of the web interface.

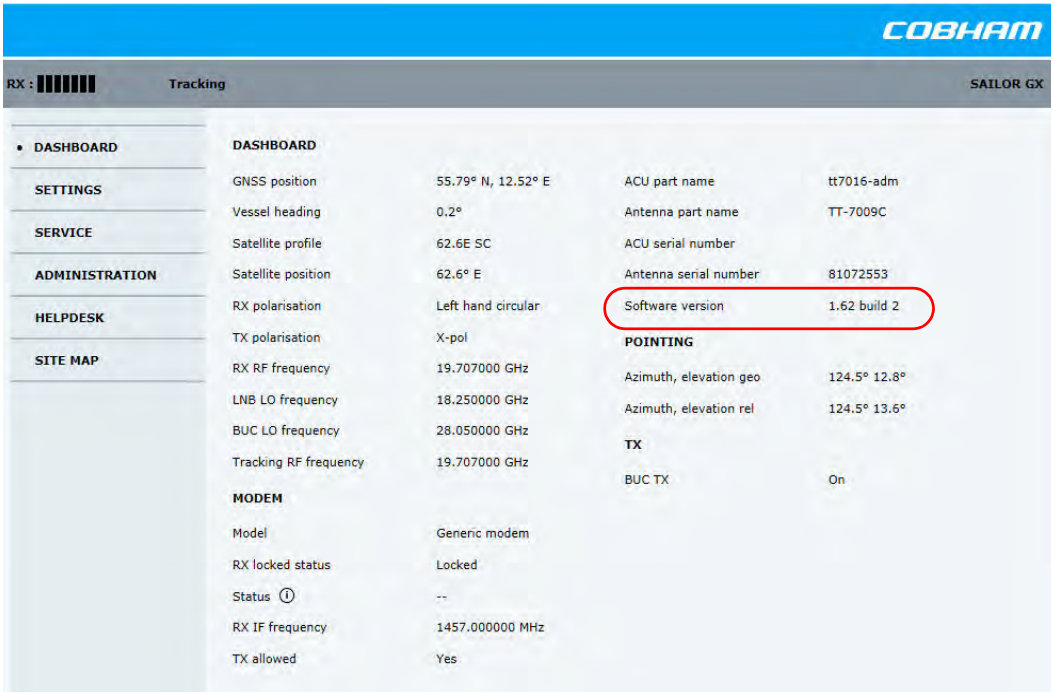


Figure 8-10: Verifying software update

8.2.2.3 Software update (modem)

The modem detects automatically whether a software upgrade is needed. If yes, software upgrade is done automatically via the satellite link. You can see the current software version in the GMU web interface.

8.3 Satellite profiles and modem profiles

8.3.1 Satellite profiles

A satellite profile with the GX Modem is already set up at the factory. You may add a satellite profile with the generic modem for troubleshooting purposes. This is done on the page **Satellite profiles**.

8.3.1.1 Satellite profiles – New entry and Edit

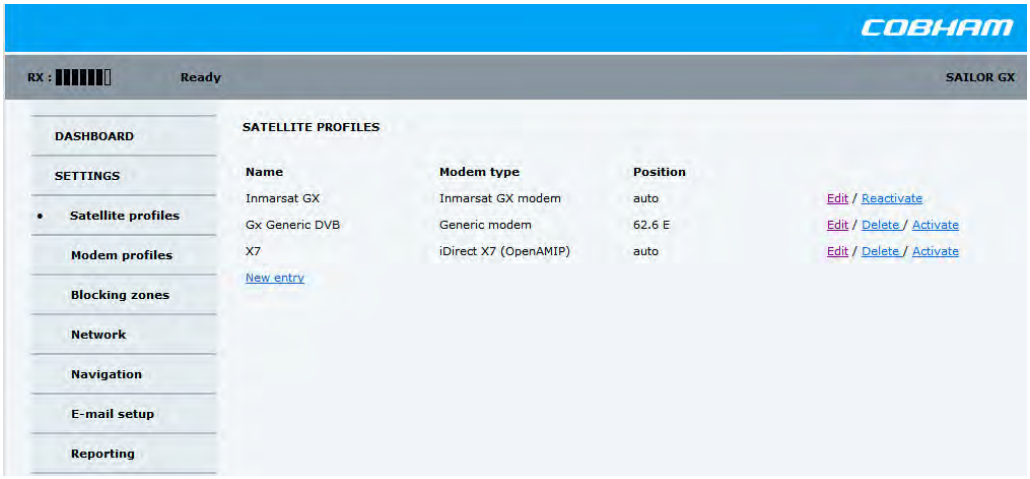


Figure 8-11: Web interface: SETTINGS - list of satellite profiles (example)

Each satellite profile has one assigned VSAT modem profile.

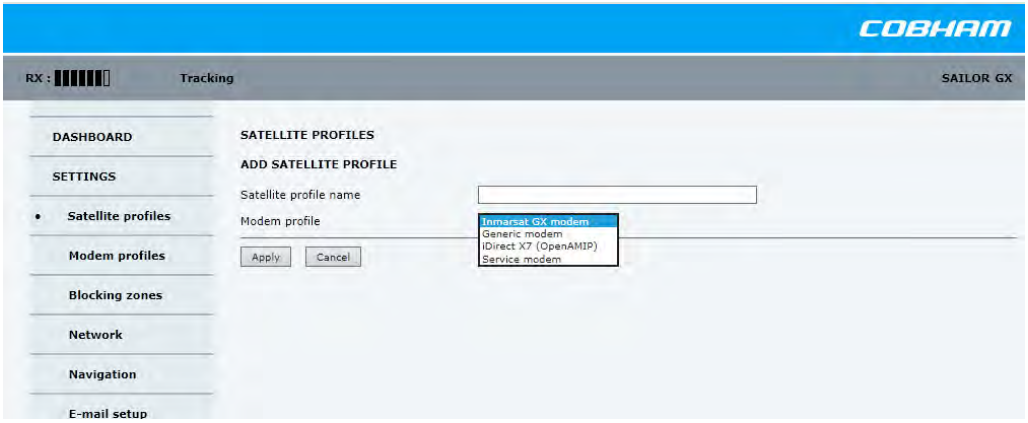


Figure 8-12: Web interface: SETTINGS, Satellite profiles — new entry (example)

To add or edit a satellite profile, do as follows:

1. Go to **SETTINGS or Satellite profiles** and click **Edit** or **New entry**.
2. Enter or edit the Satellite profile name.

Note It is helpful to assign a name containing the location where the Satellite profile is to be used (e.g. *Gulf of Mexico* or *North Sea*) and possibly the provider.

3. Select a modem profile. The page automatically displays the parameters available for the selected modem profile. For instructions how to add a modem profile see *Modem profile – New entry and Edit* on page 8-14.
4. Enter the data for the satellite, if any. For satellite data see www.lyngsat.com.
5. **Only for satellite profiles that use a modem profile with the Generic modem**: At Elevation cut-off enter the minimum elevation angle for the antenna.
   - **FCC (FCC §25.205)**: 5 degrees
6. Click **Apply** to save the settings for the satellite profile.

8.3.2 Modem profiles

A VSAT modem profile contains all VSAT modem settings that are necessary for a successful connection to the satellite. The data you have to fill in are provided by your VSAT service and modem provider.

On the page **Modem profiles** you create, edit or delete modem profiles. You must add at least one modem profile.

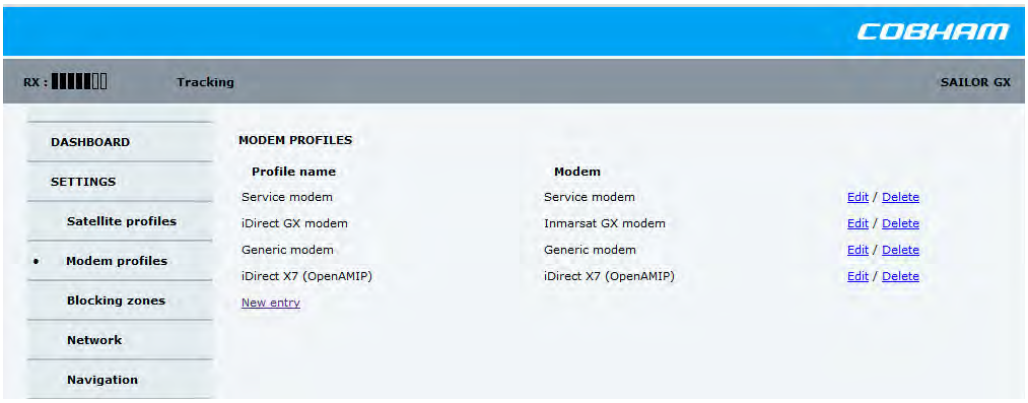


Figure 8-13: Web interface: SETTINGS, Modem profiles (example)

8.3.2.1 Modem profile – New entry and Edit

To add or edit a VSAT modem profile, do as follows:

1. Go to **SETTINGS** > **Modem profiles** and click **New entry** or **Edit**. The supported modems are listed in the drop-down list **Modem**.

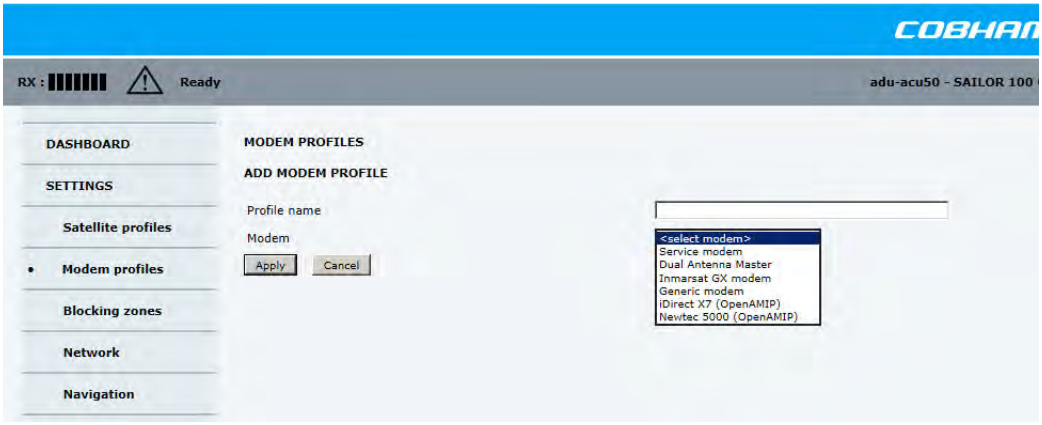


Figure 8-14: Web interface: SETTINGS, Modem profile – supported modems

2. Fill in a modem profile name of your own choice.
3. Select one of the supported modems from the drop down list.
   Generic modem: If you have a modem that is not included in the list, select the generic modem. This is mainly used for troubleshooting purposes.
4. Click **Apply** to add the new profile to the list of modem profiles or to accept the edits.

For a generic modem you enter all parameters in the satellite profile.

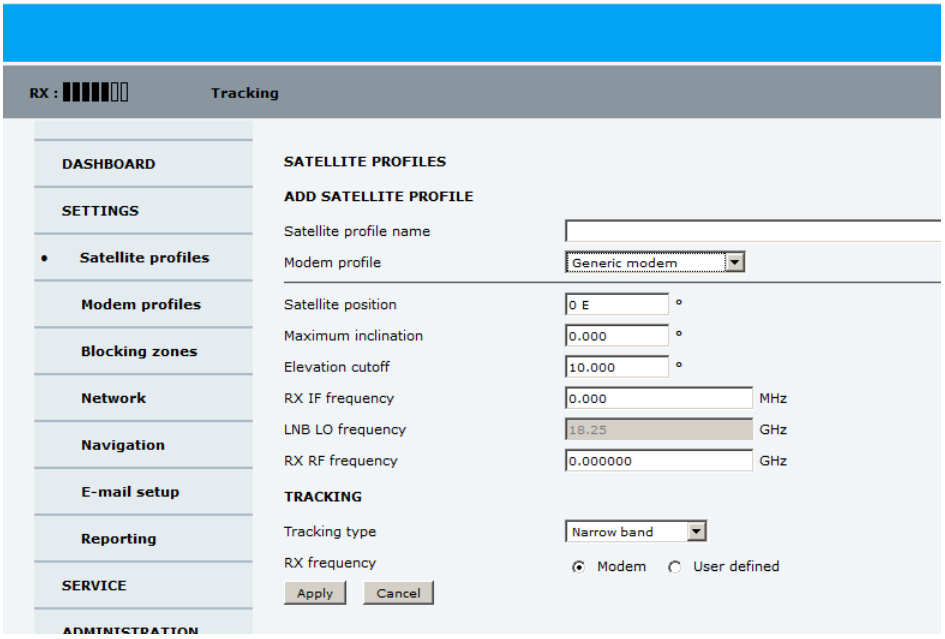


Figure 8-15: Satellite profile with generic modem

8.4 Status signalling with LEDs and status messages

8.4.1 Built-In Test Equipment

The ADU and the ACU have a Built-In Test Equipment (BITE) function in order to make fault diagnostics easy during installation and service. The BITE test is performed during:

- Power On Self Test (POST), which is automatically performed each time the system is powered on.
- Person Activated Self Test (PAST), which is initiated by starting a self test in the web interface **HELPDESK > Self test**.

For details on error messages after a POST or a self test see *Event list* on page 8-4.

8.4.2 Means of signalling

The SAILOR 100 GX provides various methods for signalling the system status. **LEDs** on the front panel of the ACU are used to signal:

- Power on/off
- Logon
- Fail/Pass

The built-in web interface of the ACU shows any events (BITE error codes) with a short message describing each error. This is also displayed in the ACU.

In an error situation, one of the following system status messages may be shown:

- ACU POST error
- Antenna POST error
- SAFE MODE (plus information about the specific error, see *System messages* on page D-1).

8.4.3 LEDs of the ADU modules

Each ADU module has two LEDs: a Power and a Service LED.

LED	Behaviour	Description
Power	Steady green	Power supply OK
	Off	No power
Service	Steady green	Module ok, application running.
	Flashing green	Waiting for upload
	Flashing red/green	Uploading software
	Steady red	Module error or loading error

Table 8-1: LEDs of the ADU modules

For a list of modules see *Removal and replacement of ADU modules* on page 8-18.

8.4.4 LEDs in the ACU

The ACU has 3 LEDs: on the front panel: Power, Logon and Fail/Pass LED.

LED	Behaviour	Description
Power	Steady green	Power supply OK
	Steady red	Power supply failure
	Off	No power
Logon	Flashing green	Current status is displayed: • Searching satellite • Identifying satellite • Carrier lock & TX enabled from modem
	Steady green	Satellite link established
	Off	No satellite link acquired
Fail/Pass LED	Steady red	A fault which prevents operation is present in the system (ACU, ADU, MODEM).
	Flashing green	A Power On Self Test (POST) or Person Activated Self Test (PAST) in progress. The current status is displayed.
	Flashing red	Active BITE failure or warning. The event is shown in the ACU display.
	Steady green	No faults.

Table 8-2: LEDs on the ACU

8.4.5 LEDs of the modem

The modem does not have any LEDs on the front plate. You can check the status of the modem in the display of the ACU, in the menu **Modem**. The current status is communicated by a text string. Each LED can have the status steady green, red or amber, or flashing green, red or amber.

- NET LED
- STAT LED
- TX LED
- RX1 LED
- RX2 LED
- PWR LED
- TEMP LED
- FAN LED

8.5 Removal and replacement of the ACU

There are no parts in the ACU that you can remove or replace. Contact your Cobham SATCOM service partner for further repair or replacement.

8.6 Removal and replacement of ADU modules

All replacement of modules must be carried out by a Cobham SATCOM service partner. The figure below shows the modules and their position. Some modules are equipped with LEDs for status information and troubleshooting. An overview of the antenna modules is shown in *Above Deck Unit (ADU)* on page 2-3.

For instructions how to open and remove the service hatch see *To open the service hatch* on page 3-20.

Before contacting your service partner check the LEDs on all modules (VIM, DDMs, PCM, PMM and ISM). See *LEDs of the ADU modules* on page 8-16 and *LEDs in the ACU* on page 8-17.

8.7 Troubleshooting basics

8.7.1 Overview

This section describes an initial check of the primary functions of the SAILOR 100 GX system, and provides some guidelines for troubleshooting. Generally, if a fault occurs without any obvious reason, it is always recommended to observe the LEDs and the ACU display showing the active events. Possible failure states are shown in the web interface and the display of the ACU.

Possible failure states are:

- SAFE MODE (e.g. hardware error, missing communication link between the ADU and ACU, excessive ship motion) (see also *Software recovery procedure (SAFE MODE)* on page 8-10)
- Antenna data error (after exchange of modules, XIM)
- Antenna POST error (hardware error)
- ACU POST error (hardware error)

For information on the function of the LEDs, see *Status signalling with LEDs and status messages* on page 8-16. For a list of all the error messages and warnings, see *Event messages – overview* on page I-1.

8.7.2 Event list for troubleshooting

You can use the event list for troubleshooting. For more information on the event list, see *Options for support* on page 8-2. You can download the event list as part of a diagnostics report.

8.7.3 Diagnostics report for troubleshooting

You can generate a diagnostics report containing results from the POST, all events and system log information since the last reset to factory default. For more information see *To download diagnostics and statistics reports* on page 8-3.

8.8 Frequently asked questions

8.8.1 Overview

The following sections are a collection of frequently asked questions with answers.

- *Q1: What is OTC and what happens?*
- *Q2: The antenna points towards the wrong Inmarsat GX satellite, what do I do?*
- *Q3: There is an ACU WARNING BUC calibration outdated, what do I do?*
- *Q4: How do I start a manual OTC procedure?*
- *Q5: What is the login to the GMU web server?*
- *Q6: GMU stays in OTC calibration without end, what can I do?*
- *Q7: How do I delete the BUC calibration file in the GMU?*
- *Q8: How do I log in to the GMU Linux shell?*
- *Q9: ACU stays in BUC CALIBRATION state almost forever, what can I do?*
- *Q10: Why does the DASHBOARD not show any satellite values?*
- *Q11: How do I manually upload a new TERMINAL_OPT.json configuration file to the GMU?*
- *Q12: BUC calibration reports: ERROR: Not Enough Modem Power During Ramping, BUC Not ready For OTC.*
- *Q13: What is my IP address for my PC to access the Internet?*
- *Q14: How do I find the User VLAN?*
- *Q15: I do not have Internet access using the IP address for the UserNET VLAN. Why?*
- *Q16: How can I confirm that the GMU is authenticated correctly to the Inmarsat GX network?*
- *Q17: The antenna is pointing in a wrong direction, what is wrong?*
- *Q18: How do I perform an azimuth calibration?*
- *Q19: After successful azimuth calibration the antenna is still pointing in a wrong direction, what is wrong?*
- *Q20: Why do I get the 08A02-0 ADM WARNING GX Core Module temperature?*
- *Q21: Why do I get the 08A03-0 ADM ERROR GX Core Module power?*
- *Q22: Why do I get the 08A04-0 ADM WARNING iDirect modem; ACU detected a warning/error in the iDirect modem.*
- *Q23: OTC reports: ERROR: BUC Local Oscillator Unlocked, BUC Not ready For OTC.*
- *Q24: Why do I get the 08075-0 ADM WARNING Rx cable calibration?*

8.8.2 The questions

8.8.2.1 Q1: What is OTC and what happens?

OTC stands for One Touch Commission. OTC is similar to a P1dB compression test for VSAT but on multiple frequencies. The GMU will instruct the antenna to point away from the Clark belt (geostationary satellites), disable the Power Amplifier (PA) of the BUC and use a built-in Power Detector to measure the gain of the system from GMU tx-connector up to BUC PA. The GMU will transmit a Continuous Wave (CW) from 950 MHz - 1950 MHz in 50 MHz increments and store the BUC calibration file on the GMU file system. OTC takes about 10-15 minutes to perform.

Automatic OTC is only performed once when the GMU boots for the first time because the GMU from factory does not have any BUC calibration file stored yet. The BUC calibration file: `buc_calibration` is located in the GMU Linux file system directory: `/sysopt/buc/`

8.8.2.2 Q2: The antenna points towards the wrong Inmarsat GX satellite, what do I do?

You do nothing and wait until the GMU times out and automatically selects the next satellite in its list.

The GMU has three Inmarsat GX satellites defined in its satellite list. From factory the GMU has only a default beam map file loaded and will therefore search for the satellites one by one. iDirect calls this *Round Robin*. This may take about 5 -10 minutes per satellite before the GMU times out and tries the next satellite in its list. After logon to the correct GX satellite the Inmarsat system will download an Over The Air (OTA) beam map and at next boot up the GMU should select the correct satellite.

If the ACU is switched OFF or the view towards the GX satellite is blocked the GMU will time out and start the Round Robin scenario. This can take many minutes before the GMU selects the right GX satellite again from its satellite list.

8.8.2.3 Q3: There is an ACU WARNING *BUC calibration outdated*, what do I do?

Make a new manual OTC and wait until the GMU reboots and sends a new pointing request via OpenAMIP to the ACU. This clears the warning.

The ACU WARNING *BUC calibration outdated* is always shown after a cable calibration because it is mandatory to perform a new OTC. Cable calibration is normally only done at installation of the antenna or if the antenna cable or connectors have been changed or in a service situation.

8.8.2.4 Q4: How do I start a manual OTC procedure?

You start a manual OTC procedure from the web server of the GMU. The GMU (iDirect Core Module) does NOT support Internet Explorer, use Mozilla Firefox or Chrome!

1. Access the web interface of the ACU, select **SERVICE - Modem** and click the hyper link to the modem's web interface.

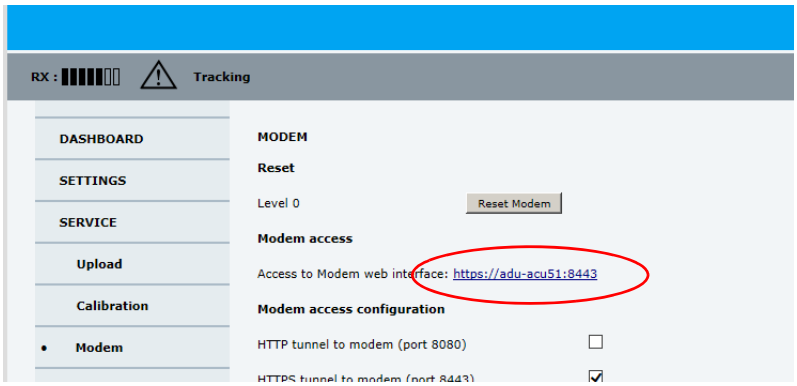


Figure 8-16: Start of OTC procedure 1/2

2. Log in to the GMU web interface. Select **COMMISSIONING - One Touch Commissioning** and click the **START** button.

Figure 8-17: Start of OTC procedure 2/2

8.8.2.5 Q5: What is the login to the GMU web server?

The login profiles are: admin / iDirect or admin / iDirect123!

From factory the login password is **iDirect**, after satellite connection Inmarsat changes it over the air to: **admin / iDirect123!**

The GMU (iDirect Core Module) does NOT support Internet Explorer, please use Mozilla Firefox or Chrome!

8.8.2.6 Q6: GMU stays in OTC calibration without end, what can I do?

Delete the GMU BUC calibration file, reboot the GMU and wait for another 10-15 minutes for the OTC to finish. For unknown reasons the BUC calibration can fail and the BUC calibration file might be corrupt.

8.8.2.7 Q7: How do I delete the BUC calibration file in the GMU?

Log in to the GMU Linux shell and issue following Linux command:

```
rm /sysopt/buc/buc_calibration
```

rm is a Linux command to remove (delete) files. The file name is `buc_calibration`.

8.8.2.8 Q8: How do I log in to the GMU Linux shell?

Make an SSH connection (Freeware: PuTTY.exe) to the ACU on IP port number 8022.

Example: `ssh 192.168.0.1:8022`

User and Password: `root / iDirect` or `root / iDirect123!`

8.8.2.9 Q9: ACU stays in BUC CALIBRATION state almost forever, what can I do?

Make a new manual OTC and wait until the GMU reboots and sends a new pointing request to the ACU.

The GMU had probably not finished its previous OTC calibration completely. Maybe it had been interrupted by the user. It is important to wait until the GMU reboots and sends the new pointing request as this will clear the BUC CALIBRATION state in the ACU.

8.8.2.10 Q10: Why does the DASHBOARD not show any satellite values?

Make sure that a straight-through Ethernet LAN cable is connected between the ACU LAN1 to GMU top left LAN port.

Figure 8-18: LAN port at GMU

Make sure the GMU is switched ON and that the GX modem satellite profile is activated in the ACU.

If there are still no satellite values on the DASHBOARD, then the GMU probably has a wrong configuration. Contact your Inmarsat service provider to get a new configuration file (TERMINAL_OPT.json) which must be uploaded manually to the GMU via the GMU web server.

It can take several minutes before the GMU sends the satellite information via OpenAMIP to the ACU.

8.8.2.11 Q11: How do I manually upload a new TERMINAL_OPT.json configuration file to the GMU?

Log in to the web server of the GMU from the ACU web server menu **CONFIGURATION - MODEM**. See *Q4: How do I start a manual OTC procedure?* on page 8-22.

Go to **ADMINISTRATION - TERMINAL** to upload the new TERMINAL_OPT.json file.

Figure 8-19: TERMINAL_OPT.json configuration file

See also *Q5: What is the login to the GMU web server?* on page 8-22.

8.8.2.12 Q12: BUC calibration reports: ERROR: Not Enough Modem Power During Ramping, BUC Not ready For OTC.

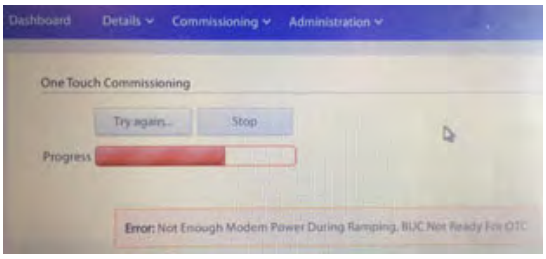


Figure 8-20: BUC calibration reports: Error

1. Check the GMU Tx cable, antenna cable and connectors and make a new cable calibration using the ACU web server.
2. Start the OTC again.

A possible reason may be that there is not enough power from the GMU tx-port to BUC.

8.8.2.13 Q13: What is my IP address for my PC to access the Internet?

1. Check the IP address from the GMU web server **DETAILS - IP CONFIGURATION VLANS**.

2. Select the tab for the user VLAN number. It is most likely VLAN 1010 or VLAN 3901.

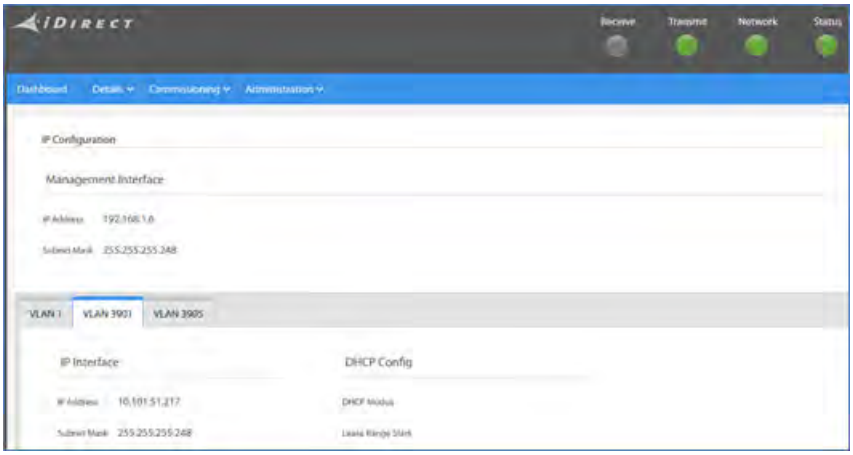


Figure 8-21: IP address of PC

3. On the PC configure the GW, DNS and subnet mask to the IP address and Subnet Mask shown in the VLAN tab.
4. Configure the IP address of the PC network card to one IP address higher.

Example: 0.101.51.218 (in the above example).

Unfortunately the IP addressing is not known by the SAILOR GX antenna system as the IP addresses are VLANs configured over the air by the Inmarsat system.

The PC must be connected to ACU LAN2 for Internet access.

8.8.2.14 Q14: How do I find the User VLAN?

1. Go to the ACU web server **SETTINGS - NETWORK**.
2. Scroll down to the bottom to find the VLAN table which shows the configuration done over the air by the Inmarsat system to the GMU.
3. Look for the VLAN(s) that has an entry (U or T) for PORT 2 which correspond to the ACU LAN2. These are the VLANs that have the information about the IP addresses for Internet access.

Vlan table

	VID	PORT 1	PORT 2	PORT 3	PORT 4
VLAN 1	1	U			
VLAN 3	3			U	
VLAN 4	4				U
VLAN 3901	3901	T	T		
VLAN 3905	3905	T	T		

U = Egress untagged
T = Egress tagged

Figure 8-22: VLAN table (example)

Typically Inmarsat uses VLAN 1010 or VLAN 3901 for the UserNET VLAN.

8.8.2.15 Q15: I do not have Internet access using the IP address for the UserNET VLAN. Why?

1. Go to the ACU web server **SETTINGS - NETWORK**.
2. Scroll down to the bottom to find the VLAN table which shows the network configuration done over the air by the Inmarsat system to the GMU.
3. Look for the VLAN(s) that has an entry (U or T) on PORT 2 which correspond to the ACU LAN2. If the entry shows T (Tagged) then you need a VLAN capable switch to get Internet access. If the entry shows U (Untagged) a standard PC can be used for Internet access and the issue is probably a commissioning issue.

The GMU can for each LAN port configure one VLAN whose outgoing packets on that port are untagged. Thereby the user can connect a standard PC and there is no need for complicated configuration of VLAN capable switches.

Only Inmarsat or your GX service provider can change these settings!

8.8.2.16 Q16: How can I confirm that the GMU is authenticated correctly to the Inmarsat GX network?

1. Make an SSH connection to the ACU service port (192.168.0.1) on IP port number 8022 which the ACU will route to the GMU.
2. Login using user/password: `root/iDirect` or `root/iDirect123!`.
3. At the Linux prompt issue the command: `telnet 0` to access the iDirect falcon application.
4. Log in using user/pass: `admin/iDirect` or `admin/iDirect123!`.
5. At the prompt issue the command: `remotestate`.

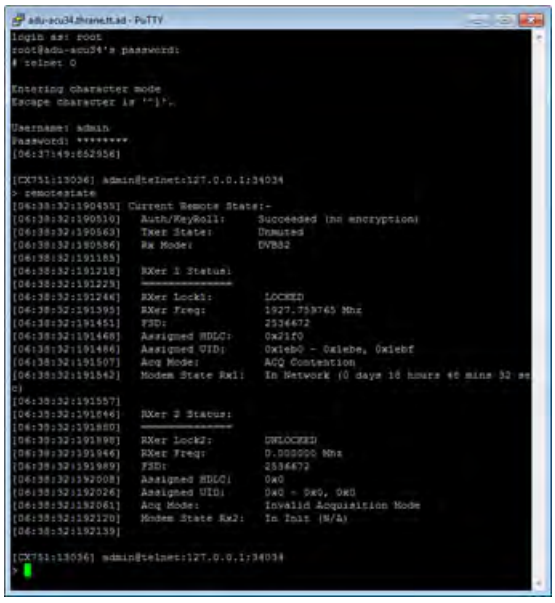


Figure 8-23: SSH connection to the ACU

6. Check the following: Tx state is Unmuted. Rx Mode: DVB-S2. Modem State: In Network.

7. Use the command `help` to show all available GMU commands.

8.8.2.17 Q17: The antenna is pointing in a wrong direction, what is wrong?

You have probably not made an azimuth calibration yet, or maybe moved the antenna recently during a stationary test setup. Perform a new azimuth calibration.

Always use heading input when available on the ship. Only use gyro free mode when the ship does not have a gyro installed. Use fixed heading when testing in the workshop.

8.8.2.18 Q18: How do I perform an azimuth calibration?

1. Go to ACU web server **SERVICE - CALIBRATION**.
2. Select User Defined satellite.
3. Type in the visible GX satellite longitude (55W, 62.6E or 180W), type in 19.707 GHz for tracking frequency
4. Select GSC for satellite identifier
5. Click **START**.

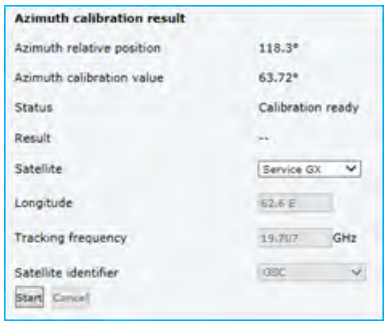


Figure 8-24: Azimuth calibration result

The SAILOR GX antenna will turn +360 degrees in order to locate the Inmarsat GX satellite and then calibrate the azimuth offset according to the BOW of the ship.

8.8.2.19 Q19: After successful azimuth calibration the antenna is still pointing in a wrong direction, what is wrong?

You have made a successful azimuth calibration, but the antenna status stays in the status **ACQUISITION**. The reason for this may be that the antenna has found another GX satellite than the one you intended it to use for the azimuth calibration. This is the case if you make the azimuth calibration when in an area that is covered by two satellites, see the following figure.

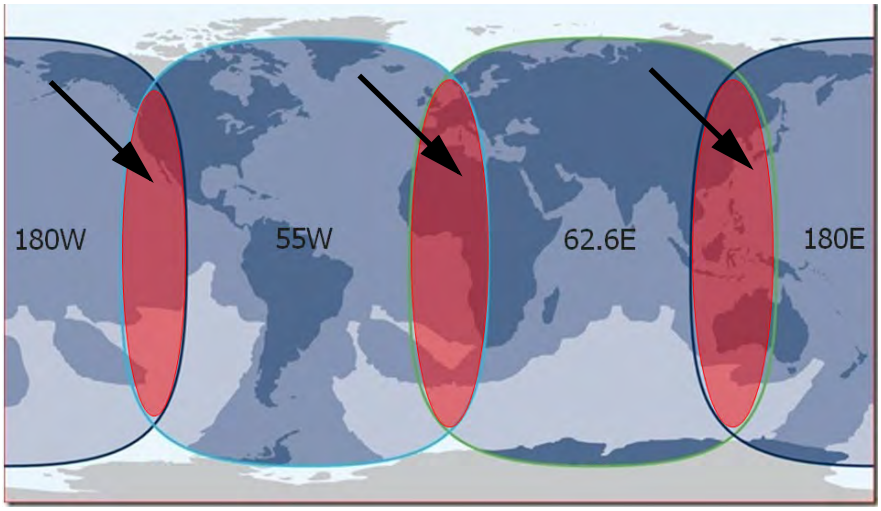


Figure 8-25: GX satellites with overlapping areas

Example: Calibration in a European harbor (within the red area). There are two GX satellites on the same elevation: 62.6E and 55W.

The SAILOR GX cannot tell the difference between the GSC signal sent by the GX satellite on 62.6E and the GSC signal sent by the GX satellite on 55W (Same frequency and same Global Signalling Channel). In rare cases the SAILOR GX might find the 'opposite' satellite during the azimuth calibration. As a consequence, the azimuth calibration value will be wrong. The azimuth calibration value is the relation between vessel heading and the antenna zero point. This causes the antenna to miss point when put into normal operation.

Note The azimuth calibration will show successful even if the opposite satellite is found. And if the modem uses the same satellite as used for azimuth calibration, a successful connection will be established. But when a change to a new satellite is needed the SAILOR GX will point in the wrong direction.

8.8.2.20 Action

Check the azimuth calibration value against the position of the service hatch of the antenna.

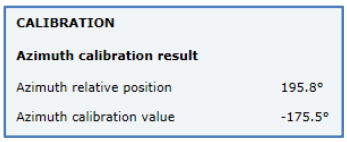


Figure 8-26: Check of azimuth calibration value

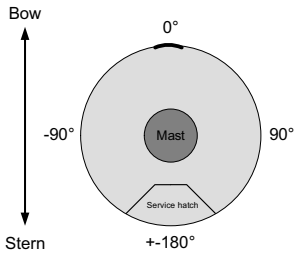
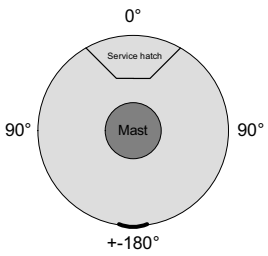
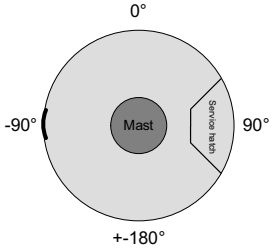
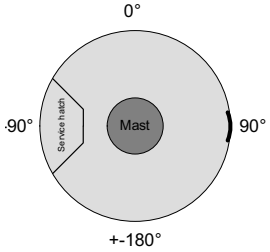
			
Azimuth calibration value must be in the range of **-10˚ to +10˚**.	Azimuth calibration value must be in the range of **+170˚ to -170˚**.	Azimuth calibration value must be in the range of **-80˚ to -100˚**.	Azimuth calibration value must be in the range of **+80˚ to +100˚**.

Table 8-3: Antenna orientation and azimuth calibration value

If the azimuth calibration value is not in the valid range, you must make a new calibration. Enter the position of the other GX satellite in the overlapping area. Web interface, SERVICE > Calibration > Azimuth calibration (user controlled).

8.8.2.21 Examples

In this example the hatch faces the bow of the vessel.

'Good' calibration	
Expected azimuth calibration value	Between +170˚ and -170˚
Actual azimuth calibration value	-175.50˚
Position	Copenhagen
Satellite selected	62.6E
Satellite found	62.6E

Table 8-4: Example of a good calibration

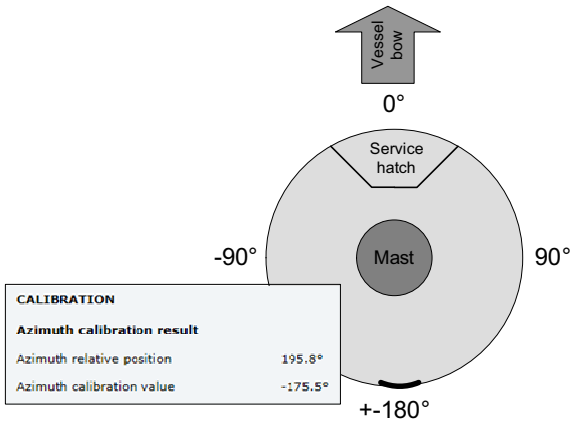


Figure 8-27: Example of a good calibration

'Bad' calibration	
Expected Azimuth Calibration value	Between +170˚ and -170˚
Actual Azimuth calibration value	-45.5˚
Position	Copenhagen
Satellite selected	62.6E
Satellite found	55W

Table 8-5: Example of a bad calibration

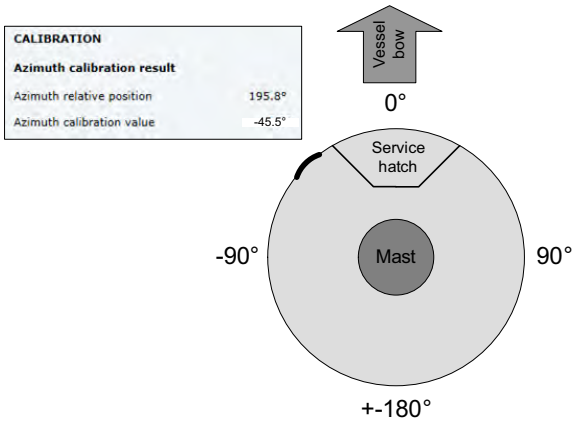


Figure 8-28: Example of a bad calibration

8.8.2.22 How to correct the issue

1. Run the Azimuth calibration using the most western satellite.
2. If the Azimuth calibration offset value is still off, or the Azimuth calibration fails, rerun Azimuth calibration using the most eastern satellite.

8.8.2.23 Q20: Why do I get the 08A02-0 ADM WARNING GX Core Module temperature?

This warning is triggered by a temperature sensor in the GMU. The ambient temperature of the GMU is approaching the temperature limits of -25˚C or +55˚C. If the situation gets worse the GMU might automatically switch OFF in order to protect the electronics.

At high temperatures check that the GMU has approximately 4-5 cm free space at the sides in the 19" rack cabinet and is not blocked by supporting rails. Ensure sufficient airflow in the 19" rack cabinet.

8.8.2.24 Q21: Why do I get the 08A03-0 ADM ERROR GX Core Module power?

This error is triggered by the GMU Power Good signal on RS-232, pin 6. It might also have been triggered because the GMU temperature is outside the limits and the GMU automatically has switched OFF. See Q20.

Check the cables between the GMU and ACU.

At high temperature check that the GMU has approximately 4-5 cm free space at the sides in the 19" rack cabinet and is not blocked by supporting rails. Ensure sufficient airflow in the 19" rack cabinet. The hysteresis for switch ON again is approximately 3˚C.

8.8.2.25 Q22: Why do I get the 08A04-0 ADM WARNING iDirect modem; ACU detected a warning/error in the iDirect modem.

This warning is communicated by the GMU iDirect Core Module to the ACU on SNMP protocol. The warning can be a temperature, test or fan error.

Log in to the GMU to get further information. For login to the GMU see Q4 and Q5.

8.8.2.26 Q23: OTC reports: ERROR: BUC Local Oscillator Unlocked, BUC Not ready For OTC.

Figure 8-29: Error: BUC Local Oscillator Unlocked

Check RS-232 and RS-422 cables between the ACU and GMU.

The GMU communicates directly with the BUC through these serial port connections.

8.8.2.27 Q24: Why do I get the 08075-0 ADM WARNING Rx cable calibration?

The calibration of the ACU-antenna cable failed. The cable could be defective, too long, of too poor quality, not properly connected, or the VIM or ACU hardware could be defective.

This warning can also be present if the antenna system has the old software version 1.50 build 16. Always make sure to update your antenna system to the latest official release as the software is constantly improved and updated to support new features for the Inmarsat GX system.

8.9 To return units for repair

Should your Cobham SATCOM product fail, contact your dealer or installer, or the nearest Cobham SATCOM partner. You will find the partner details on www.cobhamsatcom.com/where-to-buy. You can also access www.cobhamsatcom.com and select **COBHAM SYNC PARTNER PORTAL**, which may help you solve the problem. Your dealer, installer or Cobham SATCOM partner will assist you whether the need is user training, technical support, arranging on-site repair or sending the product for repair. Your dealer, installer or Cobham SATCOM partner will also take care of any warranty issue.

Technical specifications

This appendix has the following sections:

- *SAILOR 100 GX specifications*
- *SAILOR 100 GX specifications*
- *Patents*
- *SAILOR 100 GX-R2 4.5W or 9.0W specifications*

A.1 SAILOR 100 GX specifications

SYSTEM SPECIFICATIONS	
Frequency band	Ka-band (Inmarsat GX)
Reflector size	103 cm / 40.6”
Type approvals	Inmarsat
Certification	Compliant with CE (Maritime), ETSI, FCC
System power supply range	100-240 VAC, 50-60 Hz
Total system power consumption	175W typical, 370W peak
Vibration, operational	Sine: EN60945 (8.7.2), DNV 2.4A, MIL-STD-167-1 (5.1.3.3.5).
Vibration, survival	Sine: EN60945 (8.7.2) dwell, MIL-STD-167-1 (5.1.3.3.5) dwell. EN60721-3-6 class 6M3 mod. by EN60721-4-6
Shock	EN60721-3-6 class 6M3 mod. by EN60721-4-6.
Temperature (ambient)	Operational: -25°C to 55°C Operational with P/N:407090-001 heater option: -60°C to 55°C Storage: -40°C to 85°C
FREQUENCY BAND	
Rx	19.2 to 20.2 GHz
Tx	29.0 to 30.0 GHz
ANTENNA CABLE	
ACU to ADU cable	Single 50 Ω coax cable for Rx, Tx and antenna power. 50 Ω N-Connector
ABOVE DECK UNIT (ADU)	
Antenna type, pedestal	3-axis stabilised tracking antenna with integrated GNSS (GPS, GLONASS, Beidou)
Antenna type, reflector system	Reflector/sub-reflector, ring focus
Transmit Gain	47.5 dBi typ. @ 29.5 GHz (excl. radome)
Receive Gain	44.0 dBi typ. @ 19.7 GHz (excl. radome)
System G/T	20.1 dB/K typ. @ 19.7 GHz, at ≥10° elevation and clear sky (incl. radome)
LNB	GX Ka single band LNB
BUC output power	5 Watt or 10 Watt
EIRP	5 W: ≥53.5 dBW (incl. radome) 10 W: ≥57.1 dBW (incl. radome)
Tracking Receiver	Internal “all band/modulation type” including e.g. power, DVB-S2, GSC and modem RSSI
Polarisation	Circular Cross-Pol (Inmarsat GX, TX: RHCP, RX: LHCP)
Elevation Range	-25° to +125°
Cross Elevation	+/-42°
Azimuth range	Unlimited (Rotary Joint)
Ship motion, angular	Roll +/-25° (6 sec), Pitch +/-15° (5 sec), Yaw +/-10° (8 sec)
Ship, turning rate and acceleration	15°/S and 15°/S2
ADU motion, linear	Linear accelerations +/-2.5 g max any direction
Satellite acquisition	Automatic - with or without Gyro/GPS Compass input
Humidity	100%, condensing
Rain / IP class	EN60945 Exposed / IP56
Wind	80 kt. operational 110 kt. survival
Ice, survival	25 mm / 1”
Solar radiation	1120 W/m2 to MIL-STD-810F 505.4
Compass safe distance	1.0 m / 40” to EN60945
Maintenance, scheduled	None
Maintenance, unscheduled	All electronic, electromechanical modules and belts are replaceable through hatch
Built In Test	Power On Self Test, Person Activated Self Test and Continuous Monitoring w. error logging
Dimensions	Height: H 150 cm / 58.9” Diameter: Ø 130 cm / 51.3”
Weight	126 kg / 276 lb.
ANTENNA CONTROL UNIT (ACU)	
Dimensions	1U 19” rack mount HxWxD: 4.4 x 48 x 33 cm HxWxD: 1.75” x 19” x 13”
Weight	4.5 kg / 10 lb.
Humidity	EN60945 Protected, 95% (non-condensing)
IP class	IP30
Compass safe distance	0.3m / 12” to EN60945
Interfaces	1 x N-Connector for antenna RF Cable (50 Ω) with automatic cable loss compensation 2 x F-Connectors (75 Ω) for Rx and Tx to modem 1 x RS-422 (modem control) 1 x RS-232 (modem control) 1 x NMEA 0183 (RS-422 or RS-232) for Gyro/GPS Compass input and external GPS 1 x RJ-45 Ethernet (modem control) 3 x RJ-45 Ethernet (service and user) 1 x AC power input 1 x Grounding bolt

Input power	100 - 240 VAC, 175 W typical, 370 W peak
Modem control	Generic, OpenAMIP, Custom protocol
User interface	Webserver, OLED display (red), 5 pushbuttons, 3 discrete indicator LEDs and On/Off switch
Temperature control	Built-in fan
Blocking zones	Programmable, 8 zones with azimuth and elevation Real-time blocking map recorder
Remote access and management	HTTPS, SSH, SNMP Traps, Syslog, CLI, Diagnostic, Statistic
GX MODEM UNIT (GMU)	
Modem type	SAILOR Global Xpress modem
Dimensions	1U 19” rack mount HxWxD: 4.4 x 48 x 33 cm HxWxD: 1.75” x 19” x 13”
Weight	3.5 kg / 7.7 lb
Humidity	EN60945 Protected, 95% (non-condensing)
IP class	IP30
Compass safe distance	0.4 m / 16” to EN60945
Interfaces	2 x F-Connectors (75 Ω) for Rx and Tx to ACU 1 x RJ-45 Ethernet for control and user data 1 x RS-422 (Modem Control) 1 x RS-232 (Modem Control) 1 x RS-232 Modem console 1 x AC power input 1 x Grounding bolt
Input power	100 - 240 VAC, 90 W peak, 30 W typical
Modem interface control	OpenAMIP, RS-422 and RS-232
User interface	Webserver, On/Off switch and power LED
Temperature control	Built-in fan and heater

A.2 SAILOR 100 GX-R2 4.5W or 9.0W specifications

SYSTEM SPECIFICATIONS	
Frequency band	Ka-band (Inmarsat GX-R2)
Reflector size	103 cm / 40.6”
Type approvals	Inmarsat
Certification	Compliant with CE (Maritime), ETSI, FCC
System power supply range	100-240 VAC, 50-60 Hz
Total system power consumption	175W typical, 370W peak
Vibration, operational	Sine: EN60945 (8.7.2), DNV 2.4A, MIL-STD-167-1 (5.1.3.3.5).
Vibration, survival	Sine: EN60945 (8.7.2) dwell, MIL-STD-167-1 (5.1.3.3.5) dwell. EN60721-3-6 class 6M3 mod. by EN60721-4-6
Shock	EN60721-3-6 class 6M3 mod. by EN60721-4-6.
Temperature (ambient)	Operational: -25°C to 55°C Operational with P/N:407090-001 heater option: -60°C to 55°C Storage: -40°C to 85°C
FREQUENCY BAND	
Rx	17.7 to 20.2 GHz
Tx	27.5 to 30.0 GHz
ANTENNA CABLE	
ACU to ADU cable	Single 50 Ω coax cable for Rx, Tx and antenna power. 50 Ω N-Connector
ABOVE DECK UNIT (ADU)	
Antenna type, pedestal	3-axis stabilised tracking antenna with integrated GNSS (GPS, GLONASS, Beidou)
Antenna type, reflector system	Reflector/sub-reflector, ring focus
Transmit Gain	48.3 dBi typ. @ 29.5 GHz (incl. radome)
Receive Gain	43.9 dBi typ. @ 19.7 GHz (incl. radome)
System G/T	20.6 dB/K typ. @ 19.7 GHz, at ≥10° elevation and clear sky (incl. radome)
LNB	Inmarsat GX-R2 transceiver
GX-R2 transceiver output power	4.5 Watt or 9.0 Watt
EIRP	4.5 W: ≥54.1 dBW (incl. radome) 9.0 W: ≥57.1 dBW (incl. radome)
Tracking Receiver	Internal “all band/modulation type” including e.g. power, DVB-S2, GSC and modem RSSI
Polarisation	Circular (RHCP, LHCP), Co-Pol and X-Pol
Elevation Range	-25° to +125°
Cross Elevation	+/-42°
Azimuth range	Unlimited (Rotary Joint)
Ship motion, angular	Roll +/-25° (6 sec), Pitch +/-15° (5 sec), Yaw +/-10° (8 sec)
Ship, turning rate and acceleration	15°/S and 15°/S2
ADU motion, linear	Linear accelerations +/-2.5 g max any direction
Satellite acquisition	Automatic - with or without Gyro/GPS Compass input
Humidity	100%, condensing
Rain / IP class	EN60945 Exposed / IP56
Wind	80 kt. operational 110 kt. survival
Ice, survival	25 mm / 1”
Solar radiation	1120 W/m2 to MIL-STD-810F 505.4
Compass safe distance	1.0 m / 40” to EN60945
Maintenance, scheduled	None
Maintenance, unscheduled	All electronic, electromechanical modules and belts are replaceable through hatch
Built In Test	Power On Self Test, Person Activated Self Test and Continuous Monitoring w. error logging
Dimensions	Height: H 150 cm / 58.9” Diameter: Ø 130 cm / 51.3”
Weight	126 kg / 276 lb.
ANTENNA CONTROL UNIT (ACU)	
Dimensions	1U 19” rack mount HxWxD: 4.4 x 48 x 33 cm HxWxD: 1.75” x 19” x 13”
Weight	4.5 kg / 10 lb.
Humidity	EN60945 Protected, 95% (non-condensing)
IP class	IP30
Compass safe distance	0.3m / 12” to EN60945
Interfaces	1 x N-Connector for antenna RF Cable (50 Ω) with automatic cable loss compensation 2 x F-Connectors (75 Ω) for Rx and Tx to modem 1 x RS-422 (modem control) 1 x RS-232 (modem control) 1 x NMEA 0183 (RS-422 or RS-232) for Gyro/GPS Compass input and external GPS 1 x RJ-45 Ethernet (modem control) 3 x RJ-45 Ethernet (service and user) 1 x AC power input 1 x Grounding bolt

Input power	100 - 240 VAC, 175 W typical, 370 W peak
Modem control	Generic, OpenAMIP, Custom protocol
User interface	Webserver, OLED display (red), 5 pushbuttons, 3 discrete indicator LEDs and On/Off switch
Temperature control	Built-in fan
Blocking zones	Programmable, 8 zones with azimuth and elevation Real-time blocking map recorder
Remote access and management	HTTPS, SSH, SNMP Traps, Syslog, CLI, Diagnostic, Statistic
GX MODEM UNIT (GMU)	
Modem type	SAILOR Global Xpress modem
Dimensions	1U 19" rack mount HxWxD: 4.4 x 48 x 33 cm HxWxD: 1.75" x 19" x 13"
Weight	3.5 kg / 7.7 lb
Humidity	EN60945 Protected, 95% (non-condensing)
IP class	IP30
Compass safe distance	0.4 m / 16" to EN60945
Interfaces	2 x F-Connectors (75 Ω) for Rx and Tx to ACU 1 x RJ-45 Ethernet for control and user data 1 x RS-422 (Modem Control) 1 x RS-232 (Modem Control) 1 x RS-232 Modem console 1 x AC power input 1 x Grounding bolt
Input power	100 - 240 VAC, 90 W peak, 30 W typical
Modem interface control	OpenAMIP, RS-422 and RS-232
User interface	Webserver, On/Off switch and power LED
Temperature control	Built-in fan and heater

A.3 Patents

Patent application number	Description
11749202.5; 10-2013-7008607; 13/819,621	An assembly comprising a movable and brakable/dampable part and a method for braking a movable part
PCT/EP2012/063849	Combined antennas without switch
Currently applying	Reflector with enforcement ring

Table A-1: Patents

A.4 Outline drawings

A.4.1 ADU

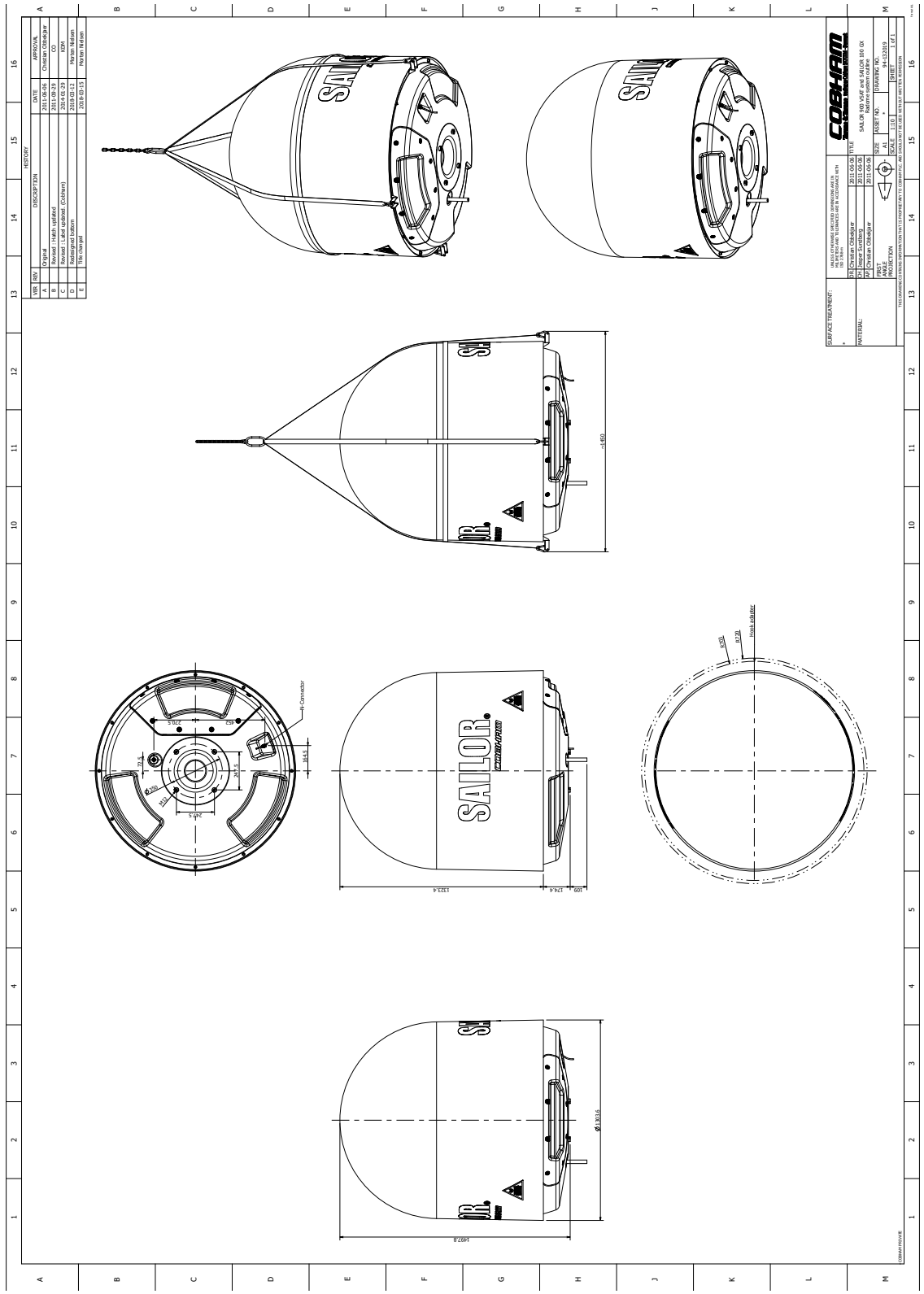


Figure A-1: Outline drawing: ADU

A.4.2 ACU

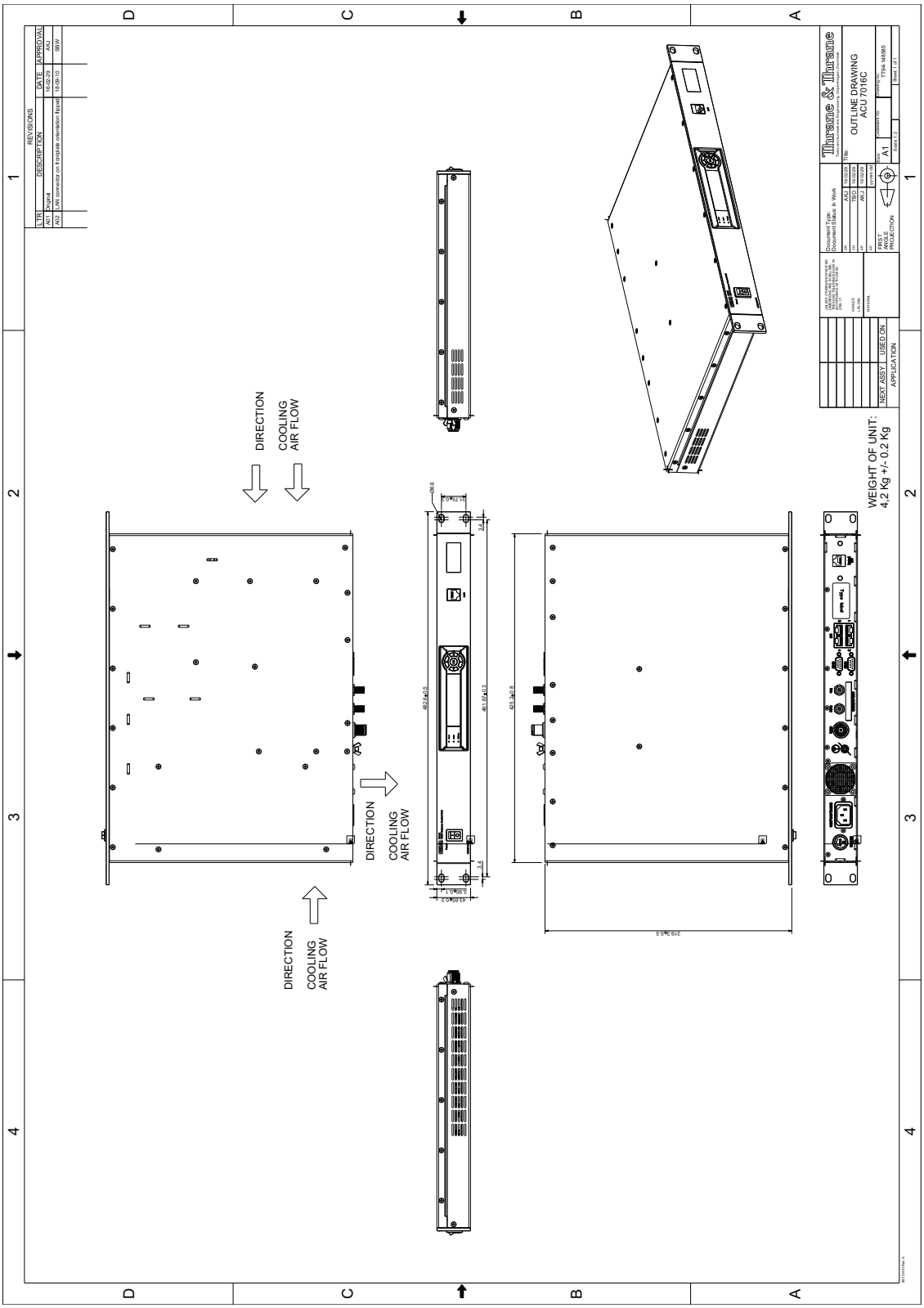


Figure A-2: Outline drawing: ACU, (SAILOR 7016C)

A.4.3 Modem

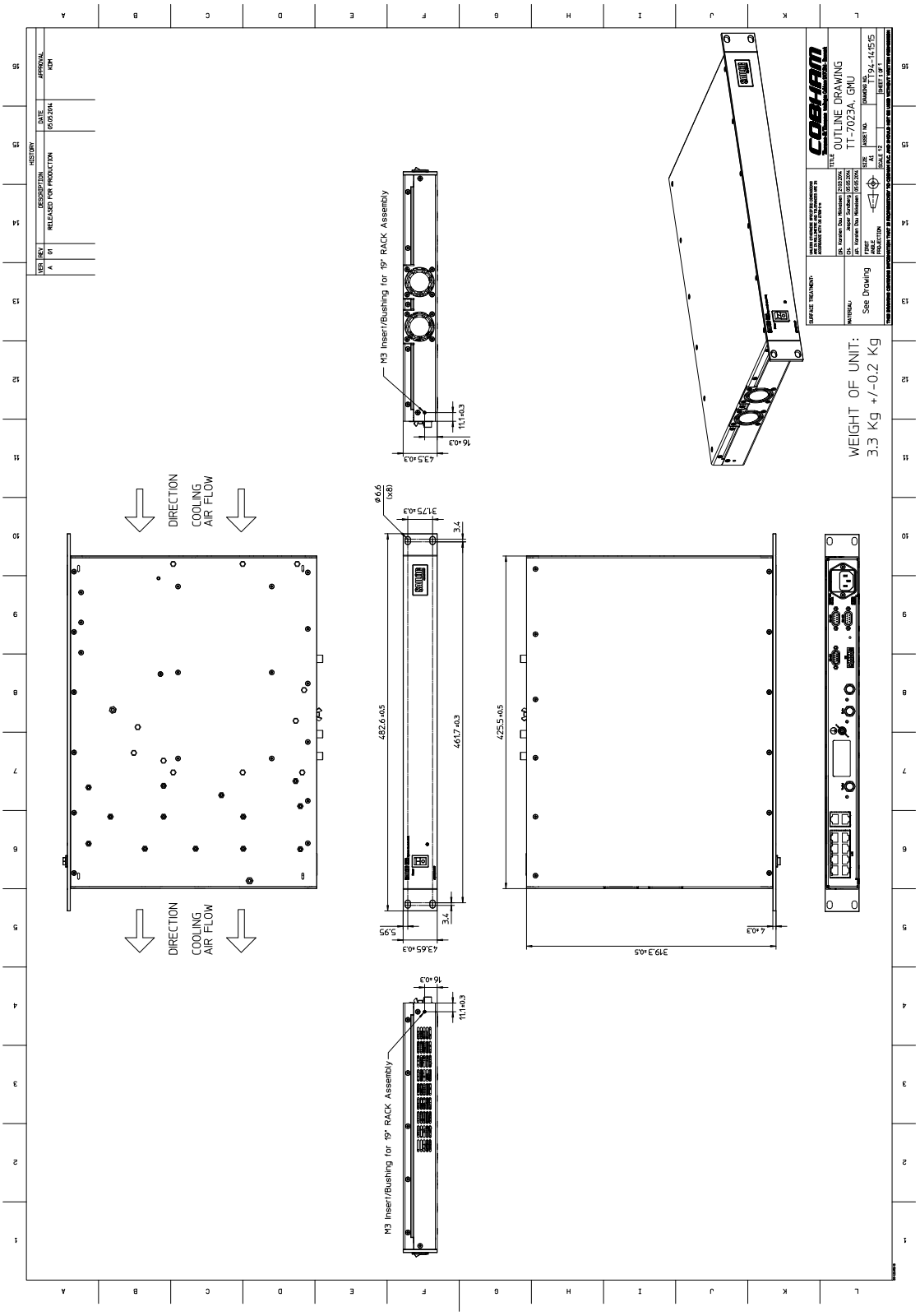


Figure A-3: OUtline drawing, GMU

A.5 X7 Modem BUC & Console to ACU cable

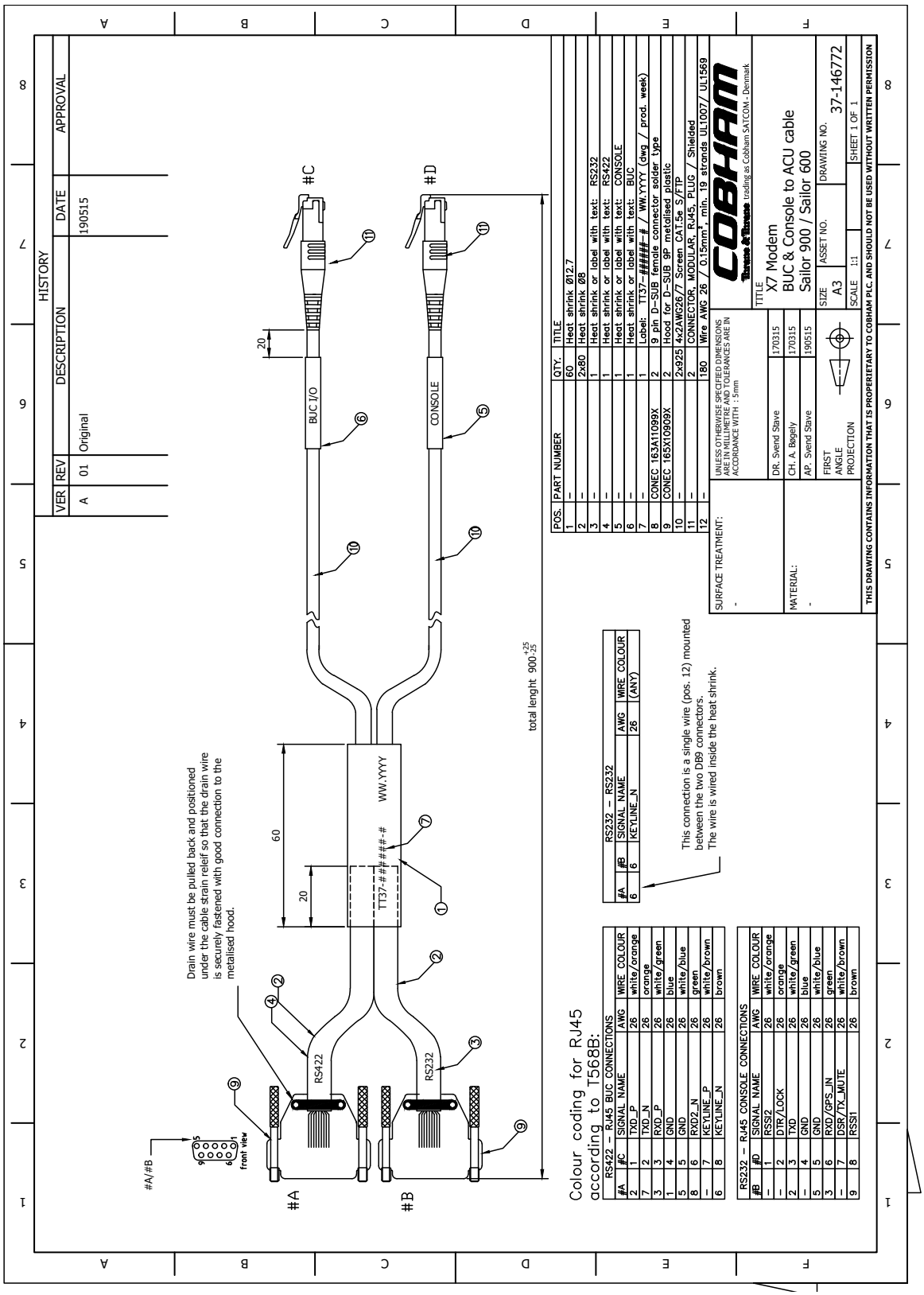


Figure A-4: X7 Modem BUC & Console to ACU cable

Antenna Diversity Solution (ADS)

This appendix has the following sections:

- *Introduction*
- *Installation of the dual-antenna mode*
- *Configuration of the dual antenna mode*
- *Flow chart for dual antenna mode*

B.1 Introduction

The SAILOR VSAT Antenna Diversity Solution (ADS) from Cobham SATCOM has the following unique features:

- Simple installation due to single cable antenna system.
- Cost effective solution using cables and COTS RF splitters, no need for additional 19" rack-mount units.
- Ensures maximum system uptime.
- Fully automatic switching to the other GX VSAT antenna, no user intervention needed.
- Switching upon programmed blocking zones.
- Switching if tracking signal strength drops 4 dB below the signal strength in the idle antenna.
- Switching if the ADU is malfunctioning.
- Configured in minutes, using the built-in web server user interface.

You can use the SAILOR VSAT in dual antenna mode (GXADS) to minimize downtime of the GX service in a Fleet Xpress system. The following figure shows a simplified system overview of the SAILOR 100 GX ADS.

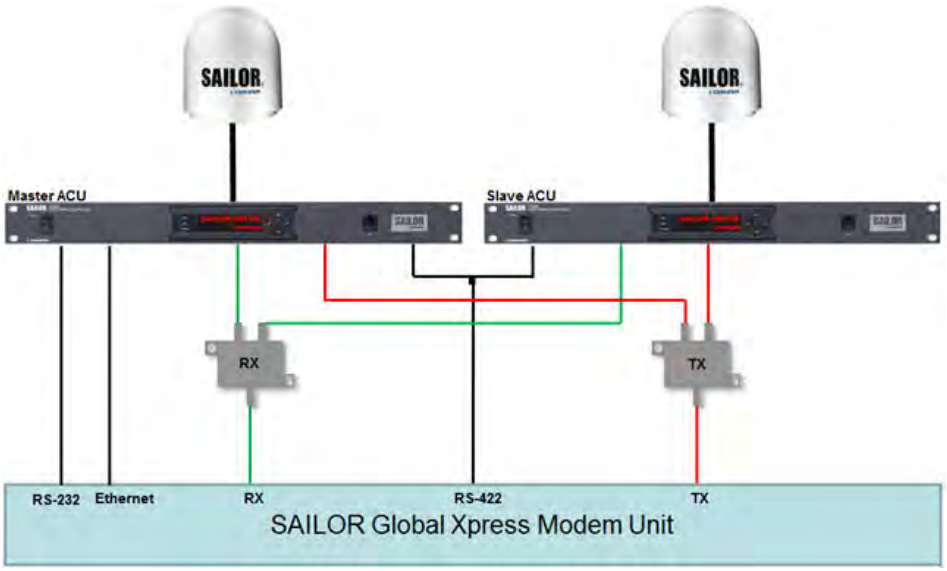


Figure B-1: Simplified system overview

The Antenna Diversity Solution (ADS) works with 2 GX antennas and one GX modem. There is GPS redundancy through support using the slave GPS.

B.2 Installation of the dual-antenna mode

Parts needed

The following parts are needed for the SAILOR 100 GX ADS:

- 1 x 407090C/407090G SAILOR 100 GX system (Master System)
- 1 x 407090C/407090G SAILOR 100 GXADU (Slave Above Deck Unit)
- 1 x 407016C SAILOR 100 GXACU (Slave Antenna Control Unit)
- 1 x 407090C-010 SAILOR ADS Cable Kit (Cable and RF splitters)
  The SAILOR ADS Cable Kit consists of two 75 Ohm RF cables, two RF splitters/combiners and a keyline-signal splitter cable.

Software revisions needed for the SAILOR 100 GX ADS:

- SAILOR 100 GX: Minimum software version 1.60
- SAILOR GMU: Minimum iDirect firmware version CX7xx_rootfs_rmt_1.5.1.0-131

System overview

A Master ACU and a Slave ACU are defined in the system. The modem is connected to and configured as modem in the Master ACU. The Slave ACU is configured as a slave unit by selecting the Master antenna as modem. The satellite information is communicated by the modem to the Master ACU through an Ethernet cable. The BUC M&C is communicated by the modem to the Master ACU through a standard serial cable. The BUC Key Line is controlled by the modem through a key-line splitter cable from the modem to each ACU (Master & Slave).

The switching from one antenna to the other is handled by the Master ACU based on several criteria, like predefined blocking zones, unexpected blocking or antenna state. In case the active antenna enters a blocking zone or is blocked by f.ex. a crane, the Master ACU commands the idle antenna of the dual antenna system to take over and the system continues to provide network access. A connection diagram is shown in the following figure.

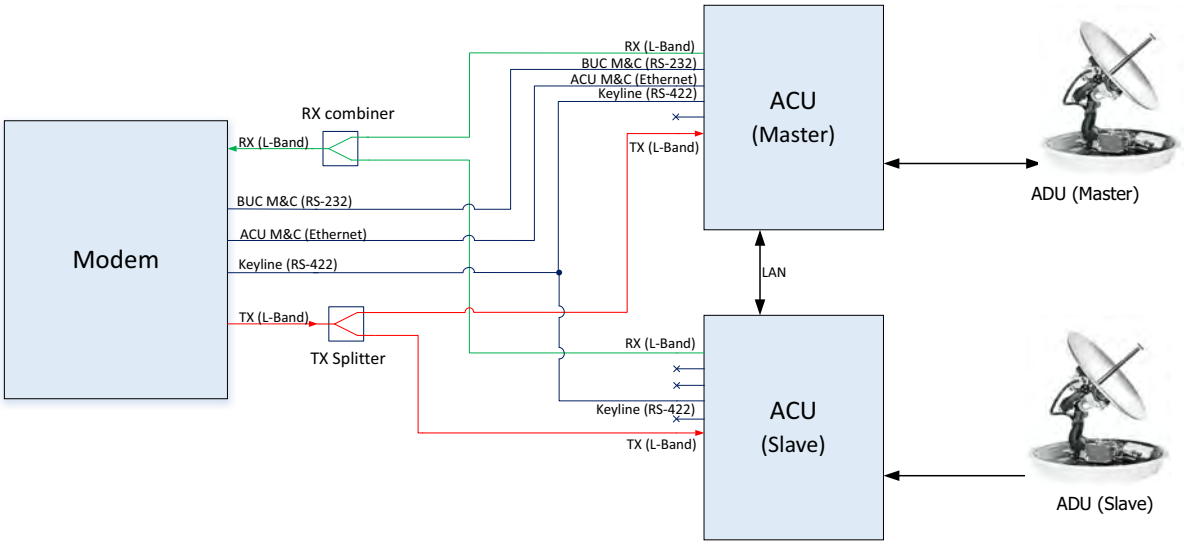


Figure B-2: ADS connection diagram

Installation

To install the dual antennas, do as follows:

Important Do not power on the modem; the modem must only be turned on when the complete system is ready to perform a One Touch Commissioning (OTC).

1. Install the Master ADU, ACU, the RX combiner and the modem as shown in **Figure B-2: ADS connection diagram**.
2. Install the Slave ADU, ACU, the TX splitter as shown in **Figure B-2: ADS connection diagram**.
3. Provide the vessel heading in the web interface of the Master ACU and Slave ACU, see *NMEA 0183 connector* on page 4-3.
4. Connect the cables as shown in **Figure B-2: ADS connection diagram** and in the following table.

Cable.	Connect cables GX specific	Purpose
1	GMU LAN Port 1 to Master ACU LAN port 1	Modem M&C connection
2	Master ACU LAN Port 2 to Cisco router	Inmarsat payload
3	Master ACU LAN Port 3 to Cisco router	Inmarsat payload
4	Master ACU LAN 4 to Slave ACU LAN1	Master/slave/GMU management
5	GMU Keyline to both ACUs RS422 (Cable order number 37-159192)	Provide keyline signal to both ACUs
6	Master ACU RS232 to GMU RS232	BUC M&C
7	Master ACU Rx Out to Rx combiner input 1	Rx when Master is active
8	Slave ACU Rx Out to Rx combiner input 2	Rx when Slave is active
9	Rx combiner output to GMU Rx 1	Rx to GMU
10	Master ACU Tx In to Tx splitter output 1	Enabled when Master is active
11	Slave ACU Tx In to Tx splitter output 2	Enabled when Slave is active
12	Tx splitter input to GMU Tx out	Tx from GMU

Table B-1: GX ADS, dual mode antenna, cabling

LAN setup and cabling

1. In GX ADS, bridge LAN1, LAN3 and LAN4 on master and slave.
2. Access the Master ACU on LAN port 1,3 & 4, IP:192.168.1.2
3. Access the Slave ACU on LAN port 1, 3 & 4 ip:192.168.1.102.
4. Connect the management device to LAN3 on slave. See Figure 3 GX ADS LAN cabling.

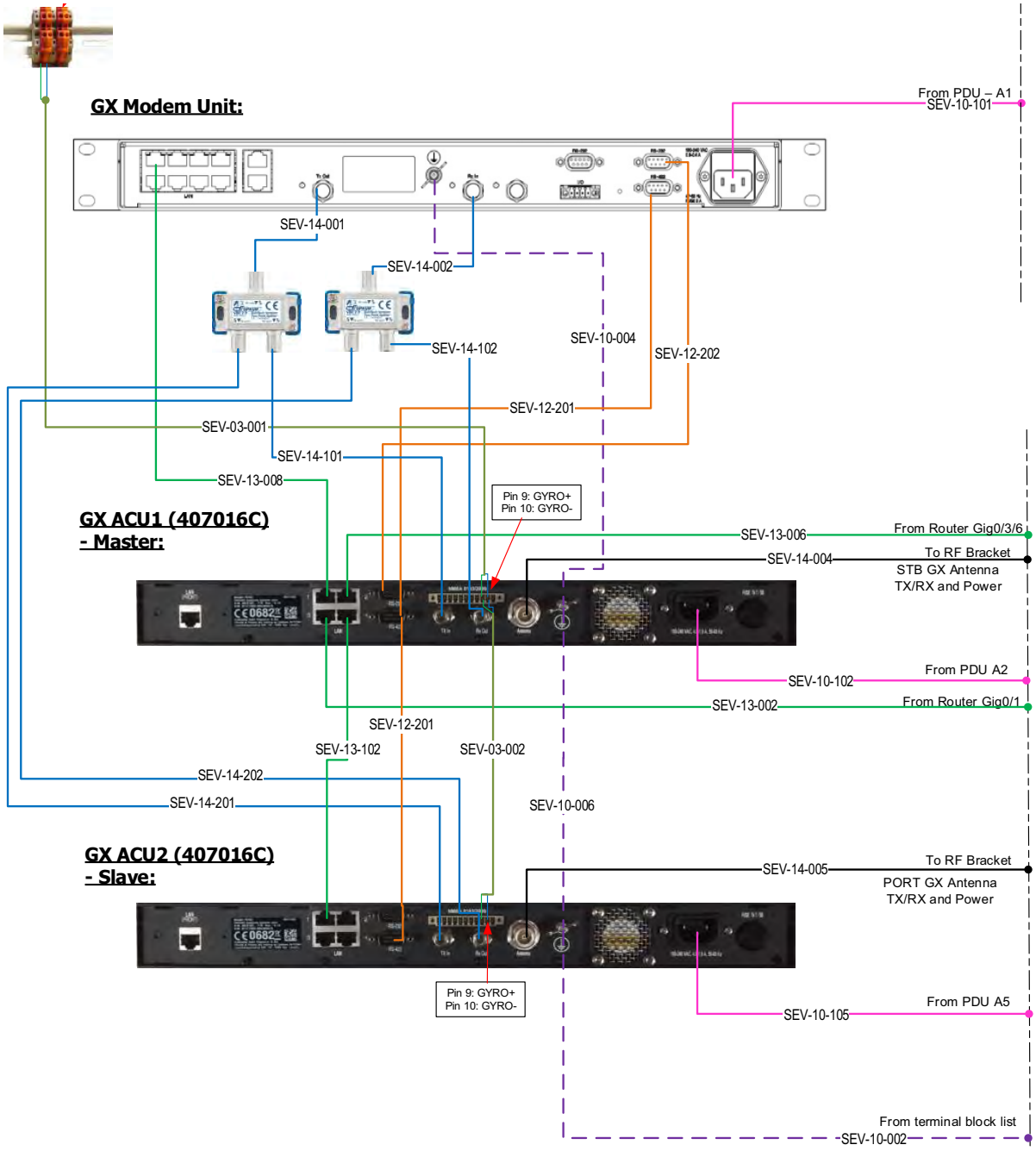


Figure B-3: GX ADS LAN cabling[a]

a. SEV are the cable annotations used by Inmarsat.

B.3 Configuration of the dual antenna mode

B.3.1 Dual antenna mode

Prerequisites

Important Do not power up the GMU at this point in time.

Before setting up the dual-antenna system and powering the modem set the following items:

1. Make a GX Modem profile configuration (on Master)
2. Make a Satellite profile using the GX Modem profile (on Master)
3. Make a Dual Antenna Master Modem profile (on Slave)
4. Make a Satellite profile using Dual Antenna Master Modem profile (on Slave)
5. Make an azimuth calibration for each antenna. This can be done by manually entering GSC information.
6. Make a Tx cable calibration for the Master antenna system and for the Slave antenna system.

Task overview for setting up a dual-antenna system

Setting up a dual-antenna system consists of the following tasks:

1. *To configure the Master ACU*
2. *To configure the Slave ACU*
3. *To set up blocking zones for dual antenna setup*
4. *To make an OTC for ADS systems*

Switching between Master and Slave antenna

On the DASHBOARD of the web interface, in the lower right hand corner, there is a hyper link which you can use to jump between the DASHBOARD of the Master and Slave antennas. Here it is also possible, like in the top bar, to see if the you are on the Master or Slave antenna and if the antenna is Active or Idle. The display of the idle ACU shows IDLE in the display's upper status line, to the right of NAV:xx.

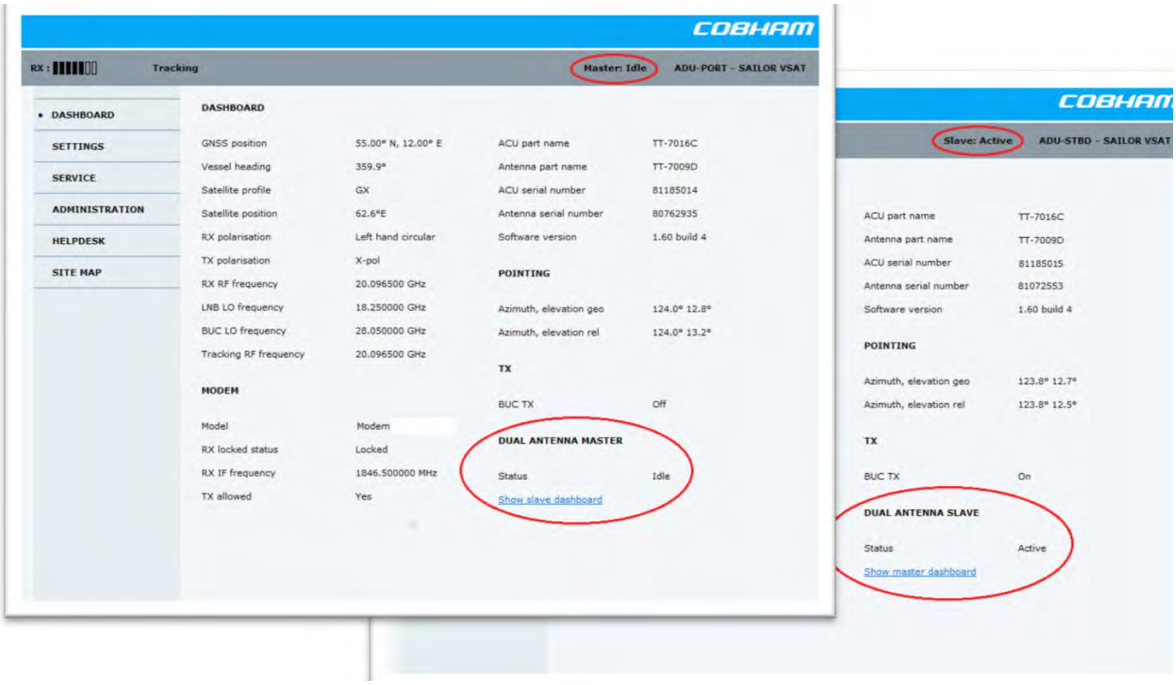


Figure B-4: Web interface, DASHBOARD of the Master and Slave antenna

The dual-antenna system switches between the 2 antennas in the following scenarios:

- When in a programmed blocking zone.
- When the signal of the active antenna is blocked for more than 2 minutes
- When the tracking signal is reduced to at least 4dB below the idle antenna.
- ADU is malfunctioning.

In the statistics report you can get more detailed information on the dual-antenna mode.

B.3.2 To configure the Master ACU

The Master ACU is configured exactly the same way as a stand-alone VSAT system with satellite and modem profiles.

To activate the ACU to be a Dual Antenna Master do as follows:

1. In the web interface on the page **SETTINGS > Network** select for **LAN Port 3**: **Service** “Switched with port 1”.

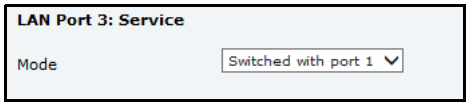


Figure B-5: Web interface, Network, LAN Port 3:Service

2. Go to **SETTINGS > Dual antenna**.

3. Select **Enable** and click **Apply**.

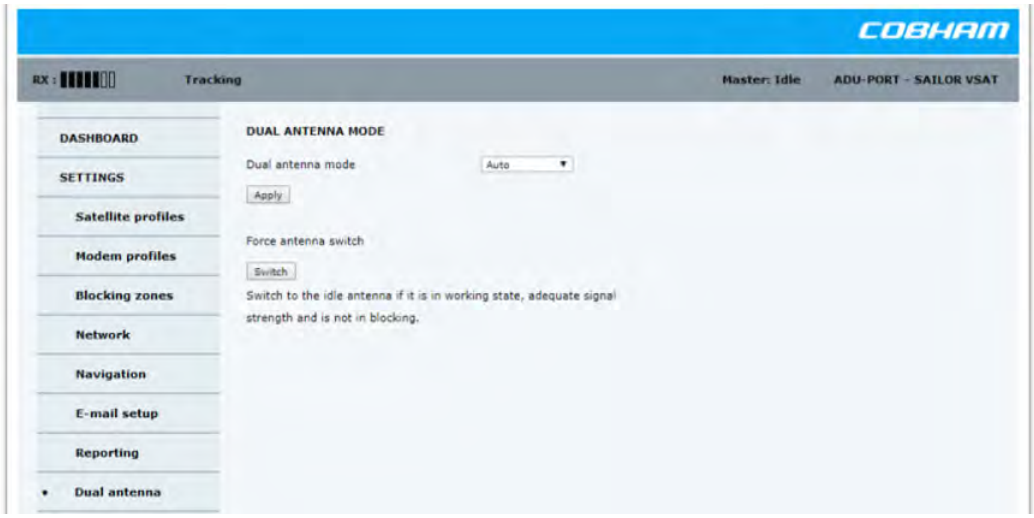


Figure B-6: Setup of the Master ACU

This SAILOR VSAT is now ready to act as Master ACU.

B.3.3 To configure the Slave ACU

The Slave ACU must be configured to use the Master ACU as a VSAT modem. The VSAT modem profile must point to the IP address of the Master ACU, which is the IP address 192.168.1.2 of LAN 2 port to where the Master/Slave communication cable is connected. The Slave antenna IP for LAN port 1 is automatically configured to IP:192.168.1.102.

To activate the ACU to be a Dual Antenna Slave do as follows:

1. In the web interface on the page **SETTINGS > Network** select for **LAN Port 3**: **Service** "Switched with port 1".

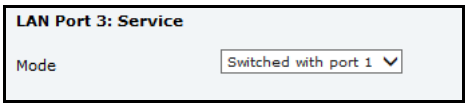


Figure B-7: Web interface, Network, LAN Port 3:Service

2. Add a specific VSAT modem profile for dual-antenna mode, go to **SETTINGS > Satellite profiles > VSAT modem profiles > New entry**.
3. Enter the VSAT modem profile name, for example **Dual Antenna Master**.
4. As modem select **Dual Antenna Master**.
5. **IP address**: this is the IP address of the LAN connector at the Master ACU (LAN1 always 192.168.1.2) which is used for modem communication (LAN1/LAN2).

Important Make sure that the IP addresses for LAN1/LAN2 of the Master ACU and the Slave ACU are not identical.

6. Click **Apply**.

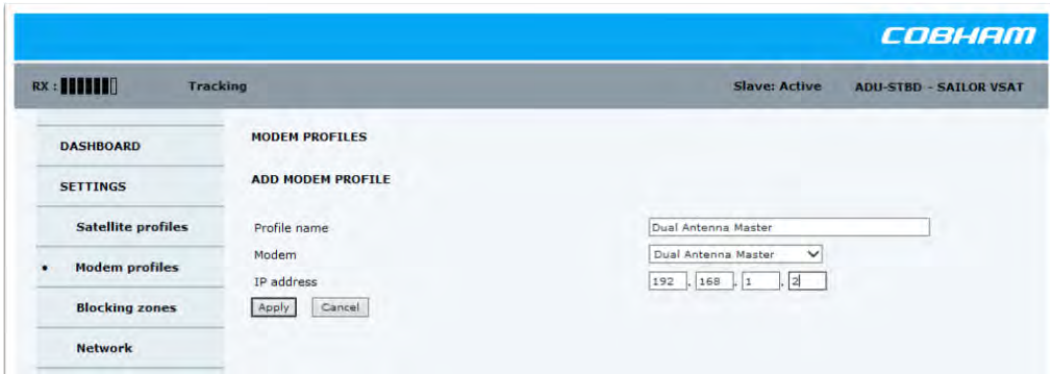


Figure B-8: Setup of the Slave ACU 1/3

7. Add a satellite profile that uses the modem profile Dual Antenna Master, go to **SETTINGS > Satellite profiles > New entry**.
8. Enter the satellite profile name, for example: **Dual ADU**.
9. As modem profile select **Dual Antenna Master**.
10. Click **Apply**.

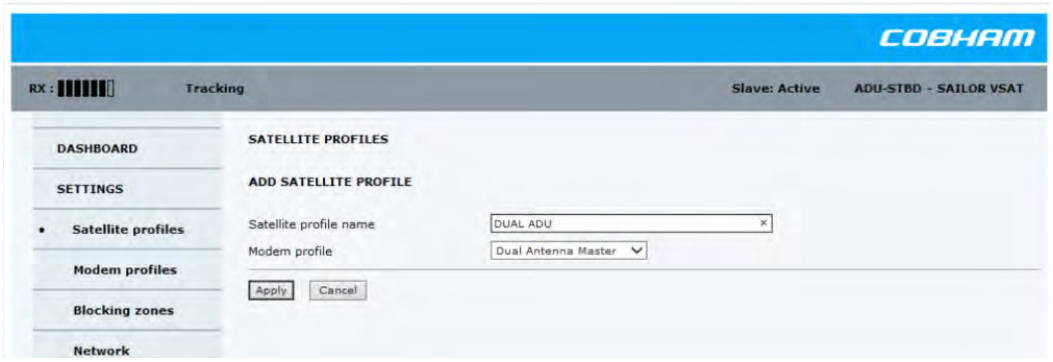


Figure B-9: Setup of the Slave ACU 2/3

11. Go to **SETTINGS > Satellite profiles**.
12. Click **Activate** to activate the satellite profile **Dual Antenna Master**.

Figure B-10: Setup of the Slave ACU 3/3

B.3.4 To set up blocking zones for dual antenna setup

It is recommended to define the following 3 types of blocking zones in each SAILOR VSAT system:

1. Actual blocking zones on the vessel (No TX)
2. Switching blocking zones (TX allowed), zones leading up to actual blocking zones, allowing the system to switch antenna before any actual blocking is encountered.
3. Personnel safety zones (No TX), a type of blocking zone securing safe passage without the risk of entering VSAT RF radiation.

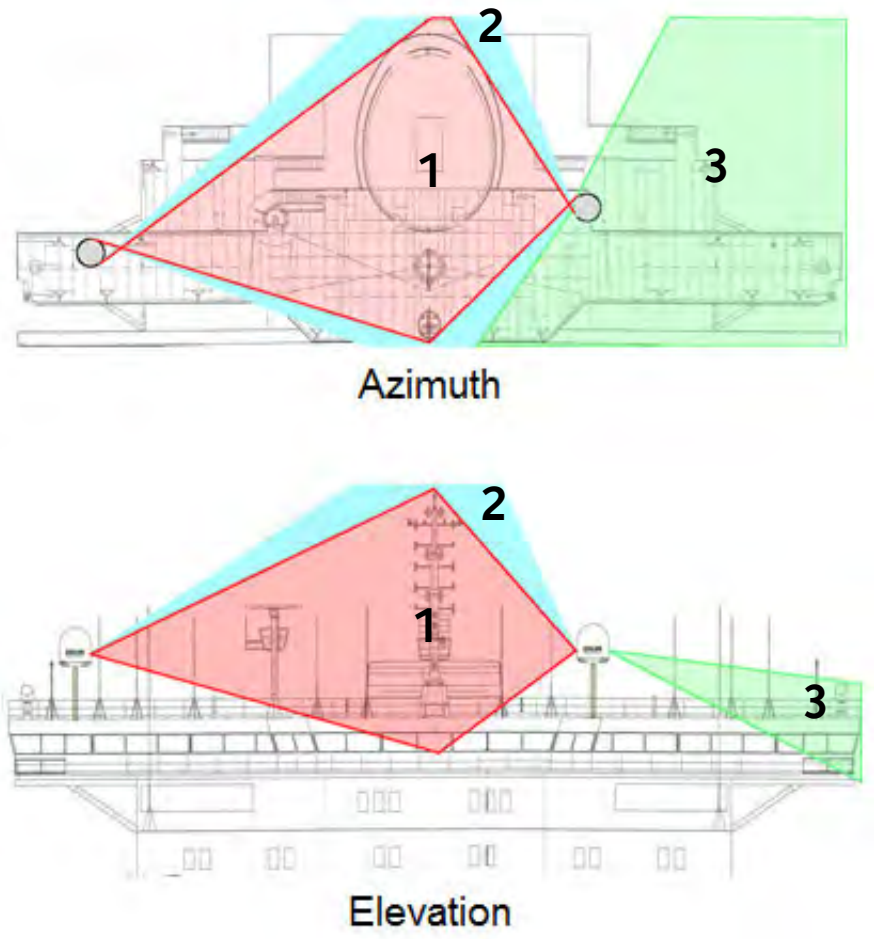


Figure B-11: Dual-antenna mode, blocking zones — azimuth and elevation

For instructions how to set up blocking zones see *To set up blocking zones (RX and TX)* on page 6-31.

B.3.5 To make an OTC for ADS systems

The entire system is now ready for operation.

1. Turn on the Modem power.
   The first time the Modem is turned on it will perform an OTC both on the Master and the Slave antennas. During this process the Modem will restart several times before pointing towards the satellite and establish the link.

2. Be patient. The OTC procedure will take at least 16 minutes.

Important Interrupting the process before it has completed will cause the process to restart.

3. If for some reason you make a TX cable calibration again, the system will request the operator to initiate a manual OTC procedure. You can start the OTC procedure from the Modem dashboard.

B.4 Flow chart for dual antenna mode

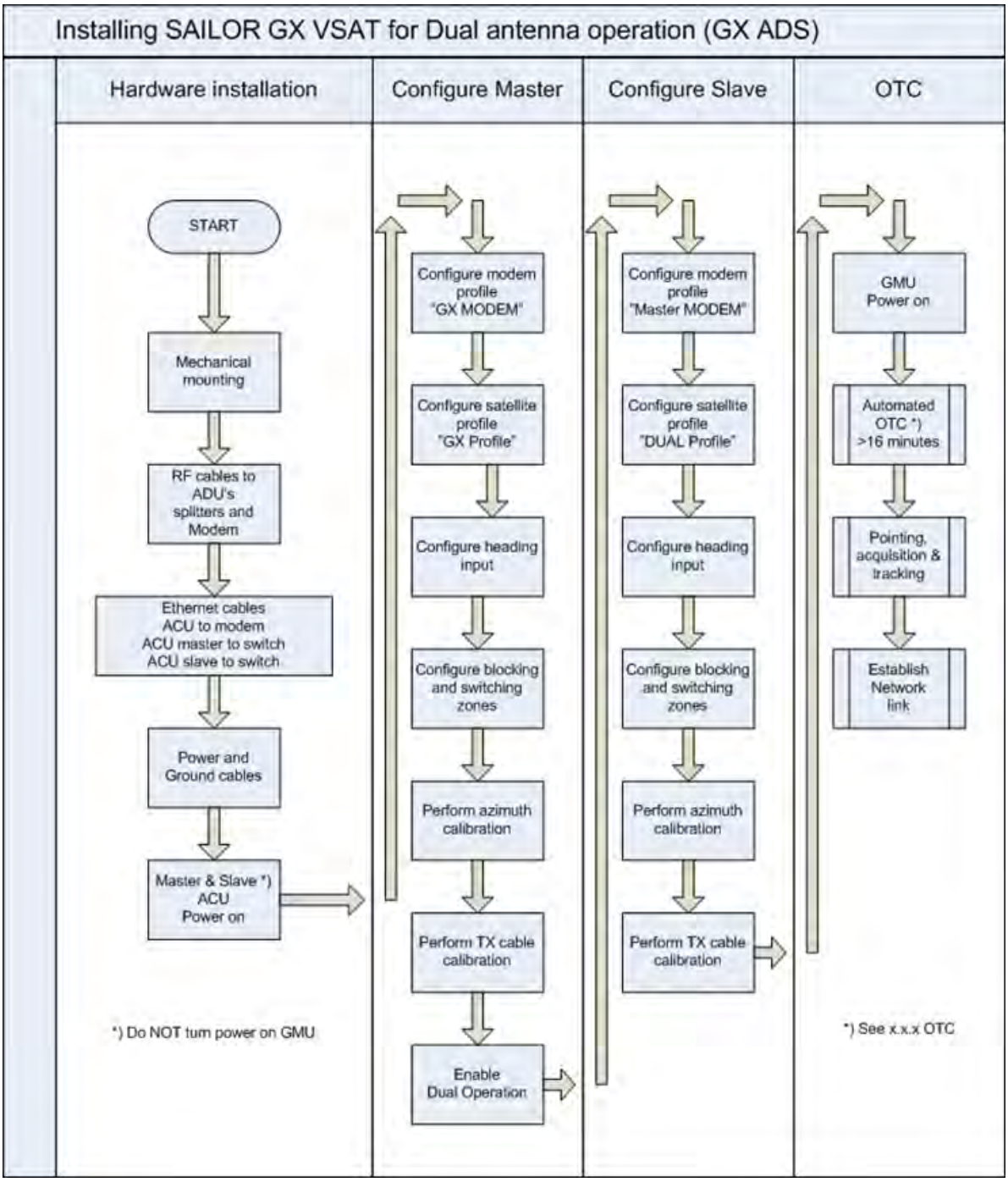


Figure B-12: Flow chart

OTC procedure: During start up the Modem sends a command to select antenna 1 (master) and checks whether the OTC calibration data is up to date. If not, OTC is started on antenna 1. When done, the Modem restarts and checks if antenna 1 is up to date, and OTC is started on antenna 2 (slave). When done, the Modem restarts. The process for the entire OTC for 2 antennas may take up to 16 minutes. If a BUC is exchanged in one of the antennas, the OTC is only done for the modified antenna and the total time for OTC is shorter.

B.5 Cable for Antenna Diversity System

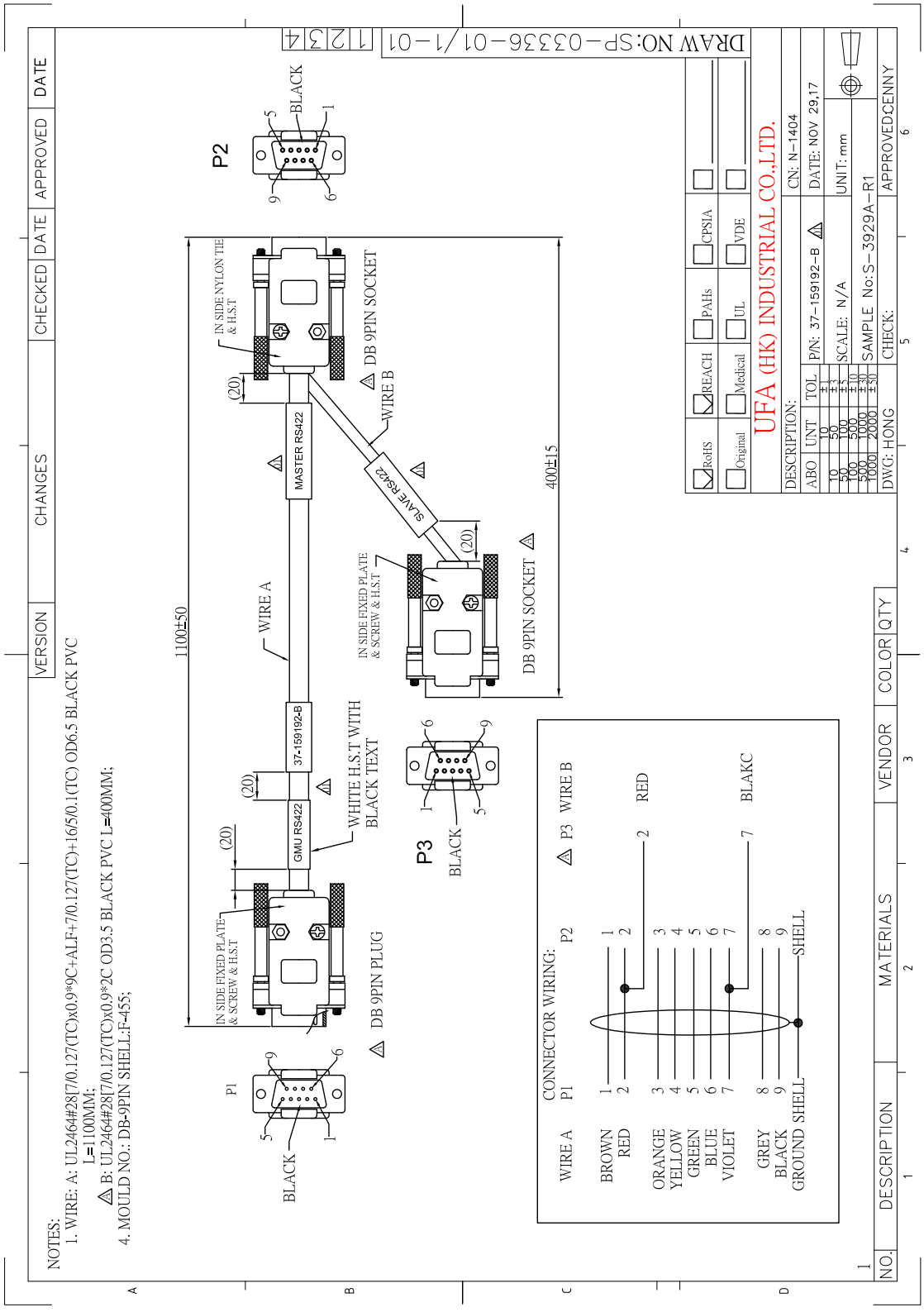


Figure B-13: Cable for ADS 1/3

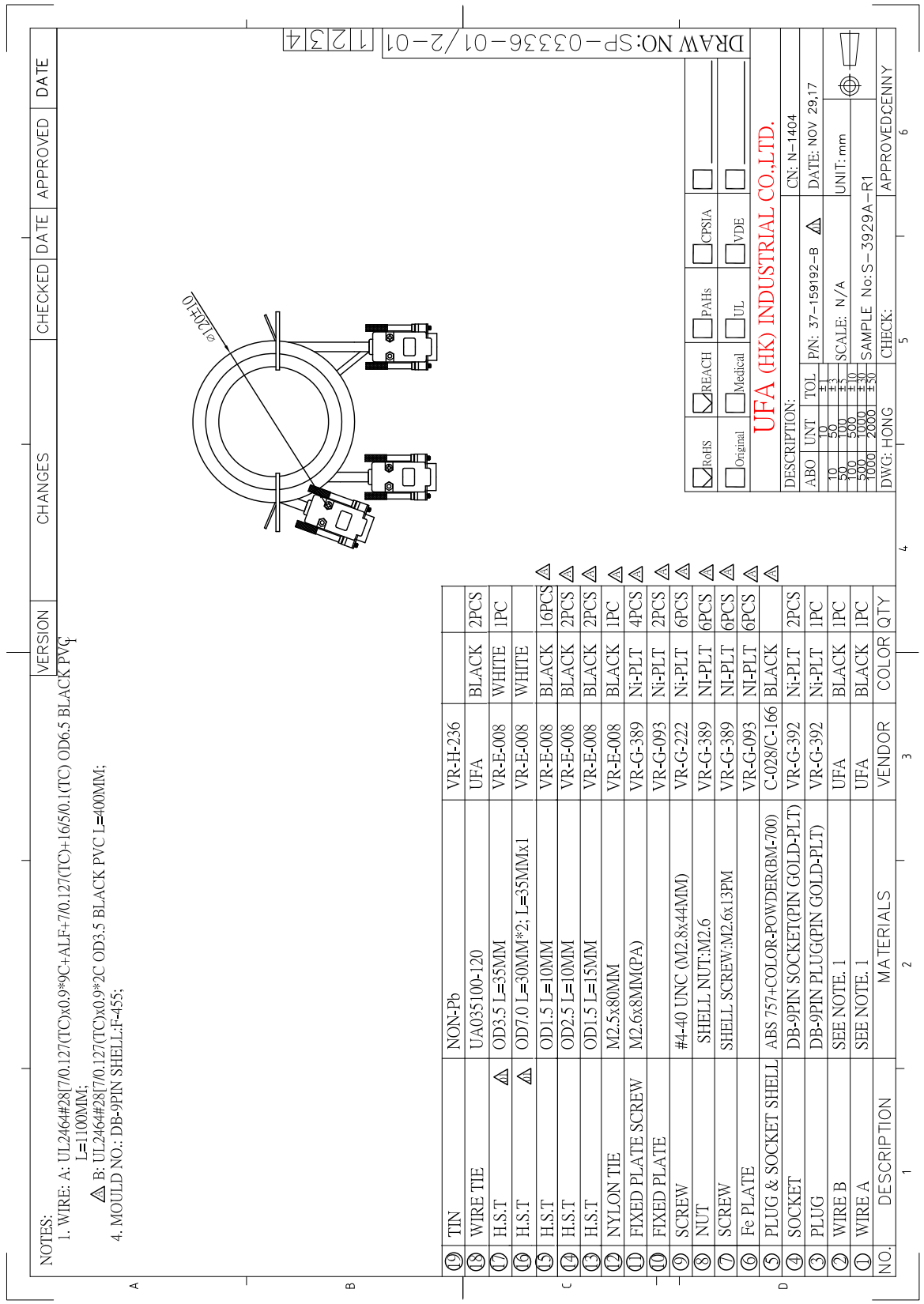
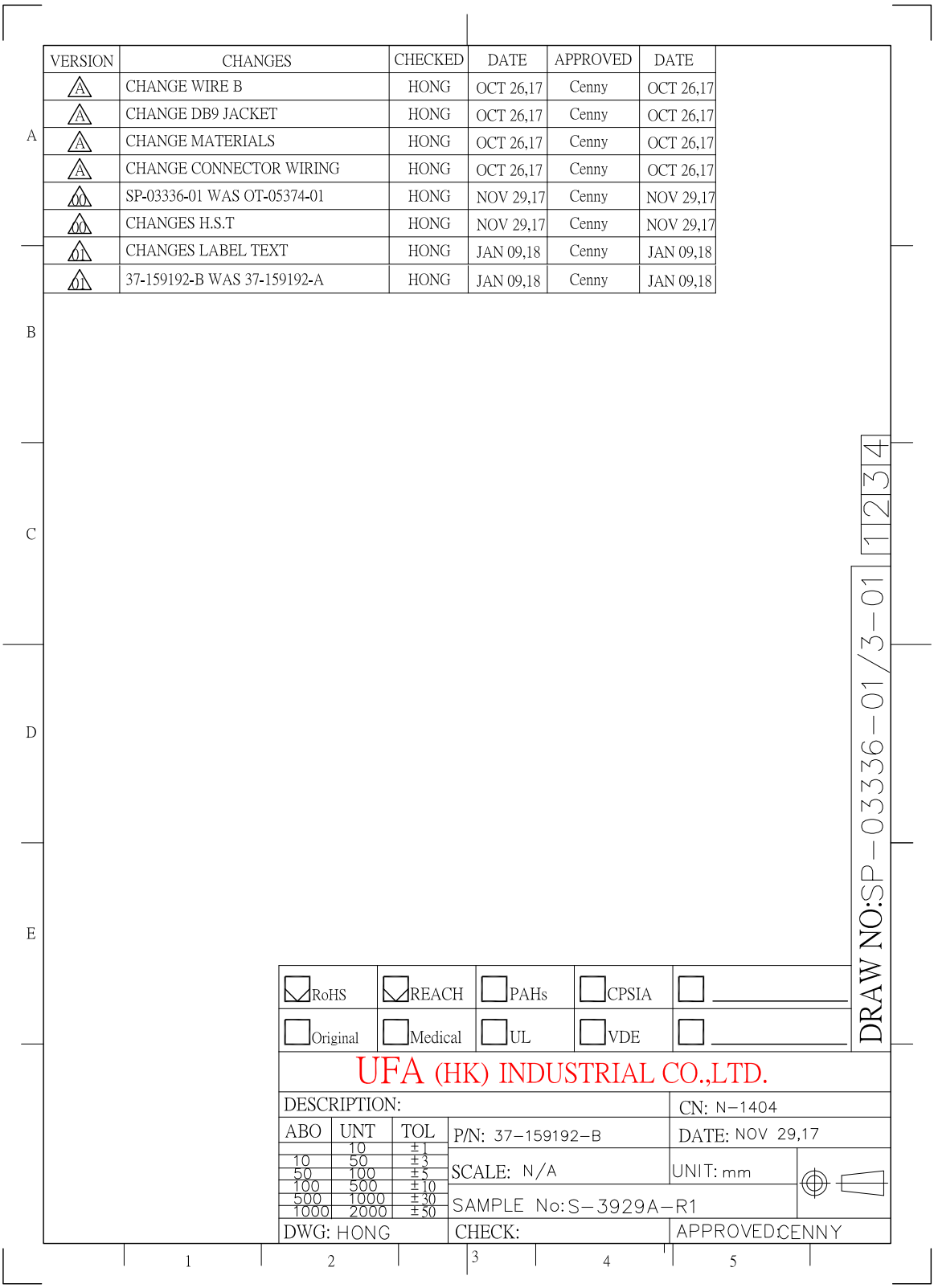


Figure B-14: Cable for ADS 2/3



VERSION	CHANGES	CHECKED	DATE	APPROVED	DATE
A	CHANGE WIRE B	HONG	OCT 26,17	Cenny	OCT 26,17
A	CHANGE DB9 JACKET	HONG	OCT 26,17	Cenny	OCT 26,17
A	CHANGE MATERIALS	HONG	OCT 26,17	Cenny	OCT 26,17
A	CHANGE CONNECTOR WIRING	HONG	OCT 26,17	Cenny	OCT 26,17
00	SP-03336-01 WAS OT-05374-01	HONG	NOV 29,17	Cenny	NOV 29,17
00	CHANGES H.S.T	HONG	NOV 29,17	Cenny	NOV 29,17
01	CHANGES LABEL TEXT	HONG	JAN 09,18	Cenny	JAN 09,18
01	37-159192-B WAS 37-159192-A	HONG	JAN 09,18	Cenny	JAN 09,18

Figure B-15: Cable for ADS 3/3

Ground and RF protection

This appendix has the following sections:

- *Why is a ground connection required?*
- *Recommendations*
- *Alternative ground for steel hulls*
- *Alternative ground for aluminum hulls*
- *Alternative ground for fibre glass hulls*
- *Separate ground cable*
- *RF interference*
- *Jumper cable for grounding*

C.1 Why is a ground connection required?

You must ground the SAILOR 100 GX system for at least two reasons:

- Safety: Lightning protection of persons and equipment.
- Protection: ESD (Electro Static Discharge) protection of equipment.

C.1.1 Safety

A ground connection of the system is required for safety reasons. In the event of a lightning strike at the ADU a proper ground connection of the system will provide a low resistance path to divert the strike discharge to seawater.

C.1.2 ESD Protection

The ESD protection circuits in the ACU rely on proper grounding of the system in order to work properly. Otherwise sensitive circuits within the ACU might be damaged due to ESD when you are handling the equipment.

C.2 Recommendations

C.2.1 To ground the ACU

To ground the ACU do as follows:

1. Ground the ACU to the ship/hull. For this purpose you may use a short ADU cable and a grounding kit.

2. Further, the ACU must be grounded at its grounding stud in order to ensure proper grounding if the short ADU cable is disconnected. For further information, see *To ground the ACU* on page 3-23.

If you use the Extended cable support, make the ground connections through the cable support. You may need to extend the ground plane using copper foil, see the following section.

C.2.1.1 To extend the ground plane

In some cases it may not be possible to access the hull and at the same time place the ACU in a suitable place. A way to ensure good grounding and at the same time make it possible to ground the coax cable - is to extend the ship ground plane by means of copper foil. The maximum length of the foil is determined by the width of the foil:

Copper foil 5 cm wide: Max 50 cm
Copper foil 10 cm wide: Max 100 cm
Copper foil 20 cm wide: Max 200 cm

Note The foil must be at least 0.1 mm thick.

Do as follows:

1. Connect the foil to the hull by plenty of screws or hard–soldering.
2. Run the foil past the place where the short ADU cable is to be grounded and mount a grounding kit on top of the foil. For details on the jumper cable see *Jumper cable for grounding* on page C-12.

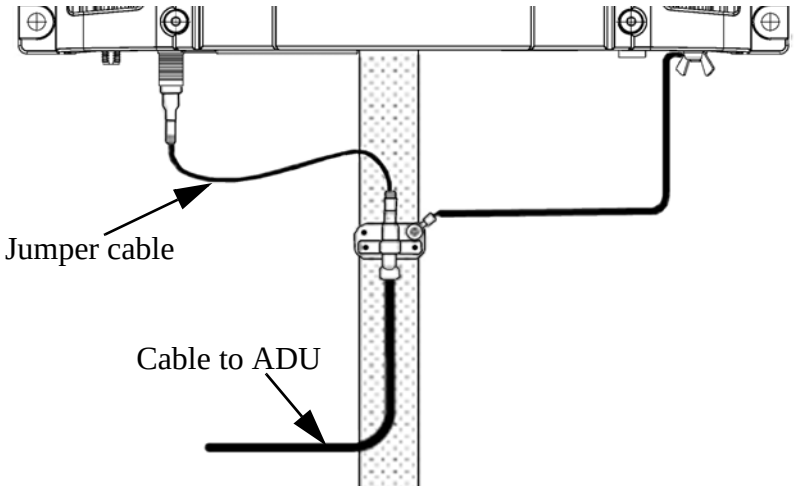


Figure C-1: Extending the ground plane

Per used jumper cable the maximum cable length of the cable to the antenna is reduced by:

- Enviroflex 400: 1.25 m
- SPUMA 400-FR: 6 m
- SUCOFEED 1/2" FR: 10 m

C.2.2 To ground the ADU

To ground the ADU do as follows:

1. Ground the ADU to the ship/hull via one or more of its mounting bolts.
2. Make sure to remove painting, dirt, grease etc. at the mounting holes in order to make good electrical contact to the hull.
3. Use serrated washers when securing the mounting bolts and seal the joint with protective coating to avoid corrosion.

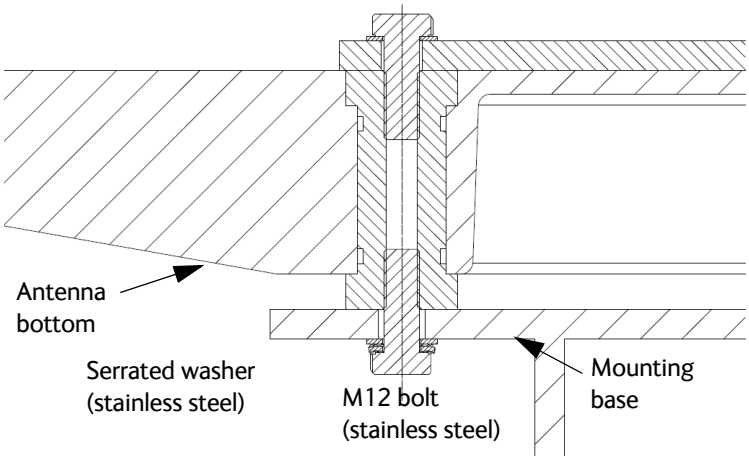


Figure C-2: Grounding the ADU

Note For optimum grounding use the mounting bolt located closest to the ADU cable plate, see *To ground the ADU* on page 3-20.

It is always recommended to establish the shortest possible grounding path e.g. on steel hulls the ADU should be grounded directly to the hull [2]. However, due to the fact that this is not possible on e.g. fibreglass hulls (nor is it preferable on aluminium hulls) a number of alternative grounding methods are suggested in the following paragraphs.

2. Note that the ADU ground connection is made at the same electrical ground potential as the ACU.

C.3 Alternative ground for steel hulls

The following guidelines assume a two-wire, isolated grounding arrangement; that is no part of the circuit, in particular the battery negative, is connected to any ground potential or equipment.

C.3.1 To ground the ACU

To ground the ACU do as follows:

1. Ground the ACU preferably to the ship with the short cable.
2. Further, ground the ACU at its grounding stud in order to ensure a proper grounding if the short ADU cable is disconnected.
3. Establish the ground connection either at the hull (recommended) or at a dedicated RF ground if available (alternative).

Important However, bear in mind that the ADU ground connection must be made at the **same electrical ground potential as the ACU** (see *To ground the ADU* on page C-4).

The ACU provides galvanic isolation (as required) from its input power terminals to the chassis/grounding stud. This way the isolated grounding arrangement is maintained.

C.3.2 To ground the ADU

Note For optimum grounding use the mounting bolt located closest to the ADU cable plate, see *To ground the ADU* on page 3-20.

C.3.2.1 Terminal grounded at the hull (recommended)

In this case the ADU is grounded to the ship via one (or more) of its mounting bolts.

1. Make sure to remove painting, dirt, grease etc. at the mounting holes in order to make good electrical contact to the hull.
2. Use serrated washers when securing the mounting bolts and seal the joint with protective coating to avoid corrosion.

C.3.2.2 Terminal grounded at a dedicated RF ground (alternative)

In this case the ADU is grounded with a separate ground cable.

1. Route the ground cable parallel and close to the shielded coax cable connecting the ADU to the ACU grounding kit.
2. You can use a heavy gauge wire with tinned strands (min. 6 mm^2) for this purpose.

Note The ADU must be electrically isolated at its mounting bolts by means of shoulder bushings and washers ensuring the isolated RF ground - see *Isolation of the ADU from the mounting base* on page C-10.

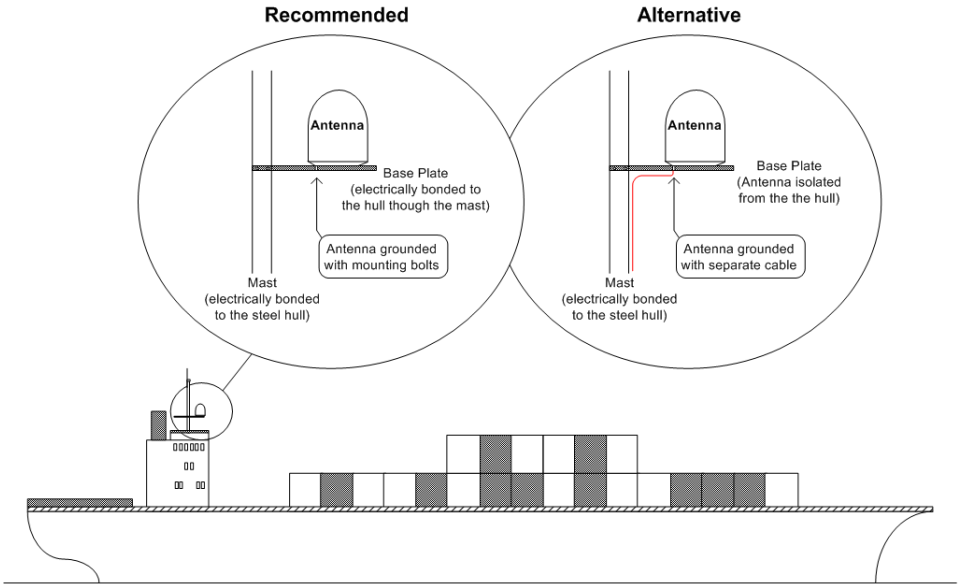


Figure C-3: Grounding at a dedicated RF ground (alternative)

C.4 Alternative ground for aluminum hulls

The following guidelines assume a two-wire, isolated grounding arrangement; that is no part of the circuit, in particular the battery negative, is connected to any ground potential or equipment.

C.4.1 To ground the ACU

To ground the ACU do as follows:

1. Ground the ACU preferably with the short cable.
2. Ground the ACU at its grounding stud to ensure a proper grounding if the short ADU cable is disconnected.
3. Establish the ground connection at a dedicated RF ground (either capacitively or electrically coupled).

Important Remember to make the ADU ground connection at the **same electrical ground potential** as the ACU (see *To ground the ADU*).

The ACU provides galvanic isolation (as required) from its input power terminals to the chassis/grounding stud. This way the isolated grounding arrangement is maintained.

C.4.2 To ground the ADU

To ground the ADU do as follows:

1. If the mounting base of the ADU is electrically connected to the hull (or any other ground potential than the ACU), isolate the ADU at its mounting bolts by means of shoulder bushings and washers, see C.6.3 . This is done in order to prevent DC currents flowing in the hull thus causing electrolytic corrosion.
2. However, you must establish a ground connection via one of the mounting bolts and a separate ground cable.

3. Route the ground cable parallel and in close proximity to the shielded coax cable hence connecting the ADU to the ACU Grounding kit. Use a heavy gauge wire with tinned strands (min. 6 mm^2) for this purpose.

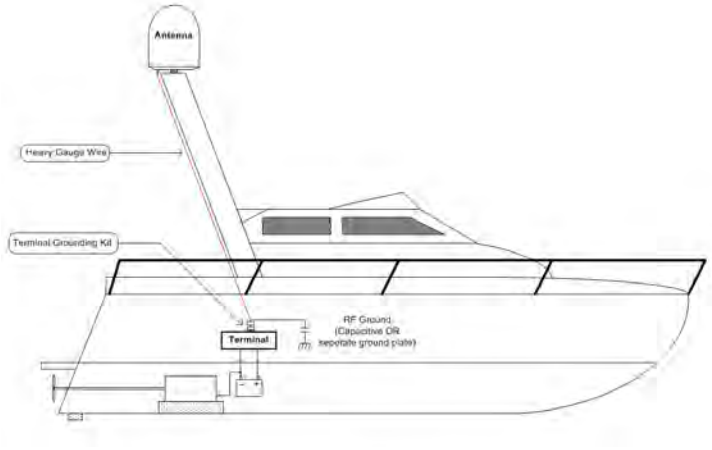


Figure C-4: Alternative grounding for aluminium hulls

C.5 Alternative ground for fibre glass hulls

C.5.1 To ground the ACU

To ground the ACU do as follows:

1. Preferably ground the ACUwith the short ADU cable and a grounding kit (available from Thrane & Thrane A/S).
2. Ground the ACU at its grounding stud in order to ensure a proper grounding if the short ADU cable is disconnected.
3. You must establish the ground connection at a dedicated RF ground (either capacitive or electrical coupled).

Important Bear in mind that the ADU ground connection is to be made at the **same electrical ground potential** as the ACU (see *To ground the ADU*).

C.5.2 To ground the ADU

To ground the ADU do as follows:

1. If the mounting base of the ADU is electrically connected to any other ground potential than the ACU (e.g. Lightning Ground), you must isolate the ADU at its mounting bolts with shoulder bushings and washers - see section C.6.3 .
2. However, you must establish a ground connection via one of the mounting bolts with a separate ground cable.
3. You must route the ground cable in parallel and in close proximity to the shielded coax cable hence connecting the ADU to the ACU Grounding kit. Use a heavy gauge wire with tinned strands (min. 6 mm^2) for this purpose.

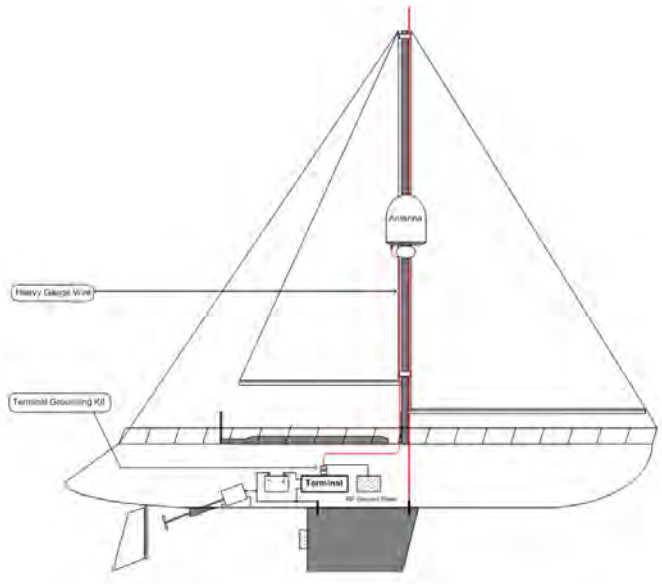


Figure C-5: Alternative grounding for fibreglass hulls

C.6 Separate ground cable

C.6.1 To make a ground cable

When dealing with electrical installations in a marine environment, all wiring must be done with double insulated, tinned strands, high quality and if exposed also UV resistant cables. This shall also apply to the separate ground cable mentioned in the previous paragraphs.

The ground cable is made using an appropriate cable with a cross section area of at least 6 mm^2 (AWG10) and terminated with insulated ring crimp terminals, see the illustration below. The crimp terminals must be a marine approved type e.g. the DuraSeal series from Raychem.

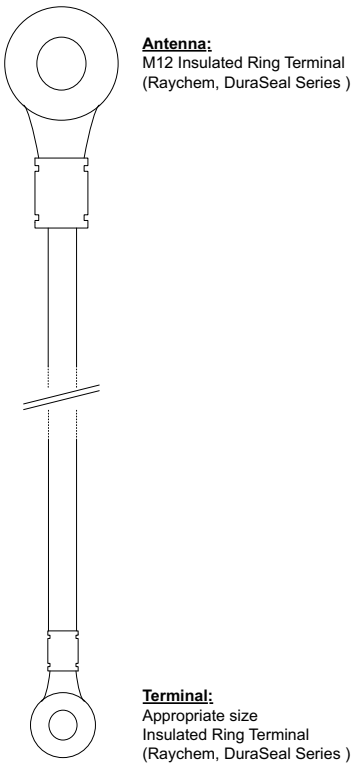


Figure C-6: Separate ground cable

C.6.2 Ground cable - connection

To mount the ground cable do as follows:

1. Mount the ground cable close to and parallel to the shielded coax cable thus minimizing ground loop problems. If possible, route the coax cable and the ground cable in metal conduits bonded to the hull or within a mast (depending on the actual installation).
2. Connect the ground cable at one of the mounting/grounding bolts on the ADU.
3. Use bolts and washers of stainless steel and seal the joint with protective coating to avoid corrosion.

4. If the ADU is to be isolated from the mounting base, use shoulder bushings and washer, see figure C-7, *Isolation of the ADU from the mounting base* on page C-10.
5. At the other end, connect the ground cable as described in *To ground the ACU* on page C-1.

C.6.3 Isolation of the ADU from the mounting base

In cases where the ADU is to be isolated from the mounting base, do as follows:

1. Use shoulder bushings and washers (accessories) as illustrated below. Note that the isolation must be implemented on all four mounting bolts (including the bolt securing the ground cable).

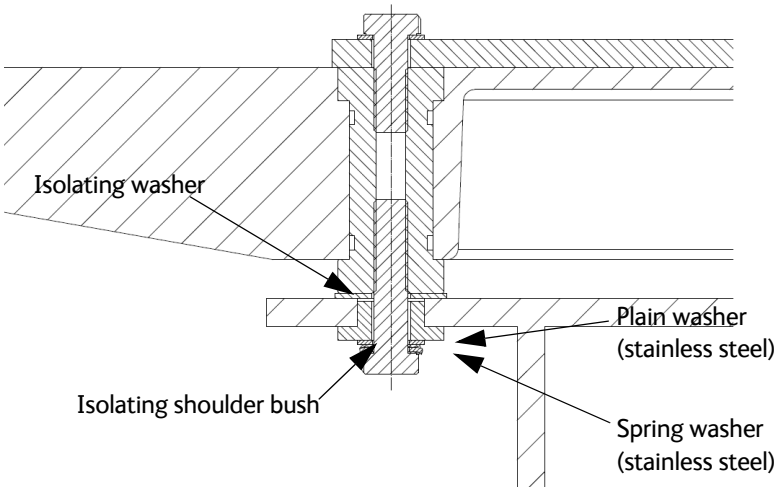


Figure C-7: Isolation of the ADU from the mounting base

2. Connect the ground cable at one of the mounting/grounding bolts on the ADU as illustrated below.
3. Seal the joint with protective coating to avoid corrosion.

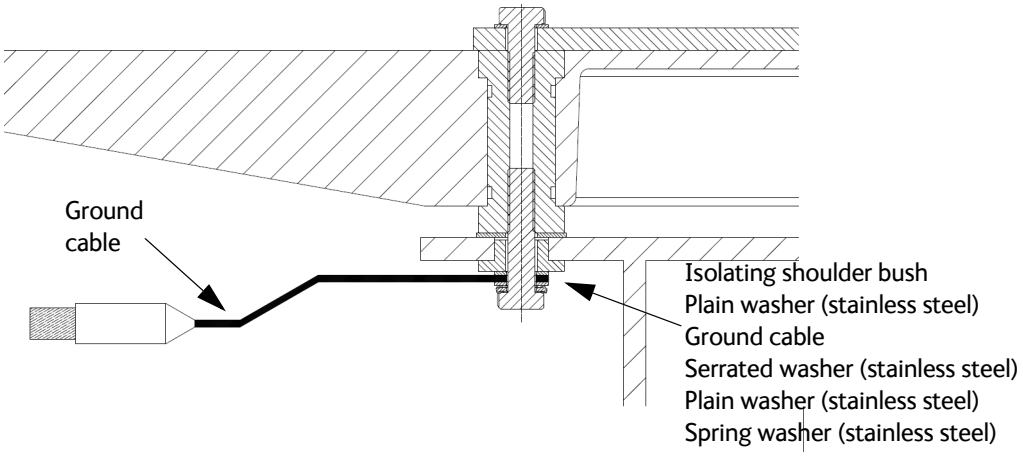


Figure C-8: ADU isolation and grounding cable

C.7 RF interference

Interference induced from nearby high-power RF transmitters might cause system failures and in extreme cases permanent damage to the SAILOR 100 GX equipment.

If there are problems with interference from HF transmitters, do as follows:

1. Mount ferrite clamps on the coax cable in order to provide suppression of induced RF. The ferrites will have no effect on the differential-mode signals but increases the impedance in relation to common-mode RFI.
2. Use 1-5 pcs. hinged clamp cores (e.g. the RFC or SFC series from Kitagawa) mounted on the ADU cable near the ADU.

C.8 Jumper cable for grounding

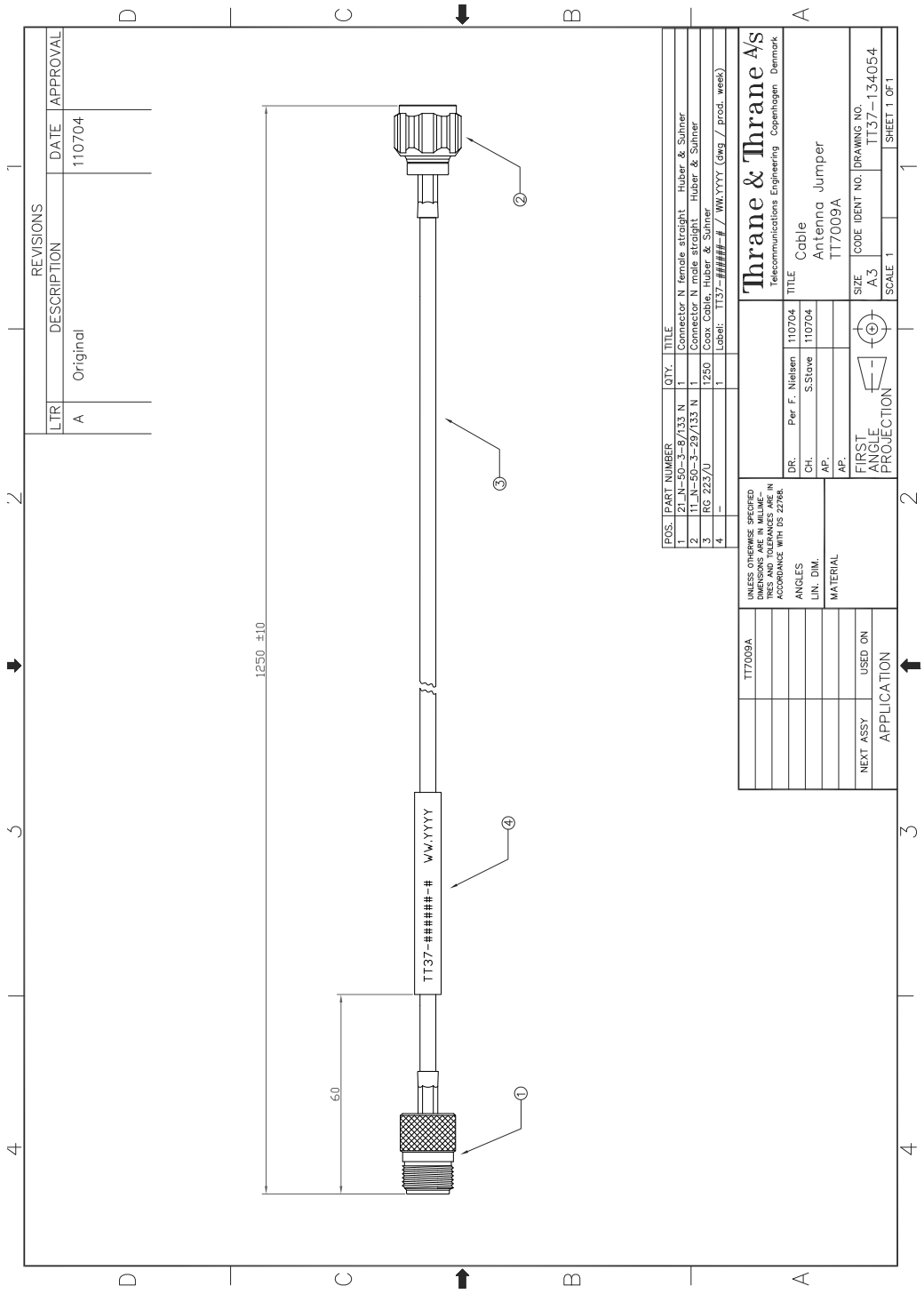


Figure C-9: Jumper cable for grounding (specifications)

System messages

This appendix has the following sections:

- *Event messages – overview*
- *List of events*

D.1 Event messages – overview

The SAILOR 100 GX detects events during

- POST (Power On Self Test) – a self test performed at every power-up.
- PAST (Person Activated Self test) – started in the web interface
- CM (Continuous Monitoring) – automatically performed while the system is in operation.

When the SAILOR 100 GX detects an event that requires your action, it issues an event message and the red Fail/Pass LED in the LED panel of the ACU is lit. As long as an event is active, it is shown in the ACU display, the Control Panel and the web interface (in HELPDESK > Event list or click the event icon on the DASHBOARD).

Note Active events and notifications are shown. As soon as the event is cleared, it is not displayed any longer. It is then moved to the Notifications section. Notifications are cleared after 24 hours.

State the Event ID when contacting your service partner.

The event description might contain a number of digits in brackets, e.g. (00000005). This is supplemental information and used for service and diagnostics purposes.

Note that the following sections cover the system messages for all SAILOR VSAT antennas. Some of the events may not be relevant for the antenna described in this manual.

D.2 List of events

List of 26-01-21

Error code	Unit	Severity	Description	Explanation
08060-0	ADM	WARNING	Antenna modem	ACU/Antenna communication error detected (framing and parity). If the situation is persistent, check if cable specifications comply (length and attenuation).
08063-0	ADM	ERROR	Antenna connection	The ACU has lost connection with the antenna.
08064-0	ADM	ERROR	ADM PLL lock	The intermediate frequency PLL is not in lock. Check the external reference signal.
08065-0	ADM	WARNING	GNSS data	Missing GNSS data (fix).
08066-0	ADM	WARNING	Heading data	Missing heading information. Check cable and heading provider device.
08067-0	ADM	ERROR	PCB temperature	ADM temperature too high. Make sure there is compliance with the environmental specifications.
08068-0	ADM	ERROR	PSM power	The PSM fails to provide the requested supply voltage.
08069-0	ADM	WARNING	Blocking Zone	The antenna has entered a blocking zone.
0806A-0	ADM	WARNING	VMU connection	The ACU has lost connection to the satellite modem.
0806C-0	ADM	ERROR	VMU frequency setup	There is a mismatch in the frequency setup. Probably the satellite modem is not configured correctly to match the requirements of the ACU and antenna. A common mismatch is the absence of Rx or Tx LO parameter in the satellite modem.
0806D-0	ADM	ERROR	Antenna power	The antenna supply voltage is outside the allowed limits. This may happen if the PSM fails to provide the requested supply voltage.
0806E-0	ADM	ERROR	VMU reference signal	There is no VMU Rx or Tx reference signal. Whether this is Rx or Tx reference depends on the user's selection on the modem profile page in the web interface. Make sure the VMU Rx/Tx cable is connected and that the VMU is configured to output the RX/TX reference signal.
0806F-0	ADM	WARNING	ROSS synchronization	The ACU has become out of sync with the ROSS device, most likely because the ACU has been replaced, or the ROSS satellite profile is new. A manual (forced) handoff sequence must be initiated from the ROSS, refer to the ROSS manual.
08073-0	ADM	WARNING	Slave connection	The system is configured as a dual antenna master, but no dual antenna slave is connected to it. Either disable the dual antenna master in the web interface or configure a another system as a dual antenna slave.

Table D-1: List of events

Error code	Unit	Severity	Description	Explanation
08074-0	ADM	WARNING	Master connection	The system is configured as a dual antenna slave, but it was not possible to connect to the dual antenna master. Check that the IP address entered in the modem profile is correct and check that the master and slave systems are physically connected as described in the manual.
08075-0	ADM	WARNING	Rx cable calibration	The calibration of the ACU-antenna cable failed. The cable could be defective, too long, of too poor quality, not properly connected, or the VIM or ACU hardware could be defective.
08076-0	ADM	WARNING	Dual mode configuration	The system is configured as a dual antenna system, but the system setup is invalid. The dual mode function may not work properly or performance could be degraded. Info code: xxxxxxx1 = Antenna types are different, they must be identical xxxxxxx2 = Master or Slave hardware does not support dual mode operation. xxxxxxx3 = Software version on master and slave are different, they must be identical.
08077-0	ADM	WARNING	BUC LO frequency invalid	The satellite modem provided an invalid BUC LO frequency. A default BUC LO frequency is assumed based on antenna type. To remove this warning re-configure the modem to provide a valid BUC LO frequency.
08078-0	ADM	WARNING	VMU TX frequency invalid	The satellite modem did not provide a Tx frequency, or it is invalid. A default Tx frequency is assumed, but this may degrade Tx performance. To remove this warning re-configure the modem to provide the correct Tx frequency.
08079-0	ADM	WARNING	ACU Fan	Internal fan is malfunctioning.
0807A-0	ADM	WARNING	Automatic azimuth calibration pending	Automatic azimuth calibration mode is enabled. The system tries to perform an azimuth calibration using the target satellite whenever satellite data is received from the modem. After successful calibration the feature is automatically disabled and the system returns to normal operation. WARNING: If a system has not completed azimuth calibration after the installation, the blocking zones may appear to be at wrong angles.
0807B-0	ADM	WARNING	OTC required (Calibration outdated)	BUC calibration is outdated. Rerun it from the Core Module by using the One Touch Commissioning in the web interface.
0807C-0	ADM	ERROR	System configuration	Invalid ACU / antenna combination.

Table D-1: List of events (Continued)

Error code	Unit	Severity	Description	Explanation
0807E-0	ADM	WARNING	Keyline signal	The keyline signal on the dual antenna master does not match the keyline signal on the slave. Check that the keyline splitter cable is connected to the RS422 connectors. When fixed, the ACUs need to be rebooted to clear the event.
0807F-0	ADM	WARNING	Local administration enabled	Local administration mode is currently enabled. This allows login without providing the admin password. Will be disabled after 1 hour or next reboot.
08080-0	ADM	WARNING	Satellite info mismatch	Currently selected manual satellite information does not match information from the modem. Please select another satellite for manual pointing.
08081-0	ADM	WARNING	BUC communication	Missing communication between VMU and BUC. Info: 0x00000001: From VMU to BUC Info: 0x00000002: From BUC to VMU
08083-0	ADM	WARNING	Friction test timeout	Friction test timeout. Info code format: 0xaaaatttt, where aaaa = axis under test (0=Azi, 1=XEL, 2=EL) and tttt = timeout type. Info: 0xaaaa0001: Axis aaaa did not get ready for test in time Info: 0xaaaa0002: Axis aaaa test did not finish in time
08084-0	ADM	WARNING	External GPS data	Missing external GPS information. Check cable and GPS provider device.
08100-0	ADM	ERROR	PSM low voltage (22 V)	The ADM measures a different antenna voltage than expected. If the problem is not solved by a restart, and the PSM is not reporting any errors, the ADM is probably defective.
08101-0	ADM	ERROR	PSM high voltage (48 V)	The ADM measures a different antenna voltage than expected. Check for short circuit of the antenna coax connector. If the problem is not solved by a restart, and the PSM is not reporting any errors, the ADM is probably defective.
08102-0	ADM	ERROR	PSM 5 V power	Internal voltage supply error of the ADM.
08103-0	ADM	ERROR	ADM hotswap	The ACU is not able to supply the correct voltage to the antenna. Check for short circuits in coax cable and the antenna
08104-0	ADM	ERROR	Antenna communication	The ACU cannot communicate with the antenna. Check cable and antenna.
08107-0	ADM	ERROR	ADM FPGA load	The ADM FPGA cannot be initialised and loaded.
08108-0	ADM	ERROR	TX Power Detector calibration	The power detector calibration is not valid.

Table D-1: List of events (Continued)

Error code	Unit	Severity	Description	Explanation
08109-0	ADM	ERROR	Antenna XIM data	There is a mismatch in the antenna configuration data. Either the PCM or the VIM in the antenna are malfunctioning or one of them has been replaced. In the latter case, select which is the original device in the web interface and restart the system.
0810A-0	ADM	ERROR	ADM production data	Production data has been corrupted.
0810B-0	ADM	ERROR	Antenna software version	An error has occurred during upload of software to the antenna, the antenna software version is not as expected. Either the software in the ACU does not meet the minimum version required by the antenna, the software image in the ACU is corrupted or the upload procedure failed because of a communication error.
0810C-0	ADM	ERROR	File system integrity	One or more file system partitions are corrupt. You may have lost your settings and collected statistics. If restarting the system does not help, contact your service partner.
0810E-0	ADM	ERROR	RF calibration	The RF calibration is not valid.
08800-0	ADM	ERROR	Internal power supply	An internal power supply voltage is outside its allowed range.
08801-0	ADM	ERROR	Input voltage too low	The input voltage to the power supply is too low. If running on battery, charge battery for correct operation.
08802-0	ADM	ERROR	Input voltage too high	The input voltage to the power supply is too high. If running on generator or inverter, check for correct operation.
08840-0	ADM	WARNING	Master PLL lock	The master PLL has lost lock. Check the input reference signal.
08841-0	ADM	ERROR	Tuner lock	The internal tuner PLL was unable to lock.
08842-0	ADM	WARNING	GSC demodulator	The GSC demodulator has reported an error.
08843-0	ADM	WARNING	DVBS demodulator	The DVBS demodulator cannot be initialised and loaded correctly.
08844-0	ADM	WARNING	BUC voltage	The BUC voltage is out of range.
08845-0	ADM	WARNING	LNB voltage	The LNB voltage is out of range. The LNB might be switched off to protect the power supply circuitry. Reactivate satellite profile to try again, check LNB cable and surroundings if the problem persists.
08880-0	ADM	ERROR	WLAN configuration error	Configuration of WLAN module failed.
08A00-0	ADM	WARNING	GX Core Module fan	There is a problem with the Core Module fan. Check/clean and replace if necessary.

Table D-1: List of events (Continued)

Error code	Unit	Severity	Description	Explanation
08A01-0	ADM	WARNING	GX Core Module heater	There is a problem with the Core Module heater. Check and replace if necessary.
08A02-0	ADM	WARNING	GX Core Module temperature	The Core Module temperature is out of range. This may affect performance, and the Core Module will be shut down if the situation gets worse. If the "GX core module heating" event is also present, the internal heater is currently warming up the unit to its operational temperature.
08A03-0	ADM	ERROR	GX Core Module power	The Power Good signal from the Core Module is low. The issue can either be: - Internal Core Module or internal cable failure - Temperature of Core Module is too high and it has been turned off (*) - GMU has been manually switched off on the front panel (*) (*) = Only on systems with GMU.
08A04-0	ADM	WARNING	iDirect modem	The ACU detected a warning/error in the iDirect modem. Log into the modem for more information. Info: 0x00000001: Temperature error 0x00000002: Test error 0x00000004: Fan error
08A05-0	ADM	WARNING	GX Core Module heating	The GX core module heater is active. It will automatically be cleared when the core module reaches the operational temperature level.
09000-0	KDM	ERROR	KDM 3V3 supply	Internal 3V3 voltage supply error in the KDM.
09001-0	KDM	ERROR	KDM 12V supply	Internal 12V voltage supply error in the KDM.
09002-0	KDM	ERROR	KDM display	Display hardware error in the KDM.
09010-0	KDM	ERROR	KDM link/SW version	Link to the KDM module could not be established. Either the KDM board is malfunctioning, or - if the system software has just been updated - the software is too old and is not compatible with the KDM hardware.
0A001-0	Antenna	ERROR	Production data	Production data is invalid.
0A002-0	Antenna	ERROR	XIM internal	Antenna configuration data stored in the PCM module is invalid.
0A003-0	Antenna	ERROR	XIM external	Antenna configuration data stored in the VIM module is invalid.
0A004-0	Antenna	ERROR	XIM I/X match	Antenna configuration data stored in the PCM module does not match the configuration data stored in the VIM module.
0A005-0	Antenna	ERROR	Antenna type	The configured antenna type is not supported or unknown.

Table D-1: List of events (Continued)

Error code	Unit	Severity	Description	Explanation
0A006-0	Antenna	ERROR	PCM FPGA load	The PCM FPGA cannot be initialised and loaded correctly.
0A007-0	Antenna	ERROR	XIM FPGA load	The VIM FPGA cannot be initialised and loaded correctly.
0A008-0	Antenna	ERROR	XIM production	Production/calibration data stored in the VIM module is invalid.
0A00A-0	Antenna	ERROR	GNSS initialisation	The GNSS device cannot be initialised. Check cable and GNSS device.
0A014-0	Antenna	ERROR	AMB device discovery	Missing one or more of the following devices: ISM, DDM/DMD/FDM and PMM. Check cables.
0A015-0	Antenna	ERROR	Azi DDM ABS device	Cannot initialise the azimuth DDM/DMD/FDM. Info: 0x00000000: Device not found (possible cabling problem) 0x0000bbaa: Device internal error (replace device) aa=status, bb=state.
0A016-0	Antenna	ERROR	Xel DDM ABS device	Cannot initialise the cross-elevation DDM/DMD/FDM. Info: See 0A015-0.
0A017-0	Antenna	ERROR	Ele DDM ABS device	Cannot initialise the elevation DDM/DMD/FDM. Info: See 0A015-0.
0A018-0	Antenna	ERROR	ISM ABS device	Cannot initialise the ISM Info: 0x00000000: Device not found (possible cabling problem) 0x000cbbaa: Device internal error (replace device) aa=status, bb=state, c=calibration data error.
0A019-0	Antenna	ERROR	PMM ABS device	Cannot initialise the PMM. Info: See 0A015-0.
0A01A-0	Antenna	ERROR	BCM ABS device	Cannot initialise the BCM. Info: See 0A015-0.
0A01E-0	Antenna	ERROR	Sensor sanity	Too many invalid values measured by the ISM during initialisation. Check for vibrations or malfunctioning ISM.
0A021-0	Antenna	ERROR	Azi axis calibration	Azimuth axis zero reference not found. Check belt and zero reference module. Info: 0x00000001: Timeout (operation did not complete in time) 0x00000010: Encoder or mechanical problem 0x00000020: Zero reference not found 0x00000040: End stop not found.
0A022-0	Antenna	ERROR	Xel axis calibration	Cross-elevation axis zero reference or end stops not found at expected locations. Check belt, zero reference module, and end stops. Info: See 0A021-0.
0A023-0	Antenna	ERROR	Ele axis calibration	Elevation axis zero reference or end stops not found at expected locations. Check belt, zero reference module, and end stops. Info: See 0A021-0.

Table D-1: List of events (Continued)

Error code	Unit	Severity	Description	Explanation
0A025-0	Antenna	ERROR	Antenna calibration	One or more errors occurred during antenna start-up Info: 0x00000001: Timeout (calibration did not complete in time) 0x00000010: Azimuth axis 0x00000020: Cross-elevation axis 0x00000040: Elevation axis 0x00000080: Polarisation axis
0A028-0	Antenna	ERROR	Demodulator load	The second receiver demodulator cannot be initialised and loaded correctly.
0A029-0	Antenna	ERROR	XIM PLL lock	The PLL on the VIM does not lock.
0A02B-0	Antenna	ERROR	ABS software version	The ABS software version in the antenna is too old to match the hardware requirements. Upload new software via the web interface.
0A02D-0	Antenna	ERROR	BUC reference switch	The BUC reference switches do not work. Check PCM-VIM cable and replace cable, VIM or PCM.
0A034-0	Antenna	WARNING	ACU communication	The communication link between ACU and antenna is not working.
0A035-0	Antenna	WARNING	ISM data valid	Sensor measurements from the ISM are invalid. This indicates a malfunctioning ISM.
0A036-0	Antenna	WARNING	ISM data range	Sensor measurements from the ISM are out of range.
0A037-0	Antenna	WARNING	GNSS communication	Lost connection to the GNSS device.
0A038-0	Antenna	WARNING	GNSS data range	Received information from the GNSS device which is out of range.
0A039-0	Antenna	WARNING	GNSS device warning	Local GNSS device warning.
0A03A-0	Antenna	WARNING	GNSS device error	Local GNSS device error.
0A03B-0	Antenna	ERROR	Azi DDM shutdown	The azimuth motor control has detected one of the following situations: Extreme temperature, voltage, current or velocity. The motor was then shut down. This is usually a temporary situation and is probably fixed by a restart of the system.
0A03C-0	Antenna	ERROR	Xel DDM shutdown	As Azi DDM/DMD/FDM shutdown but detected by the cross-elevation motor control.
0A03D-0	Antenna	ERROR	Ele DDM shutdown	As Azi DDM/DMD/FDM shutdown but detected by the elevation motor control.
0A03E-0	Antenna	ERROR	PMM shutdown	As Azi DDM/DMD/FDM shutdown but detected by the polarisation motor control.
0A03F-0	Antenna	WARNING	AMB timing	This indicates a busy situation. It may occur during installation procedures. No user interaction is required unless it occurs repeatedly.

Table D-1: List of events (Continued)

Error code	Unit	Severity	Description	Explanation
0A040-0	Antenna	WARNING	VIM cable attn	The output power cannot be controlled correctly. Check the Tx chain.
0A043-0	Antenna	WARNING	LNB voltage low	The voltage for the LNB is too low probably caused by a malfunctioning VIM or LNB.
0A044-0	Antenna	WARNING	LNB voltage high	The voltage for the LNB is too high probably caused by a malfunctioning VIM.
0A047-0	Antenna	ERROR	VIM PLL lock	The PLL of the VIM is out of lock. Check the 10 MHz reference signal.
0A048-0	Antenna	WARNING	VIM tuner lock	The PLL of the second receiver (DVB) is out of lock. Check the 10 MHz reference signal.
0A049-0	Antenna	WARNING	Azi encoder slip	A slip of the azimuth encoder has been detected. If this event is not resolved by itself after some time, check the belt and encoder of the azimuth axis.
0A04A-0	Antenna	WARNING	Xel encoder slip	A slip of the cross-elevation encoder has been detected. If this event is not resolved by itself after some time, check the belt and encoder of the cross-elevation axis.
0A04B-0	Antenna	WARNING	Ele encoder slip	A slip of the elevation encoder has been detected. If this event is not resolved by itself after some time, check the belt and encoder of the elevation axis.
0A04D-0	Antenna	WARNING	GNSS position	No position available from the GNSS device or position too old.
0A04E-0	Antenna	WARNING	GNSS velocity	No velocity available from the GNSS device.
0A04F-0	Antenna	WARNING	Heading data	Heading information is missing in the antenna.
0A050-0	Antenna	ERROR	Azi DDM communication	Communication error between PCM and azimuth DDM/DMD/FDM. Check SUB-D connectors and cables.
0A051-0	Antenna	ERROR	Xel DDM communication	Communication error between PCM and cross-elevation DDM/DMD/FDM. Check SUB-D connectors and cables.
0A052-0	Antenna	ERROR	Ele DDM communication	Communication error between PCM and elevation DDM/DMD/FDM. Check SUB-D connectors and cables
0A053-0	Antenna	ERROR	ISM communication	Communication error between PCM and ISM. Check SUB-D connectors and cables.
0A054-0	Antenna	ERROR	PMM communication	Communication error between PCM and PMM. Check SUB-D connectors and cables.
0A055-0	Antenna	WARNING	Azi DDM warning	The azimuth motor controller has temporarily observed an unusual situation for temperature, voltage, current or velocity. No user interaction required.

Table D-1: List of events (Continued)

Error code	Unit	Severity	Description	Explanation
0A056-0	Antenna	WARNING	Xel DDM warning	The cross-elevation motor controller has temporarily observed an unusual situation for temperature, voltage, current or velocity. No user interaction required.
0A057-0	Antenna	WARNING	Ele DDM warning	The elevation motor controller has temporarily observed an unusual situation for temperature, voltage, current or velocity. No user interaction required.
0A058-0	Antenna	WARNING	PMM warning	The polarisation motor controller has temporarily observed an unusual situation with regards to temperature, voltage, current or velocity. No user interaction required.
0A059-0	Antenna	WARNING	Azi cal. limits	Check limits of the calibration result for the azimuth axis are exceeded. Pointing performance may be degraded. Info: 0x00000040: End stop detected before expected limit 0x00000100: Zero width is low 0x00000200: Zero width is high 0x00000400: Zero slack is high 0x00001000: Friction average is high 0x00002000: Friction peak is high 0x00004000: Friction asymmetry is high Zero width low/high: Zero reference module placement may be incorrect. Zero slack high: Mechanical slack may be too high. Friction average/peak high: Mechanical friction is higher than expected. Friction asymmetry high: Mechanical imbalance may be too high.
0A05A-0	Antenna	WARNING	Xel cal. limits	Check limits of the calibration result for the cross-elevation axis are exceeded. Pointing performance may be degraded. Info: See 0A059-0.
0A05B-0	Antenna	WARNING	Ele cal. limits	Check limits of the calibration result for the elevation axis are exceeded. Pointing performance may be degraded. Info: See 0A059-0.
0A05D-0	Antenna	WARNING	ISM warning	The ISM has temporarily observed an unusual situation for temperature or voltage. No user interaction required. If repeated after cooldown and reboot, check if the ISM or cables around it are defective.
0A05E-0	Antenna	WARNING	Low elevation	The antenna is not allowed to transmit because the elevation is too low.
0A05F-0	Antenna	WARNING	Heading range	Heading data range error. External heading unit supplies unreliable data.

Table D-1: List of events (Continued)

Error code	Unit	Severity	Description	Explanation
0A062-0	Antenna	WARNING	High elevation	The antenna cannot perform acquisition in gyro-free mode because the elevation is too high.
0A063-0	Antenna	WARNING	BCM warning	The BCM has observed an unusual situation with regards to the PLL. If the situation persists, check the BCM.
0A064-0	Antenna	ERROR	BCM communication	Communication error between PCM and BCM. Check SUB-D connectors and cables.
0A065-0	Antenna	ERROR	Deploy/Stow	Deploy/stow error. The antenna did not properly unlock (deploy), or the stow switch never closed (stow).
0A066-0	Antenna	ERROR	OMT error	Problem with OMT. Temperature out of range or OMT cable may be broken.
0A067-0	Antenna	WARNING	Automatic stow	The antenna automatically stowed because it detected significant movement.
0A068-0	Antenna	WARNING	Polarisation tuning	Polarisation tuning was not successful. Polarisation may be incorrect.
0A069-0	Antenna	ERROR	BCM error	The BCM PLL failed to initialize.
0A06A-0	Antenna	WARNING	Missing BUC response	No response received from the BUC.
0A06C-0	Antenna	FATAL	Antenna base tilt	Antenna base tilted beyond limit.
0A06D-0	Antenna	WARNING	VMU reference distribution	VMU reference signal not present at BCM, but is present at ACU. Check coax cable between VIM and BCM.
0A06E-0	Antenna	WARNING	Antenna orientation	The terminal is oriented in a way that prevents it from pointing to the selected satellite.
0B000-0	PSM	ERROR	PSM production data	Missing or invalid production data in the PSM. Replace it.
0B001-0	PSM	ERROR	NMEA 2000 identifier	Missing or invalid production data in the PSM. Replace it.
0B010-0	PSM	ERROR	PSM link/SW version	Link to the PSM module could not be established. Either the PSM board is malfunctioning, or - if the system software has just been updated - the software is too old and is not compatible with the PSM hardware.

Table D-1: List of events (Continued)

Error code	Unit	Severity	Description	Explanation
0B060-0	PSM	WARNING	NMEA 0183 parse error	Parse errors detected on the NMEA 0183 interface. Check NMEA 0183 cable, signal levels etc.
0B061-0	PSM	WARNING	Power supply temperature	ACU Power supply temperature is high. Improve ventilation or move to a cooler area. Info: 00000000 = Temperature warning, system still operational, but will shut down eventually if temperature keeps rising. 00000001 = Temperature critical, system has shut down to protect the hardware from overheating.

Table D-1: List of events (Continued)

Command line interface

E.1 Introduction

After you have done the initial configuration and connected the SAILOR VSAT system to your network, you can use Telnet to configure the SAILOR VSAT system. You can also set up VSAT modem parameters. Note that the following sections cover the command line interface for all SAILOR VSAT antennas.

Some of the commands may not be relevant for the antenna described in this manual.

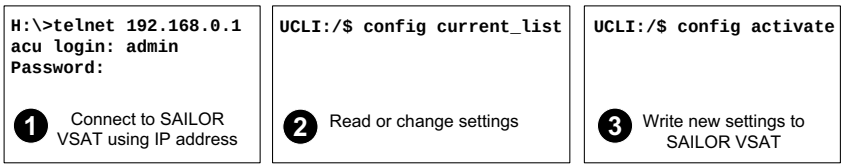


Figure E-1: How to use the command line interface (example for telnet)

After successful login you can read and change settings. Use the command **`config activate`** to activate the new settings in the ACU. You will need to refresh the browser window before the changed settings become visible.

Note Every change is performed on the active satellite profile or the active VSAT modem profile. Parameter identifiers are case sensitive.

E.1.1 Telnet connection

You can access the command line interface via Telnet.

Access to the SAILOR VSAT system system is protected by a user name and password. This is the same user name and password that is used in the web interface under **ADMINISTRATION**.

The interface is on the standard Telnet port 23 or SSH port 22. Use any LAN port and corresponding IP address of the ACU (except LAN 2 on GX/Ka ACU). To start telnet session do as follows:

1. Open a Telnet client of your choice.
2. At the prompt, enter the IP address of the ACU, login **admin** and password.

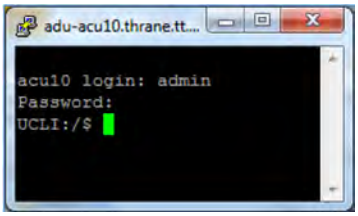


Figure E-2: Command line interface, login

E.1.2 Help

If you enter **`help`** directly at the prompt **`UCLI:/$`** all available commands are listed. Additionally any command will take **`help`** as first argument and display detailed information of the specific command.

E.1.3 Conventions

The command description below uses the following special typography:

Convention	Description
`Courier font`	Information that is displayed on the screen.
`Bold Courier font`	Text the user must enter.
`<argument>`	Required argument
`[argument]`	Optional argument

Table E-1: Command typography

Example:
```
satellite lon [longitude]
zone <id> active <yes | no>
```

E.2 Supported commands

The following commands are described in detail. They are listed in alphabetical order.

- *config*
- *demo*
- *dual_antenna*
- *exit*
- *help*
- *modem*
- *satellite*
- *status*
- *system*
- *track*
- *zone*

E.2.1 config

Command	Description
config	Shows the sub commands available, including a short description.
config pending_list	Shows the number of pending changes.
config current_list	Shows the values for the current satellite profile, antenna and some tracking information.
config discard	Discards all pending changes.
config activate	Use this command to save and activate the pending changes in the SAILOR VSAT system.

Table E-2: UCLI command: config

E.2.2 demo

Command	Description
demo start	Starts a demo pattern where the antenna will turn azimuth, elevation and cross elevation until it receives the command **demo stop.**
demo stop	Stops the antenna demo pattern.
demo reset	Resets the antenna to angle 0.

Table E-3: UCLI command: demo

E.2.3 dual_antenna

Command	Description
dual_antenna mode	Shows the current dual antenna mode • single • master • slave
dual_antenna status	• Shows the current dual-antenna mode status • active • inactive

Table E-4: UCLI command: dual_antenna

E.2.4 exit

Command	Description
exit	Exits the connection to the SAILOR VSAT system.

Table E-5: UCLI command: exit

E.2.5 help

Command	Description
help	Shows a list of commands available, including a short description.
help satellite	Shows the sub commands and description for the command satellite.
help modem	Shows the sub commands and a short description for the command modem.
help track	Shows the sub commands and description for the command track.
help status	Shows the sub commands and description for the command status.
help system	Shows the sub commands and a short description for the command system.
help config	Shows the sub commands, unit and description for the command config.
help zone	Shows the sub commands, unit and description for the command zone.
help demo	Shows the sub commands, unit and description for the command demo
help dual antenna	Shows the sub commands, unit and description for the command dual antenna
help exit	Shows the sub commands, unit and description for the command exit

Table E-6: UCLI command: **help**

E.2.6 modem

Command	Description
modem	Shows a list of sub commands available, including a short description.
modem name	Shows the VSAT modem name of the currently active satellite profile (entered in the web interface).
modem model	Shows the currently active VSAT modem model (selected in the web interface).
modem gps_fix	Shows the current GPS position
modem gps_lat	Shows the latitude value of the current position.
modem gps_lon	Shows the longitude value of the current position.

Table E-7: UCLI command: **modem**

E.2.7 satellite

Command	Description
satellite name	Shows the name of the currently active satellite profile.
satellite lon **satellite lon 1W**	Shows or sets the longitude position of the satellite, in degrees. • 1.0W or 1.0E or -1.0 for west and 1.0 for east
satellite skew **satellite skew 3.7**	Shows or sets an additional skew offset of the satellite[a]. Some satellites have additional skew because they have been placed different in the orbit. E.g. Optus satellites in Australia are offset -45 degrees. Most satellites have 0 degree skew offset. • Skew of the satellite: –90˚ to +90˚.
satellite max_inc **satellite max_inc 2.5**	Shows or sets the maximum inclination of the used satellite. Some satellites are old and are therefore moving in larger circles in space. Setting the maximum inclination will add this to the SAILOR VSAT system acquisition window size used to find the satellite. • Maximum inclination of satellite 0.0˚ to 90˚

Table E-8: UCLI command: **satellite**

Command	Description
satellite rx_pol **satellite rx_pol v**	Shows or sets the current RX polarization: • v (vertical) • h (horizontal) • l (left) • r (right)
satellite tx_pol **satellite tx_pol v**	Shows or sets the current TX polarization: • v (vertical) • h (horizontal) • l (left) • r (right)
satellite ele_cut_off **satellite ele_cut_off 5**	Shows or sets the elevation referenced to earth where the SAILOR VSAT system must shut off for transmission. This is an FCC requirement. The elevation cut off depends on how much power is transmitted and which coding is used. • Valid range: 0˚ to 90˚
satellite rx_lo	Shows the Rx LO / LNB LO. Range: 9.6 GHz to 11.3 GHz. GX: 18.25 GHz
satellite rx_rf_freq **satellite rx_rf_freq 12.123456 9.75**	Shows or sets the Rx frequency and LNB Lo frequency. • Ku band: RF frequency: 10.7 – 12.75 GHz. LNB Lo frequency: 9.6 GHz – 11.3 GHz. The SAILOR VSAT system supports any LNB Lo. • Ka band: RF frequency: 19.2 – 20.2 GHz. LNB Lo frequency: 18.25 GHz. **Note**: Setting the Ku-band Rx frequency and LNB Lo automatically configures the L-band rx frequency: Rx L-band freq = rx_rf_freq – LNB Lo **Example**: 1567.890 MHz = 11.567890 GHz – 10 GHz

Table E-8: UCLI command: **satellite** (Continued)

Command	Description
satellite rx_if_freq **satellite rx_if_freq 1200.123 9.75**	Shows or sets the IF Rx frequency together with the LNB Lo frequency. • Ku band: IF frequency within 950 MHz – 2150 MHz. LNB Lo frequency within 9.6 GHz – 11.3 GHz. The SAILOR VSAT system supports any LNB Lo. • Ka band: IF frequency within 950 MHz – 1950 MHz. LNB Lo frequency: 18.25 GHz. **Note**: Setting the L-band Rx frequency and LNB Lo automatically configures the Ku-band Rx frequency: Rx Ku-band frequency = LNB Lo + rx_if_frequency **Example**: 11.567890 GHz = 10 GHz + 1567.890000 MHz
satellite tx_lo	Shows the current TX LO frequency, fixed at Ku band:12.8 GHz Ka band: 28.05 GHz
satellite tx_rf_freq **satellite tx_rf_freq 14.123456**	Shows or sets the RF frequency used for tx. • Valid range: Ku band: 13.75 GHz to 14.5 GHz. Ka band: 29 GHz to 30 GHz. **Note**: Configuring the Ku-band tx frequency automatically configures the L-band frequency: L-band frequency = Ku-band tx frequency – 12.8 GHz (BUC Lo) **Example**: 1308.300000 MHz = 14.108300 GHz – 12.8 GHz
satellite tx_if_freq **satellite tx_if_freq 1200.123**	Shows or sets the IF frequency for tx. • Valid range: Ku band: 950 MHz to 1700 MHz. Ka band: 950 MHz to 1950 MHz **Note**: Configuring the L-band tx frequency automatically configures the Ku-band frequency: Ku-band frequency = 12.8 GHz (BUC Lo) + L-band frequency **Example**: 14.108300 GHz = 12.8 GHz + 1308.300000 MHz

Table E-8: UCLI command: **satellite** (Continued)

a. Relevant for Ku band.

E.2.8 status

Command	Description
status	Shows the sub commands available, including a short description.
status system	Shows the current status of the SAILOR 100 GX.
status track_all	Shows the current values for all tracking parameters: • vessel heading • azimuth relative • elevation relative • polarization skew • GPS latitude and longitude
status event_list	Shows a list of active events.

Table E-9: UCLI command: **status**

E.2.9 system

Command	Description
system	Shows the sub commands available, including a short description.
system restart	Sends a command to the ACU to restart the system instantaneously. It makes a power-on self test and then points to the last used satellite.
system info	Shows the software version, part names and serial numbers of the SAILOR 100 GX.
system oem <OEM ID>	Set system OEM ID. 0: Cobham 1: Inmarsat 2: Furuno
bpo [on | off]	Set Bearing performance optimization On or Off.

Table E-10: UCLI command: **system**

E.2.10 track

Command	Description
track	Shows the sub commands available, including a short description.
track mode **track mode dvb**	Shows or sets the receiver bandwidth or mode, the way the SAILOR 100 GX tracks the satellite: • narrow (recommended, uses the built-in 300 kHz filter of the SAILOR 100 GX) • rssi (uses the RSSI signal from the VSAT modem) • wide (uses the wide-band filter to track the satellite) • dvb (uses the built-in DVB-S2 receiver of the SAILOR 100 GX to track the satellite. You must configure `dvb_sym` and `dvb_nid`.) • GSC (uses Inmarsat Global Signalling Channel • GSCpwr (uses power of Inmarsat Global Signalling Channel)
track dvb_sym **track dvb_sym 22**	Shows or sets the current mega symbols rate for the DVB-S2 receiver when in dvb mode. The symbol rate used to verify and track a transponder. • Valid range: 0.1 — 99
track dvb_nid **track dvb_nid 0**	Shows or sets the DVB NID to be verified by the built-in DVB-S2 tracking receiver, when using tracking mode DVB. It configures the NID used to verify and track a transponder. • Valid range: 0 — 65535 A NID of '0' disables the NID check. Then the NID will be omitted in the verification of the transponder.
track rx_rf_freq	The frequency for the receiver to tune to. Verify that the frequency is in the same range as the modem rx_rf_frequency, above or below 11.7 GHz. I.f rx_rf_freq is set to 0, the tracking frequency is the same as the RX frequency provided by the modem • Valid range: Ku band: 10.7 GHz to 12.75 GHz Ka band: 19.2 GHz to 20.2 GHz

Table E-11: UCLI command: `track`

E.2.11 zone

Command	Description
zone	Shows the sub commands, unit and description for the command zone.
zone <id> azimuth <start angle> <end angle>	Sets the azimuth angles of the blocking zone for one zone. • Valid zones: 0 to 7 • Valid angles: 0 to 360
zone <id> elevation <start angle> <end angle>	Sets the elevation angles for a blocking zone. • Valid zones: 0 to 7 • Valid angles: 0 to 360
zone <id> tx_off <yes | no>	Enables or disables TX inside the blocking zone.
zone <id> active <yes | no>	Enables or disables the blocking zone.
zone <id>	Shows the setting for the blocking zone.

Table E-12: UCLI command: zone

Approvals

This appendix lists the approvals for SAILOR 100 GX:

- *CE (RED)*
- *Inmarsat SAILOR 100 GX ADS*
- *Japan approval (SAILOR 100 GX)*

F.1 CE (RED)

The SAILOR 100 GX is CE certified (RED directive) as stated in the "Declaration of Conformity with RED Directive", enclosed in copy on the next page.

EU Declaration of Conformity

Hereby **Thrane & Thrane A/S trading as Cobham SATCOM** declares that the following equipment complies with the specifications of:

RED directive 2014/53/EU concerning Radio Equipment
RoHS directive 2011/65/EU concerning Restriction of Harzardous Substances including delegated directive
(EU) 2015/863.

Equipment included in this declaration

Ku Models	Description	Part no.
7060C **7080A** **7080B** **7090B** **7090E** **7090I** **7090J** Consists of	**SAILOR 600 VSAT Ku** **SAILOR 800 VSAT Ku** **SAILOR 800 VSAT Ku High Power** **SAILOR 900 VSAT Ku** **SAILOR 900 VSAT High Power** **SAILOR 900 VSAT Ku Optimized** **SAILOR 900 VSAT Ku Optimized High Power**	
7006C	SAILOR 600 VSAT Above Deck Unit (ADU)	407006C-xxx
7008A	SAILOR 800 VSAT Above Deck Unit (ADU)	407008A-xxx-01
7008B	SAILOR 800 VSAT Ku HP Above Deck Unit (ADU)	407008B-xxx
7009B	SAILOR 900 VSAT Above Deck Unit (ADU)	407009B-xxx-01
7009E	SAILOR 900 VSAT HP Above Deck Unit (ADU)	407009E-xxx
7009I	SAILOR 900 VSAT Ku Optimized Above Deck Unit (ADU)	407009I-xxx
7009J	SAILOR 900 VSAT Ku Optimized HP Above Deck Unit (ADU)	407009J-xxx
7016C	SAILOR Antenna Control Unit (ACU)	407016C-xxx

GX Models	Description	Part no.
7060A **7060F** **7090C** **7090G** Consists of	**SAILOR 60 GX** **SAILOR 60 GX High Power** **SAILOR 100 GX** **SAILOR 100 GX High Power**	
7006A	SAILOR 60 GX Above Deck Unit (ADU)	407006A-xxx-01
7006F	SAILOR 60 GX HP Above Deck Unit (ADU)	407006F-xxx
7009C	SAILOR 100 GX Above Deck Unit (ADU)	
7009G	SAILOR 100 GX HP Above Deck Unit (ADU)	407009C-xxx-01 407009G-xxx
7016C	SAILOR Antenna Control Unit (ACU)	407016C-xxx
7023A	SAILOR GX Modem Unit (GMU)	407023A-xxx

GX-R2 Models	Description	Part no.
7060I **7060J** **7090K** **7090L** Consists of	**SAILOR 60 GX-R2, 4.5W** **SAILOR 60 GX-R2, 9W** **SAILOR 100 GX-R2, 4.5W** **SAILOR 100 GX-2, 9W**	
7006I	SAILOR 60 GX-R2 ADU, 4.5W	407006I-xxx
7006J	SAILOR 60 GX-R2 ADU, 9W	407006J-xxx
7009K	SAILOR 100 GX-R2 ADU, 4.5W	
7009L	SAILOR 100 GX-R2 ADU, 9W	407009K-xxx 407009L-xxx
7016C	SAILOR Antenna Control Unit (ACU)	407016C-xxx
7023A	SAILOR GX Modem Unit (GMU)	407023A-xxx

Ka Models	Description	Part no.
7060B **7060G** **7090D** **7090H** Consists of	**SAILOR 600 VSAT Ka** **SAILOR 600 VSAT Ka High Power** **SAILOR 900 VSAT Ka** **SAILOR 900 VSAT Ka High Power**	
7006B	SAILOR 600 VSAT Ka Above Deck Unit (ADU)	407006B-xxx-01
7006F	SAILOR 60 GX High Power Antenna	407006F-xxx
7009D	SAILOR 900 VSAT Ka Above Deck Unit (ADU)	407009D-xxx-01
7009G	SAILOR 100 GX High Power ADU	407009G-xxx
7016C	SAILOR Antenna Control Unit (ACU)	407016C-xxx

Viasat Ka Models	Description	Part no.
7060D **7090F** Consists of	**SAILOR 600 Viasat Ka** **SAILOR 900 Viasat Ka**	
7006D	SAILOR 600 Viasat Ka Above Deck Unit (ADU)	407006B-xxx
7009F	SAILOR 900 Viasat Ka Above Deck Unit (ADU)	407009D-xxx
7016C	SAILOR Antenna Control Unit (ACU)	407016C-xxx-001
7024A	SAILOR pTRIA Interface Unit (PIU)	407024A-xxx

"xxx" is 3 characters, that determine the product branding, where only labels, logo and user interface varies.

The full text of the EU declaration of conformity is available at the following internet address:
http://sync.cobham.com/satcom/support/downloads

Document no.: 99-157422-I
Date: 27 January 2021

Type Approval Certificate

Cobham
Model Sailor 100 GX ADS

Certificate Number: GXM100TNT-03

Cobham, the manufacturer of Cobham 100GX ADS has submitted documents which demonstrate that the said user terminal when operating in the environmental conditions set forth in its Type Approval Particulars meets the technical requirements for use with the Inmarsat Satellite Communications System.

Cobham has certified that all other units of the same type will meet all technical requirements in a similar manner to the unit subjected to test, and that the tests have been conducted in accordance with procedures approved by Inmarsat. The full technical details of the Cobham 100GX ADS are documented in its Type Approval Particulars.

Inmarsat does hereby certify that the Cobham 100GX ADS model identified herein is acceptable for use in the Commercial Ka Band with the Inmarsat Satellite Communications System as of the date of this Certificate.

Inmarsat Global Limited

By

Name:	Hok Shuen Wong
Title:	Vice President Engineering
Signed:	
Approval Date:	31st October 2017

1. This certificate is intended only as formal notification to the manufacturer that Inmarsat has determined, on the basis of information submitted by Cobham using test procedures approved by Inmarsat that the UT model of the type identified herein meet the standards for use with the Inmarsat System. This certificate is not a warranty of the performance or fitness for purpose of the Cobham 100GX ADS and Inmarsat hereby expressly disclaims any and all liability arising out of or in connection with the issuance, use, or misuse of this certificate.
2. This certificate is not intended to replace any required national regulatory type approvals for the placement of market of UT models of the type identified in the Certificate. It is the responsibility of the manufacturer of the UT model to obtain the required national regulatory type approval before the terminal can be placed in the markets within the regulatory sovereignty region of the countries of concern. In addition, the operation of the UT model may also be subject to national licensing requirements.

Inmarsat Global Limited
99 City Road
London, EC1Y 1AX
United Kingdom.

inmarsat
Total Communications Network™

F.3 Japan approval (SAILOR 100 GX)

Cobham SATCOM殿

工事設計の認証書
Certificate of Construction Type

特定無線設備の種別 Classification of Specified Radio Equipment	証明規則第２条第１項第２８号の２の４の無線設備 ＥＳＩＭ携帯移動地球局
電波の型式、周波数及び空中線電力 Type of Emission, Frequency and Antenna Power	7M05G7W　29.5～30.0GHz　5W
型式又は名称 Model/Name of Equipment	SAILOR 100 GX
製造者名 Manufacturer Name	Thrane & Thrane A/S
認証番号 Certification Number	001-A11887
工事設計の認証をした年月日 Date of Certification	平成29年10月17日

上記のとおり、電波法第38条の24第１項の規定に基づく工事設計の認証を行ったものであることを証する。

This is to certify that above type certification has been granted in accordance with the provisions set out in Article 38-24 Paragraph 1 of the Radio Law.

平成29年10月17日

一般財団法人　テレコムエンジニアリングセンター
Telecom Engineering Center

一般財団法人 テレコムエンジニアリングセンター 認証

0010SAA1005　12A4-OS-2990005

A

ABS	ADU Bus Slave
ACU	Antenna Control Unit
ADM	ACU Digital Module. A main processor board in the ACU.
ADS	Antenna Diversity Solution
AMB	Antenna Module Bus

C

CM	Continuous Monitoring
COTS	Commercial Off The Shelf

D

DDM	DC-Motor Driver Module ,
DHCP	Dynamic Host Configuration Protocol. A protocol for assigning dynamic IP addresses to devices on a network. With dynamic addressing, a device can have a different IP address every time it connects to the network.
DNS	Domain Name System. A system translating server names (URLs) to server addresses.

E

ESD	ElectroStatic Discharge

F

FBB	FleetBroadband

G

GMU	GX Modem Unit
GPL	General Public License, Software license, which guarantees individuals, organizations and companies the freedom to use, study, share (copy), and modify the software.
GSC	Global Signaling Channel.

H

HDT	HeaDing True, NMEA sentence.

HTTPS	HyperText Transfer Protocol Secure.

I

IMSO	International Mobile Satellite Organisation. An intergovernmental organisation that oversees certain public satellite safety and security communication services provided via the Inmarsat satellites.
ISM	Inertial Sensor Module ,

K

KDM	Keyboard and Display Module of the ACU

L

LAN	Local Area Network
LEN	Load Equivalent Number
LGPL	Lesser General Public License

M

MIB	Management Information Base

N

NID	Network IDentification ,
NMEA	National Marine Electronics Association (standard). A combined electrical and data specification for communication between marine electronic devices such as echo sounder, sonars, anemometer (wind speed and direction), gyrocompass, autopilot, GPS receivers and many other types of instruments. It has been defined by, and is controlled by, the U.S.-based National Marine Electronics Association.

P

PAST	Person Activated Self Test
PCM	Pedestal Control Module ,
PMM	Polarisation Motor Module ,
POST	Power On Self Test. A system test that is activated each time the system is powered on.
PSM	Power Supply Module

R

RF	Radio Frequency. Electromagnetic wave frequencies between about 3 kilohertz and about

	300 gigahertz including the frequencies used for communications signals (radio, television, cell-phone and satellite transmissions) or radar signals.
RFI	Radio Frequency Interference. A non-desired radio signal which creates noise or dropouts in the wireless system or noise in a sound system.
ROSS	Roaming Oceanic Satellite Server

S

SMD	Single Motor Driver Module ,
SMTPS	Simple Mail Transfer Protocol Secure
SNMP	Simple Network Management Protocol. An Internet-standard protocol for managing devices on IP networks. It is used mostly in network management systems to monitor network-attached devices for conditions that warrant administrative attention.
SSH	Secure Shell. A network protocol for secure data communication, remote shell services or command execution and other secure network services between two networked computers that it connects via a secure channel over an insecure network. ,
STARTTLS	Start TLS begins a process where the email program and server turn an unencrypted connection into a connection that is secured and encrypted with either SSL or TLS.

T

TLS	Transport Layer Security
TPK	Terminal Provisioning Key

U

UCLI	User Command Line Interface

V

VIM	VSAT Interface Module ,
VLAN	Virtual Local Area Network
VMU	VSAT Modem Unit

W

WAN	Wide Area Network

X

XIM	Xim Interface Module, term for the module that connects the PCM and the ACU. X stands for one of various interface modules.

Z

ZRM Zero Reference Module ,

A

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