COBHAM

SAILOR 6280/6281 AIS System

Installation manual

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Safety summary

Observe the following general safety precautions 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. Cobham SATCOM assumes no liability for the customer's failure to comply with these requirements.

Ground the equipment

To minimise shock hazard, connect the SAILOR 6282 AIS Transponder to an electrical ground and follow the cable instructions.

RF exposure hazards and instructions

The SAILOR unit generates electromagnetic RF energy when transmitting. To ensure that you and those around you are not exposed to excessive amounts of energy and to avoid health hazards from excessive exposure to RF energy, all persons must be at least 1 ft (0.25 m) away from the antenna when the unit is transmitting.

Warranty limitation

IMPORTANT - The SAILOR 6285 GPS Antenna – Active is a sealed waterproof unit (classified IPx6 & IPx8). To create and maintain its waterproof integrity it was assembled in a controlled environment using special equipment. The SAILOR 6282 AIS Transponder is not a user maintainable unit, and under no circumstances should the unit be opened except by authorized personnel. Unauthorized opening of the unit will invalidate the warranty.

Installation and service

Installation and general service must be done by skilled service personnel.

Compass safe distance

Compass safe distance: 55 cm (standard magnetic compass), 45 cm (Emergency magnetic compass) from the SAILOR 6282 AIS Transponder.

Preface

Approvals

The SAILOR 6282 AIS Transponder fulfills the requirements of the Marine Equipment Directive 96/98/EC with 8th amend 2012/32/EU and is intended for use in maritime environment.

The SAILOR 6282 AIS Transponder is approved to MED 2011/75/EU and fulfills the requirements in the standards: IEC 61993-2 (2012), IEC 60945 ed.4 (2002), ITU-R M.1371-4, IEC 61162-1 (2010), IEC61162-2 (1999), IEC61162-450 (2011).

The SAILOR 6282 AIS Transponder is approved to FCC CFR47 part 80 with USCG approval no. 165.155/EC0168/BABT/MED000046/EC0575.

The SAILOR 6282 AIS Transponder is approved to IC and fulfills the requirements in RSS-182.

The approvals of the SAILOR 6282 AIS Transponder are constantly monitored. New national approvals will be applied for and granted and new test standards may come into force. Therefore the above list may not be complete. Contact your authorized dealer for more information.

Training information

The SAILOR 6282 AIS Transponder is designed for *occupational use only* and is also classified as such. It must only be used in the course of employment by individuals aware of the hazards as well as the way to minimize those hazards.

The unit is thus NOT intended for use in an uncontrolled environment by general public. The SAILOR 6282 AIS Transponder has been tested and complies with the FCC RF exposure limits for *Occupational Use Only*. The unit also complies with the following guidelines and standards regarding RF energy and electromagnetic energy levels including the recommended levels for human exposure:

- FCC OET Bulletin 65 Supplement C, evaluating compliance with FCC guidelines for human exposure to radio frequency electromagnetic fields.
- American National Standards Institute (C95.1) IEEE standard for safety levels with respect to human exposure to radio frequency electromagnetic fields, 3 kHz to 300 GHz.
- American National Standards Institute (C95.3) IEEE recommended practice for the measurement of potentially hazardous electromagnetic fields - RF and microwaves.

Below is a description of the RF exposure hazards and instructions in safe operation of the unit within the FCC RF exposure limits established for it.

Warning

Your SAILOR unit generates electromagnetic RF (radio frequency) energy when it is transmitting. To ensure that you and those around you are not exposed to excessive amounts of that energy (beyond FCC allowable limits for occupational use) and thus to avoid health hazards from excessive exposure to RF energy, FCC OET bulletin 65 establishes a Maximum Permissible Exposure (MPE) radius of 1 ft. (0.25 m) for the maximum power of your unit (12.5 W selected) with a half wave omni-directional antenna having a maximum gain of 3 dB (5.2 dBi). This means all persons must be at least 1 ft. (0.25 m) away from the antenna when the unit is transmitting.

Alerte de Sécurité

Dangers liés á l'exposition aux fréquences radio et instructions. Conformément á la réglementation d'industrie Canada, le present radio emetteur ne peut fonctionner qu'avec une antenne de type omnidirectionelle, demi-onde ou d'un gain maximale de 3 dB, approuvée par Industrie Canada. Pour éviter les risques pour la santé dûs á une exposition excessive aux champs de fréquences radio, une distance minimale de 25 cm est nécessaire entre l'utilisateur et le radio-émetteur.

Installation

The SAILOR 6282 AIS Transponder is designed for installation by a skilled service person.

1. An omni-directional antenna with a maximum power gain of 5.2 dBi must be mounted at least 7.6 ft. (2.25 m) above the highest deck where people may be staying during radio transmissions. The distance is to be measured vertically from the lowest point of the antenna. This provides the minimum separation distance which is in compliance with RF exposure requirements and is based on the MPE radius of 1 ft. (0.25 m) plus the 6.6 ft. (2 m) height of an adult.
2. On vessels that cannot fulfill requirements in item 1, the antenna must be mounted so that its lowest point is at least 1 ft. (0.25 m) vertically above the heads of people on deck and all persons must be outside the 1 ft. (0.25 m) MPE radius during radio transmission.
   - Always mount the antenna at least 1ft (0.25 m) from possible human access.

- Never touch the antenna when transmitting
- Use only authorized SAILOR accessories.

3. If the antenna has to be placed in public areas or near people with no awareness of the radio transmission, the antenna must be placed at a distance not less than 6 ft. (1.8 m) from possible human access.

Failure to observe any of these warnings may cause you or other people to exceed FCC RF exposure limits or create other dangerous conditions.

Record of Revisions

Rev.	Description	Release Date	Initials
A	Original document	28 June 2013	UFO

Table of contents

About this manual

1.1 Intended readers

This is an installation manual for the SAILOR 6280/6281 AIS System. It is intended for installers of the system and service personnel. Personnel installing or servicing the system must be properly trained 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. For daily use see the SAILOR 6282 AIS Transponder User manual.

1.2 Manual overview

This manual has the following chapters and appendices:

- *Introduction*
- *Installation*
- *Interface description*
- *Configuration*
- *Service & maintenance*
- *Technical specifications*
- *NMEA sentences*

1.3 Related documentation

The following table shows the documents related to this manual and to the SAILOR 6282 AIS Transponder.

Title and description	Document number
SAILOR 6282 AIS Transponder & SAILOR 6280/6281 AIS System, User manual	98-135323
SAILOR 6004 Control Panel, Installation manual	98-136644
SAILOR 6282 AIS Transponder, Installation guide	98-136017
SAILOR 6283 AIS Connection Box and Wall Tray, Installation guide	98-136018
SAILOR 6285 GPS Antenna - Active, Installation guide	98-136019

Table 1-1: Related documents

1.4 Precautions

Warnings, Cautions and Notes

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, or jeopardize the safety on board.
- **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, travel safety nor personal safety.

General precautions

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.

CAUTION! Do not use materials that are not equivalent to materials specified by Cobham SATCOM. 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:

- *Introduction to AIS*
- *SAILOR 6280/6281 AIS System*
- *System components*
- *Part numbers and options*

2.1 Introduction to AIS

2.1.1 Overview

AIS (Automatic Identification System) is a communication system for the exchange of navigation data. An AIS station can be a ship station or a shore-side base station. AIS stations operate without interaction by ship or shore personnel (autonomous and continuous). AIS has evolved to include devices such as AIS as a navigation aid, AIS on search and rescue aircraft and AIS search and rescue transmitters (AIS SART).

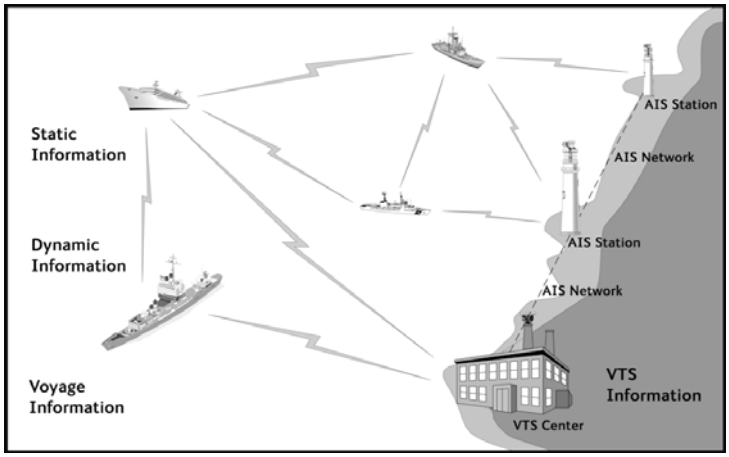


Figure 2-1: AIS for exchange of data

AIS enables the automatic exchange of shipboard information from the vessel's sensors (dynamic data), as well as manually entered static and voyage related data, between one vessel and another and between a vessel and a shore station(s). AIS also provides the possibility to send short safety related text messaging for ship or shore personnel. AIS devices are required internationally on most commercial vessels as identified by the International Maritime Organization (IMO) in the Safety of Life at Sea Convention (SOLAS), Chapter V. In addition, AIS is often required domestically on other vessels by some administrations.

2.1.2 AIS applications and purpose

The principal applications of AIS are:

- Information exchange between vessels within VHF range of each other, increasing situation awareness
- Information exchange between a vessel and a shore station, such as a Vessel Traffic Service (VTS), to improve traffic management in congested waterways
- Automatic reporting in areas of mandatory and voluntary reporting
- Exchange of safety related information between vessels and between vessels and shore station(s).

The purpose of AIS is to improve the safety of navigation and protection of the environment by assisting in the effective navigation of ships and the operation of VTS. This is achieved through the following:

- In a ship-to-ship mode for collision avoidance
- As a means for littoral states to obtain information about a ship and its cargo
- As a VTS tool, i.e. ship-to-shore, for traffic management
- Increased situational awareness which enables effective response to emergencies such as search and rescue (SAR) as well as environmental pollution
- Providing data to identify trends or improvements to enhance navigational safety.

Note Not all ships are required to have AIS. Furthermore, AIS may be switched off if there is a potential risk that the operation of AIS might compromise the safety or security of the ship, or if security incidents are imminent.

If a vessel operating in a mandatory ship reporting system does switch off its AIS, this should be reported to the relevant authority. Note that some data is entered or updated manually, meaning that there is potential for false entry and for the entered data to become out of date. This includes data related to static information (e.g. ship identity, dimension) and voyage related data (e.g. navigational status).

AIS and radar

A difference between AIS and radar is that AIS uses an absolute referencing system to determine the position, whereas radar determines the position by relative measurements from the vessel or shore base to observed targets. AIS may be used together with radar information to provide:

- Vessel identification, heading, course over ground (COG) and speed over ground (SOG)
- Improved vessel tracking (no target swap)
- Wider geographical coverage
- Greater positional accuracy, dependent on the position input sensor
- Information in radar shadow area ('sees' around bends and behind islands)
- Maneuver data in nearly real time
- No loss of targets in sea, rain and snow clutter

2.1.3 AIS classes

AIS is not only used on board ships. It can be grouped by 'class' (shipborne) and function. A Ship borne AIS device which contributes by most of the flow of AIS information, is classified as either Class A or B. The AIS Class A stations are ship borne units which meet IMO performance standards and are required on most commercial ships by the International Maritime organization (IMO). The SAILOR 6282 AIS Transponder is a Class A AIS.

2.2 SAILOR 6280/6281 AIS System

The SAILOR 6280 AIS System consists of the following units:

1. SAILOR 6282 AIS Transponder
2. SAILOR 6285 GPS Antenna - Active
3. SAILOR 6004 Control Panel
4. SAILOR 6283 AIS Connection Box and Wall Tray

The SAILOR 6281 AIS Basic System consists of the following units:

1. SAILOR 6282 AIS Transponder
2. SAILOR 6285 GPS Antenna - Active
3. SAILOR 6004 Control Panel

2.2.1 Overview of a SAILOR 6281 AIS Basic System

The following figure shows the system configuration.

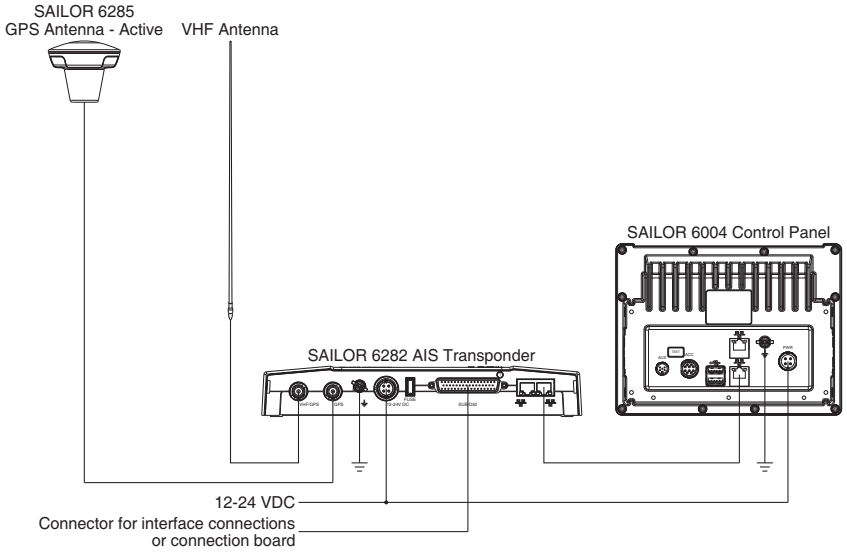


Figure 2-2: System configuration for the SAILOR 6281 AIS Basic System

The SAILOR 6004 Control Panel is connected to the SAILOR 6282 AIS Transponder through a LAN connection (LWE/IEC 61162-450), here after called LWE. The SAILOR 6281 AIS Basic System is operated using the touch display of the SAILOR 6004 Control Panel.

2.2.2 Features

- AIS Class A compliant and approved
- Active GPS antenna included
- Interface for ThraneLINK applications and INS available
- Programmable interface for connection to sensors using the NMEA interface versions 2.0, ..., 4.1
- Touch screen on the SAILOR 6004 Control Panel
- Easy installation with the dedicated connection box available (SAILOR 6283 AIS Connection Box and Wall Tray)
- Easy service - on the unit, through the ThraneLINK Management Application (TMA) or a web browser
- Built-in self-diagnostic system
- Built-in DC output on GPS antenna connector
- Possibility for a combined VHF and GPS antenna
- Works with both GPS and GLONASS
- Input for Low Power Forced Control, 1W output (gas alarm)
- Support of Class B carrier sense messages
- Function for discarding Class B messages
- Support for Long Range satellite tracking on channel 75 & channel 76
- Interface for pilot plug

2.3 System components

2.3.1 SAILOR 6282 AIS Transponder

The SAILOR 6282 AIS Transponder is a Class A AIS. It has connectors for GPS and VHF antenna, a ground stud, connector for DC power (12–24 VDC), multi connector for interfaces and 2 LAN connectors. The SAILOR 6282 AIS Transponder is always on, provided there is DC power.

The SAILOR 6282 AIS Transponder supports 3 sensor inputs for e.g. GPS and ROT and 4 presentation interfaces for e.g. ECDIS, Radar, Long Range and Pilot Plug. It also has inputs for Blue Sign functionality, Low Power Forced Control (gas alarm) and output for alarm. The SAILOR 6282 AIS Transponder has three LEDs showing the status of Power, Rx and Tx.

Figure 2-3: SAILOR 6282 AIS Transponder

2.3.2 SAILOR 6285 GPS Antenna - Active

The SAILOR 6285 GPS Antenna - Active is a robust, sealed and waterproof GPS antenna (classified IPx6 & IPx8).

Figure 2-4: SAILOR 6285 GPS Antenna - Active

2.3.3 SAILOR 6004 Control panel

The SAILOR 6004 Control panel is the user interface for the SAILOR 6282 AIS Transponder. Through the touch panel you access all settings that can be changed by the user. Alarms and notifications are shown in the display. The SAILOR 6004 Control panel has a buzzer for alarm tones. The display supports night mode. The AIS application is loaded into the SAILOR 6004 Control Panel during installation.

Figure 2-5: SAILOR 6004 Control panel

2.3.4 SAILOR 6283 AIS Connection Box and Wall Tray (optional)

The SAILOR 6283 AIS Connection Box and Wall Tray has spring-loaded terminals for easy connection of all interfaces. See *SAILOR 6282 AIS Transponder* on page 2-5 for more information on interfaces.

Figure 2-6: SAILOR 6283 AIS Connection Box and Wall Tray

2.4 Part numbers and options

2.4.1 Applicable part numbers

This installation manual is for the SAILOR 6282 AIS Transponder system and is applicable to the model- and part numbers below:

Part number	Description
406282A	SAILOR 6282 AIS Transponder
406004A	SAILOR 6004 Control Panel
406285A	SAILOR 6285 GPS Antenna - Active
406283A	SAILOR 6283 AIS Connection Box and Wall Tray

Table 2-1: Part numbers for the SAILOR 6280/6281 AIS System

2.4.2 Accessories

The following accessories are included in the delivery:

Part number	Description accessories
37-130130	DC Power cable for SAILOR 6282 AIS Transponder and SAILOR 6004 Control Panel
37-135955	SUB-D50 cable, 1 m
37-207073-000	RJ45 Cat5e STP LAN cable, 5 m
41-135855	GPS Antenna bracket
67-135974	Pilot plug

Table 2-2: Part numbers for accessories

Installation

This chapter has the following sections:

- *Unpacking and initial inspection*
- *VHF and GPS antenna installation*
- *Physical installation of the SAILOR 6280 AIS System*
- *Physical installation of the SAILOR 6281 AIS System*
- *Physical installation of the SAILOR 6004 Control panel*

3.1 Unpacking and initial inspection

3.1.1 Unpacking

The following items are included in the delivery of a SAILOR 6282 AIS Transponder:

- SAILOR 6282 AIS Transponder
- SAILOR 6285 GPS Antenna - Active
- GPS antenna bracket
- User manual SAILOR 6282 AIS Transponder & SAILOR 6280/6281 AIS System
- Installation guide SAILOR 6282 AIS Transponder
- Installation guide SAILOR 6285 GPS Antenna - Active
- Power cable, 1 m
- Cable D-SUB, 50 pin, 1 m
- Cable RJ45 Cat5e STP, 5 m
- Fuse puller
- Fuse (7.5 AF)
- Screw M5-40 TORX, black (5 pieces)
- Screw ST4.8x50 TORX (5 pieces)
- Pilot plug

3.1.2 Initial inspection

Inspect the shipping carton immediately upon receipt for evidence of damage during transport. If the shipping carton is severely damaged or water stained, request that the carrier's agent be present when opening the carton. Save the carton 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, 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.

3.2 VHF and GPS antenna installation

The SAILOR 6282 AIS Transponder must be installed with one antenna for VHF RX/TX communication and one antenna for GPS communication. You can install all commonly available 50 Ohm antennas covering the appropriate frequency range and providing a VSWR less than 1.5 over this range.

For further details on equipment and antenna installation, see IMOCOMSAR/Circ. 32, GUIDELINES FOR THE HARMONIZATION OF GMDSS REQUIREMENTS FOR RADIO INSTALLATIONS ON BOARD SOLAS SHIPS.

3.2.1 Combined VHF and GPS antenna

Typically the SAILOR 6282 AIS Transponder is connected to a VHF antenna and a GPS with two cables. The SAILOR 6282 AIS Transponder can also be connected to a combined VHF and GPS antenna with only one cable. The combined antenna must be approved to work with the SAILOR 6282 AIS Transponder. The approved combined VHF and GPS antennas are listed in Table 3-3 on page 3-11.

The combined VHF and GPS antenna is connected to the VHF plug of the SAILOR 6282 AIS Transponder. During installation the SAILOR 6282 AIS Transponder must be set up for the one-cable installation. You do this using a service PC with the TT6282 AIS Service Interface, setup menu.

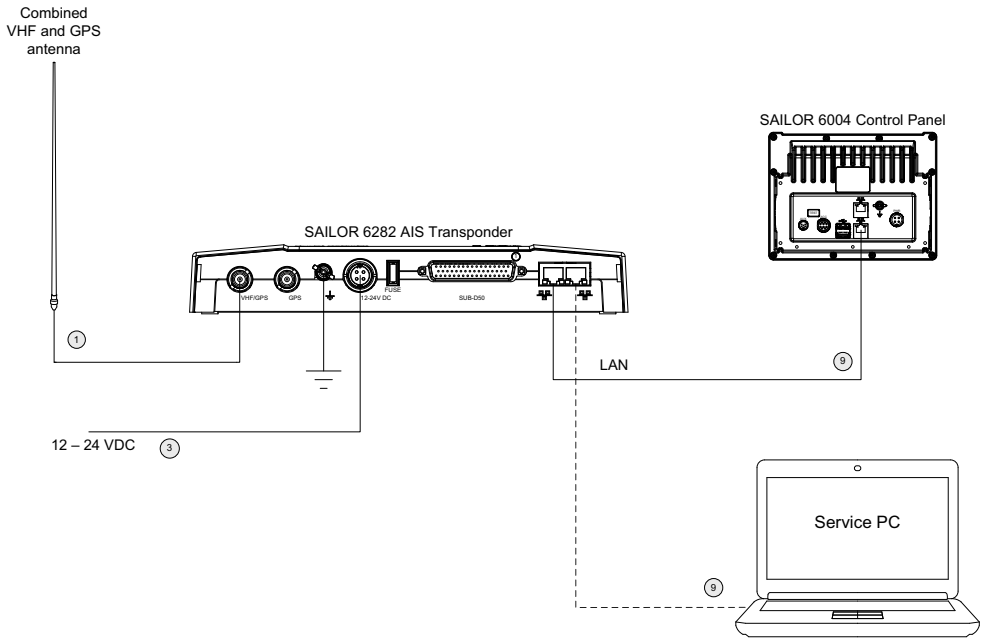


Figure 3-1: Installation of a combined VHF and GPS antenna

3.2.2 Cable requirements

Connect the antennas using a low loss type 50 Ohm coaxial cable, e.g. good quality RG214 or better. IMO-COMSAR/Circ. 32 recommends the use of a double screened type cable (like e.g. RG214) with a maximum insertion loss of 3 dB across the antenna cable installation.

The maximum antenna cable length in the installation depends on the quality of the cable, i.e. the specified attenuation (dB/m) of the cable of choice at the high end of the VHF frequency band. As a rule of thumb the cable length using e.g. RG214 coaxial cable should not exceed 25 m.

3.2.3 VHF RX/TX antenna

In installations with two or more units it is important to ensure the optimum performance of these by carefully selecting the antenna positions for both units. It is recommended to maximize the RF attenuation between the VHF RX/TX antennas in the installation. You can ensure this by not having the RX/TX antennas positioned at the same horizontal level, i.e. the RX/TX antennas for each radio must be installed at shifted elevations as shown in the following drawing.

If sufficient vertical distance between two or more such antennas cannot be achieved, the horizontal distance between them is increasingly important for optimum performance. If there is hardly any vertical separation ensure that there is a minimum of 5 m horizontal distance between any RX/TX antennas in the installation.

To minimize any increase in VSWR of the VHF RX/TX antenna, install the antenna at a vertical distance of at least 2 m to any other mast, pole or other RF antennas. Keep VHF antennas as far away as possible from the antenna main beam of any radar and satellite equipment.

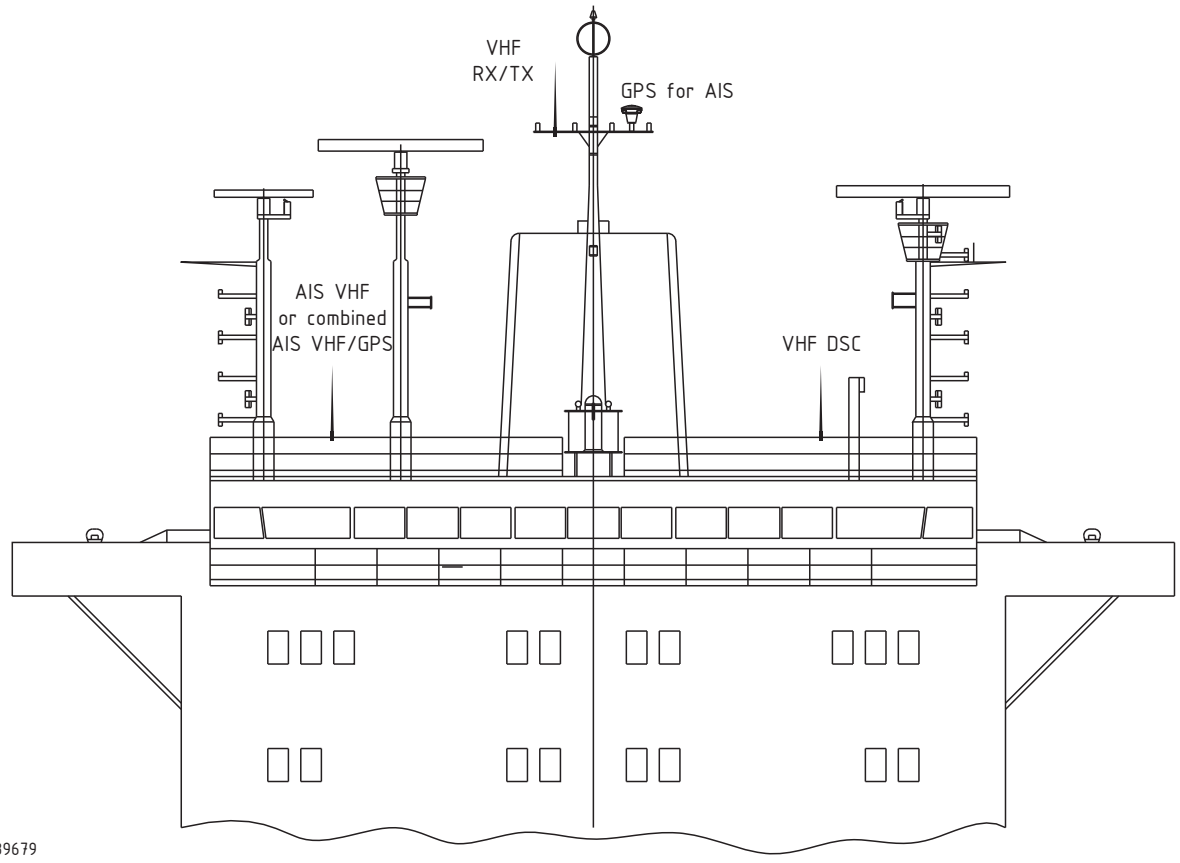


Figure 3-2: Antenna positioning

3.2.4 SAILOR 6285 GPS Antenna - Active

To install the SAILOR 6285 GPS Antenna - Active do as follows:

1. Install the bracket on the pipe. Use silicone glue to lock the bracket to the pipe.
2. Pass the cable through the top of the bracket and connect the antenna cable to the antenna (screw lock). Seal the connection to prevent water ingress.
3. Click the antenna onto the bracket.

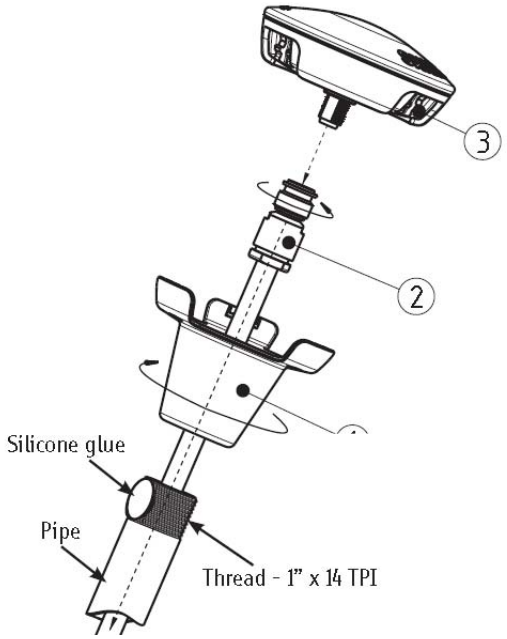


Figure 3-3: Installing the SAILOR 6285 GPS Antenna - Active

3.3 Physical installation of the SAILOR 6280 AIS System

The SAILOR 6280 AIS System consists of the following units:

1. SAILOR 6282 AIS Transponder
2. SAILOR 6004 Control Panel
3. SAILOR 6285 GPS Antenna - Active
4. SAILOR 6283 AIS Connection Box and Wall Tray

You can mount the SAILOR 6283 AIS Connection Box and Wall Tray on a desktop or on a wall. Provide space enough to access the connectors and the fuse. Allow space for the cables.

Application example

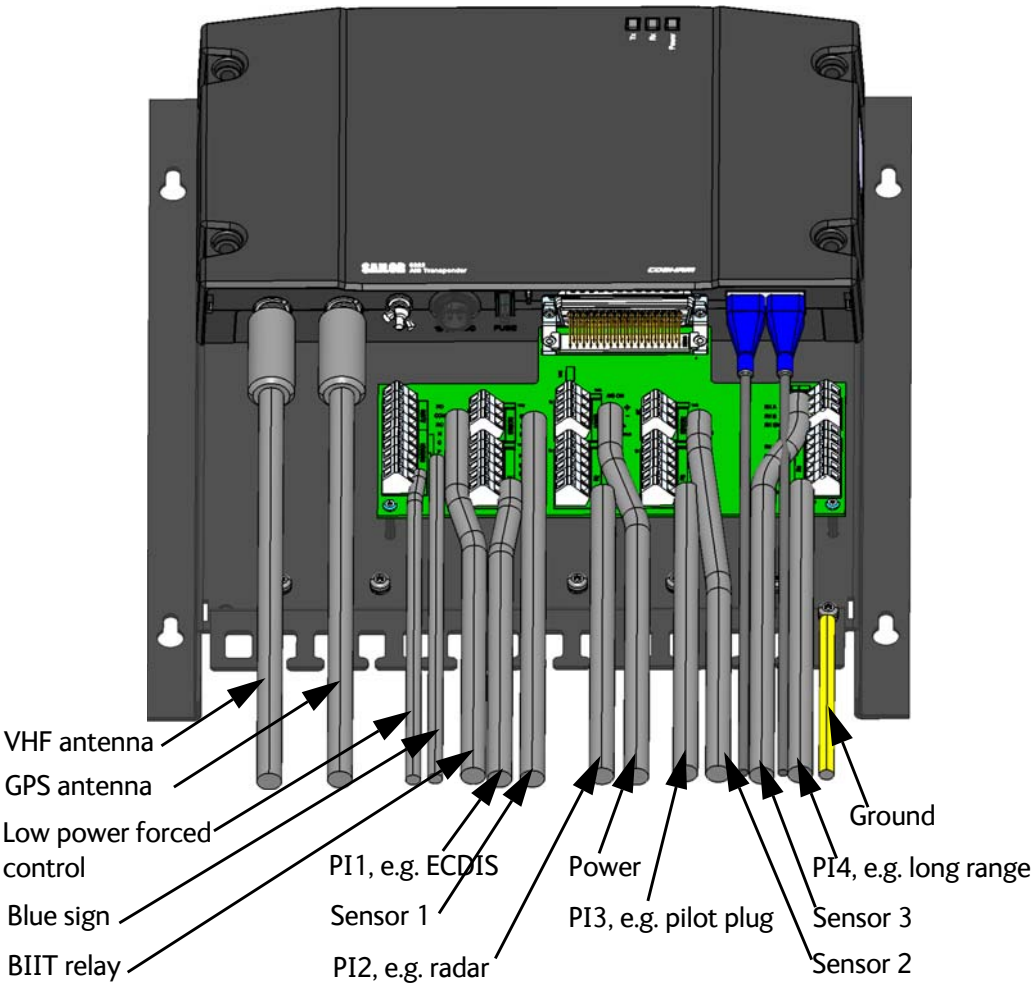


Figure 3-4: Application example with SAILOR 6283 AIS Connection Box and Wall Tray

Compass safe distance

Make sure that the SAILOR 6282 AIS Transponder is far enough from any magnetic compass. See the following table for the safe distance after magnetization between the nearest point of the device and the centre of the compass at which it will produce a deviation of 0.3°.

Device	Compass safe distance
SAILOR 6282 AIS Transponder	55 cm (standard magnetic compass) 45 cm (Emergency magnetic compass)
SAILOR 6004 Control Panel	60 cm

Table 3-1: Compass safe distance for SAILOR 6282 AIS Transponder

Physical installation

See the following figure for installing the SAILOR 6283 AIS Connection Box and Wall Tray.

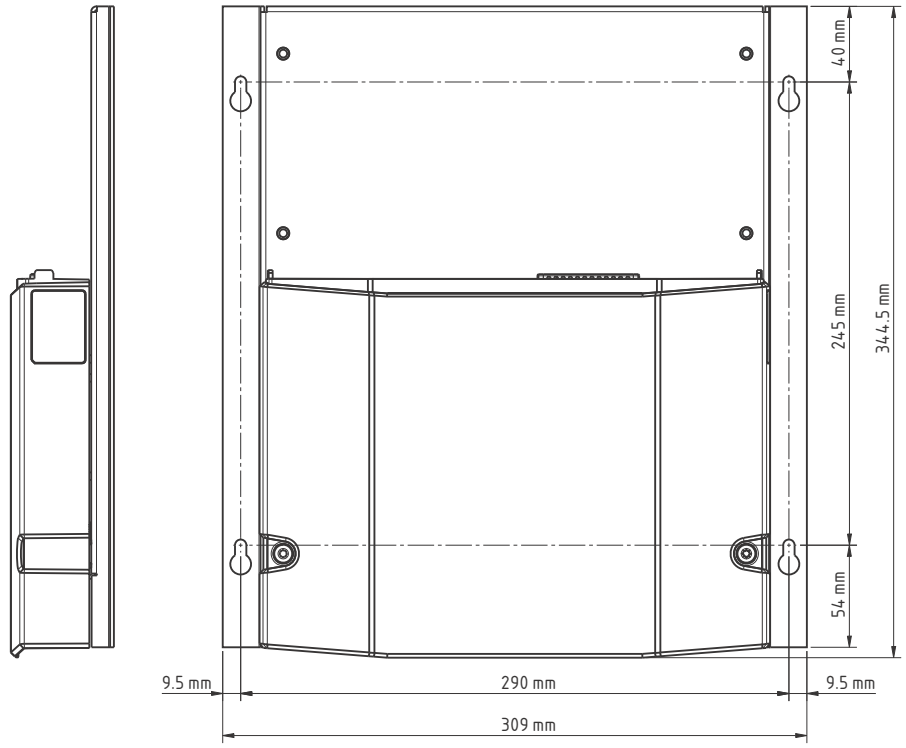


Figure 3-5: Installing the SAILOR 6283 AIS Connection Box and Wall Tray

1. Put the SAILOR 6282 AIS Transponder on the SAILOR 6283 AIS Connection Box and Wall Tray and fasten it with 4 screws (included in the delivery).
2. Leave the lid of the SAILOR 6283 AIS Connection Box and Wall Tray off until all equipment is connected to the spring-loaded terminals.
3. Use the integrated cable relief to secure the cables.
4. Having connected and secured all cables fasten the lid on the SAILOR 6283 AIS Connection Box and Wall Tray with 2 screws (included in the delivery).

Connector overview – SAILOR 6282 AIS Transponder

The following figure shows the connectors of the SAILOR 6282 AIS Transponder.

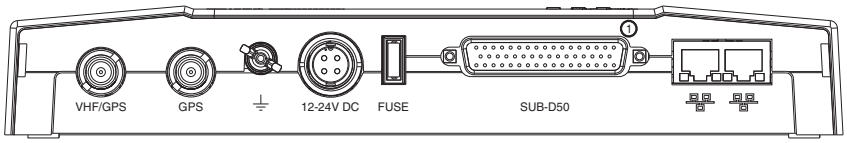


Figure 3-6: Connectors of the SAILOR 6282 AIS Transponder

VHF/GPS

Connect the VHF antenna or the combined VHF/GPS antenna to this connector.

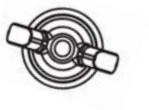
GPS

Connect the cable from the SAILOR 6285 GPS Antenna - Active to this connector.

Grounding

To connect the SAILOR 6282 AIS Transponder to ship ground, do as follows:

Ground stud



1. Connect a ground cable of shortest possible length and minimum 4 mm^2 cross section to the Ground stud and fasten it with the wing nut.
2. Connect the other end of the cable to ship ground.

DC Power input 12–24 VDC

For more information on DC power input, pin allocation and instructions how to connect DC power see *Connecting DC power* on page 4-2.

Connector overview – spring loaded terminals

The following figure shows the spring loaded terminals of the SAILOR 6283 AIS Connection Box and Wall Tray.

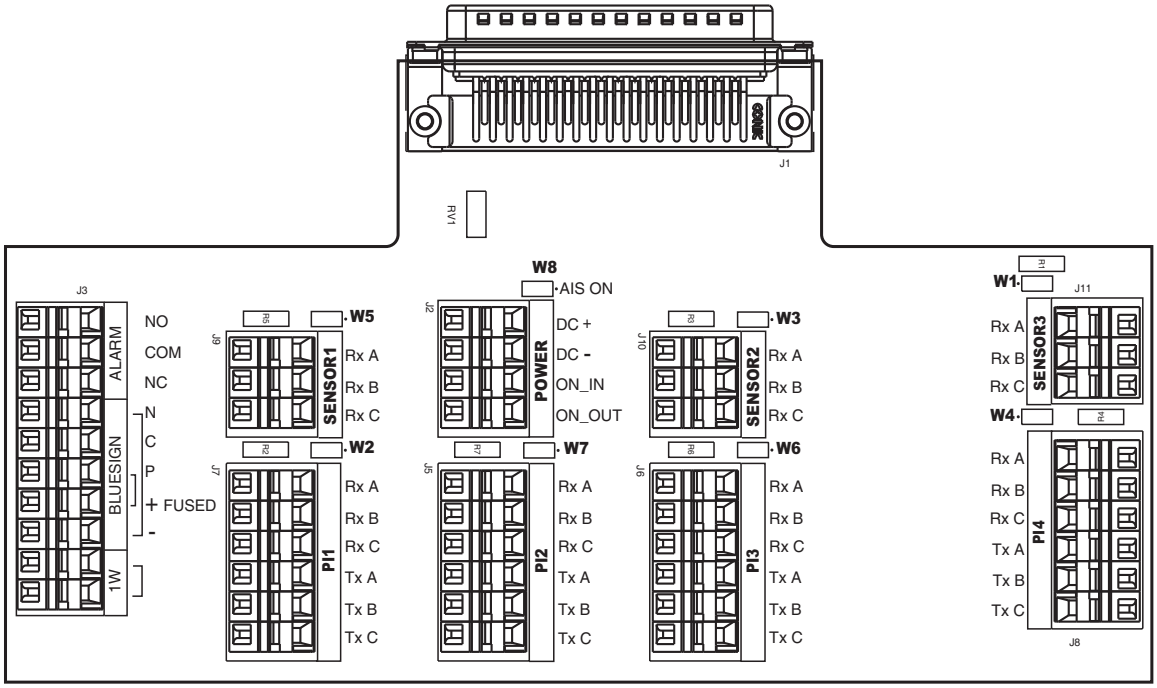


Figure 3-7: Connectors of the SAILOR 6283 AIS Connection Box and Wall Tray

Maximum wire cross section: 2.5 mm

If the SENSOR or PI is used for high speed communication (38400 baud) the related jumper must be closed. Closing the jumper terminates the Rx A and Rx B lines with 120 Ohm.

Jumper	Description
W5	SENSOR 1
W3	SENSOR 2
W1	SENSOR 3
W2	PI1
W7	PI2
W6	PI3
W4	PI4
W8	Must always be closed to switch on the SAILOR 6282 AIS Transponder.

Table 3-2: Jumper settings on the SAILOR 6283 AIS Connection Box and Wall Tray

3.3.1 SAILOR 6280 AIS System - wiring

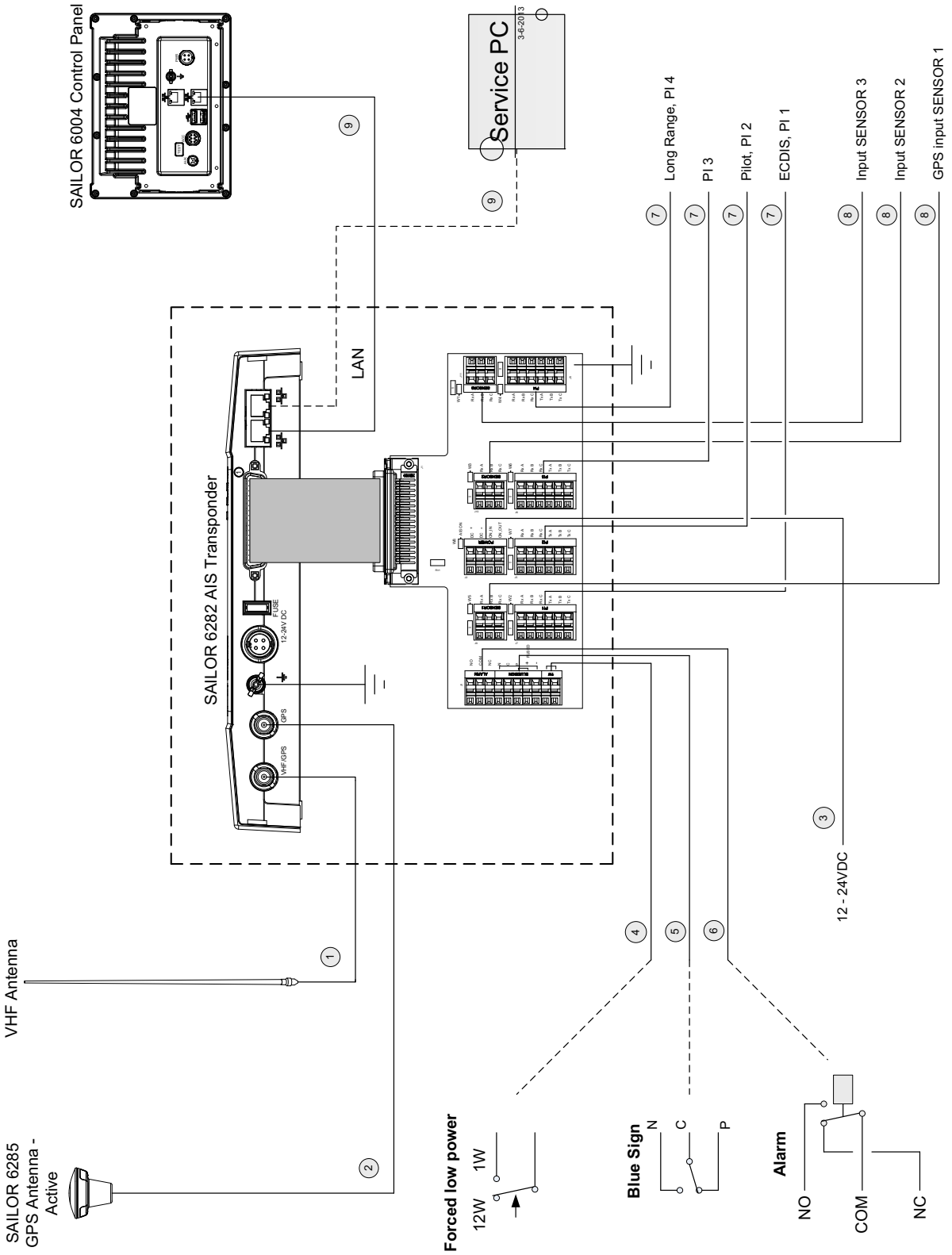


Figure 3-8: SAILOR 6280 AIS System, wiring

3.3.2 Cable specifications

Number	Cable for:	Specification	Length
1	VHF antenna	Coaxial RG 214 or similar	Max. 45 m
	Combined antennas for VHF and GPS	Comrod VHF / GPS antenna type AC17M4-AIS, item number 014822.	Max. 40 m
		Comrod VHF / GPS antenna type AC17P4-AIS, item no 014828.	Max. 40 m
		AC Marine VHF / GPS antenna type VHF/GPS-B	Max. 35 m
2	SAILOR 6285 GPS Antenna - Active	Coaxial RG 214 or similar	Max. 55 m
3	DC supply	2 x AWG 14 with screen, length 1.2 m, Included.	–
4	Low power forced control (gas alarm): 1W	2 leaded wire with screen.	15 m
5	Blue Sign input	3 leaded wire with screen	50 m
6	Alarm output	3 leaded wire with screen	50 m
7	Sensor input, Sensor 1 - Sensor 3	2 wire twisted, screened cable for NMEA The name of the signals are also printed on the connection board: • RxA (signal A) • RxB (signal B) • RxC (screen)	Max. 100 m
8	Presentation Interface, PI1 - PI4	4 wire twisted pair, screened cable for NMEA The name of the signals are also printed on the connection board: • RxA (signal A) • RxB (signal B) • RxC (screen) • TxA (signal A) • TxB (signal B) • TxC (screen)	Max. 100 m
9	LAN	Ethernet cable, shielded Cat 5	Max. 100 m
10	Interface cable	Multi wire with SUB-D 50 pin (male) connector. Included in the delivery.	1.5 m

Table 3-3: Cable specifications, SAILOR 6280 AIS System

3.4 Physical installation of the SAILOR 6281 AIS System

The SAILOR 6281 AIS System consists of the following units:

1. SAILOR 6282 AIS Transponder
2. SAILOR 6004 Control Panel
3. SAILOR 6285 GPS Antenna - Active

You can mount the SAILOR 6282 AIS Transponder on a desktop or on a wall. Provide space enough to access the connectors and the fuse. Allow space for the cables.

Compass safe distance

See *Compass safe distance* on page 3-7.

Physical installation

See the following figure for dimensions of the SAILOR 6282 AIS Transponder.

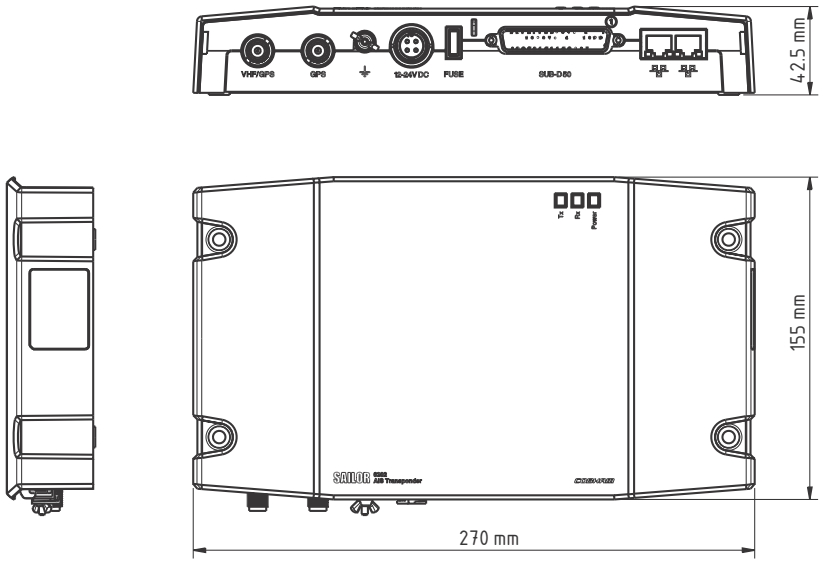


Figure 3-9: Dimensions of the SAILOR 6282 AIS Transponder

Fasten the SAILOR 6282 AIS Transponder using the delivered screws according to the following measures:

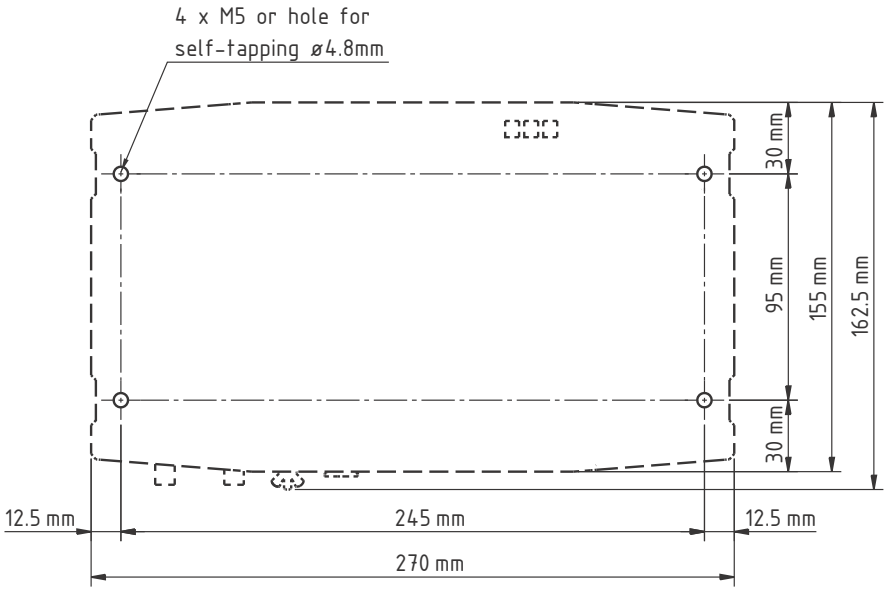


Figure 3-10: Measures for installing the SAILOR 6282 AIS Transponder

Connector overview

The following figure shows the connectors of the SAILOR 6282 AIS Transponder.

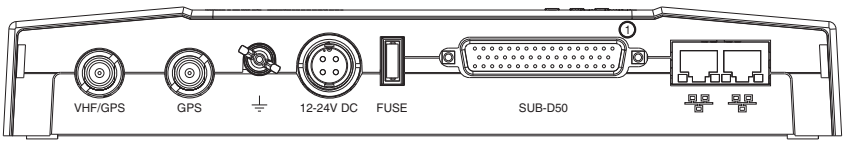


Figure 3-11: Connectors of the SAILOR 6282 AIS Transponder

VHF/GPS

Connect the VHF antenna or the combined VHF/GPS antenna to this connector.

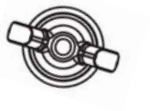
GPS

Connect the cable from the SAILOR 6285 GPS Antenna - Active to this connector.

Grounding

To connect the SAILOR 6282 AIS Transponder to ship ground, do as follows:

Ground stud



1. Connect a ground cable of shortest possible length and minimum 4 mm^2 cross section to the Ground stud and fasten it with the wing nut.
2. Connect the other end of the cable to ship ground.

DC Power input 12–24 VDC

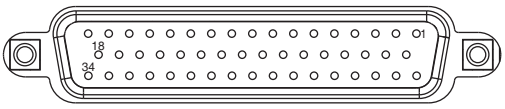
For more information on DC power input, pin allocation and instructions how to connect DC power see *Connecting DC power* on page 4-2.

SUB-D50 connector and cable

For a detailed description of the interfaces see *Interface description* on page 4-1.

The SUB-D50 connector is intended for connecting external sensors and devices connected to PI1 to PI4.

View on SAILOR 6282 AIS Transponder
SUB-D, 50 pin female



Description	Pin number	Wire colour
SENSOR 3 Rx C	1	Black
SENSOR 3 Rx B	2	Brown
SENSOR 3 Rx A	3	Red
SENSOR 2 Rx C	4	Orange
SENSOR 2 Rx B	5	Yellow
SENSOR 2 Rx A	6	Green
BLUESIGN N	11	Blue
AUX	12	Purple
ON_IN	13	Grey
BLUESIGN C	14	White
ON_OUT	15	Pink
PI 4 Rx A	18	Light Green
PI 4 Rx B	19	Light Blue
PI 4 Rx C	20	Black/White
PI 4 Tx A	21	Brown/White
PI 4 Tx B	22	Red/White
PI 1 Tx B	23	Orange/White
PI 1 Tx A	24	Yellow/White
PI 1 Rx C	25	Green/White
PI 1 Rx B	26	Blue/White
PI 1 Rx A	27	Purple/White
SENSOR 1 Rx A	28	Grey/White

Description	Pin number	Wire colour
1W	29	Brown/Black
ALARM COM	30	Red/Black
ALARM NC	31	Orange/Black
DC- (0 VDC)	32	Yellow/Black
PI 3 Tx B	34	Green/Black
PI 3 Tx A	35	Blue/Black
PI 3 Rx C	36	Purple/Black
PI 3 Rx B	37	Grey/Black
PI 3 Rx A	38	Brown/Red
PI 2 Tx B	39	Orange/Red
PI 2 Tx A	40	Green/Red
PI 2 Rx C	41	Blue/Red
PI 2 Rx B	42	Purple/Red
PI 2 Rx A	43	Grey/Red
SENSOR 1 Rx C	44	White/Red
SENSOR 1 Rx B	45	Yellow/Green
BLUESIGN P	46	Black/Red
ALARM NO	47	Blue/Green
DC- (0 VDC)	48	Purple/Green
DC- (0 VDC)	49	Grey/Green
CABLE SHIELD	50	Drain wire

Table 3-4: Pin allocation, SUB-D50

LAN connector and cable

The SAILOR 6282 AIS Transponder has two LAN connections used for connection to the display and keyboard of the SAILOR 6004 Control Panel and for ThraneLINK Management Application (Service Tool).

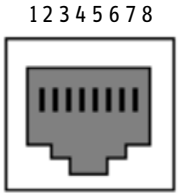
The two connectors are identical and of the type RJ45 with 8 leads

Important **For GMDSS installations**: Only connect units that are part of the system. For safety and compliance reasons, the Ethernet interface is restricted to internal communication in an isolated system.

The figure and table below show the connector outline and pin assignments.

Pin	Pin function	Wire colour
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 3-5: Pin allocation, LAN connector and cable



RJ-45 female

Cable type: Cat5e STP

For instructions how to connect to a LAN network see *Ethernet interfaces* on page 4-11

3.4.1 SAILOR 6181 AIS Basic System - wiring

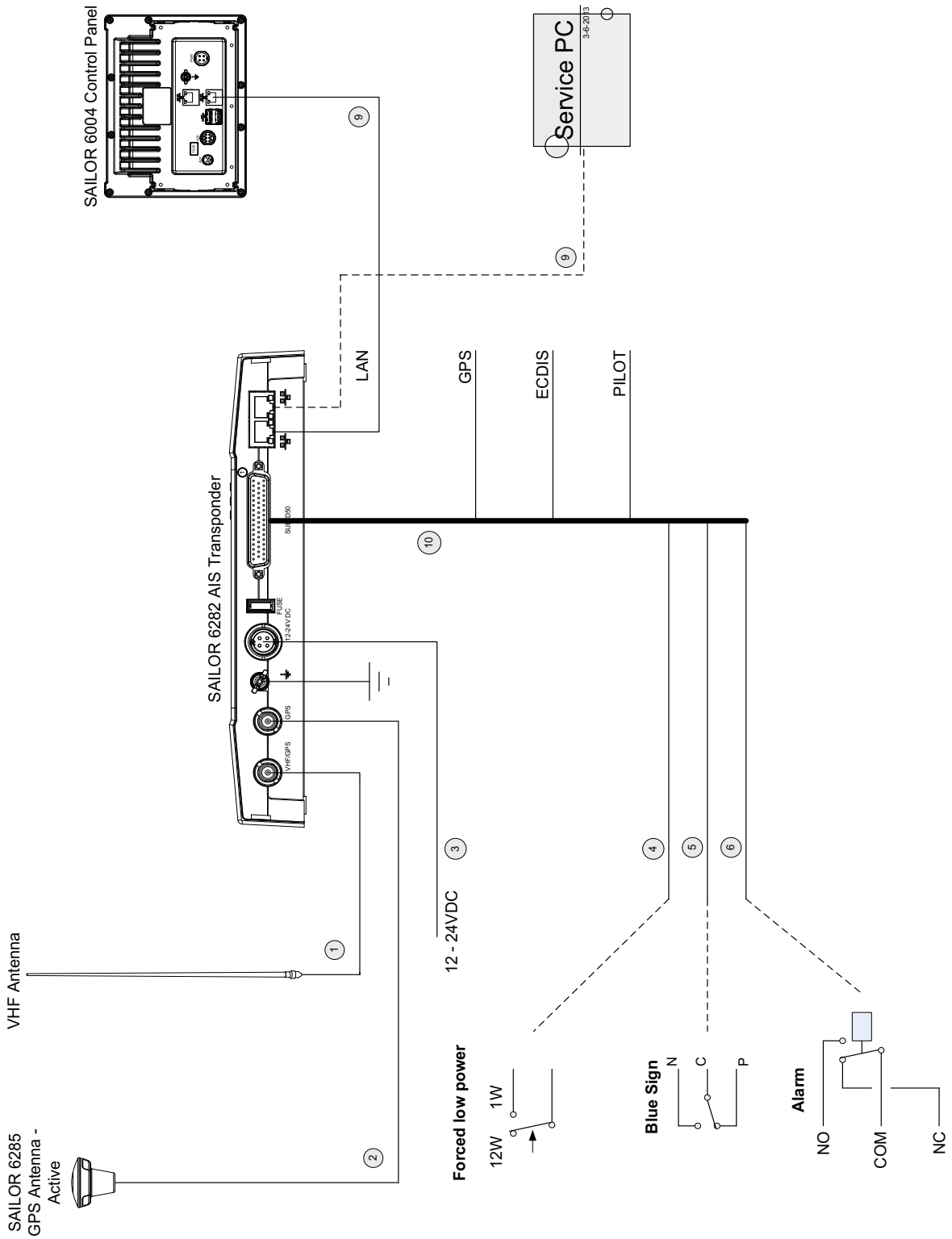


Figure 3-12: SAILOR 6281 AIS Basic System, wiring

For cable specifications see *Cable specifications* on page 3-11.

3.5 Physical installation of the SAILOR 6004 Control panel

For instructions how to install the SAILOR 6004 Control Panel see separate installation manual for the SAILOR 6004 Control panel (part number 98-136644).

Connect a LAN connector at the SAILOR 6282 AIS Transponder to a LAN connector at the SAILOR 6004 Control Panel.

Interface description

This chapter describes the electrical interfaces of the SAILOR 6282 AIS Transponder in details. It has the following sections:

- *Power*
- *Sensor input*
- *Presentation Interfaces*
- *Alarm relay*
- *Low power forced control (gas alarm) 1 W*
- *Blue sign input*
- *Ethernet interfaces*

4.1 Power

The SAILOR 6282 AIS Transponder is designed to operate on 24 VDC. The transponder can also operate in the voltage range 10.8 to 31.2 VDC.

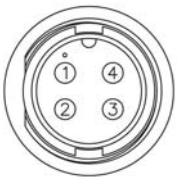
The SAILOR 6282 AIS Transponder is protected with a 7.5 AT fuse. The fuse is located on the transponder next to the power connector. The power connector is a custom connector and a power cable with matching connector is included in the box. To avoid power and voltage drops in the power line it is important that a sufficient sized cable is used (for further details see *Cable specifications* on page 3-11).

The figure and table below show the connector outline on the SAILOR 6282 AIS Transponder, pin assignments and wire color in the power cable delivered with the SAILOR 6282 AIS Transponder.

Pin	Pin function	Wire color in power cable
1	DC+ (10.8 - 31.2 VDC)	Red
2	DC- (0 VDC)	Black
3	ON_IN	White
4	ON_OUT	Blue

Table 4-1: Pin allocation, DC connector

Front view on Control Panel lock, 4 pin male



4.1.1 Connecting DC power

Connect DC+ (red wire) to DC out + from your DC supply.

Connect DC- (black wire) to DC out - from your DC supply.

Connect the white wire in the power cable to DC- (black wire) unless you want to use the Remote on/off (ON_IN) function. See the next section for further details on remote on/off.

Connecting remote on/off (ON_IN)

With the remote on/off function you can remotely switch on and off the SAILOR 6282 AIS Transponder. To connect the remote on/off function do as follows:

1. Connect DC+ and DC- as described in the previous section.
2. Connect a switch to the white wire in the power cable (pin3, ON_IN, in the power connector)
3. Connect the other side of the switch to the black wire in the power cable (DC- (0 VDC) in the power connector).

To switch on the SAILOR 6282 AIS Transponder, close the switch.

Connecting on/off control (ON_OUT)

You can use pin 4 in the power connector (blue wire) to switch other units on and off when the SAILOR 6282 AIS Transponder is switched on and off. How to connect this pin depends on the units you connect.

The function of pin 4 is as follows:

- SAILOR 6282 AIS Transponder off: Pin 4 is in high impedance state.
- SAILOR 6282 AIS Transponder on: Pin 4 is low (DC- from the power supply, with 10 kOhm serial resistance).

4.2 Sensor input

The SAILOR 6282 AIS Transponder has three sensor inputs (SENSOR 1, SENSOR 2 and SENSOR 3). These can be connected to the ship's sensors which can provide information about e.g. speed over ground (SOG), course over ground (COG), heading (HDT), rate of turn (ROT) and position.

These sensors are connected to the sensor input through the SUB-D 50 pin connector, which is connected to the SAILOR 6283 AIS Connection Box and Wall Tray or the multi-wire cable supplied with the SAILOR 6282 AIS Transponder. See the section *SUB-D50 connector and cable* on page 3-14 for a description of the connector and the cable. Rx-A and Rx-B are the data wires and Rx-C is an electrically isolated ground.

The three sensor inputs are input-only data and support the following NMEA0183 (IEC61162-1/2) sentences, version 2.0, 2.3 and 4.1:

- IEC 61162-1 sensor sentences: **DTM**, **GNS**, **GBS**, **RMC**, **VBW**, **HDT**, **THS**, **ROT**

For a full list of supported NMEA sentences see Appendix B, *NMEA sentences*.

4.2.1 Electrical characteristics

The schematics of the sensor inputs is shown in the following figure. The sensor inputs support both IEC61162-1 and IEC61162-2, i.e. baud rates ranging from 4800 to 38400, input voltages down to 0.3 VDC and electrical isolation between each sensor input and the internal power supply.

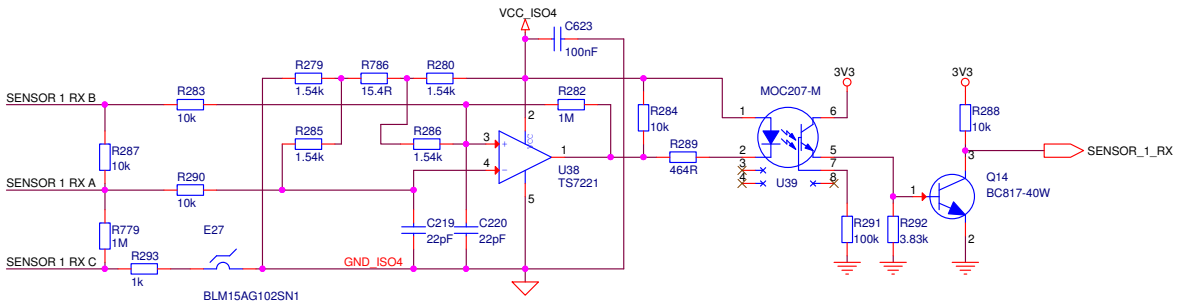


Figure 4-1: Schematics of sensor inputs

The load of each sensor input is maximum 2 mA at minimum 2 VDC.

If the sensor input is configured as high speed (38400) it is recommended to terminate the signal lines with 120 Ohm in both ends of the bus. See the figure below:

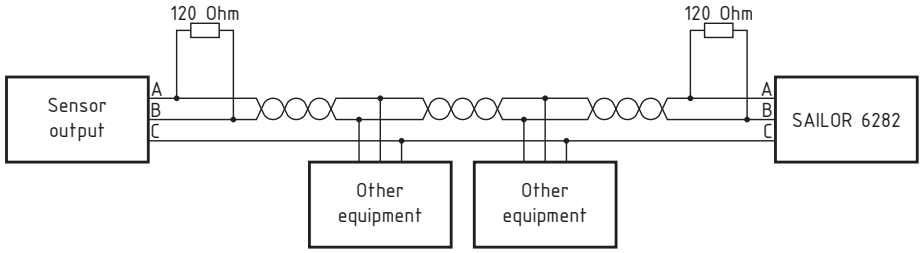


Figure 4-2: Termination of signal lines

4.2.2 Sensor configuration

All three sensor inputs are IEC61162-1/2 (RS-422) compliant and can be configured individually with different baud rates. From the factory the ports are set up with the default baud rate as stated in the following table:

Port ID	Default baud rate	Function
SENSOR 1	4800	GPS input
SENSOR 2	4800	Input
SENSOR 3	4800	Input

Table 4-2: Sensor inputs – default baud rate

With the Service Interface the sensor input can be set to another baud rate and NMEA0183 version.

See *Interface settings* on page 5-12 to learn how to set up the SAILOR 6282 AIS Transponder using the Service Interface.

4.2.3 Position (GNS, RMC, DTM, GGA)

The SAILOR 6282 AIS Transponder processes the position from both the external GNSS sensor and the internal GNSS receiver. Therefore you must enter the dimensions of the physical location of both GNSS antennas. To do this use the Service Interface, General Settings. The dimensions are defined as shown in the following figure. Enter the values in metres.

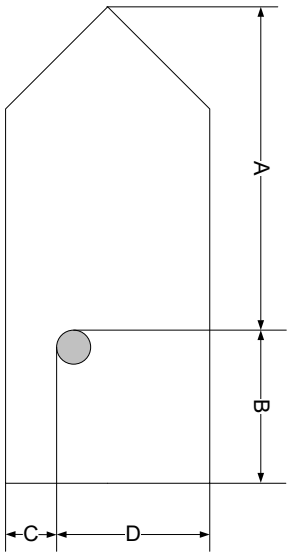


Figure 4-3: Physical location of the GNSS antennas

The SAILOR 6282 AIS Transponder automatically selects the position source with the highest priority as defined in IEC 61993-2.

See *General settings* on page 5-8 to learn how to set up the reference points for reported position in the SAILOR 6282 AIS Transponder using the Service Interface.

4.2.4 Heading (HDT)

The SAILOR 6282 AIS Transponder can process heading information from heading sensors that provide an IEC 61162 output.

If THS (True Heading and Status) and HDT are available, THS is preferred.

4.2.5 Rate of Turn (ROT)

If a Rate of Turn (ROT) sensor is available and provides an IEC 61162 output, the sensor must be connected to the SAILOR 6282 AIS Transponder.

If the ROT information is not available from a Rate of Turn sensor it may optionally be delivered from another source, e.g. a gyrocompass or other external sources giving ROT or heading.

The SAILOR 6282 AIS Transponder automatically selects the ROT source with the highest priority. The priority is defined in IEC 61993-2. It is decided by the Talker ID, where TI (Turn Indicator) has a higher priority than HE (Heading sensor; lower priority). TI and HE are the talker IDs of these devices.

4.2.6 Log (VBW)

The Log (VBW, Dual ground/water speed) refers to the speed log sensor. It has nothing to do with the malfunction log and system log. The Log (VBW) is about water-referenced and ground-referenced speed data.

Priority: Only one sensor is allowed to be connected to the SAILOR 6282 AIS Transponder. You can also use Talker ID filtering to ensure that VBW only at one port can enter the SAILOR 6282 AIS Transponder.

4.3 Presentation Interfaces

4.3.1 Overview

The SAILOR 6282 AIS Transponder has four presentation interfaces (PI1, PI2, PI3 and PI4). A presentation interface is a bidirectional interface used for e.g. an ECDIS, pilot plug, Long Range equipment or similar.

The presentation interfaces are connected through the SUB-D 50 pin connector, which is connected to the SAILOR 6283 AIS Connection Box and Wall Tray or the multi-wire cable supplied with the SAILOR 6282 AIS Transponder. See the section *SUB-D50 connector and cable* on page 3-14 for a description of the connector and the cable.

Rx-A and Rx-B are the data input wires and Tx-A and Tx-B are the data output wires to the SAILOR 6282 AIS Transponder. Rx-C is an electrically isolated ground for the input. Tx-C is connected to DC- on the SAILOR 6283 AIS Connection Box and Wall Tray.

The presentation interfaces are bidirectional data ports and support the following NMEA0183 (IEC61162-1/2) sentences, version 2.0, 2.3 and 4.1:

IEC 61993-2 Sentence	Support
AIS High-speed input data and formats	VSD, SSD, ABM, BBM, ABK, AIR, ACA, HBT, ACK, LRF
AIS high speed output data and formats	ABK, VDO, ALR/TXT, ACA, VDM, LRI, LRF, SSD, VSD, VER
AIS Long-range communications input data and formats	LRI, LRF
LR output data formats	LR1, LR2, LR3
Optional PI port sentences	EPV, SPW, TRL
Transmission of binary Message 25 and 26	ABM, BBM, ABK

Table 4-3: Supported IEC 61993-2 sentences

The Appendix B, *NMEA sentences*, gives detailed information on the supported NMEA sentences.

Long Range

The Long Range functionality uses an appropriate long-range communication link (e.g. Inmarsat C or MF/HF) to provide a means for ship reporting and tracking systems which cannot use AIS VHF coverage due to the distance to the next AIS base station ashore.

Long-range messages are input to and output from external long-range communication systems, e.g. Inmarsat C via one of the four PI.

4.3.2 Electrical Characteristics

The schematics for the presentation interfaces is shown in the following figure. The presentation interfaces support both IEC61162-1 and IEC61162-2, i.e. baud rates from 4800 to 38400, input voltages down to 0.3 VDC and electrical isolation between each sensor input and the internal power supply.

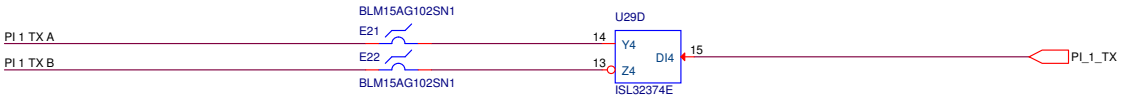


Figure 4-4: Schematics of presentation interfaces

The load of each input is maximum 2 mA at minimum 2 VDC.

Each output can drive maximum 20 listeners, each consuming 2 mA.

4.3.3 Configuration of the Presentation Interfaces

All four presentation interfaces are IEC61162-1/2 (RS-422) compliant and can be configured individually with different baud rates. From the factory the ports are setup with the default baud rate as follows:

Port ID	Default baud rate	Function
PI1	38400	ECDIS
PI4	4800	Long Range
PI2	38400	Pilot plug
PI3	38400	AUX

Table 4-4: Presentation interfaces – default baud rate

See *Interface settings* on page 5-12 to learn how to set up theSAILOR 6282 AIS Transponder using the Service Interface.

4.3.4 Pilot plug connection

The pilot plug provides a connection to the SAILOR 6282 AIS Transponder for pilots using the standard pilot plug connector. This connector is supplied with the SAILOR 6282 AIS Transponder. Mount it in an appropriate position for easy access by the pilot. The connector kit for the pilot plug consists of the following items:

Type	Manufacturer	Part number
Pilot Plug Connector	AMP/Tyco	206486-2, Square Flange
Contact Pins	AMP/Tyco	66570-3, solder type
Sealing Cap	AMP/Tyco	208800-1

Table 4-5: Connector kit for the pilot plug

Connect the pilot plug as shown below:

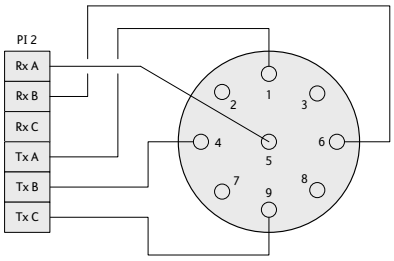


Figure 4-5: Pilot plug connection

4.4 Alarm relay

The SAILOR 6282 AIS Transponder has an internal alarm relay. Connect the alarm relay to an audible alarm device or the ships alarm system, if available.

The ship's alarm system is connected to the alarm relay through the SUB-D 50 pin connector, which is connected to the SAILOR 6283 AIS Connection Box and Wall Tray or the multi-wire cable included. See the section *SUB-D50 connector and cable* on page 3-14 for a description of the connector and the cable. The alarm relay connections are described in the table below.

Signal	Function
ALARM COM	Alarm relay common
ALARM NC	Alarm relay normally closed
ALARM NO	Alarm relay normally open

Table 4-6: Alarm relay connections

When the SAILOR 6282 AIS Transponder is powered on and there are no alarms the relay is energized, i.e. ALARM COM and ALARM NO is connected.

The maximum switching current is 1 A.

The maximum switching voltage is 125 VAC, 60 VDC.

4.5 Low power forced control (gas alarm) 1 W

The transmitter output power of the SAILOR 6282 AIS Transponder is normally 12 W. For the vessel type defined as **Tanker(s)** and the voyage data set to **Moored** the transmitter output power will automatically be reduced to 1 W.

The transmitter can be forced to an output power of 1 W. This is done by shorting the '1W' signal to DC-.

The Low power forced control (gas alarm) 1W can be connected to a switch to DC- through the SUB-D 50 pin connector, which is connected to the SAILOR 6283 AIS Connection Box and Wall Tray or the multi-wire cable supplied with the SAILOR 6282 AIS Transponder. See the section *SUB-D50 connector and cable* on page 3-14 for a description of the connector and the cable.

4.6 Blue sign input

Blue sign is used on vessels that are subject to the Inland Waterway specifications where the Blue sign is used as a special manoeuvre indicator. The SAILOR 6282 AIS Transponder supports a direct connection to the Blue sign switch and is able to detect three logical states:

- Set
- Not Set
- Not Connected

The state **Not Connected** can be used to detect a broken wire.

4.6.1 Electrical interface

The Blue sign interface is shown below. The voltage on the Blue sign interface must be between 12 and 24 VDC. The interface can be powered from the ship's Blue sign switch, alternatively it can be powered from the AIS Transponder.

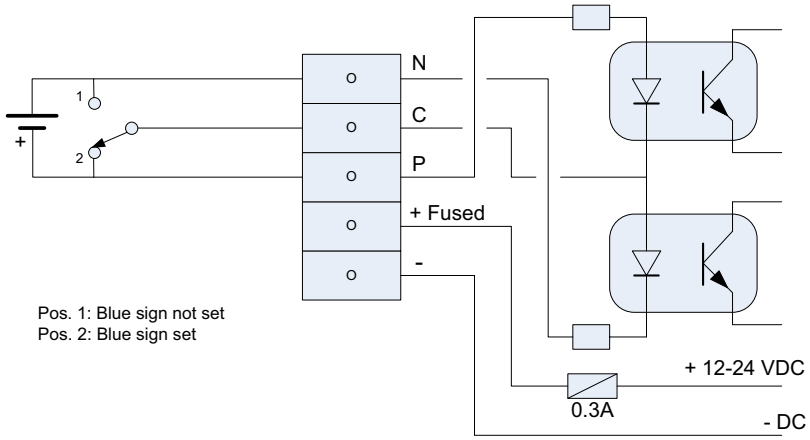


Figure 4-6: Blue sign interface to SAILOR 6282 AIS Transponder, powered by Blue sign switch

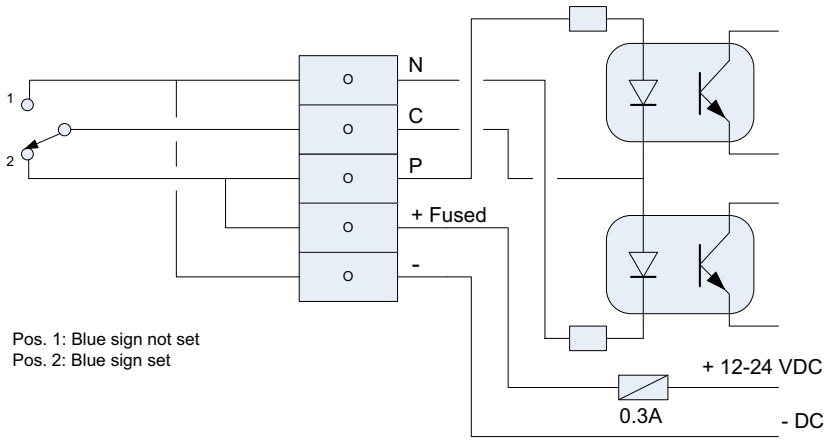


Figure 4-7: Blue sign interface to SAILOR 6282 AIS Transponder, powered by SAILOR 6282 AIS Transponder

The Blue sign switch has two states: **Set** or **Not Set**. Each state activates one or the other optocoupler. If the switch or wire becomes open circuit both optocouplers are activated. If Blue sign is not used (12–24 VDC not connected or a broken wire) both optocouplers are deactivated.

4.6.2 Configuration of Blue sign input

See *Interface settings* on page 5-12 to learn how to set up theSAILOR 6282 AIS Transponder using the Service Interface.

4.7 Ethernet interfaces

The SAILOR 6282 AIS Transponder has two Ethernet connectors (RJ45). The Ethernet connectors are used to communicate between the SAILOR 6004 Control Panel and the SAILOR 6282 AIS Transponder. The Ethernet connectors are identical, you can use any of the connectors to connect the SAILOR 6282 AIS Transponder to the SAILOR 6004 Control Panel.

The units use the IEC 61162-450 protocol, also called Light Weight Ethernet (LWE), for communication. LWE is a maritime standard for carrying NMEA sentences over Ethernet. LWE is using UDP Multicast to communicate with other LWE equipment.

The Ethernet interface is used for communication with the Service Interface. For more information see *Service Interface* on page 5-4.

4.7.1 Ethernet configuration

The SAILOR 6282 AIS Transponder and the SAILOR 6004 Control Panel communicate through Ethernet (LWE). Other equipment can also communicate using the same Ethernet. Therefore, it is necessary to configure an IP address and LWE ID for the SAILOR 6282 AIS Transponder in the SAILOR 6004 Control Panel. I.e. the two devices must be paired.

IP address

The IP addresses of the SAILOR 6282 AIS Transponder and the SAILOR 6004 Control Panel are acquired automatically. There is also the possibility to set a static IP address. The IP addresses are unique for each device connected to the Ethernet network.

LWE ID

There are two LWE IDs, one for the SAILOR 6282 AIS Transponder and one for the SAILOR 6004 Control Panel. An LWE ID consists of two letters (always AI) and four digits, e.g. AI0001. The LWE ID must be unique for each device connected to the Ethernet network.

When configuring the SAILOR 6282 AIS Transponder you must set the LWE ID on the SAILOR 6004 Control Panel. Make sure that the SAILOR 6282 AIS Transponder and the SAILOR 6004 Control Panel are connected to the same network.

Unit	Default LWE ID
SAILOR 6282 AIS Transponder (default)	AI0001
SAILOR 6004 Control Panel (must be set)	AI0002

Table 4-7: LWE ID for SAILOR 6282 AIS Transponder and SAILOR 6004 Control Panel

Both IDs are visible in the display of the SAILOR 6004 Control Panel in the AIS app in section **Settings** > **Connection**. The SAILOR 6282 AIS Transponder LWE ID is visible in the top bar of all AIS screens of the SAILOR 6004 Control Panel.

You can change the LWE IDs in two ways:

- Using the AIS app, Settings > Connection, see the user manual for more detailed instructions.
- Using the Service Interface, see *LWE ID* on page 4-11.

See *Interface settings* on page 5-12 to learn how to set up theSAILOR 6282 AIS Transponder using the Service Interface.

Transmission group

See *Light weight Ethernet - LWE* on page B-1.

Configuration

This chapter has the following sections:

- *Start up*
- *AIS app installation and system settings*
- *Service Interface*

5.1 Start up

5.1.1 To Power on and off

As soon as DC power is provided the SAILOR 6282 AIS Transponder is on.

To switch on the SAILOR 6004 Control Panel push the power button. Operate the SAILOR 6004 Control Panel by tapping the touch screen. To switch off the SAILOR 6004 Control Panel push and hold the power button for 2 seconds and follow the instructions on the screen.

If the Control Panel cannot switch off normally (e.g. due to a fault): Push and hold for 12 seconds.

5.1.2 Dim and night mode

Turn the dim knob of the SAILOR 6004 Control Panel to increase or decrease the display brightness. The display goes into **night mode** either when turning the dim knob on the front panel counterclockwise or when the internal light sensor detects the light level for changing to night mode.

To dim to level zero push the power button once. If an alarm appears while the display is in level zero, the display returns to the latest dim value and the alarm is displayed.

5.2 AIS app installation and system settings

5.2.1 System app

Having switched on the SAILOR 6004 Control Panel, an icon named **System** is always displayed, plus the icon(s) of the applications that are installed. Under **System** you can set up and manage the SAILOR 6004 Control Panel.

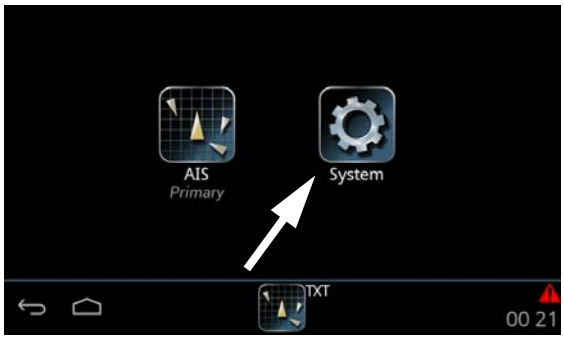


Figure 5-1: Screen to enter **System** (example)

Tap the icon **System** and the following topics are available:

- *Settings*
  containing Network, Date/Time and Debugging.
- *Applications*
  containing installed and available applications.
- *Self Test*
  containing a self test of Touch, Controls Display, Audio, USB, Light Sensor, Alarm Output, NMEA and LAN.
- *About*
  containing Legal information, software versions and network information (IP address and MAC address of the SAILOR 6004 Control panel).

Settings

Tap **Settings** to enter the section for network configuration, date and time setting and debugging. Tap the section you want to work with and explore the touch screen for each setting.

To change a setting you must enter the password for user level and tap **OK**.

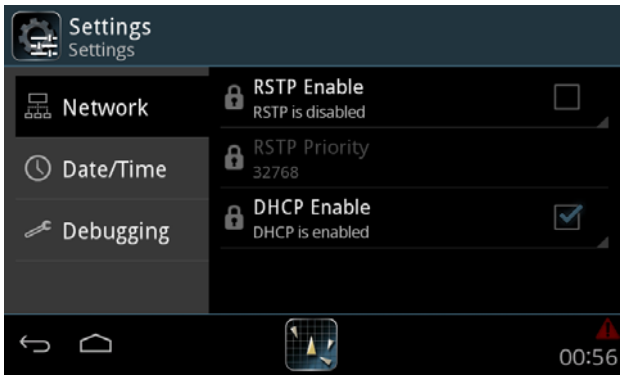


Figure 5-2: System - Settings, Display

Applications

Tap **Applications** to install or uninstall applications. This section has two tabs: **Available**, showing the apps that are available to the SAILOR 6004 Control Panel on the current network, and **Installed**, showing which apps are already installed.

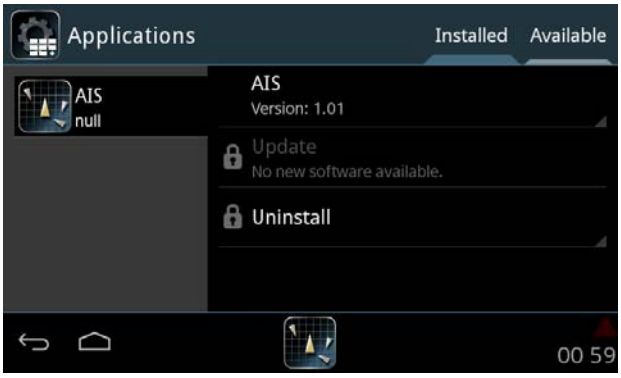


Figure 5-3: System – Applications (example)

To install an app, do as follows:

1. Tap **Available** to display the apps that are available to this SAILOR 6004 Control Panel.
2. Tap the app you want to install.
   For each app there are the following items::
   - App name and version, e.g. AIS Version 1.0.
   - **Install** to install this app on the SAILOR 6004 Control Panel.
3. Enter the password for user level and tap **OK.**

To manage an already installed app, do as follows:

1. Tap **Installed** to display the apps that are installed on this SAILOR 6004 Control Panel.
2. Tap the app you want to manage.
   For each app there are the following items::
   - App name and version, e.g. AIS Version 1.0.
   - **Update** (if available, else grayed out) – tap here to update this app. Enter the password for user level and tap **OK.**

- **Uninstall** – tap here to uninstall this app from the SAILOR 6004 Control Panel.

3. Enter the password for user level and tap **OK**.

Self Test

Tap **Self Test** to start the self test of the SAILOR 6004 Control Panel. For further details on the self test see the installation manual of the SAILOR 6004 Control Panel.

About

Tap About to view the following:

- **Legal** with legal and copyright information, open source licences, etc.
- **Version** with various software versions and serial number of the SAILOR 6004 Control Panel.
- **Network** with IP address and MAC address of the SAILOR 6004 Control Panel.

5.2.2 AIS app – daily use

The daily use of the AIS app is described in the user manual for the SAILOR 6282 AIS Transponder.

Note When entering text, note that only touch-screen keys that are required in the AIS standard 1371-4, table 44 are supported. Other keys are ignored. You find the complete table in the appendix *Supported keys* on page C-1.

5.3 Service Interface

Before the SAILOR 6280/6281 AIS System can be used on board you must set up several parameters in the SAILOR 6282 AIS Transponder. To do this, use the Service Interface.

The Service Interface is a web interface built into the software of the SAILOR 6282 AIS Transponder. No installation of software is necessary. You access it from a computer with a standard Internet browser (Firefox or Chrome recommended). The Service Interface can also be shown in the display of the SAILOR 6004 Control Panel at **Settings** > **Installation**.

5.3.1 Accessing the Service Interface

You can start the Service Interface in several ways:

- *Using a PC with Thrane Management Application (TMA)*
- *Using a PC and an Internet browser*

Using a PC with Thrane Management Application (TMA)

To access the built-in web interface, also called the Service Interface, via the TMA do as follows:

1. Switch on the SAILOR 6004 Control Panel and make sure that DC power is provided for the SAILOR 6282 AIS Transponder.
2. Connect a PC to the same network as the SAILOR 6282 AIS Transponder (preferably a direct connection to the Ethernet connector of the SAILOR 6282 AIS Transponder).
3. Start the TMA (v. 1.04 or higher) and click on the SAILOR 6282 AIS Transponder (TT-6282 AIS).
4. Click the icon **Management** and then **Web interface**. The web interface opens in a browser window.

Figure 5-4: Accessing the web interface using the TMA

Using a PC and an Internet browser

To access the Service Interface, with a PC and an Internet browser do as follows:

1. Switch on the SAILOR 6004 Control Panel and make sure that DC power is provided for the SAILOR 6282 AIS Transponder.
2. Tap the menu item in the top right corner, swipe upwards and tap **Settings**.
3. In the section **Connection**, two IP addresses are listed:
   - Remote IP address – IP address of the SAILOR 6282 AIS Transponder
   - Own IP Address – IP address of the SAILOR 6004 Control Panel

   These IP addresses are assigned automatically. Note down the IP address of the SAILOR 6282 AIS Transponder.
4. Connect a PC to the same network as the SAILOR 6282 AIS Transponder - or - SAILOR 6004 Control Panel.

5. Open an Internet browser (Firefox or Chrome recommended) and enter the IP address of the SAILOR 6282 AIS Transponder (Remote IP address), e.g.:
   http://10.10.8.45/index.html

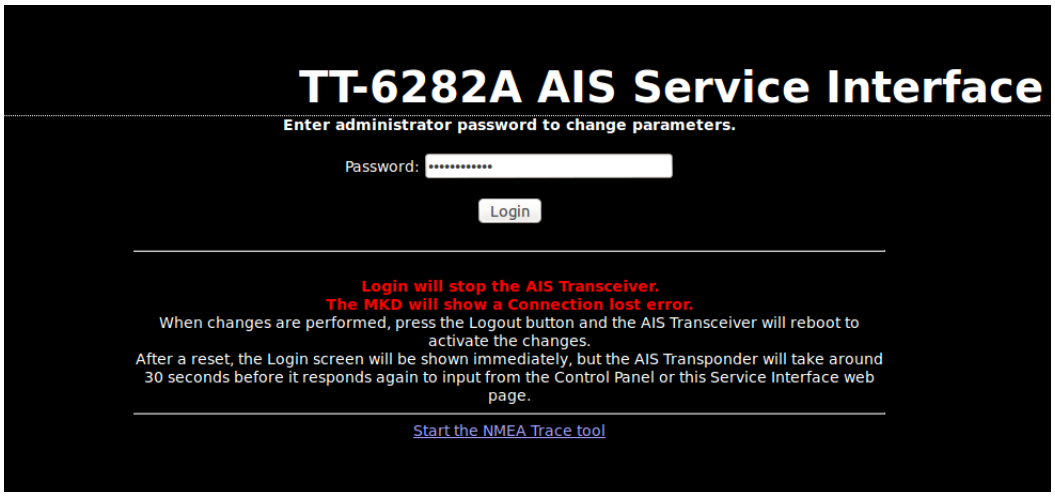


Figure 5-5: Start screen of the Service Interface in an Internet browser

The start screen of the Service Interface is displayed.

Important

The SAILOR 6282 AIS Transponder (also called AIS Transceiver) is locked for normal use for as long as communication with the Service Interface is ongoing.

The SAILOR 6282 AIS Transponder raises the alarm **Connection lost**, this will be displayed in the SAILOR 6004 Control Panel (also called MKD). There will be no alarm **TX malfunction**.

From the start screen you can start an NMEA Trace tool. This tool is useful when verifying the installation and the connected devices. For more information see *Verification* on page 5-20.

Figure 5-6: SAILOR 6004 Control Panel display: No connection when using the Service Interface

6. Enter the password and click **Login**.
   Default password: sailorsailor

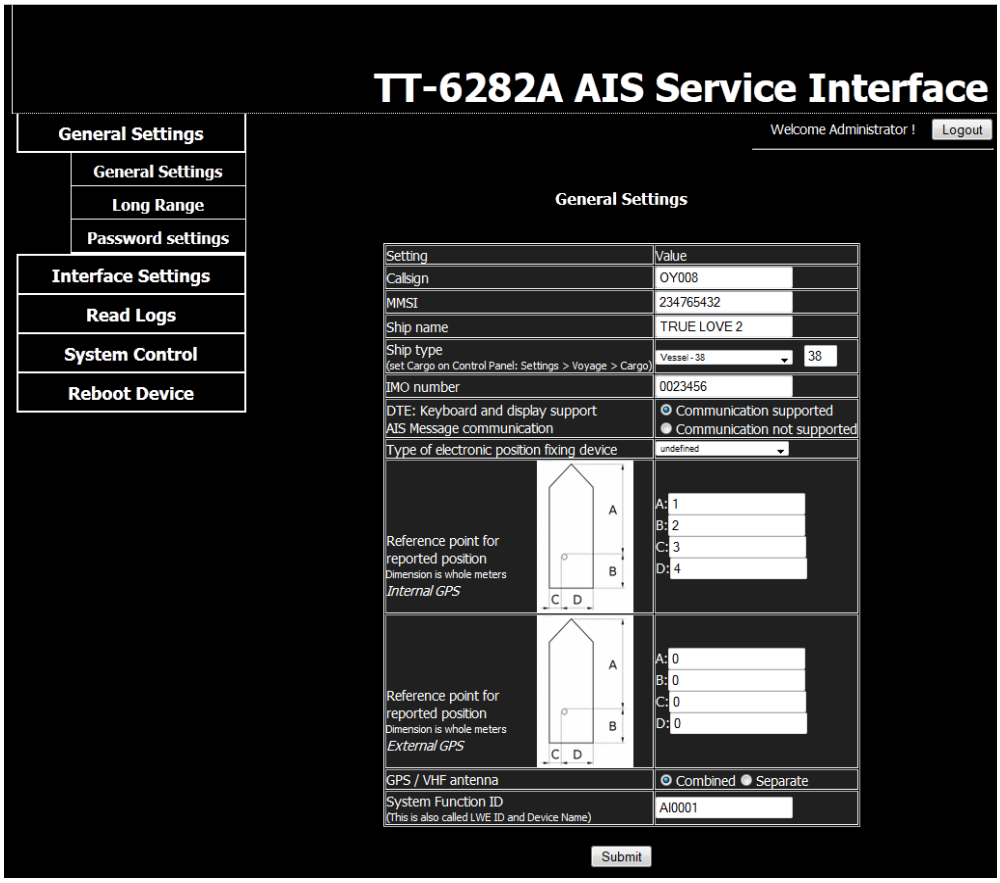


Figure 5-7: Service Interface – general settings

5.3.2 General settings

Enter the general settings and click **Submit** to store the settings in the SAILOR 6282 AIS Transponder.

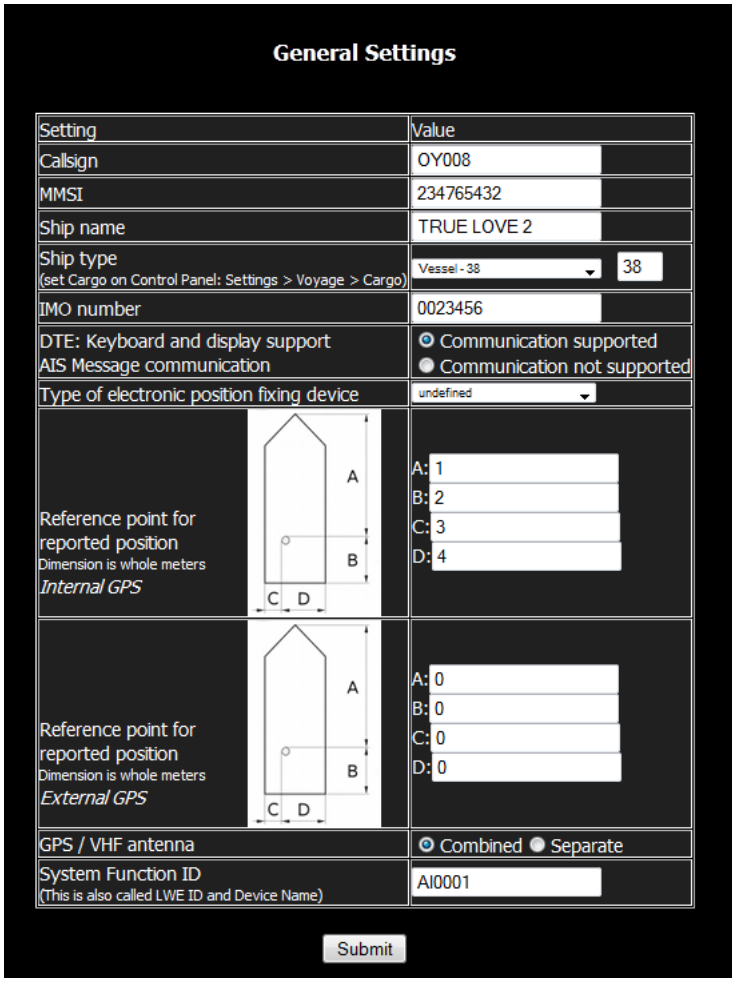


Figure 5-8: Service Interface: General settings

Callsign

Enter the callsign of the vessel.

MMSI

Enter the vessel's MMSI number.

Ship name

Enter the vessel's name.

Note Enter the ship name using upper-case letters and numbers. Lower-case letters are not valid.

Ship type

Select a ship type from the drop-down list or select **Numeric entry** to enter directly the 2-digit value for the ship type.

Ship types	Ship types (Continued)
Not available	Pleasure Craft
Future ship types	Vessel - 38
WIG	Vessel - 39
HSC	Pilot Vessel
Passenger Ships	S and rescue vessel
Cargo Ships	Tugs
Tanker(s)	Port tenders
Vessel - Fishing	Vessel with anti-pollution facilities or equipment
Vessel - Towing	Law Enforcement Vessel
Vessel - Towing > 200 m length or > 25 m breadth	Local vessel:56
Vessel - Dredging or underwater operations	Local vessel:57
Vessel - Diving operations	Medical transport
Vessel - Military Operations	Ships of states not party to an armed conflict
Vessel - Sailing	Numeric entry:

Table 5-1: Ship types

How to set the cargo is described in the user manual of the SAILOR 6282 AIS Transponder.

Short instruction: Tap **List icon > Settings > Voyage > Cargo**

DTE indicator

DTE is an abbreviation for data terminal equipment. The purpose of the DTE indicator is to inform distant receiving applications that, if set to **Communication supported**, the transmitting station conforms, at least, to the minimum keyboard and display requirements (SAILOR 6004 Control Panel). The DTE indicator is only used as information provided to the application layer of the SAILOR 6282 AIS Transponder, indicating that the transmitting station is available for communication. The DTE indication is transmitted in AIS Message 5.

The consequences of configuring the DTE value are the following:

- **Communication not supported** (DTE=1): (Keyboard and display are either unknown or unable to support communication). Message 5 will always indicate "1" (unavailable).
- **Communication supported** (DTE=0): (Keyboard and display are a standard configuration, and communication is supported).

Message 5 will indicate "1" (unavailable) if no MKD connection (no HBT - heart beat) or if an established connection is lost (HBT time-out).
Message 5 will indicate "0" (available) if MKD connection (HBT - heart beat) is detected.

Type of electronic position fixing device

Select the desired electronic position fixing device. See also *Position (GNS, RMC, DTM, GGA)* on page 4-4.

Reference point for reported position, internal and external GPS

Enter the respective coordinates for the location of the GPS antenna(s) on the vessel, with A, B, C and D according to the drawings on the screen. For more information see *Position (GNS, RMC, DTM, GGA)* on page 4-4.

GPS / VHF antenna

Select whether the vessel has a combined GPS and VHF antenna or a separate GPS antenna. For more information see *VHF and GPS antenna installation* on page 3-2.

System function ID

This is the device name of the SAILOR 6282 AIS Transponder that appears in the display of the SAILOR 6004 Control Panel. The default value is AI0001. For more information see *LWE ID* on page 4-11.

You can also change the LWE ID using the SAILOR 6004 Control Panel. This is described in the user manual of the SAILOR 6282 AIS Transponder.

Short instruction: Tap **List icon > Settings > Connection > Own Name**

5.3.3 Long Range

Here you can change the channels for Long Range broadcast channel 1 and 2.

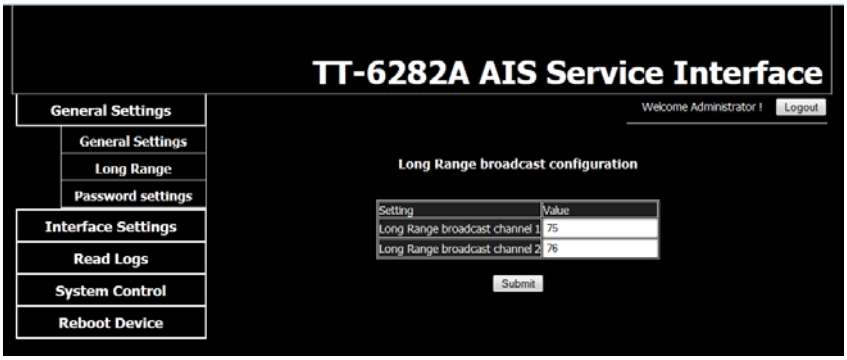


Figure 5-9: Service Interface: Long Range

1. Enter the new channel number.
2. Click **Submit** to store the new setting in the SAILOR 6282 AIS Transponder.

5.3.4 Password settings

Here you can change the password for user and administrator level. The password for **user level** is used when unlocking a setting using the SAILOR 6004 Control Panel. The password for **administrator level** is used when accessing the SAILOR 6282 AIS Transponder through the Service Interface.

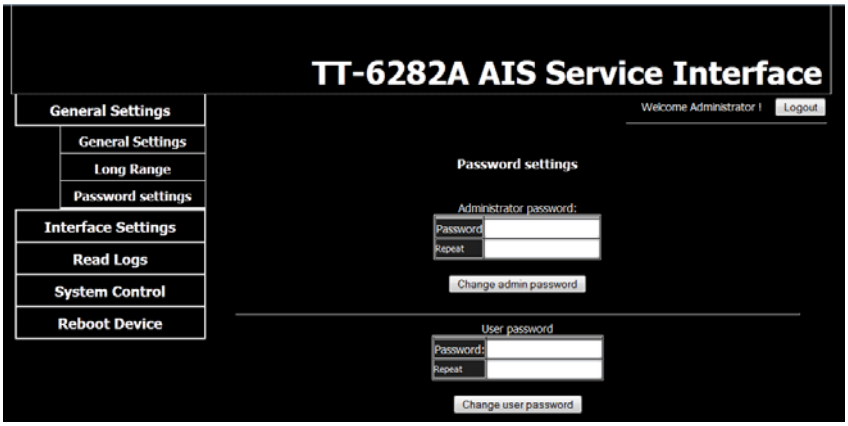


Figure 5-10: Service Interface: Password settings

1. Enter the new password in the boxes **Password** and **Repeat**.
2. Click **Change admin password** or **Change user password** to store the new setting in the SAILOR 6282 AIS Transponder.

Default password – administrator: sailorsailor

Default password – user: user (for SAILOR 6004 Control Panel)

Master Reset password

The master reset password will reset the SAILOR 6282 AIS Transponder to factory default passwords if the operator has unintentionally closed access or forgotten the user or administrator password. Every time this password has been used both the passwords must be changed again from this default.

Password – Master reset: 12345

5.3.5 Interface settings

The purpose of the UART interface settings is to control the information coming into the 4 PI ports and the 3 sensor input ports and to configure for the desired purposes.

PI Settings (Presentation Interface bi-directional ports)

The PI ports can be configured to encode and decode different categories/purposes:

- Sensor specific NMEA sentences
- AIS specific NMEA sentences
- Alarm specific NMEA sentences
- Proprietary NMEA sentences
- Long Range NMEA sentences[1]
- DGNSS input (Differential GNSS)[2]

If two ports are configured with the same encoder/decoder pair they are operated equally. This means if for example an AIS specific sentence is configured for output on both P1 and P2, VDO/VDM sentences will be output on both ports. If identical sentences are received from multiple sources on different input ports, they shall be filtered by their talker ID.

Query sentences will only be acknowledged on the port where the request was received.

The DGNSS configuration is only allowed to be exclusively on a single port.

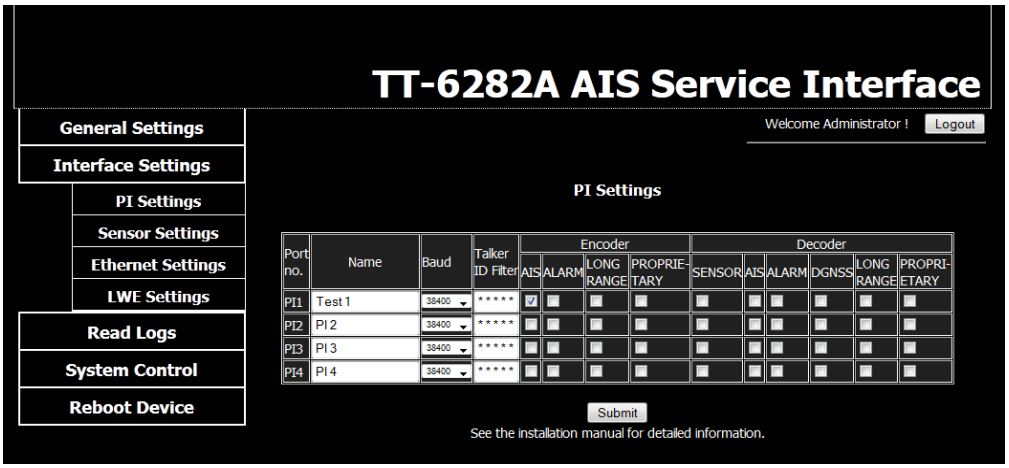


Figure 5-11: Service Interface: Interface settings – PI Settings

1. Configure only a single PI port with LONG_RANGE parser and LONG_RANGE encoder.
2. Configure only a single PI port for DGNSS parser input.

Item	Description
Name	You can name PI1 through PI4 according to your system requirements.
Baud	Use the drop-down list to change the baud rate, if needed (default: 38400 baud).
Talker ID Filter	Enter NMEA talker ID. Replace * from left to right. Example: AI ZZ BI0000 CC9999 GH ZI VA ST ** Talker ID filters are used to ensure that the SAILOR 6282 AIS TransponderAIS does not get the same sentence type from more than one physical sensor. If one of the inputs (PI, Sensor or LWE) provides sentences that must be ignored by the AIS, make a positive Talker ID filter list for this port listing all the talker ID's that must be used by the AIS on this interface. By leaving out the Talker IDs that are **not** to be used by the AIS, these are filtered out.
Encoder	Select which NMEA sentences you want to encode. For further information see Table B-2 on page B-2.
Decoder	Select which NMEA sentences you want to decode. For further information see Table B-2 on page B-2.

Table 5-2: Interface settings, PI Settings

Sensor Settings

The sensor ports are normally connected to a variety of sensor sources on board the vessel, such as positioning, heading and speed sensors. If identical sentences are received from multiple sources on different input ports, they shall be filtered by their talker ID. If a port is configured as a sensor port, an empty talker ID list will allow all sensor devices to be accepted on that port regardless of the talker ID applied in the sentences.

Example: If the position source is connected to SENSOR 1 and the heading sensor to SENSOR 2, both ports should be configured as sensor decoders and SENSOR 1 should have **GP** as talker ID whereas SENSOR 2 should be configured **HE** in the talker ID list.

The Sensor ports can be configured to decode different categories/purposes:

- Sensor specific NMEA sentences
- AIS specific NMEA sentences
- Alarm specific NMEA sentences
- Proprietary NMEA sentences
- Long Range NMEA sentences[1]
- DGNSS input (Differential GNSS)[2]

1. Configure only a single PI port with LONG_RANGE parser and LONG_RANGE encoder.
2. Configure only a single PI port for DGNSS parser input.

Note The sensor inputs can in principle also be configured to decode the same sentence categories as the PI ports, but as the sensor ports are pure input ports query sentences will not be acknowledged correctly.

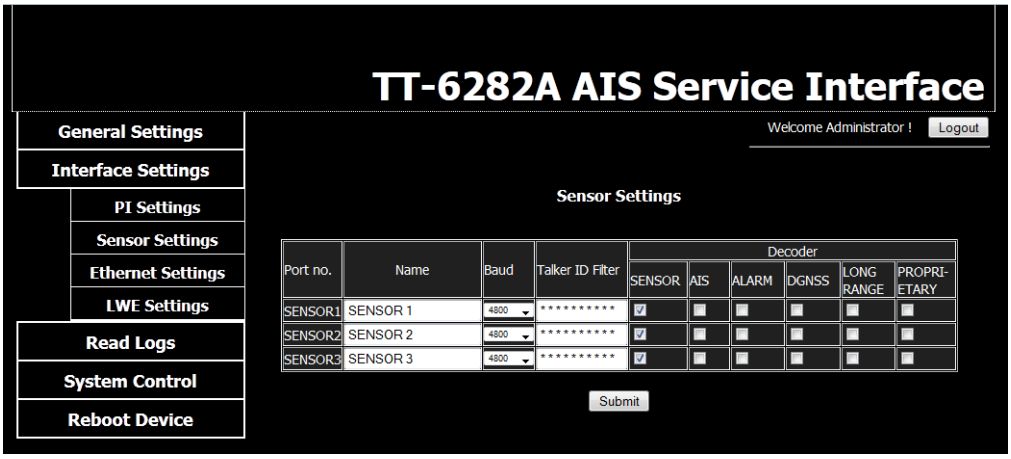


Figure 5-12: Service Interface: Interface settings – Sensor Settings

Item	Description
Name	You can name SENSOR1 through SENSOR3 according to your system requirements.
Baud	Use the drop-down list to change the baud rate, if needed (default: 4800 baud).
Talker ID Filter	Enter NMEA talker ID. Replace * from left to right. Example: AI ZZ BI0000 CC9999 GH ZI VA ST ** Talker ID filters are used to ensure that the SAILOR 6282 AIS TransponderAIS does not get the same sentence type from more than one physical sensor. If one of the inputs (PI, Sensor or LWE) provides sentences that shall be ignored by the AIS, make a positive Talker ID filter list for this port listing all the talker ID's that shall be used by the AIS on this interface. By leaving out the Talker IDs that are **not** to be used by the AIS, these are filtered out.
Decoder	Select which NMEA sentences you want to decode. For further information see Table B-2 on page B-2.

Table 5-3: Interface settings, Sensor Settings

Ethernet Settings

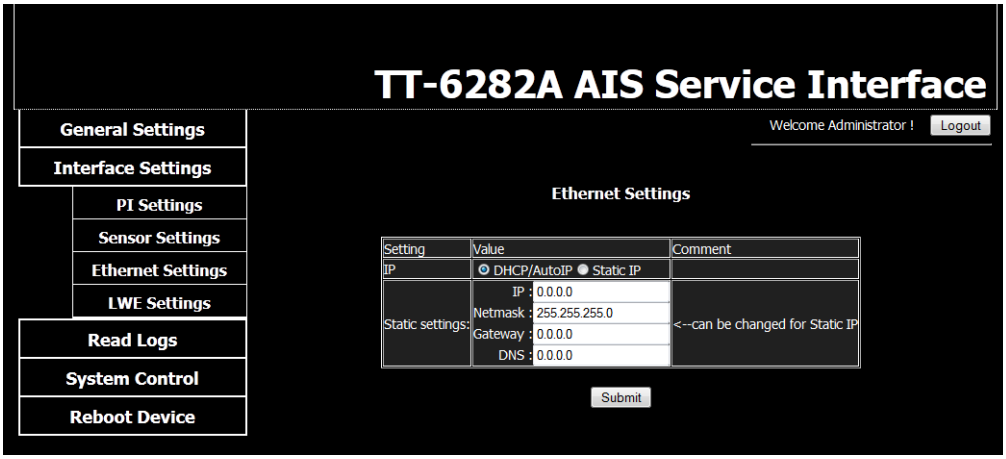


Figure 5-13: Service Interface: Interface settings – Ethernet Settings

If needed you can set the SAILOR 6282 AIS Transponder to have a static IP address.

Item	Description
IP	DHCP/Auto IP (recommended and default) or Static IP
Static settings	If you need a static IP you must enter the following: – IP address – Netmask – Gateway – DNS

Table 5-4: Interface settings, Ethernet Settings

Click **Submit** to send the new setting to the SAILOR 6282 AIS Transponder.

LWE Settings

Set the LWE Settings as shown in the figure below to achieve connection to the SAILOR 6004 Control panel.

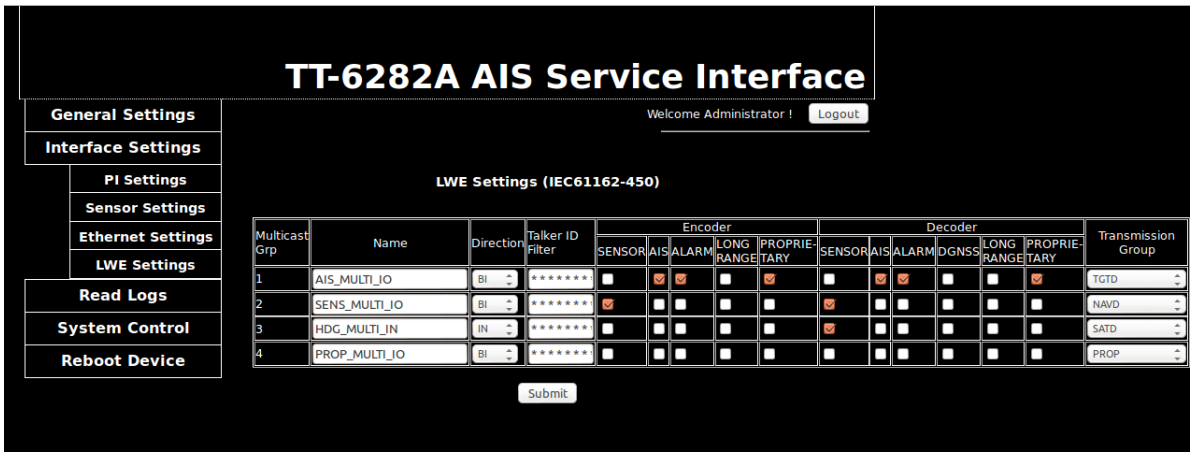


Figure 5-14: Service Interface: Interface settings – LWE Settings (default)

Item	Description
Name	You can name Multicast groups1 through 4 according to your system requirements.
Direction	There are three possibilities for the multicast group: • listen only (IN:input only), • talk (OUT:output only) • listen and talk (BI:bidriectional)
Talker ID Filter	Talker ID filters are used to ensure that the SAILOR 6282 AIS Transponder does not get the same sentence type from more than one physical sensor. If one of the inputs (PI, Sensor or LWE) provides sentences that must be ignored by the AIS, make a positive Talker ID filter list for this port listing all the talker ID's that must be used by the AIS on this interface. By leaving out the Talker IDs that are **not** to be used by the AIS, these are filtered out.
Encoder	Select which NMEA sentences you want to encode. For further information see Table B-2 on page B-2.
Decoder	Select which NMEA sentences you want to decode. For further information see Table B-2 on page B-2.
Transmission Group	Select which lightweight Ethernet transmission group to use for the telegrams to use. Transmission groups must be unique for each port. For further information see Appendix B, *NMEA sentences*.

Table 5-5: Interface settings, LWE Settings

Read more about LWE at *LWE ID* on page 4-11.

5.3.6 Read logs

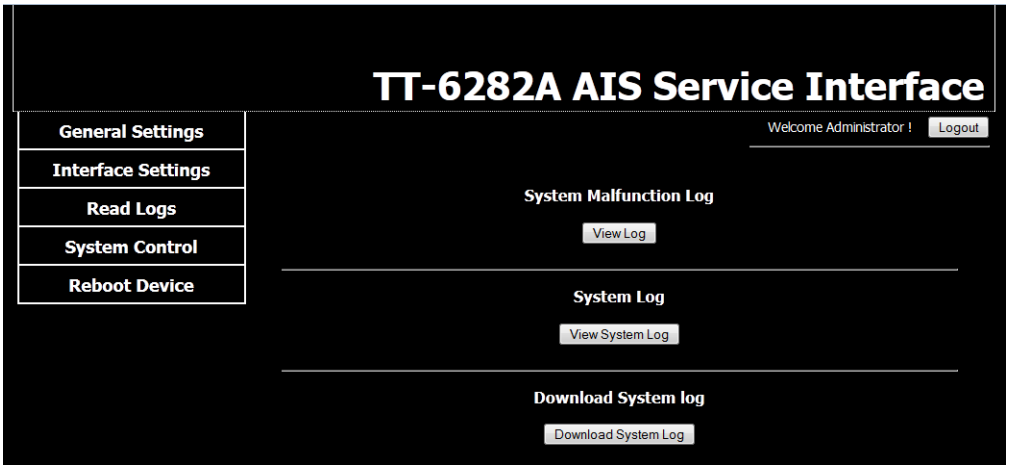


Figure 5-15: Service Interface: Read Logs

Log type	Description
System Malfunction Log	This log shows: • offTime – start time of event • onTime – stop time of event • reason – Reason codes are explained on the screen • entry – running number of event
System Log	This log shows a list of system activities.

Table 5-6: Service Interface – System logs

You can view and download the system log to a file. Click **Download System Log** and follow the instructions on the screen.

5.3.7 System control

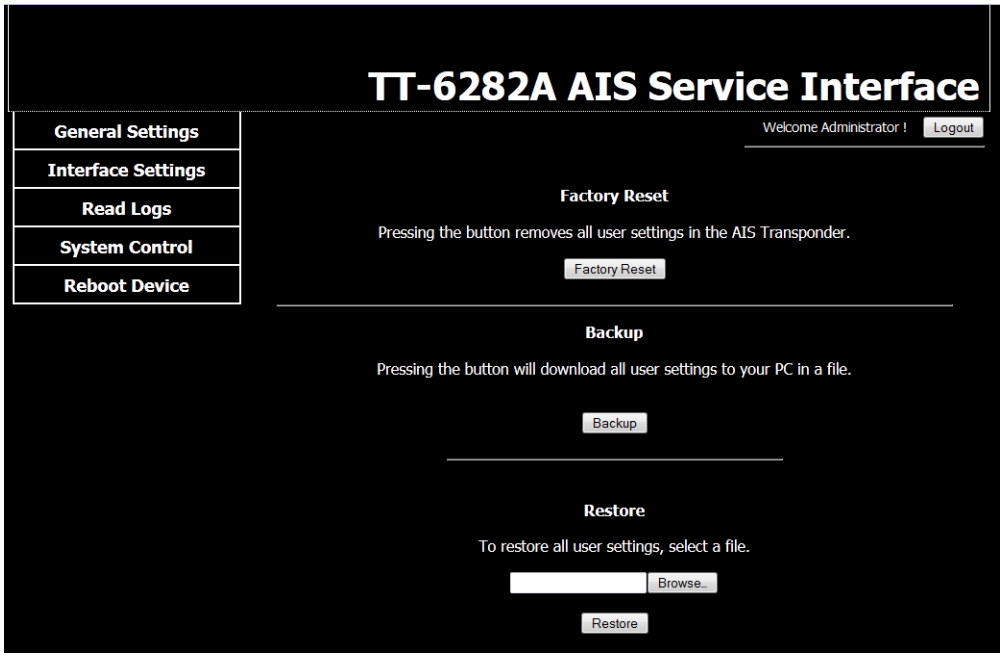


Figure 5-16: Service Interface: System control

System Control	Description
Factory Reset	Click **Factory Reset** to reset the SAILOR 6282 AIS Transponder to default values. All user settings are deleted.
Cloning	Click **Backup** to make a clone of the current setup of the SAILOR 6282 AIS Transponder.
Restore from file	Click **Browse** and **Restore** to restore a setup from file.

Table 5-7: Service Interface: System Control

5.3.8 Reboot device

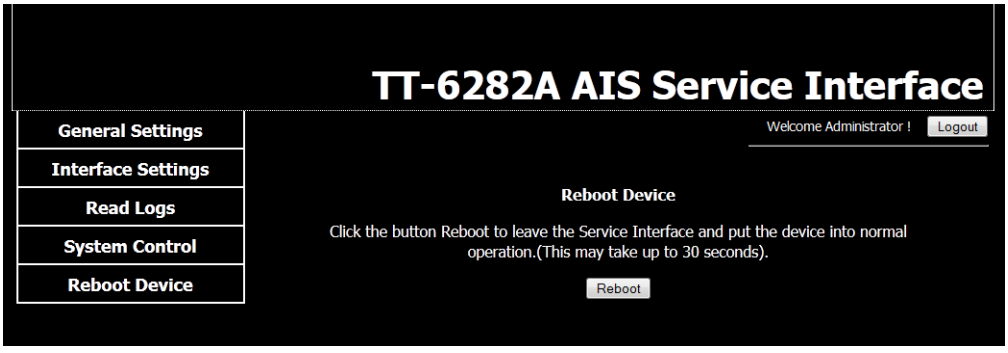


Figure 5-17: Reboot the device

Click the button **Reboot** to activate the changes and leave the Service Interface and put the SAILOR 6282 AIS Transponder into normal operation. This may take up to 30 seconds.

After a reboot the latest 20 addressed safety messages remain in the SAILOR 6282 AIS Transponder, all other messages are deleted.

5.3.9 Connecting a chart plotter

To set up the chart plotter to work together with the SAILOR 6282 AIS Transponder do as follows:

1. Connect a chart plotter to a free PI interface.
2. Login to the Service Interface.
3. Click **Interface settings > PI Settings**.
4. Set the baud rate according to the requirements of the chart plotter.
5. In **Encoder** select **AIS**.
6. Select nothing in **Decoder**.
7. Click **Submit** to save the settings.

5.4 Verification

5.4.1 NMEA Trace tool

After installation of all devices to the SAILOR 6280/6281 AIS System it can be useful to start the NMEA Trace tool to see current system information whether the connected device on a selected port receives and sends correct NMEA information. The tool runs independently from the Service Interface and you can access the SAILOR 6282 AIS Transponder as in normal operation.

To start the NMEA Trace tool, do as follows:

1. Access the login page of the Service Interface, see *Using a PC and an Internet browser* on page 5-5.

Note Do not login to the Service Interface! The NMEA Trace tool is started and works separately.

2. Click **Start the NMEA Trace tool** to start the NMEA tracer tool. A new window opens.

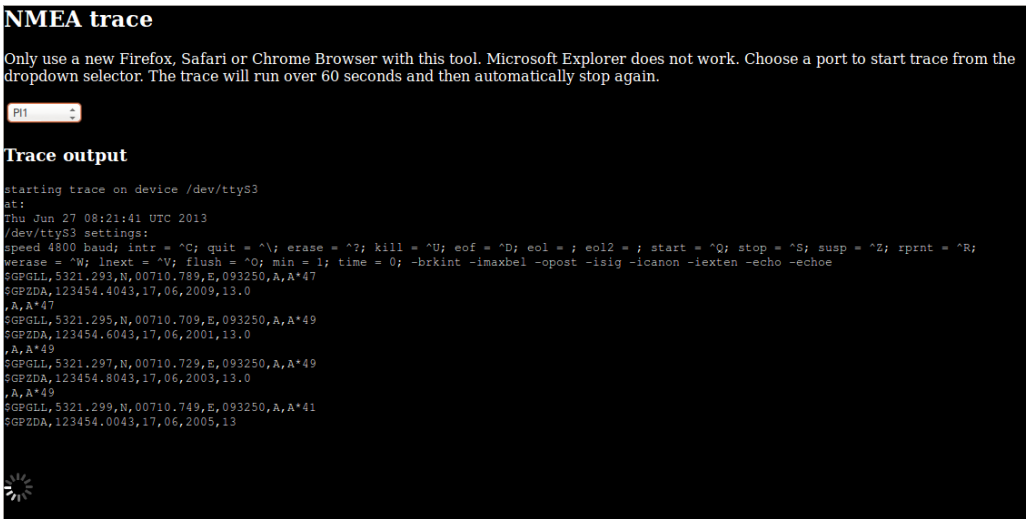


Figure 5-18: NMEA Trace tool (example)

In this window the current data to and from the port selected in the drop-down list are displayed.

At the same time you can monitor alarms related to the connected devices and configure the connected devices in the display of the SAILOR 6004 Control Panel.

Service & maintenance

6.1 Contact for support

Contact your authorized dealer for technical service and support of the SAILOR 6280/6281 AIS System. Before contacting your authorized dealer you can go through the troubleshooting guide to solve some of the most common operational problems.

6.2 Maintenance

6.2.1 Preventive maintenance

Maintenance of the SAILOR 6280/6281 AIS System can be reduced to a maintenance check at each visit of the service staff. Inspect all units for mechanical damages, salt deposits, corrosion and any foreign material. Due to its robust construction and ruggedness the SAILOR 6282 AIS Transponder, SAILOR 6285 GPS Antenna - Active, SAILOR 6283 AIS Connection Box and Wall Tray and SAILOR 6004 Control Panel have a long lifetime. Anyway they must carefully be checked at intervals not longer than 12 months - dependent on the current working conditions.

Salt deposits

In case the equipment has been exposed to sea water there is a risk of salt crystallization on the keys and knobs and they may become inoperable. Clean the units with fresh water.

6.2.2 Error messages

Error messages are shown in the display of the SAILOR 6004 Control panel and are read-only. Tap the red triangle/exclamation mark in the lower right corner of the SAILOR 6004 Control Panel to display the alarm(s).

Figure 6-1: Display error messages

6.2.3 Software update using the TMA (ThraneLINK Management Application)

1. Download the TMA from the Cobham eSupport web site (Self-Service Center, SSC. You find the SSC in the Service and Support section, 24-7 Service). Make sure to use version 1.03 or higher.
2. Make sure that your PC is on the same network as the SAILOR 6282 AIS Transponder.
3. Make sure that the SAILOR 6004 Control Panel is switched on.
4. Connect your PC to a free LAN interface of the SAILOR 6282 AIS Transponder.

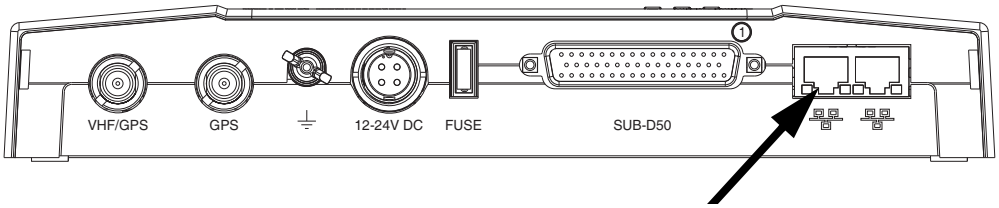


Figure 6-2: LAN connectors of the SAILOR 6282 AIS Transponder

5. Start the TMA on your PC. The SAILOR 6282 AIS Transponder is automatically detected. Click the icon for the SAILOR 6282 AIS Transponder. The **Software Download Status** must show **Ready**.
6. The icon **Software update** pulsates yellow when a new software version is detected for the SAILOR 6282 AIS Transponder.
   The TMA searches all devices connected via USB for new software. You can add an additional search path. To do so press the icon **Option** on the software update screen and select **Search for software**. A dialog box is displayed and you can select a directory.
7. To start the software update click the icon **Software update** and select **Update.** The current and the new software version numbers are displayed.
   You can also select a specific software version. To do so press the icon **Option** on the software update screen and select **Select software**. A list of available software versions is displayed. Select one and click the button **Update**.

6.3 Disassembling

6.3.1 Removing the SAILOR 6282 AIS Transponder from the wall tray

1. Remove the cover of the SAILOR 6283 AIS Connection Box and Wall Tray by loosening the two screws marked 1.

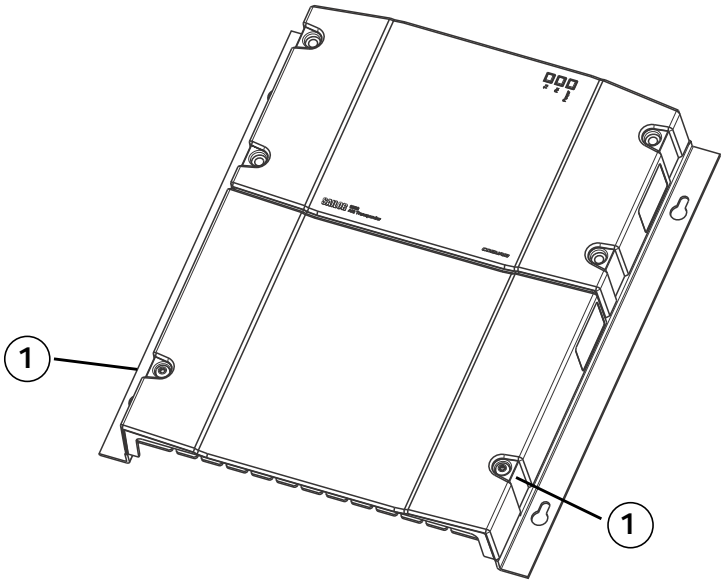


Figure 6-3: Removing the cover of the SAILOR 6283 AIS Connection Box and Wall Tray

2. Remove the cables, going to the SAILOR 6282 AIS Transponder 6282, marked 2.

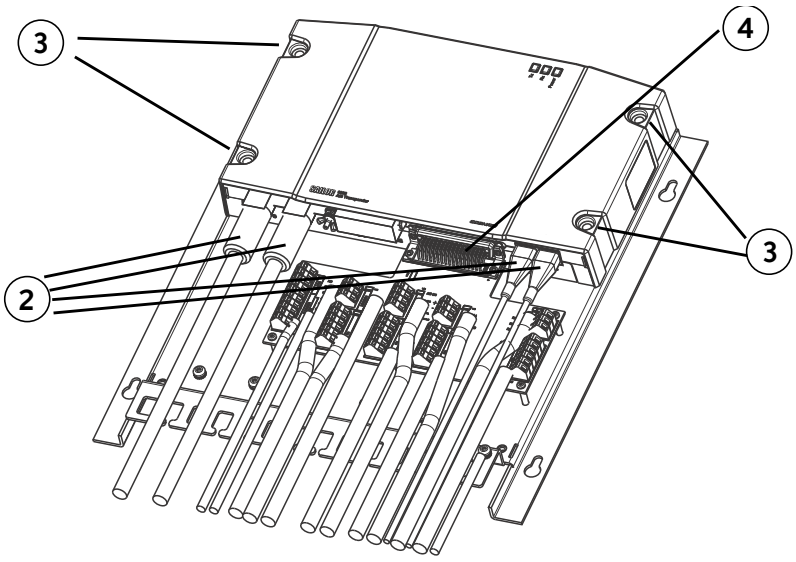


Figure 6-4: Removing the SAILOR 6282 AIS Transponder

3. To remove the SAILOR 6282 AIS Transponder from the wall tray, loosen the four screws marked 3.
4. Remove the SAILOR 6282 AIS Transponder from the wall tray by moving it upwards, away from the wall tray, and detach carefully the multi-connector, marked 4.

6.4 Alarms and notifications

6.4.1 Overview

If an alarm is reported from the SAILOR 6282 AIS Transponder a flashing red triangle appears in the bottom bar of the SAILOR 6004 Control Panel display:

- Flashing, bright red triangle: Unacknowledged alarm(s).
- Faded red triangle: Acknowledged alarm(s).

To acknowledge an alarm do as follows:

1. Tap the flashing, bright red triangle to display the list with active alarms.
2. Tap the alarm to acknowledge the alarm.

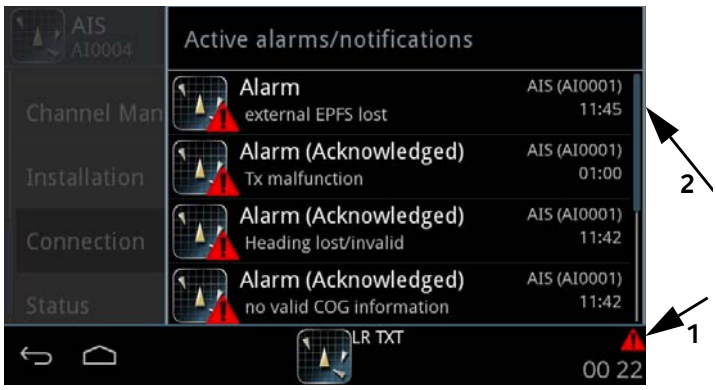


Figure 6-5: Active alarms (example)

When all active alarms are acknowledged the bright red triangle turns into a faded red triangle.

Internal hardware errors in the SAILOR 6282 AIS Transponder are reported as Rx channel malfunction alarm messages. See Table 6-1 on page 5 for further details.

If the SAILOR 6004 Control Panel cannot retrieve the time for an alarm from the SAILOR 6282 AIS Transponder, this is marked by adding (CPT) to the alarm title. See the example in the following figure.

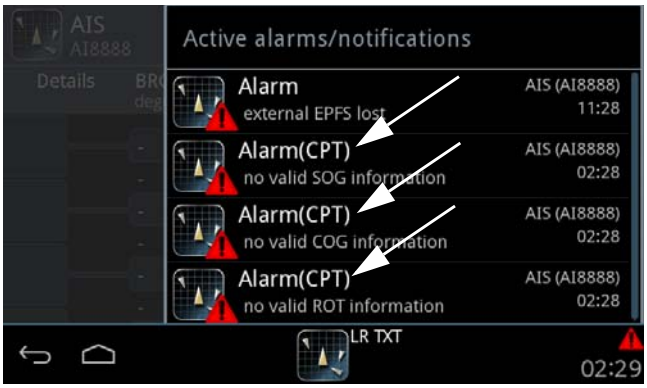


Figure 6-6: Active alarms, no time stamp from SAILOR 6282 AIS Transponder (example)

6.4.2 List of alarms

Alarm	Consequence	Reason	Remedy
Connection lost	AIS list is empty, the padlock for password protection cannot be opened.	Someone has logged into the TT-6282A AIS Service Interface. TRX has no power TRX-MKD connection cable is defect TRX lost Ethernet connection TRX or MKD use wrong connection settings.	After logout from the TT-6282A AIS Service Interface resumes normal operation. Allow up to 30 s.
Tx malfunction (ID 001)	The SAILOR 6282 AIS Transponder stops transmission.	The AIS is not able to transmit for technical reasons (VSWR exceeds allowed ratio, see alarm ID 002) Missing or invalid MMSI The integrity of the VDL is degraded by incorrect transmitter behaviour for instance in case of the Tx shutdown procedure has been activated.	Check the VHF antenna, plugs, and cable to the AIS Transponder. Check correct programming of the MMSI.
Antenna VSWR exceeds limit (ID 002)	The SAILOR 6282 AIS Transponder continues operation.	For every transmission, the VSWR is checked. If it exceeds the warning threshold, this alarm is generated. The alarm is cleared by the AIS when the VSWR is measured to be below the threshold again.	Check the VHF antenna, plugs, and cable to the AIS Transponder.
Rx channel AIS 1 malfunction (ID 003)	The SAILOR 6282 AIS Transponder stops transmission on the affected channel.	If continuous monitoring of the receiver channel 1 shows inconsistency, this alarm is activated.	Check the VHF antenna, plugs, and cable to the AIS transceiver.

Table 6-1: AIS Alarms

Alarm	Consequence	Reason	Remedy
Rx channel AIS 2 malfunction (ID 004)	The SAILOR 6282 AIS Transponder stops transmitting on the affected channel.	If continuous monitoring of the receiver channel 2 shows inconsistency, this alarm is activated.	Check the VHF antenna, plugs, and cable to the AIS Transponder.
Rx channel 70 malfunction (ID 005)	The SAILOR 6282 AIS Transponder continues operation, but external channel management is not possible.	If continuous monitoring of the receiver channels shows inconsistency, this alarm is activated.	Check the VHF antenna, plugs, and cable to the AIS Transponder.
General failure (ID 006)	The SAILOR 6282 AIS Transponder stops functioning. In case of severe software or hardware failure, this alarm is activated.		Check the power supply to the AIS Transponder.
UTC sync invalid (ID 007)	The SAILOR 6282 AIS Transponder continues operation using indirect or semaphore synchronization.	If the internal GNSS receiver cannot receive a synchronization signal from the satellites, this alarm is activated.	Check the GNSS antenna, plugs, and cable to the AIS Transponder.

Table 6-1: AIS Alarms (Continued)

Alarm	Consequence	Reason	Remedy
MKD Connection lost (ID 008)	The SAILOR 6282 AIS Transponder continues operation with DTE set to 1, the MKD is not active.	This alarm is activated by the system, if the AIS Transponder does not receive heartbeat messages from at least one minimum keyboard display (MKD) unit (e.g. SAILOR 6004 Control Panel).	Check the power supplies, cabling, Ethernet connection between the AIS Transponder and the SAILOR 6004 Control Panel. Restart both units: SAILOR 6282 AIS Transponder: remove and connect power, SAILOR 6004 Control Panel: use on/off button.
Internal / external GNSS position mismatch (ID 009)	The SAILOR 6282 AIS Transponder continues operation.	This alarm is activated when the distance between the external and internal GNSS position remains >100 m for an interval longer than 15 minutes.	Check the NMEA connection between external GNSS receiver and the AIS Transponder. Check as well the GNSS antenna, plugs, and cable to the AIS Transponder.
NavStatus incorrect (ID 010)	The SAILOR 6282 AIS Transponder continues operation.	This alarm is activated if a mismatch exists between the sensor input and the Voyage settings status. E.g. when the status is set by the operator to At Anchor and the ship is moving faster than 3 kn, this alarm is activated.	Enter the AIS Application on the SAILOR 6004 Control Panel and set Status in **Settings > Voyage** to the correct state according to the ship's current movement.
Heading sensor offset (ID 011)	The SAILOR 6282 AIS Transponder continues operation.	This alarm is activated when SOG is greater than 5 kn and the difference between COG and HDT is greater than 45° for 5 min.	Check the heading sensor and its NMEA connection to the AIS Transponder.

Table 6-1: AIS Alarms (Continued)

Alarm	Consequence	Reason	Remedy
Active AIS-SART (ID 014)	The SAILOR 6282 AIS Transponder continues operation.	This alarm is activated when the SAILOR 6282 AIS Transponder receives a position report from an AIS search and rescue transponder (SART). The AIS SART indicates the position of persons in distress. It is displayed on the first line in the AIS list view on the SAILOR 6004 Control Panel.	
External EPFS lost (ID 025)	The SAILOR 6282 AIS Transponder continues operation, based on the internal GNSS.	The alarm is activated if the external electronic position fixing system (EPFS) is lost.	Check the NMEA connection between the external GNSS and the AIS Transponder.
No position sensor in use (ID 026)	The SAILOR 6282 AIS Transponder continues operation.	The alarm is activated in case none of the GNSS connected to the AIS Transponder provide valid position data to the AIS Transponder.	Check the GNSS antenna, plugs, and cable to the AIS. Check the NMEA connections between the external GNSS and the AIS Transponder. Check the status of the external GNSS at its own control panel. Check that the GNSS antennas are not covered and are free to receive satellite signals.

Table 6-1: AIS Alarms (Continued)

Alarm	Consequence	Reason	Remedy
No valid SOG information (ID 029)	The SAILOR 6282 AIS Transponder continues operation using default data.	This alarm is activated when none of the sensor inputs reports a valid speed over ground (SOG).	Check the NMEA connection between speed measuring device and AIS Transponder; check the GNSS antenna, plugs, and cable to the AIS Transponder; check the NMEA connection between the external GNSS receiver and the AIS Transponder.
No valid COG information (ID 030)	The SAILOR 6282 AIS Transponder continues operation using default data.	This alarm is activated when none of the sensor inputs reports a valid course over ground (COG).	In order to solve the problem, check the GNSS antenna, plugs, and cable to the AIS Transponder; check the NMEA connection between the external GNSS receiver and the AIS Transponder.
Heading lost/invalid (ID 032)	The SAILOR 6282 AIS Transponder continues operation using default data.	This alarm is activated when none of the sensor inputs reports a valid heading.	Check the NMEA connection between heading sensor and the AIS Transponder.

Table 6-1: AIS Alarms (Continued)

Alarm	Consequence	Reason	Remedy
No valid ROT information (ID 035)	The SAILOR 6282 AIS Transponder continues operation using default data.	This alarm is issued if the rate of turn (ROT) cannot be determined from sensor data or internal calculations.	Check the NMEA connection between ROT sensor and AIS transceiver; check the GNSS antenna, plugs, and cable to the AIS transceiver; check the NMEA connection between the external GNSS receiver and the AIS Transponder.

Table 6-1: AIS Alarms (Continued)

6.5 Troubleshooting guide

Problem	Symptom	Remedy
The SAILOR 6282 AIS Transponder will not turn on.	Green LED on SAILOR 6282 AIS Transponder is off.	If the power cable is connected directly to the SAILOR 6282 AIS Transponder then check that the white wire in the power cable is connected to the black wire (-DC). If power to SAILOR 6282 AIS Transponder is connected via the connection board then check the jumper W8 is placed in position **AIS ON**. For further details see the Installation manual.
No communi-cation	No flashing yellow or red LED on AIS transponder	Check if a valid MMSI has been entered. For further details see the installation manual.
No GPS	No signal from GPS. Position requested.	Check the antenna cable to the GPS.
Missing MMSI		When powering up the SAILOR 6282 AIS Transponder for the first time after leaving the factory there is no MMSI stored in the SAILOR 6282 AIS Transponder. Enter a valid MMSI to operate the SAILOR 6282 AIS Transponder. For further details see the Installation manual.
Wrong MMSI		If a wrong MMSI number has been entered and stored, or if there is a requirement to change it, contact your authorized dealer.
Device failure		If any of the checks and tests described in this section do not assist in resolving the difficulties experienced in the operation and/or performance of the AIS installation, a fault may have developed in the AIS System. When contacting an authorized representative be sure to provide as much information as possible describing the observed behaviour - also including the type of the AIS units, serial number, and software release version. You find this information in the setup menu of the connected SAILOR 6004 Control Panel.

Table 6-2: Troubleshooting guide

Problem	Symptom	Remedy
SAILOR 6004 Control Panel cannot be switched off.		If the SAILOR 6004 Control Panel cannot be switched off normally (e.g. due to a fault): Push and hold for 12 seconds.
Password entered, but padlock does not open	Authorization failed. Wrong password or the connection to the SAILOR 6282 AIS Transponder is lost	Check that you enter the correct password. Check the power supplies, cabling, Ethernet connection between the AIS transceiver and the SAILOR 6004 Control Panel. Restart both units: SAILOR 6282 AIS Transponder: remove and connect power, SAILOR 6004 Control Panel: use on/off button. Check that no one has logged into the Service Interface.
The Test Message does not pass.		If you do not receive an answer within 30 seconds try the test with another ship.

Table 6-2: Troubleshooting guide (Continued)

6.5.1 Recovering communication with the SAILOR 6004 Control Panel

If there is no communication between the SAILOR 6282 AIS Transponder and the SAILOR 6004 Control Panel you can re-establish the communication by setting the parameters as shown in the screen below. This situation may arise after you have made unintended, conflicting settings in the SAILOR 6282 AIS Transponder.

1. Start the Service Interface, see *Accessing the Service Interface* on page 5-4.
2. Click **LWE Settings** and copy the settings from the figure below.

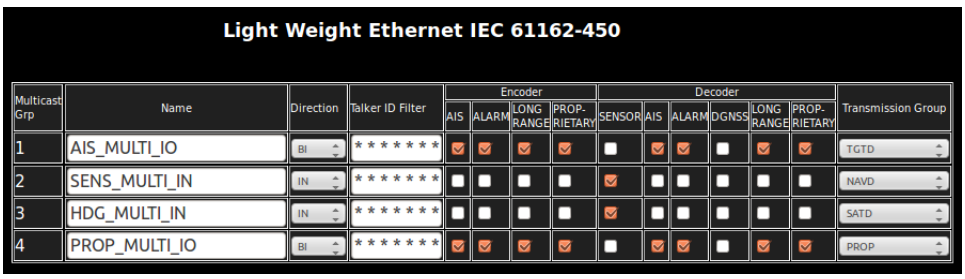


Figure 6-7: Recovering communication between the SAILOR 6282 AIS Transponder and the SAILOR 6004 Control panel

6.6 Warranty and returning units for repair

Should your Cobham SATCOM product fail, please contact your dealer or installer, or the nearest Cobham SATCOM partner. You will find the partner details on cobham.com/satcom where you also find the Cobham SATCOM Self Service Center web-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.

6.6.1 Repacking for shipment

Should you need to send the product for repair, please read the below information before packing the product.

The shipping carton has been carefully designed to protect the SAILOR 6282 AIS Transponder and its accessories during shipment. This carton and its associated packing material should be used when repacking for shipment. Attach a tag indicating the type of service required, return address, part number and full serial number. Mark the carton FRAGILE to ensure careful handling.

Note Correct shipment is the customer's own responsibility.

If the original shipping carton is not available, the following general instructions should be used for repacking with commercially available material.

1. Wrap the defective unit in heavy paper or plastic. Attach a tag indicating the type of service required, return address, part number and full serial number.
2. Use a strong shipping container, e.g. a double walled carton.
3. Protect the front- and rear panel with cardboard and insert a layer of shock-absorbing material between all surfaces of the equipment and the sides of the container.
4. Seal the shipping container securely.
5. Mark the shipping container FRAGILE to ensure careful handling.

Failure to do so may invalidate the warranty.

Technical specifications

A.1 SAILOR 6282 AIS Transponder

Item	Specification
Weight	1.15 kg
Dimensions (L x W x H)	160 x 270 x 42 mm
Equipment class	Protected, according to IEC 60945
Input voltage	10.8 VDC to 31.2 VDC
Power consumption	12 W (0.5 A @24 VDC input voltage)
Heat dissipation	10 W
Temperature	-15 ˚C to +55 ˚C (Operational) -30 ˚C to +70 ˚C (Storage)
Compass Safe Distance	55 cm (standard magnetic compass) 45 cm (Emergency magnetic compass)
Receivers	156.025 - 162.025 MHz (TDMA) 156.525 MHz (Channel 70, DSC)
Channel bandwidth	25 kHz
RF Output Power	High: 12.5 W Low: 1 W Low power forced control (gas alarm): 1 W
Frequency	156.025 - 162.025 MHz
VHF connector	TNC female
GPS connector	TNC female
VHF and GPS cable	RG214 or better
Connection to SAILOR 6004 Control Panel	LAN (LWE IEC 61162-450)
Connections to sensors and PI	50 pin sub-D

Table A-1: SAILOR 6282 AIS Transponder specifications

A.1.1 Reporting Intervals

The SAILOR 6282 AIS Transponder is transmitting in different intervals depending of the dynamic input data as speed and turn. The reporting intervals are as follows:

Type of information	Reporting interval
Static Information	Every 6 min. or when data has been amended and on request.
Dynamic Information	Depending on speed and course alteration, see the table below.
Voyage related information	Every 6 min. or when data has been amended and on request.
Safety related message	As required.

Table A-2: Reporting intervals

Type of ship	Reporting Interval
Ship at anchor or moored and not moving faster than 3 knots	3 min
Ship at anchor or moored and moving faster than 3 knots	10 s
Ship with a speed of between 0 - 14 knots	10 s
Ship with a speed of between 0 - 14 knots and changing course	3 1/3 s
Ship with a speed of between 14 - 23 knots	6 s
Ship with a speed of between 14 - 23 knots and changing course	2 s
Ship with a speed of greater than 23 knots	2 s
Ship with a speed of greater than 23 knots and changing course	2 s

Table A-3: Reporting intervals for types of ship

A.2 SAILOR 6285 GPS Antenna - Active

Item	Specification
Dimensions	Ø: 91 mm, H: 77.5 mm
Weight	0.15 kg
Mounting	Bracket mount on pipe, thread 1” x 14 TPI
Equipment class	Exposed, according to IEC 60945
Antenna type	Active patch antenna
Frequency	1570 to 1608 MHz
Impedance	Nominal 50 Ohm
Polarization	Circular right-hand
Coverage	Hemispherical
Selectivity	45 dB down at center ±25 MHz
Gain	28 dB
Supply voltage	5 ±1 VDC
Current consumption	Approx. 30 mA
Connector	TNC female
Cable	RG214 recommended
Operating temperature	-40 ˚C to +55 ˚C
Storage temperature	-40 ˚C to +70 ˚C

Table A-4: SAILOR 6285 GPS Antenna - Active specifications

A.3 SAILOR 6283 AIS Connection Box and Wall Tray

Item	Specification
Weight without SAILOR 6282 AIS Transponder	2.15 kg
Weight with SAILOR 6282 AIS Transponder mounted	3.30 kg
Dimensions (L x W x H)	340 x 310 x 55 mm
Equipment class	Protected, according to IEC 60945

Table A-5: SAILOR 6283 AIS Connection Box and Wall Tray specifications

A.4 SAILOR 6004 Control Panel

Item	Specifications
Mounting method	Flush mount or bracket
Voltage	10.8 to 31.2 VDC
Power consumption	Typical: 18 W active Peak: 42 W 3.15 A internal fuse (non-serviceable)
Audio input	Up to 6 W in 8 Ohm
Interfaces	2 x Ethernet (10/100 Mbit/s) Accessories connector Auxiliary connector
Compliance	• IEC 60945 • IEC 60950-1
IP rating	IP54[a]
Ambient temperature	-15 ˚C to 55 ˚C
Storage temperature	-30 ˚C to 80 ˚C
Compass safe distance	0.6 m
Dimensions W x H x D	191 mm x 145 mm x 61 mm (without mounting bracket)
Weight	1.1 kg (1.25 kg with mounting bracket)

Table A-6: SAILOR 6004 Control Panel specifications

a. Estimated.

NMEA sentences

B.1 NMEA sentences used

All sentences are defined according to NMEA 0183 version 4.10 and IEC 61162-1 and IEC 61162-2.

B.1.1 Light weight Ethernet - LWE

Sentences may be configured to be received and transmitted over serial PI and sensor interfaces, but also over Light Weight Ethernet (IEC 61162-450). The following table shows the available transmission group multicast addresses and ports that can be set up in the Service Interface.

Transmission group	Category	Multicast address	Destination port
MISC	SF not explicitly listed below	239.192.0.1	60001
TGTD	Target data (AIS), tracked target messages (Radar)	239.192.0.2	60002
SATD	High update rate, for example ship heading, attitude data.	239.192.0.3	60003
NAVD	Navigational output other than that of TGTD and SATD groups	239.192.0.4	60004
VDRD	Data required for the VDR according to IEC 61996	239.192.0.5	60005
RCOM	Radio communication equipment	239.192.0.6	60006
TIME	Time transmitting equipment	239.192.0.7	60007
PROP	Proprietary and user specified SFs	239.192.0.8	60008
USR1 to USR8	User defined transmission group 1 to 8	239.192.0.9 to 239.192.0.16	60009 to 60016

Table B-1: Destination multicast addresses and port numbers

B.1.2 Sentence characteristics and their linkage with port configuration

The following table lists all the supported sentences. The Encoder/Parser column reflects the group of sentences that can be configured for a specific port. See also *Interface settings* on page 5-12.

- Transmission Interval indicates the time after which a renewed sentence must be received. Otherwise sentence data will be invalidated.
- Restore Time indicates the time an invalidated sentence must be received from the same source with the proper transmission interval until it can be qualified for input.

Encoder/Parser	Sentence	Transmission Interval (s)	Restore time (s)
ENCODER_AIS output sentences	ABK, ACA, EPV, LRF, NAK, VER, VDM, VDO, VSD, SSD, TXT	N.A	N.A
PARSER_AIS input sentences	ABM	1	-
	ACA	1	-
	AIR	1	-
	BBM	1	-
	EPV	1	-
	HBT	Programmable (default 30)	-
	LRF	-	-
	SPW	1	-
	SSD	1	-
	VSD	1	-
ENCODER_LONG_RANGE output sentences	LR1, LR2, LR3, LRF, LRI	N.A	N.A
PARSER_LONG_RANGE input sentences	LRF	-	-
	LRI	-	-
ENCODER_PROPRIETARY output sentences	PTHRAOC, PTHRROS	N.A	N.A
PARSER_PROPRIETARY input sentences	PTHRAOC	-	-
ENCODER_SENSOR output sentences	ZDA [a]	N.A	N.A
PARSER_SENSOR input sentences	DTM	60	70
	GBS	5,5	30
	GGA	5,5	30
	GNS	5,5	30
	HDT	11	11
	RMC	5,5	30
	ROT	1,5	3
	THS	11	11
	VBW	11	11
	VTG	5,5	30
ENCODER_ALARM output sentences	ALR, TRL	N.A	N.A
PARSER_ALARM input sentences	ACK	-	-
PARSER_DGNSS input	RTCM 104 binary	-	-

Table B-2: Supported sentences and their characteristics.

a. Only transmitted to the identified HBT MKD source (TT-6004A).

B.2 Sentence use reference

This section describes the supported sentences and the specific field use in the SAILOR 6282 AIS Transponder.

B.2.1 ABK - AIS addressed and binary broadcast acknowledgement (output)

$--ABK,xxxxxxxxx,x,x,x,x*hh<CR><LF>

Field	Data format	Description	Comment
1	ABK	Sentence Id	Used
2	xxxxxxxxx	MMSI of the addressed AIS unit	Used
3	x	AIS channel of reception	Used
4	x	Message ID, ITU-R M.1371	Used
5	x	Message sequence number	Used
6	x	Type of acknowledgement	Used

B.2.2 ABM - AIS addressed binary and safety related message (input)

$--ABM,x,x,x,xxxxxxxxx,x,xx,s-s,x*hh<CR><LF>

Field	Data format	Description	Comment
1	ABM	Sentence Id	Used
2	x	Total number of sentences needed	Used
3	x	Sentence number	Used
4	x	Sequential message identifier	Used
5	xxxxxxxxx	The MMSI of the destination AIS unit	Used
6	x	AIS channel for broadcast of radio message	Used
7	xx	Message ID, ITU-R M.1371	Used
8	s-s	Encapsulated data	Used
9	x	Number of fill-bits	Used

B.2.3 ACA - AIS channel assignment message (input / output)

$--ACA,x,llll.ll,a,yyyyy.yy,a,llll.ll,a,yyyyy.yy,a,x,xxxx,x,xxxx,x,x,x,a,x,hhmmss.ss*hh<CR><LF>

Field	Data format	Description	Comment
1	ACA	Sentence Id	Used
2	x	Sequence number, 0 to 9	Used
3	llll.ll	Region northeast corner latitude	Used
4	a	Region northeast corner latitude - N/S	Used
5	yyyyy.yy	Region northeast corner longitude	Used
6	a	Region northeast corner longitude - E/W	Used
7	llll.ll	Region southwest corner latitude	Used
8	a	Region southwest corner latitude -N/S	Used
9	yyyyy.yy	Region southwest corner longitude	Used
10	a	Region southwest corner longitude - E/W	Used
11	x	Transition zone size	Used
12	xxxx	Channel A	Used
13	x	Channel A bandwidth	Used
14	xxxx	Channel B	Used
15	x	Channel B bandwidth	Used
16	x	Tx/Rx mode control	Used
17	x	Power level control	Used
18	a	Information source	Used
19	x	In-use flag	Used
20	hhmmss.ss	Time of "in use"	Used (hhmmss)

B.2.4 ACK - Acknowledge alarm (input)

$--ACK,xxx*hh>CR><LF>

Field	Data format	Description	Comment
1	ACK	Sentence Id	Used
2	xxx	Unique alarm number (identifier) at alarm source	Used

B.2.5 AIR - AIS interrogation request (input)

$--AIR, xxxxxxxxx,x.x,x,x.x,x,xxxxxxxxx,x.x,x,a,x.x,x.x,x.x*hh<CR><LF>

Field	Data format	Description	Comment
1	AIR	Sentence Id	Used
2	xxxxxxxxx	MMSI of interrogated station 1	Used
3	x.x	First message number requested from station 1	Used
4	x	Message sub-section	Not Used
5	x.x	Second message number requested from station 1	Used
6	x	Message sub-section	Not Used
7	xxxxxxxxx	MMSI of interrogated station 2	Used
8	x.x	First message number requested from station 2	Used
9	x	Message sub-section	Not Used
10	a	Channel of interrogation	Not Used
11	x.x	Message ID1.1 station 1 reply slot	Not Used
12	x.x	Message ID1.2 station 1 reply slot	Not Used
13	x.x	Message ID2.1 station 2 reply slot	Not Used

B.2.6 ALR - Set alarm state (output)

$--ALR,hhmmss.ss,xxx,A,A,c-c*hh<CR><LF>

Field	Data format	Description	Comment
1	ALR	Sentence Id	Used
2	hhmmss.ss	Time of alarm condition change	Used
3	xxx	Unique alarm number (identifier) at alarm source	Used
4	A	Alarm condition (A=threshold exceeded, V=not exceeded)	Used
5	A	Alarm acknowledge state, (A=acknowledged, V= unacknowledged)	Used
6	c-c	Alarm's description text	Used

B.2.7 BBM - AIS broadcast binary message (input)

$--BBM,x,x,x,x,xx,s-s,x*hh<CR><LF>

Field	Data format	Description	Comment
1	BBM	Sentence Id	Used
2	x	Total number of sentences needed	Used
3	x	Sentence number	Used
4	x	Sequential message identifier	Used
5	x	AIS channel for broadcast of radio message	Used
6	xx	Message ID, ITU-R M.1371	Used
7	s-s	Encapsulated data	Used
8	x	Numbers of fill-bits	Used

B.2.8 DTM - Datum reference (input)

$--DTM,ccc,a,x.x,a,x.x,a,x.x,ccc*hh<CR><LF>

Field	Data format	Description	Comment
1	DTM	Sentence Id	Used
2	ccc	Local datum	Used
3	a	Local datum subdivision code	Not Used
4	x.x	Latitude offset, min	Not Used
5	a	Latitude offset, min, N/S	Not Used
6	x.x	Longitude offset, min	Not Used
7	a	Longitude offset, min, E/W	Not Used
8	x.x	Altitude offset, m	Not Used
9	ccc	Reference datum	Not Used

B.2.9 EPV - Command or report equipment property value (input / response output)

$--EPV,a,c-c,c-c,x.x,c-c,*hh<CR><LF>

Field	Data format	Description	Comment
1	EPV	Sentence Id	Used
2	a	Sentence status flag	Used
3	c-c	Destination equipment type	Used
4	c-c	Unique identifier	Used
5	x.x	Property identifier for the property to be set	Used
6	c-c	Value of property to be set	Used

B.2.10 GBS - GNSS satellite fault detection (input)

$--GBS,hhmmss.ss,x.x,x.x,x.x,xx,x.x,x.x,x.x,h,h*hh<CR><LF>

Field	Data format	Description	Comment
1	GBS	Sentence Id	Used
2	hhmmss.ss	UTC of GGA or GNS	Used
3	x.x	Expected error in latitude	Used
4	x.x	Expected error in longitude	Used
5	x.x	Expected error in altitude	Used
6	xx	ID number	Not Used
7	x.x	Probability of missed detection	Not Used
8	x.x	Estimate of bias on failed satellite	Not Used
9	x.x	Standard deviation of bias estimate	Not Used
10	h	GNSS System ID	Not Used
11	h	GNSS System ID	Not Used

B.2.11 GGA - Global positioning system (GPS) fix data (input)

$--GGA,hhmmss.ss,llll.ll,a,yyyyy.yy,a,x,xx,x.x,x.x,M,x.x,M,x.x,xxxx*hh<CR><LF>

Field	Data format	Description	Comment
1	GGA	Sentence Id	Used
2	hhmmss.ss	UTC of position	Used
3	llll.ll	Latitude	Used
4	a	Latitude N/S	Used
5	yyyyy.yy	Longitude	Used
6	a	Longitude E/W	Used
7	x	GPS quality indicator	Used
8	xx	Number of satellites in use, 00-12	Not Used
9	x.x	HDOP	Not Used
10	x.x	Antenna altitude, m	Not Used
11	M	Units of antenna altitude M	Not Used
12	x.x	Geoidal separation	Not Used
13	M	Units of geoidal separation M	Not Used
14	x.x	Age of differential data	Not Used
15	xxxx	Differential reference station	Not Used

B.2.12 GNS - Fix data (input)

$--GNS,hhmmss.ss,llll.ll,a,yyyyy.yy,a,c-c,xx,x.x,x.x,x.x,x.x,x.x,a*hh<CR><LF>

Field	Data format	Description	Comment
1	GNS	Sentence Id	Used
2	hhmmss.ss	UTC of position	Used
3	llll.ll	Latitude	Used
4	a	Latitude N/S	Used
5	yyyyy.yy	Longitude	Used
6	a	Longitude E/W	Used
7	c-c	Mode indicator	Used
8	xx	Total number of satellites in use, 00-99	Not Used
9	x.x	HDOP	Not Used
10	x.x	Antenna altitude, m	Not Used
11	x.x	Geoidal separation	Not Used
12	x.x	Age of differential data	Not Used
13	x.x	Differential reference station	Not Used
14	a	Navigational status indicator	Used

B.2.13 HBT - Heartbeat supervision sentence (input)

$--HBT,x.x,a,x*hh<CR><LF>

Field	Data format	Description	Comment
1	HBT	Sentence Id	Used
2	x.x	Configured repeat interval	Used
3	a	Equipment status	Used
4	x	Sequential sentence identifier	Used

B.2.14 HDT - Heading true (input)

$--HDT,x.x,T*hh<CR><LF>

Field	Data format	Description	Comment
1	HDT	Sentence Id	Used
2	x.x	Heading, degrees true	Used
3	T	Heading, degrees true	Not Used

B.2.15 LR1 - AIS long-range reply sentence 1 (output)

$--LR1,x,xxxxxxxxx,xxxxxxxxxx,c-c,c-c,xxxxxxxxxx*hh<CR><LF>

Field	Data format	Description	Comment
1	LR1	Sentence Id	Used
2	x	Sequence number	Used
3	xxxxxxxxx	MMSI of responder	Used
4	xxxxxxxxx	MMSI of requestor (replydestination)	Used
5	c-c	Ship's name, 1 to 20 characters	Used
6	c-c	Call sign, 1 to 7 characters	Used
7	xxxxxxxxx	IMO number, 9-digit number	Used

B.2.16 LR2 - AIS long-range reply sentence 2 (output)

$--LR2,x,xxxxxxxxx,xxxxxxxx,hhmmss.ss,llll.ll,a,yyyyy.yy,a,x.x,T,x.x,N*hh<CR><LF>

Field	Data format	Description	Comment
1	LR2	Sentence Id	Used
2	x	Sequence number	Used
3	xxxxxxxxx	MMSI of responder	Used
4	xxxxxxxx	Date: ddmmyyyy, 8 digits	Used
5	hhmmss.ss	UTC time of position	Used
6	llll.ll	Latitude	Used
7	a	Latitude - N/S	Used
8	yyyyy.yy	Longitude	Used
9	a	Longitude - E/W	Used

Field	Data format	Description	Comment
10	x.x	Course over ground, degrees, true	Used
11	T	Course over ground, degrees, true	Used
12	x.x	Speed over ground, knots	Used
13	N	Speed over ground, knots	Used

B.2.17 LR3 - AIS long-range reply sentence 3 (output)

$--LR3,x,xxxxxxxxx,c-c,xxxxxx,hhmmss.ss,x.x,x.x,x.x,x.x,x.x,x.x,x.x*hh<CR><LF>

Field	Data format	Description	Comment
1	LR3	Sentence Id	Used
2	x	Sequence number	Used
3	xxxxxxxxx	MMSI of responder	Used
4	c-c	Voyage destination, 1 to 20 chars	Used
5	xxxxxx	ETA date: ddmmyy	Used (ddmm00)
6	hhmmss.ss	ETA time	Used (hhmm00.00)
7	x.x	Draught	Used
8	x.x	Ship/cargo	Used
9	x.x	Ship length	Used
10	x.x	Ship breadth	Used
11	x.x	Ship type	Used
12	x.x	Persons, 0 to 8191	Used

B.2.18 LRF - AIS long-range function (input / output)

$--LRF,x,xxxxxxxxx,c-c,c-c,c-c*hh<CR><LF>

Field	Data format	Description	Comment
1	LRF	Sentence Id	Used
2	x	Sequence number, 0 to 9	Used
3	xxxxxxxxx	MMSI of requestor	Used
4	c-c	Name of requestor, 1 to 20 characters	Used
5	c-c	Function request, 1 to 26 characters	Used
6	c-c	Function reply status	Used

B.2.19 LRI - AIS long-range interrogation (input / output)

$--LRI,x,a ,xxxxxxxxx,xxxxxxxxx,llll.ll,a,yyyyy.yy,a,llll.ll,a,yyyyy.yy,a*hh<CR><LF>

Field	Data format	Description	Comment
1	LRI	Sentence Id	Used
2	x	Sequence number, 0 to 9	Used
3	a	Control flag	Used
4	xxxxxxxxx	MMSI of requestor	Used
5	xxxxxxxxx	MMSI of destination	Used
6	llll.ll	Latitude (north-east co-ordinate)	Used
7	a	Latitude - N/S (north-east co-ordinate)	Used
8	yyyyy.yy	Longitude (north-east co-ordinate)	Used
9	a	Longitude - E/W (north-east co-ordinate)	Used
10	llll.ll	Latitude (south-west co-ordinate)	Used
11	a	Latitude - N/S (south-west co-ordinate)	Used
12	yyyyy.yy	Longitude (south-west co-ordinate)	Used
13	a	Longitude - E/W (south-west co-ordinate)	Used

B.2.20 NAK - Negative acknowledgement (output)

$--NAK,cc,ccc,c-c,x.x,c-c*hh<CR><LF>

Field	Data format	Description	Comment
1	NAK	Sentence Id	Used
2	cc	Talker identifier	Used
3	ccc	Affected sentence formatter	Used
4	c-c	Unique identifier	Used
5	x.x	Reason code for negative acknowledgement	Used
6	c-c	Negative acknowledgement's descriptive text	Used

B.2.21 PTHRAOC - AIS operational control (input / output)

$PTHRAOC,x,x*hh<CR><LF>

Field	Data format	Description	Comment
1	PTHRAOC	Sentence Id	Used
2	x	Enable/disable inland waterways mode 0 = Disable 1 = Enable	Used
3	x	Enable/disable long range broadcast 0 = Disable 1 = Enable	Used

B.2.22 PTHRROS - Radio operational status (output)

$PTHRROS,cc,x,x,xx,x,x,x,xxxx,x*hh<CR><LF>

Field	Data format	Description	Comment
1	PTHRROS	Sentence Id	Used
2	cc	Product code. The product code for which this sentence is valid AI = AIS CR = NAVTEX receiver	Used
3	x	Inland waterways enabled - AIS specific 0 = Disabled 1 = Enabled	Used
4	x	Transmitter power level - AIS specific 0 = Low 1 = High	Used
5	xx	Receiver channel status - NAVTEX specific 0 = Not received over air 1 = 490 kHz 2 = 518 kHz 3 = 4209,5 kHz 4 = 490 kHz and 518 kHz 5 = 490 kHz and 4209,5 kHz 6 = 518 kHz and 4209,5 kHz 7 = 490 kHz, 518 kHz and 4209,5 kHz 8-99 Reserved for future use	Not Used
6	x	Automatic filter mode for storage and display - NAVTEX 0 = Manual 1 = Automatic	Not Used
7	x	Automatic filter mode for the INS port - NAVTEX 0 = Manual 1 = Automatic	Not Used
8	x	Automatic filter mode for the printing device - NAVTEX 0 = Manual 1 = Automatic	Not Used
9	xxxx	Receive radius - NAVTEX 1-9999 Nautical Miles	Not Used
10	x	Long range broadcast enabled - AIS specific 0 = Disabled 1 = Enabled	Used

B.2.23 RMC - Recommended minimum specific GNSS data (input)

$--RMC, hhmmss.ss,a,llll.ll,a,yyyyy.yy,a ,x.x,x.x, xxxxxx, x.x,a,a,a*hh<CR><LF>

Field	Data format	Description	Comment
1	RMC	Sentence Id	Used
2	hhmmss.ss	UTC of position fix	Used
3	a	Status (A or V)	Used
4	llll.ll	Latitude	Used
5	a	Latitude N/S	Used
6	yyyyy.yy	Longitude	Used
7	a	Longitude E/W	Used
8	x.x	Speed over ground, knots	Used
9	x.x	Course over ground, degrees true	Used
10	xxxxxx	Date: ddmmyy	Used
11	x.x	Magnetic variation, degrees	Not Used
12	a	Magnetic variation, E/W	Not Used
13	a	Mode indicator	Used
14	a	Navigational status	Used

B.2.24 ROT - Rate of turn (input)

$--ROT,x.x,a*hh<CR><LF>

Field	Data format	Description	Comment
1	ROT	Sentence Id	Used
2	x.x	Rate of turn, °/min, "-" = bow turn to port	Used
3	a	Status: A = data valid, V = data invalid	Used

B.2.25 SPW - Security password sentence (input)

$--SPW,ccc,c-c,x,c-c*hh<CR><LF>

Field	Data format	Description	Comment
1	SPW	Sentence Id	Used
2	ccc	Password protected sentence	Used
3	c-c	Unique identifier	Used
4	x	Password level	Used
5	c-c	Password	Used

B.2.26 SSD - AIS ship static data (input / output)

$--SSD,c-c,c-c,xxx,xxx,xx,xx,c,ac*hh<CR><LF>

Field	Data format	Description	Comment
1	SSD	Sentence Id	Used
2	c-c	Ship's call sign	Used
3	c-c	Ship's name	Used
4	xxx	Pos. ref., point dist. A from bow	Used
5	xxx	Pos. ref., point dist. B from stern	Used
6	xx	Pos. ref., point dist. C from port beam	Used
7	xx	Pos. ref., point dist. D from starboard beam	Used
8	c	DTE indicator flag	Used
9	ac	Source identifier	Used

B.2.27 THS -True heading and status (input)

$--THS,x.x,a*hh<CR><LF>

Field	Data format	Description	Comment
1	THS	Sentence Id	Used
2	x.x	Heading, degrees true	Used
3	a	Mode indicator	Used

B.2.28 TRL - AIS transmitter non functioning log (output)

$--TRL,x.x,x.x,x,xxxxxxxx,hhmmss.ss,xxxxxxxx,hhmmss.ss,x,*hh<CR><LF>

Field	Data format	Description	Comment
1	TRL	Sentence Id	Used
2	x.x	Total number of log entries	Used
3	x.x	Log entry number	Used
4	x	Sequential message identifier	Used
5	xxxxxxxx	Switch off date	Used
6	hhmmss.ss	Switch off UTC time	Used
7	xxxxxxxx	Switch on date	Used
8	hhmmss.ss	Switch on UTC time	Used
9	x	Reason code	Used

B.2.29 TXT - Text transmission (output)

$--TXT,xx,xx,xx,c-c*hh<CR><LF>

Field	Data format	Description	Comment
1	TXT	Sentence Id	Used
2	xx	Total number of sentences	Used
3	xx	Sentence number	Used
4	xx	Text identifier	Used
5	c-c	Text message	Used

B.2.30 VBW - Dual ground/water speed (input)

$--VBW,x.x,x.x,a,x.x,x.x,a,x.x,a,x.x,a*hh<CR><LF>

Field	Data format	Description	Comment
1	VBW	Sentence Id	Used
2	x.x	Longitudinal water speed	Not Used
3	x.x	Transverse water speed	Not Used
4	a	Status water speed, A = data valid, V = data invalid	Not Used
5	x.x	Longitudinal ground speed	Used
6	x.x	Transverse ground speed	Used
7	A	Status ground speed, A = data valid, V = data invalid	Used
8	x.x	Stern transverse water speed	Not Used
9	A	Status stern water speed, A = data valid, V = data invalid	Not Used
10	x.x	Stern transverse ground speed	Not Used
11	A	Status stern ground speed, stern ground speed	Not Used

B.2.31 VDM - AIS VHF data-link message (output)

$--VDM,x,x,x,a,s-s,x*hh<CR><LF>

Field	Data format	Description	Comment
1	VDM	Sentence Id	Used
2	x	Total number of sentences needed to transfer message, 1 to 9	Used
3	x	Sentence number, 1 to 9	Used
4	x	Sequential message identifier, 0 to 9	Used
5	a	AIS channel	Used
6	s-s	Encapsulated ITU-R M.1371 radio message	Used
7	x	Number of fill-bits	Used

B.2.32 VDO - AIS VHF data-link own-vessel report (output)

$--VDO,x,x,x,a,s-s,x*hh<CR><LF>

Field	Data format	Description	Comment
1	VDO	Sentence Id	Used
2	x	Total number of sentences needed to transfer message	Used
3	x	Sentence number	Used
4	x	Sequential message identifier, 0 to 9	Used
5	a	AIS channel	Used
6	s-s	Encapsulated ITU-R M.1371 radio message	Used
7	x	Number of fill-bits	Used

B.2.33 VER - Version (output)

$--VER,x,x,aa,c-c,c-c,c-c,c-c,c-c,c-c,x*hh<CR><LF>

Field	Data format	Description	Comment
1	VER	Sentence Id	Used
2	x	Total number of sentences needed, 1 to 9	Used
3	x	Sentence number, 1 to 9	Used
4	aa	Device type	Used
5	c-c	Vendor ID	Used
6	c-c	Unique identifier	Used
7	c-c	Manufacture serial number	Used
8	c-c	Model code (product code)	Used
9	c-c	Software revision	Used
10	c-c	Hardware revision	Used
11	x	Sequential message identifier	Used

B.2.34 VSD - AIS voyage static data (input / output)

$--VSD,x.x,x.x,x.x,c-c,hhmmss.ss,xx,xx,x.x,x.x*hh<CR><LF>

Field	Data format	Description	Comment
1	VSD	Sentence Id	Used
2	x.x	Type of ship and cargo category	Used
3	x.x	Maximum present static draught	Used
4	x.x	Persons on-board	Used
5	c-c	Destination	Used
6	hhmmss.ss	Estimated UTC of arrival at destination	Used (hhmm00.00)
7	xx	Estimated day of arrival at destination	Used
8	xx	Estimated month of arrival at destination	Used
9	x.x	Navigational status	Used
10	x.x	Regional application flags	Used

B.2.35 VTG - Course over ground and ground speed (input)

$--VTG,x.x,T,x.x,M,x.x,N,x.x,K,a*hh<CR><LF>

Field	Data format	Description	Comment
1	VTG	Sentence Id	Used
2	x.x	Course over ground, degrees true	Used
3	T	T	Not Used
4	x.x	Course over ground, degrees magnetic	Not Used
5	M	M	Not Used
6	x.x	Speed over ground, knots	Used
7	N	N	Not Used
8	x.x	Speed over ground, km/h	Not Used
9	K	K	Not Used
10	a	Mode indicator	Used

B.2.36 ZDA - Time and Date (output)

$--ZDA, hhmmss.ss,xx,xx,xxxx,xx,xx*hh<CR><LF>

Field	Data format	Description	Comment
1	ZDA	Sentence Id	Used
2	hhmmss.ss	UTC	Used
3	xx	Day, 01 to 31 (UTC)	Used
4	xx	Month, 01 to 12 (UTC)	Used
5	xxxx	Year (UTC)	Used
6	xx	Local zone hours (00 to +/-13h)	Not Used
7	xx	Local zone minutes (00 to +59)	Not Used

Supported keys

C.1 Keys supported by the SAILOR 6004 Control Panel

When entering ship's name, destination, call sign and more, the following characters are available. These are in accordance with the AIS standard 1371-4.

6-Bit ASCII				Standard ASCII			6-Bit ASCII				Standard ASCII		
Chr	Dec	Hex	Binary	Dec	Hex	Binary	**Chr**	Dec	Hex	Binary	Dec	Hex	Binary
@	0	0x00	00 0000	64	0x40	0100 0000	**!**	33	0x21	10 0001	33	0x21	0010 0001
A	1	0x01	00 0001	65	0x41	0100 0001	**"**	34	0x22	10 0010	34	0x22	0010 0010
B	2	0x02	00 0010	66	0x42	0100 0010	**#**	35	0x23	10 0011	35	0x23	0010 0011
C	3	0x03	00 0011	67	0x43	0100 0011	**$**	36	0x24	10 0100	36	0x24	0010 0100
D	4	0x04	00 0100	68	0x44	0100 0100	**%**	37	0x25	10 0101	37	0x25	0010 0101
E	5	0x05	00 0101	69	0x45	0100 0101	**&**	38	0x26	10 0110	38	0x26	0010 0110
F	6	0x06	00 0110	70	0x46	0100 0110	**`**	39	0x27	10 0111	39	0x27	0010 0111
G	7	0x07	00 0111	71	0x47	0100 0111	**(**	40	0x28	10 1000	40	0x28	0010 1000
H	8	0x08	00 1000	72	0x48	0100 1000	**)**	41	0x29	10 1001	41	0x29	0010 1001
I	9	0x09	00 1001	73	0x49	0100 1001	*****	42	0x2A	10 1010	42	0x2A	0010 1010
J	10	0x0A	00 1010	74	0x4A	0100 1010	**+**	43	0x2B	10 1011	43	0x2B	0010 1011
K	11	0x0B	00 1011	75	0x4B	0100 1011	**,**	44	0x2C	10 1100	44	0x2C	0010 1100
L	12	0x0C	00 1100	76	0x4C	0100 1100	**-**	45	0x2D	10 1101	45	0x2D	0010 1101
M	13	0x0D	00 1101	77	0x4D	0100 1101	**.**	46	0x2E	10 1110	46	0x2E	0010 1110
N	14	0x0E	00 1110	78	0x4E	0100 1110	**/**	47	0x2F	10 1111	47	0x2F	0010 1111
O	15	0x0F	00 1111	79	0x4F	0100 1111	**0**	48	0x30	11 0000	48	0x30	0011 0000
P	16	0x10	01 0000	80	0x50	0101 0000	**1**	49	0x31	11 0001	49	0x31	0011 0001
Q	17	0x11	01 0001	81	0x51	0101 0001	**2**	50	0x32	11 0010	50	0x32	0011 0010
R	18	0x12	01 0010	82	0x52	0101 0010	**3**	51	0x33	11 0011	51	0x33	0011 0011
S	19	0x13	01 0011	83	0x53	0101 0011	**4**	52	0x34	11 0100	52	0x34	0011 0100
T	20	0x14	01 0100	84	0x54	0101 0100	**5**	53	0x35	11 0101	53	0x35	0011 0101
U	21	0x15	01 0101	85	0x55	0101 0101	**6**	54	0x36	11 0110	54	0x36	0011 0110
V	22	0x16	01 0110	86	0x56	0101 0110	**7**	55	0x37	11 0111	55	0x37	0011 0111
W	23	0x17	01 0111	87	0x57	0101 0111	**8**	56	0x38	11 1000	56	0x38	0011 1000
X	24	0x18	01 1000	88	0x58	0101 1000	**9**	57	0x39	11 1001	57	0x39	0011 1001
Y	25	0x19	01 1001	89	0x59	0101 1001	**:**	58	0x3A	11 1010	58	0x3A	0011 1010
Z	26	0x1A	01 1010	90	0x5A	0101 1010	**;**	59	0x3B	11 1011	59	0x3B	0011 1011
[	27	0x1B	01 1011	91	0x5B	0101 1011	**<**	60	0x3C	11 1100	60	0x3C	0011 1100

Table C-1: Keys supported in compliance with AIS standard 1371-4

6-Bit ASCII				Standard ASCII			6-Bit ASCII				Standard ASCII		
****	28	0x1C	01 1100	92	0x5C	0101 1100	**=**	61	0x3D	11 1101	61	0x3D	0011 1101
]	29	0x1D	01 1101	93	0x5D	0101 1101	**>**	62	0x3E	11 1110	62	0x3E	0011 1110
^	30	0x1E	01 1110	94	0x5E	0101 1110	**?**	63	0x3F	11 1111	63	0x3F	0011 1111
-	31	0x1F	01 1111	95	0x5F	0101 1111							
Space	32	0x20	10 0000	32	0x20	0010 0000							

Table C-1: Keys supported in compliance with AIS standard 1371-4 (Continued)

A

AIS SART	AIS Search And Rescue Transmitters
AIS	Automatic Identification System

C

COG	Course Over Ground

D

DC	Direct Current
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.
DSC	Digital Selective Calling. Primarily intended to initiate ship-to-ship, ship-to-shore and shore-to-ship radiotelephone and MF/HF radiotelex calls. Each DSC-equipped ship, shore station and group is assigned a unique 9-digit Maritime Mobile Service Identity. DSC distress alerts, which consist of a preformatted distress message, are used to initiate emergency communication with ships and rescue coordination centers.
DTE	Data Terminal Equipment

E

ECDIS	Electronic Chart Display and Information System (ECDIS) is a computer-based navigation information system that complies with International Maritime Organization (IMO) regulations and can be used as an alternative to paper nautical charts.

G

GLONASS	GLObal'naya NAvigatsionnaya Sputnikovaya Sistema. Global Navigation Satellite System in English.
GMDSS	Global Maritime Distress and Safety System. The system is intended to perform the following functions: alerting (including position determination of the unit in distress), search and rescue coordination, locating (homing), maritime safety information broadcasts, general communication, and bridge-to-bridge communication.
GPL	General Public License
GPS	Global Positioning System. A system of satellites, computers, and receivers that is able to

	determine the latitude and longitude of a receiver on Earth by calculating the time difference for signals from different satellites to reach the receiver.

H

HDT	HeaDing True
HSC	High-Speed Craft, e.g. air-cushion vehicles (such as hovercraft) and hydrofoil boats.

I

IEC	International Electrotechnical Commission. The international standards and conformity assessment body for all fields of electrotechnology.
IMO	International Maritime Organization
INS	Integrated Navigation System
IP	Ingress Protection. An international classification system for the sealing effectiveness of enclosures of electrical equipment against the intrusion into the equipment of foreign bodies (i.e. tools, dust, fingers) and moisture. This classification system uses the letters "IP" followed by two or three digits. An "x" is used for one of the digits if there is only one class of protection; e.g. IPX4 which addresses moisture resistance only.

L

LAN	Local Area Network. A computer network covering a small physical area, like a home, office, school or airport. The defining characteristics of LANs, in contrast to wide-area networks (WANs), include their usually higher data-transfer rates, smaller geographic area, and lack of a need for leased telecommunication lines.
LGPL	Lesser General Public License
LWE	LightWeight Ethernet

M

MKD	Minimum Keyboard Display
MMSI	MMSI Maritime Mobile Service Identity. A series of nine digits which are sent in digital form over a radio frequency channel in order to uniquely identify ship stations, ship earth stations, coast stations, coast earth stations, and group calls. These identities are formed in such a way that the identity or part thereof can be used by telephone and telex subscribers connected to the general telecommunications network to call ships automatically.

R

RF	Radio Frequency
ROT	Rate Of Turn
Rx	Receive

S

SAR	Search And Rescue
SART	Search And Rescue Transponder
SOG	Speed Over Ground.
SOLAS	(International Convention for the) Safety Of Life At Sea. Generally regarded as the most important of all international treaties concerning the safety of merchant ships.
STP	Shielded Twisted Pair

T

TDMA	Time-Division Multiple Access
TMA	Thrane Management Application
TPI	Threads Per Inch
Tx	Transmit

U

UART	Universal Asynchronous Receiver/Transmitter, part of an integrated circuit used for serial communications over a peripheral device serial port.
UDP	User Datagram Protocol

V

VDL	VHF Data Link
VHF	Very High Frequency. 30-300 MHz, a "straight-line" signal used for short-distance terrestrial communication and navigation.
VSWR	Antenna Voltage Standing Wave Ratio
VSWR	Voltage Standing Wave Ratio
VTS	Vessel Traffic Service, a marine traffic monitoring system established by harbour or port authorities, similar to air traffic control for aircraft.

W

WIG	Wing-In-Ground (craft)

A

B

C

D

E

F

G

H

I

J

K

L

M

N

O

P

R

S

T

U

V

W