

SAILOR 65xx GNSS/DGNSS

Installation manual



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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. Thrane & Thrane A/S assumes no liability for the customer's failure to comply with these requirements.

Ground the equipment

To minimize shock hazard, connect the GNSS/DGNSS Receiver to an electrical ground and follow the cable instructions.

Warranty limitation

IMPORTANT - The SAILOR 6286 DGNSS Antenna - Active and the SAILOR 6285 GNSS Antenna - Active are sealed waterproof units (classified IPx6 & IPx8). To create and maintain its waterproof integrity the antenna was assembled in a controlled environment using special equipment. The antennas and the GNSS/DGNSS Receiver are not user maintainable units, they should under no circumstances 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: 30 cm (Standard magnetic compass), 20 cm (Emergency magnetic compass) from the GNSS/DGNSS Receiver.

Preface

Approvals

The GNSS/DGNSS Receiver is approved to MED 2015/559/EU and fulfils the requirements in the standards:

IEC 61108-1 Ed.2.0, 2003 – MSC.112(73)

IEC 61108-2 Ed.1.0, 1998 – MSC.113(73)

IEC 61108-4 Ed.1.0, 2004 – MSC.114(73)

IEC 60945 Ed.4.0, 2002 – MSC.115(73) incl. Corr. 1, 2008

IEC 61162-1 Ed.4.0, 2010 – A.694(17)

IEC 61162-2 Ed.1, 1998

IEC 61162-450 Ed.1, 2012

IEC 62288 Ed.2.0, 2014 – MSC.191(79)

CD IEC 62923, 2015 (applicable sections) – MSC.302(87)

IEC 61924-2 ED. 1 (Annex K)

The approvals of the GNSS/DGNSS Receiver 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.

Record of Revisions

Rev.	Description	Release Date
A	Original document	20 August 2015
B	List of alert updated. Magnetic variations added.	January 2016
C	NMEA updated. Figure update - 5.11, 5.12, 5.19, 5.22, 5.27, 5.31 Approvals on page iv update.	September 2016

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About this manual

1.1 Intended readers

This is an installation manual for the GNSS/DGNSS Receiver. 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 GNSS/DGNSS Receiver 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 GNSS/DGNSS Receiver.

Title and description	Document number
SAILOR 65xx GNSS/DGNSS User manual	98-140657
SAILOR 6004 Control Panel, Installation manual	98-136644
SAILOR 6588 GNSS/DGNSS Receiver, Installation guide	98-140656
SAILOR 6286 DGNSS Antenna - Active, Installation guide	98-141644
SAILOR 6285 GNSS 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 GNSS and DGNSS*
- *GNSS or DGNSS system*
- *System components*
- *Part numbers and options*

2.1 Introduction to GNSS and DGNSS

2.1.1 Overview

A GNSS receiver processes the signals transmitted by the satellites of Global Navigation Satellite Systems (GNSS). The GNSS receiver determines the position, velocity, and precise time by processing the signals broadcast by GNSS satellites.

A DGNSS receiver (Differential GNSS) is an enhancement to a GNSS receiver. It can utilize a global network of ground-based reference stations for improved position accuracy. The ground-based reference stations compare their known fixed positions with the positions calculated from the received GNSS satellite signals. The differences are transmitted via radio beacons to the DGNSS Receiver, which can use them to calculate a more precise position. In order to be able to apply high-quality corrections, the selected reference station must be near the DGNSS receiver to ensure that they both observe roughly the same GNSS satellites.

2.2 GNSS or DGNSS system

The GNSS/DGNSS Receiver is available in variants as listed in the following table. Depending on the antenna used the Receiver will either be a GNSS or a DGNSS Receiver. Using the SAILOR 6285 GNSS Antenna - Active gives a GNSS Receiver variant and the SAILOR 6286 DGNSS Antenna - Active gives a DGNSS Receiver variant. Both variants can be controlled by the SAILOR 6004 Control Panel. The Control Panel is connected to the GNSS/DGNSS Receiver through a LAN connection. The variants include the DGNSS or GNSS app for the Control Panel. The app is an integrated part of the GNSS/DGNSS Receiver.

Variant	DGNSS Receiver	GNSS antenna	DGNSS antenna	Control Panel
SAILOR 6560 GNSS System	x	x		x
SAILOR 6561 GNSS Basic	x	x		
SAILOR 6570 DGNSS System	x		x	x
SAILOR 6571 DGNSS Basic	x		x	

Table 2-1: System variants

Features

- Position calculation with GPS and/or GLONASS satellites.
- Reception and use of differential corrections from SBAS, RTCM SC-104 via a serial interface or the integrated radio beacon receiver.¹
- RAIM calculation according to IEC 61108-1. Estimates the calculated positions accuracy and monitors the signal integrity.
- SBAS corrections from EGNOS, MSAS, WAAS, GAGAN and SDCM.
- Automatic or manual radio beacon station selection.¹
- Support for other datums, including a user defined.
- Calculation of magnetic variation based on the last known position and date.
- Serial inputs and outputs according to IEC 61162-1/2. Fully configurable for each port.
- Light Weight Ethernet interface according to IEC 61162-450. Fully configurable.
- Alert management according to MSC.302. Fully configurable.
- Support for High Speed Craft (HSC).
- Antenna offset correction.
- Anchor Watch.
- Two Trip Counters and a total counter.
- Speed log output.
- Pulse Per Second (PPS) output.
- Interface for ThraneLink applications and INS available.
- Touch screen on the SAILOR 6004 Control Panel.
- Possibility for multiple-receiver setup with up to three GNSS/DGNSS Receivers.
- Up to three Control Panels on the same GNSS/DGNSS Receiver.

1. DGNSS only

2.2.1 System configuration

The following figure shows the units of a GNSS or DGNSS system.

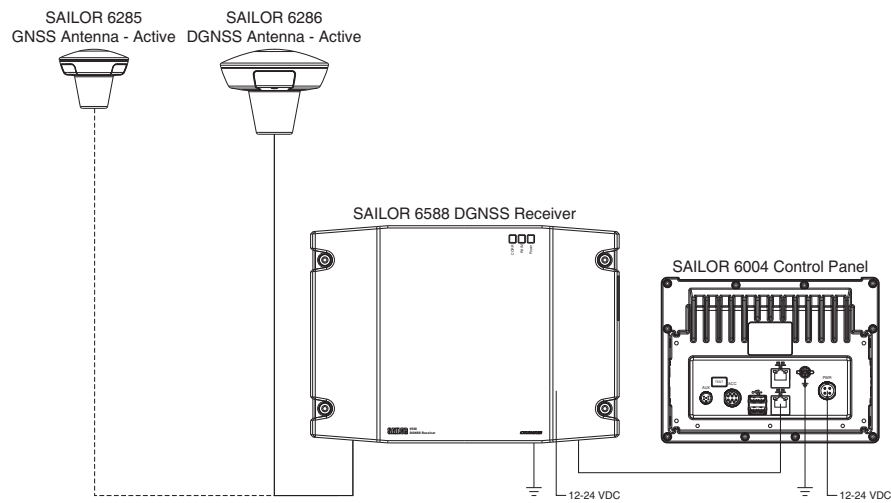


Figure 2-1: System configuration

2.3 System components

2.3.1 SAILOR 6588 DGNSS Receiver

The DGNSS Receiver is the main unit in a DGNSS or GNSS position system. The DGNSS Receiver is always on, provided there is DC power. It has a connector for the GNSS or DGNSS antenna, a ground connection, spring-loaded terminals for DC power (12–24 VDC) and two LAN connectors. The DGNSS Receiver has spring-loaded terminals for connection to various inputs and outputs.



Figure 2-2: SAILOR 6588 DGNSS Receiver

2.3.2 SAILOR 6285 GNSS Antenna - Active

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



Figure 2-3: SAILOR 6285 GNSS Antenna - Active

2.3.3 SAILOR 6286 DGNSS Antenna - Active

The SAILOR 6286 DGNSS Antenna - Active is a robust, sealed and waterproof GPS and GLONASS antenna. This antenna also has an antenna for receiving differential corrections from radio beacon stations in the LW frequency band.



Figure 2-4: SAILOR 6286 DGNSS Antenna - Active

2.3.4 SAILOR 6004 Control Panel

The Control Panel is the user interface for the GNSS/DGNSS Receiver. Alerts are shown in the display. The Control Panel has a touch screen and a buzzer for alert tones. The display can be dimmed. The Control Panel has a color LCD screen and the nominal viewing distance is 0.9 m.



Figure 2-5: SAILOR 6004 Control Panel

2.4 Part numbers and options

2.4.1 Applicable SAILOR part numbers

The table below shows the applicable part numbers:

Part number	Description
406560A-00500	GNSS System
406561A-00500	GNSS Basic
406570A-00500	DGNSS System
406571A-00500	DGNSS Basic
406588A-00500	DGNSS Receiver
406004A-00500	Control Panel
406285A-00500	GNSS Antenna - Active
406286A-00500	DGNSS Antenna - Active

Table 2-2: Part numbers

2.4.2 Accessories

The following accessories are included in the delivery:

Part number	GNSS/DGNSS Receiver
37-207073-000	RJ45 Cat5e STP LAN cable, 5 m
67-138959	Accessory kit containing: 1 A fuse, fuse puller, mounting tool for spring loaded terminals, cable tie, 5 screws M4x20 Torx A2, 5 screws ST ø3.9x33, T20 PAN head, self-tapping

Table 2-3: Part numbers for included accessories (GNSS/DGNSS Receiver)

Part number	SAILOR 6285 GNSS Antenna - Active
41-135855	GNSS Antenna bracket

Table 2-4: Part numbers for included accessories (SAILOR 6285 GNSS Antenna - Active)

Part number	SAILOR 6286 DGNSS Antenna - Active
41-141001	DGNSS Antenna bracket
67-141936	Screw kit for DGNSS/GNSS antenna: 4 screws, Tuflock, M4x8 mm

Table 2-5: Part numbers for included accessories (SAILOR 6286 DGNSS Antenna - Active)

Installation

This chapter has the following sections:

- *Unpacking and initial inspection*
- *DGNSS or GNSS antenna installation*
- *Physical installation of the GNSS or DGNSS system*
- *Physical installation of the Control Panel*

3.1 Unpacking and initial inspection

3.1.1 Unpacking

The following items are included in the delivery of a GNSS/DGNSS Receiver:

- SAILOR 6588 GNSS/DGNSS Receiver
- User manual, GNSS/DGNSS Receiver
- Installation guide, GNSS/DGNSS Receiver
- Cable RJ45 Cat5e STP, 5 m
- Accessory kit with
 - Fuse puller
 - Fuse (Mini blade, 1 A)
 - Mounting tool for spring loaded terminals
 - Cable ties
 - Screw M4-20 TORX A2 (5 pieces)
 - Screw ST ø3.9x33 T20 PAN head, self-tapping (5 pieces)
- SAILOR 6285 GNSS Antenna - Active or SAILOR 6286 DGNSS Antenna - Active

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 Physical installation of the GNSS or DGNSS system

The GNSS or DGNSS system consists of the following units:

1. SAILOR 6588 GNSS/DGNSS Receiver
2. SAILOR 6004 Control Panel
3. SAILOR 6285 GNSS Antenna - Active or SAILOR 6286 DGNSS Antenna - Active

You can mount the GNSS/DGNSS Receiver on a desktop or on a wall. Provide space enough to access the connectors and the fuse. Allow space for the cables, see Figure 3-1 on page 3-3.

Compass safe distance

Make sure that the GNSS/DGNSS Receiver 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
GNSS/DGNSS Receiver	30 cm (standard magnetic compass)
	20 cm (Emergency magnetic compass)
Control Panel	60 cm

Table 3-1: Compass safe distance for GNSS/DGNSS Receiver

Physical installation

See the following figure for installing the GNSS/DGNSS Receiver.

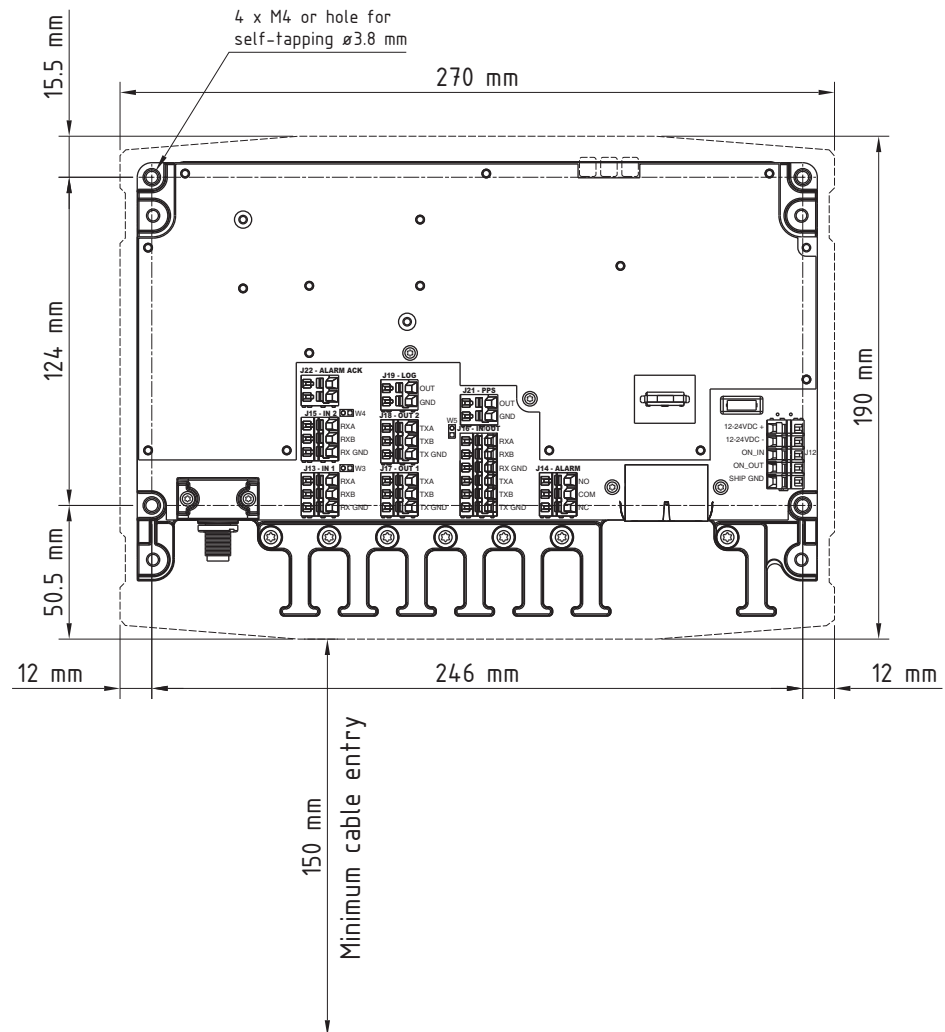


Figure 3-1: Installing the GNSS/DGNSS Receiver

1. Loosen the 4 screws that hold the lid and take the lid off.
2. Put the GNSS/DGNSS Receiver in place and fasten it with 4 screws (included in the delivery).
3. Leave the lid of the GNSS/DGNSS Receiver off until all equipment is connected to the spring-loaded terminals.
4. Use the integrated cable relief to secure the cables.
5. Put the lid on and fasten the screws that hold the lid on the GNSS/DGNSS Receiver.
6. Connect the cable shielding with cable lugs on the GND screws.

The following sections describe the connectors on the SAILOR 6588 DGNSS Receiver.

Antenna connector

Connect the cable from the SAILOR 6285 GNSS Antenna - Active or the SAILOR 6286 DGNSS Antenna - Active to the TNC connector.

Spring loaded terminals

The following figure shows the spring loaded terminals of the GNSS/DGNSS Receiver.

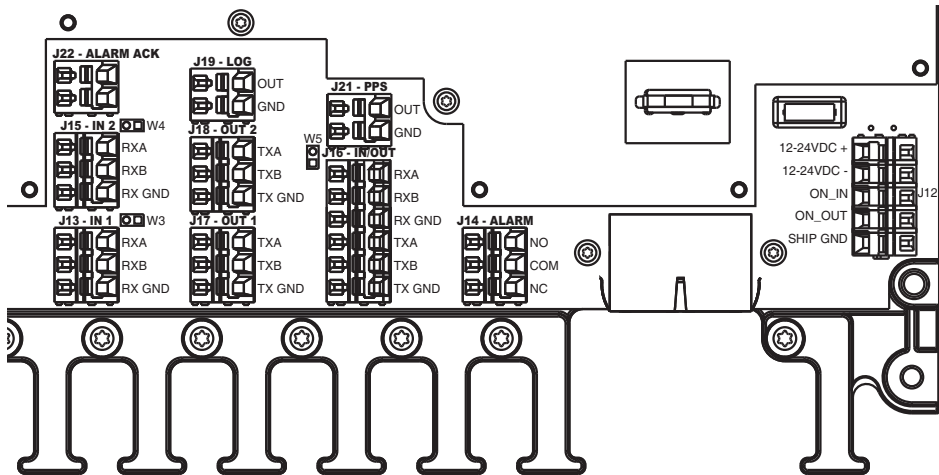


Figure 3-2: Spring loaded terminals

The maximum wire cross section for cables is 2.5 mm²(AWG).

If the serial interfaces are used for high speed communication (38400 baud) the jumper belonging to this interface must be closed. Closing the jumper terminates the RXA and RXB lines with 120 Ohm. See also *Interface description* on page 4-1.

Jumper	Description
W3	IN 1
W4	IN 2
W5	IN/OUT

Table 3-2: Jumper settings

DC Power input 12-24 VDC

For more information on DC power input and instructions how to connect DC power see *To connect DC power* on page 4-1.

Grounding

To connect the GNSS/DGNSS Receiver to ship ground use the SHIP GND terminal on the power connector (J12) or one of the screws on the chassis.

Connect a ground cable of shortest possible length.

3.2.1 Detailed wiring diagram

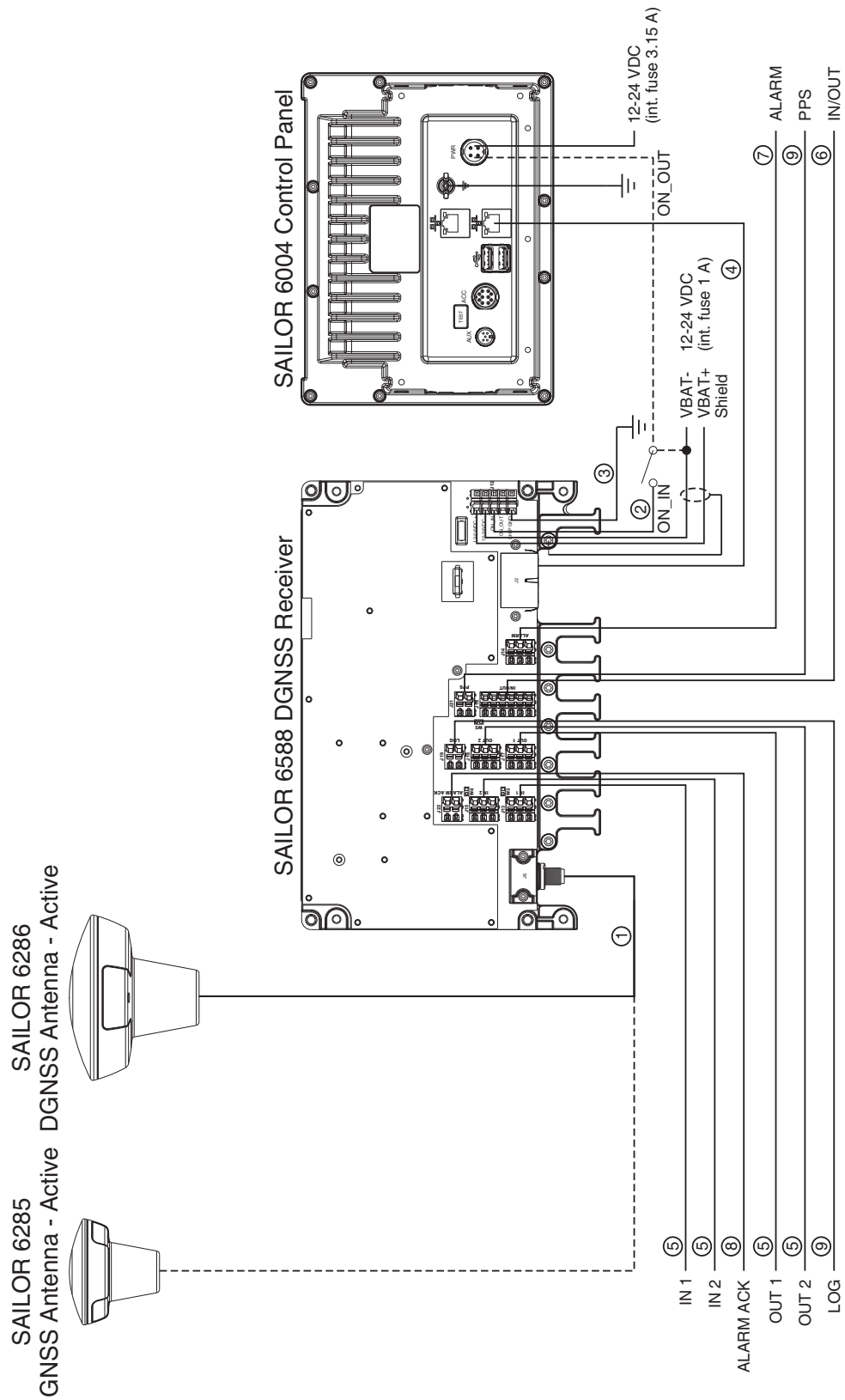


Figure 3-3: Wiring diagram

3.2.2 Cable specifications

Number	Cable for	Specification	Length
1	GNSS/DGNSS antenna	Coaxial RG 214 or similar. Maximum cable loss: 10dB	-
2	DC supply	Minimum AWG 14 with screen 2 mm ²	-
3	Ground	4 mm ²	As short as possible
4	Ethernet	Ethernet cable, shielded Cat 5.	Max. 100 m
5	Serial interfaces, IN1, IN2, OUT1, OUT2	2-wire twisted pair, screened cable for NMEA, AWG 20, 0.5 mm ²	Max. 100 m
6	Serial interface, IN/OUT	4-wire twisted pair, screened cable for NMEA, AWG 20, 0.5 mm ²	Max. 100 m
7	Alarm relay	3 leaded wire with screen	Max. 50 m
8	Alarm acknowledge	2 leaded wire with screen	Max. 15 m
9	PPS and LOG output	2 leaded wire with screen	Max. 50 m

Table 3-3: Cable specifications

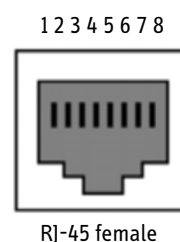
Ethernet connector and cable

The GNSS/DGNSS Receiver has two Ethernet connections used for connection to the Control Panel and for ThraneLINK Management Application. 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



RJ-45 female

Table 3-4: Pin allocation, Ethernet connector and cable

Cable type: Cat5e STP

For instructions how to connect to a LAN network see *Ethernet interfaces* on page 4-7.

3.3 DGNSS or GNSS antenna installation

The GNSS/DGNSS Receiver must be connected with one of the following antennas:

- SAILOR 6285 GNSS Antenna - Active
- SAILOR 6286 DGNSS Antenna - Active

depending on the system type.

The SAILOR 6285 GNSS Antenna - Active is a GNSS antenna used for receiving GPS and GLONASS signals.

The SAILOR 6286 DGNSS Antenna - Active is also a GNSS antenna used for receiving GPS and GLONASS signals. This antenna can also receive differential corrections from radio beacon stations in the LW frequency band.

When the antenna is installed you must configure the system type, see *General settings* on page 5-6.

3.3.1 Cable requirements

Use a low-loss type 50 Ohm coaxial cable, e.g. good quality RG214 or better, to connect the antenna. IMO-COMSAR/Circ. 32 recommends the use of a cable with double screen (like e.g. RG214) with a maximum insertion loss of 10 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 selected cable at the high end of the GNSS frequency band.

3.3.2 Physical placement of the antenna

Mount the SAILOR 6285 GNSS Antenna - Active or the SAILOR 6286 DGNSS Antenna - Active at a location with clear, unobstructed view to the sky.

Position the antennas outside the path of a radar beam and away from other transmitting antennas, as this may degrade the performance. Placing the antenna at the top of a mast or tower may degrade the SOG and COG readings.

3.3.3 Antenna installation

SAILOR 6285 GNSS Antenna - Active

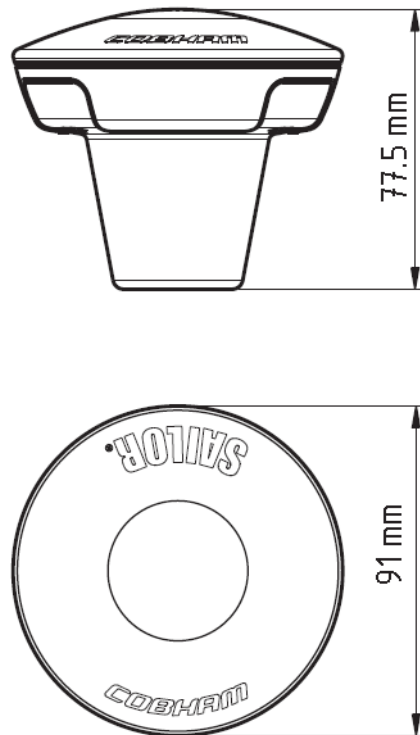


Figure 3-4: Dimensions

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

1. Install the bracket on the pipe. It is highly recommended to 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.
4. Secure the cable with cable ties to prevent it from hanging in the antenna connector.

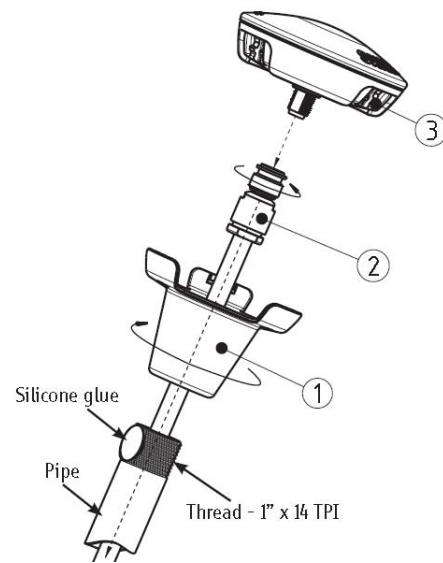


Figure 3-5: Installation of the SAILOR 6285 GNSS Antenna - Active

SAILOR 6286 DGNSS Antenna - Active

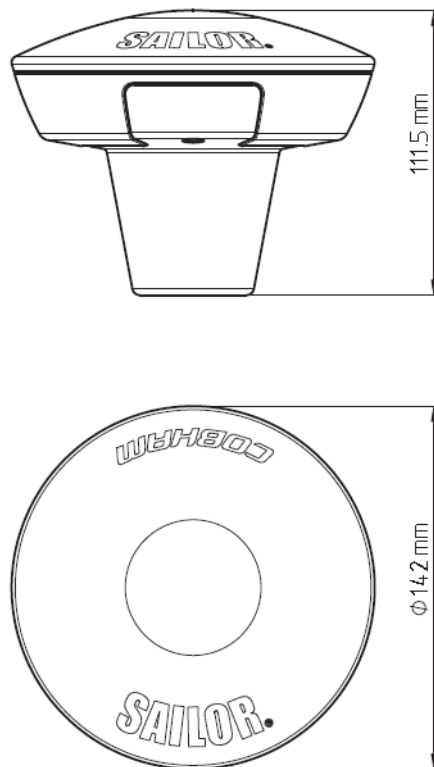


Figure 3-6: Dimensions

To install the SAILOR 6286 DGNSS Antenna - Active do as follows:

1. Install the bracket on the pipe. It is highly recommended to 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.
4. Secure the cable with cable ties to prevent it from hanging in the antenna connector.
5. Fasten the antenna to the bracket using the 3 screws.

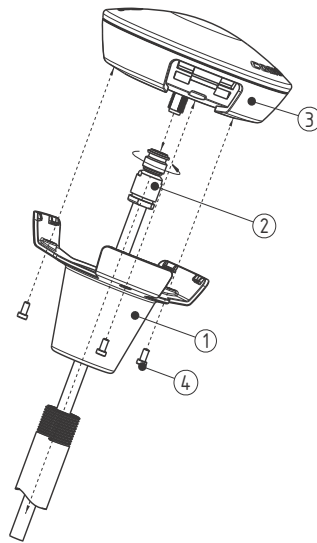


Figure 3-7: Installation of the SAILOR 6286 DGNSS Antenna - Active

3.4 Physical installation of the Control Panel

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

Connect a LAN connector at the GNSS/DGNSS Receiver to a LAN connector at the Control Panel.

Interface description

This chapter describes the electrical interfaces of the GNSS/DGNSS Receiver in details. It has the following sections:

- *Power*
- *Serial inputs*
- *Serial outputs*
- *Serial input/output*
- *Alarm relay*
- *Alarm acknowledge*
- *Speed log output*
- *PPS output*
- *Ethernet interfaces*

4.1 Power

The GNSS/DGNSS Receiver operates on 24 VDC. However, the receiver can operate in the range of 10.8 to 31.2 VDC. The GNSS/DGNSS Receiver is protected with a 1 AT fuse. The fuse is located next to the power connector.

To avoid power and voltage drops in the power line make sure that the cable used has a sufficient size, see *Cable specifications* on page 3-6.

4.1.1 To connect DC power

1. Connect 12-24VDC+ to DC out + from your DC supply.
2. Connect 12-24VDC- to DC out - from your DC supply.
3. Connect the ON IN terminal to 12-24VDC- unless you want to use the remote on/off 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 GNSS/DGNSS Receiver. To connect the remote on/off function do as follows:

1. Connect 12-24VDC+/- terminals as described in the previous section.
2. Connect a switch to the "ON IN" terminal on the power connector.
3. Connect the other side of the switch to the 12-24VDC- terminal in the power connector.

To switch on the GNSS/DGNSS Receiver close the switch.

To connect on/off control (ON_OUT)

You can use the ON OUT terminal in the power connector to switch other units on and off when the GNSS/DGNSS Receiver is switched on and off. How to connect this pin depends on the units you connect.

The function of ON_OUT is as follows:

- GNSS/DGNSS Receiver off: ON OUT is in high impedance state.
- GNSS/DGNSS Receiver on: ON OUT is low (Internally connected to 12-24VDC-, with 10 kOhm serial resistance).

4.2 Serial inputs

4.2.1 Overview

The GNSS/DGNSS Receiver has two serial inputs (IN 1 and IN 2). They can be connected to the ship's sensors which can provide heading information. These inputs can also be used for differential corrections (RTCM SC-104 input) from an external beacon receiver¹.

RXA and RXB are the data wires and RX GND is an electrically isolated ground.

The two serial inputs are input-only data and support the following sentences defined in NMEA0183 ver. 4.10 / IEC61162-1 ed. 4.0: Heading: HDT, VHW, HDG, THS.

See appendix B.1 for further details about the supported NMEA sentences.

4.2.2 Electrical characteristics

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

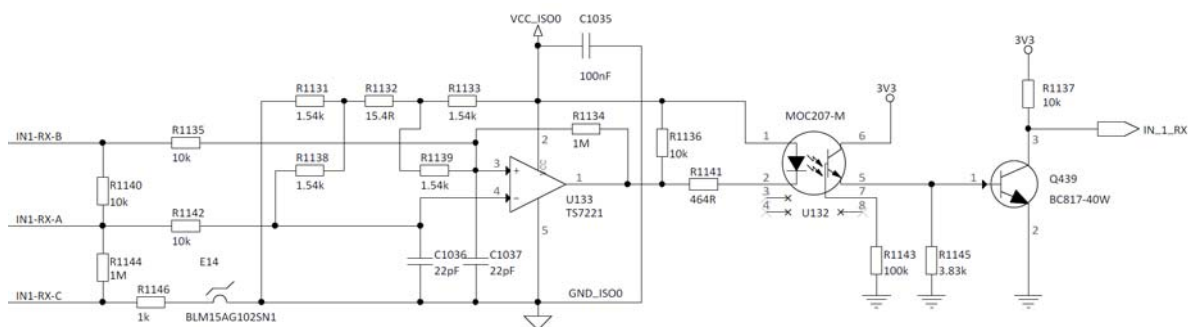


Figure 4-1: Electrical characteristics of the inputs

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

¹. GNSS only.

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

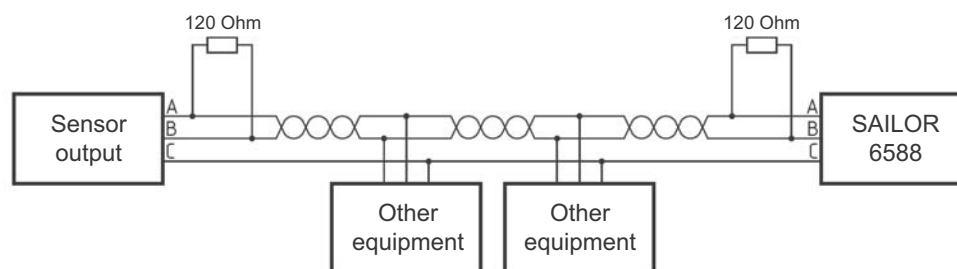


Figure 4-2: Termination of the signal lines

On the GNSS/DGNSS Receiver, a termination resistor can be inserted via a jumper. Closing the jumper terminates the RXA and RXB lines with 120 Ohm. Table 3-2 on page 3-4 shows the jumper settings.

4.2.3 Input configuration

The two inputs are IEC61162-1/2 (RS-422) compliant and can be configured individually with different baud rates. The ports have the following default baud rates:

Port ID	Default baud rate	Function
IN 1	4800	Heading Input/ RTCM
IN 2	4800	Heading Input/ RTCM

Table 4-1: Inputs - default baud rate

In the Service Interface you can set the inputs to another baud rate and with different sentences. See *Configuration with the Service Interface* on page 5-2 to learn how to set up the GNSS/DGNSS Receiver using the Service Interface.

4.2.4 Differential corrections (RTCM SC-104)

If the GNSS/DGNSS Receiver is configured to be in GNSS mode the two inputs can be configured as input for differential corrections from an external radio beacon receiver, in RTCM SC-104 format. You can configure the inputs to receive heading and corrections at the same time.

4.3 Serial outputs

4.3.1 Overview

The GNSS/DGNSS Receiver has two serial outputs (OUT 1 and OUT 2). They can provide GNSS positioning information to external equipment.

TXA and TXB are the data output wires and TX GND is connected to 12-24VDC-.

The two serial outputs support the following sentences defined in NMEA0183 Ver. IEC61162-1 Ed. 4.0 + IEC62923 Ed.1:

- Position: DTM, GBS, GGA, GLL, GNS, GSA, GSV, RMC, VTG, ZDA
- Alert: ALF, ALC, ALR
- Heartbeat: HBT

Furthermore, the outputs can be configured to send differential corrections in RTCM SC-104 format to an external GNSS receiver. This is possible in both GNSS and DGNSS mode.

See appendix B.1 for further details about the supported NMEA sentences.

4.3.2 Electrical characteristics

The schematic for the serial outputs is shown in the following figure. The serial output support both IEC61162-1 and IEC61162-2, i.e. baud rates from 4800 to 38400.

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

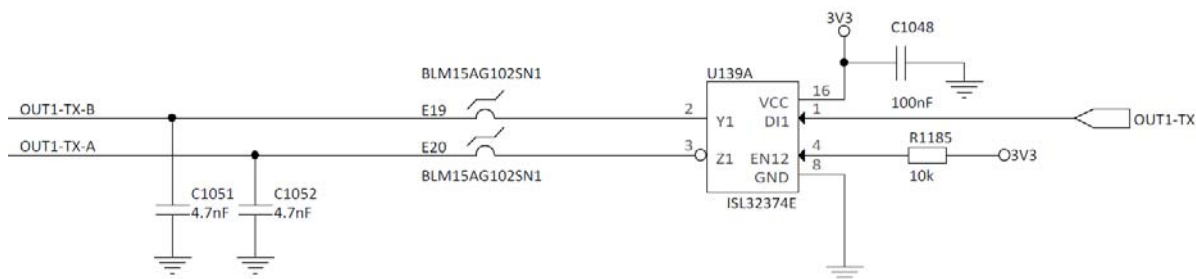


Figure 4-3: Electrical characteristics of the outputs

4.3.3 Output configuration

The two outputs 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
OUT 1	4800	Position out
OUT 2	4800	Position out

Table 4-2: Outputs - default baud rate

In the Service Interface you can configure the outputs to another baud rate and with other sentences. Furthermore, the interval at which the sentences are sent can be configured. See *OUT 1 and OUT 2* on page 5-18 to learn how to set up the SAILOR 6588 GNSS/DGNSS Receiver using the Service Interface.

4.4 Serial input/output

4.4.1 Overview

The GNSS/DGNSS Receiver has one bidirectional serial port (IN/OUT). It is fully configurable and can be used to connect the SAILOR 6588 DGNSS Receiver to an INS. It can also be used as a normal serial output or for receiving differential corrections (RTCM SC-104 input) from an external beacon receiver¹.

RXA and RXB are the data input wires and TXA and TXB are the data output wires to the GNSS/DGNSS Receiver. RX GND is an electrically isolated ground for the input. TX GND is connected to 12-24VDC-.

The IN/OUT port is a bidirectional data port and it supports the following sentences defined in NMEA0183 ver. 4.10 / IEC61162-1 ed. 4.0. The port can also be used for RTCM input and output.

- Position: DTM, GBS, GGA, GLL, GNS, GSA, GSV, RMC, VTG, ZDA
- Alert: ALF, ALC, ALR, ACN, ACK
- Radio beacon status/configuration: MSS, MSK
- Heartbeat: HBT
- Heading input: HDT, VHW, HDG, THS

See appendix B.1 for further details about the supported NMEA sentences.

4.4.2 Electrical characteristics

The input/output port supports both IEC61162-1 and IEC61162-2, i.e. baud rates from 4800 to 38400 baud, input voltages down to 0.3 VDC and electrical isolation between the serial input and the internal power supply.

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

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

If the GNSS/DGNSS Receiver is configured as high speed (38400 baud) it is recommended to terminate the signal lines with 120 Ohm in both ends of the bus.

On the GNSS/DGNSS Receiver, a termination resistor can be inserted via a jumper. Closing the jumper terminates the RXA and RXB lines with 120 Ohm. Table 3-2 on page 3-4 shows the jumper settings.

1. GNSS only.

4.5 Alarm relay

The GNSS/DGNSS Receiver has an internal alarm relay. Connect the alarm relay to an audible alarm device or the ships alarm system, if available. 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 4-3: Alarm relay connections

When the GNSS/DGNSS Receiver is powered on and there are no alarms the relay is energized, i.e. ALARM COM and ALARM NO are connected.

- Maximum switching current: 1 A.
- Maximum switching voltage: 125 VAC, 60 VDC.

4.6 Alarm acknowledge

No functionality is currently implemented for the Alarm acknowledge port. Leave the pins open.

4.7 Speed log output

The GNSS/DGNSS Receiver has a speed log output (LOG) that can provide pulses corresponding to the ship's traveled distance. You can set the number of pulses per nautical mile in the Service Interface to one of the following values:

- 100 pulses/NM
- 200 pulses/NM (default)
- 300 pulses/NM
- 400 pulses/NM

The speed log provides 50 ms pulses on an open drain output.

The LOG OUT terminal is the driver side of the output, where the maximum current is 300 mA and the maximum voltage is 50 VDC.

The LOG GND is internally connected to negative power supply, 12-24 VDC-.

4.8 PPS output

The GNSS/DGNSS Receiver has a PPS output (Pulse Per Second). The PPS is a pulse that repeats accurately every second. The signal is generated from the GNSS receiver and is only available at the output when there is a GNSS fix. When in GPS only and combined mode the PPS pulse is synchronized with GPS time, when in GLONASS only mode the PPS pulse is synchronized with GLONASS time.

- Accuracy of the PPS output: +/-15 ns.
- Pulse duration: is 2 ms

The PPS OUT terminal is the driver side of the output, where the maximum current is 300 mA and the maximum voltage is 50 VDC.

The PPS GND is internally connected to negative power supply, 12-24 VDC-.

4.9 Ethernet interfaces

The GNSS/DGNSS Receiver has two Ethernet connectors (RJ45). The Ethernet connectors are used to communicate between the Control Panel and the GNSS/DGNSS Receiver. The Ethernet connectors are identical; you can use any of the connectors to connect the GNSS/DGNSS Receiver to the Control Panel.

The GNSS/DGNSS Receiver can communicate with other equipment using the IEC 61162-450 protocol, also called Light Weight Ethernet (LWE). LWE is a maritime standard for carrying NMEA sentences over Ethernet.

LWE uses UDP Multicast to communicate with other LWE equipment. See also *LWE* on page 5-22.

The Ethernet interface is used for communication with the Service Interface. For more information see *Configuration with the Service Interface* on page 5-2.

4.9.1 Network Overview

The device provides the following services through LWE according to IEC61162-450:

1. The network function provides network connectivity.
2. The service function: GNSS satellite receiver with/without differential correction through DGNSS beacons
3. The other network functions that provide access to functions:
 - a. Maintenance
 - b. Monitoring
 - c. Test

A detailed overview over all functions with their associated capacity enforcements is shown in the following tables.

Output							
				Per instance guaranteed	Per instance maximum	Total maximum	
Class	Service	Type of traffic	# of instances	[kbps]	[kbps]	[kbps]	Note
LWE	all LWE	multicast	1	16	16	16	
ONE	NMEA/TCP proprietary	unicast	3	32	32	128	CP-BDU Link
	HTTP (Service Interface)	unicast	1	1000	10000	10000	Only used in service situations
	SSH	unicast	1	256	1000	1000	Only used in service situations
	NFS/TFTP	unicast	1	256	1000	1000	Only used in service situations
	SNMP, SLP, Zeroconf, DHCP, ARP, mDNS	broadcast, unicast	1	1	128	128	Tor Thrane Link

Table 4-4: LWE output, network functions with output rate limits

Input							
				Per instance guaranteed	Per instance maximum	Total maximum	
Class	Service	Type of traffic	# of instances	[kbps]	[kbps]	[kbps]	Note
LWE	all LWE	multicast	1	96	96	96	Maximum total output of all other LWE devices shall not exceed this number to avoid loss of data.

Table 4-5: LWE input, network functions with input rate limits

Input							
ONE	NMEA/TCP proprietary	unicast	4	32	32	128	CP-BDU Link
	HTTP (Service Interface)	unicast	1	256	1000	1000	Only used in service situations
	SSH	unicast	1	256	1000	1000	Only used in service situations
	NFS/TFTP	unicast	1	256	1000	1000	Only used in service situations
	SNMP, SLP, Zeroconf, DHCP, ARP, mDNS	broad-cast, unicast	1	1	128	128	For Thrane Link

Table 4-5: LWE input, network functions with input rate limits (Continued)

All rate limits are enforced by the DGNSS platform in such a way that the following aspects are taken care of:

- The network is protected against too high data rates from the service functions in the DGNSS (output).
- The DGNSS is protected against high CPU load due to high number of received packets from the network.

4.9.2 General

This allows you to change the Talker ID that identifies all network traffic sent by the GNSS/DGNSS Receiver to other devices. If the network setup includes multiple SAILOR DGNSS receivers, the LWE Talker IDs of the DGNSS receivers must be different. Under normal circumstances this will automatically be the case because the default Talker ID of each receiver is calculated from the MAC address of the device. If the LWE Talker IDs are manually configured, you will want to ensure that the talker IDs are setup in such a way that the different DGNSS receivers use different talker IDs. E.g:

- Primary DGNSS receiver uses Talker ID GP0001
- Secondary DGNSS receiver uses Talker ID GP0002
- Tertiary DGNSS receiver uses Talker ID GP0003

In order to allow the receiving devices to use only one position source, refer to the installation manual of these devices for information about how to setup LWE Talker ID's for reception. GNSS/DGNSS Receiver.



Figure 4-4: LWE Talker ID

Configuration

This chapter has the following sections:

- *Start up*
- *Configuration with the Service Interface*
- *NMEA Trace tool*

5.1 Start up

You can use the GNSS/DGNSS Receiver together with the Control Panel, or as an integrated part of an INS. In order to use it with a Control Panel you must install the GNSS/DGNSS app. For instructions about the App installation and system settings see the manual of the SAILOR 6004 Control Panel (98-136644).

The daily use of the GNSS/DGNSS app is described in the user manual for the GNSS/DGNSS Receiver (98-140657).

5.1.1 To Power on and off

As soon as DC power is provided the GNSS/DGNSS Receiver is on.

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

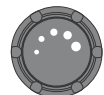


Note

If the remote switch in the Control Panel is wired and it is switched on, you can only use the Power button to reboot the Control Panel, you cannot switch it off.

5.1.2 To dim the display of the Control Panel

Turn the dim knob of the Control Panel to increase or decrease the display brightness or tap **Auto**. To dim to level zero push the power button once. If an alert appears while the display is in level zero, the display returns to the latest dim value and the alert is displayed.



5.2 Configuration with the Service Interface

The GNSS/DGNSS Receiver works as a standalone GNSS receiver as default when powered on. To configure the receiver use the Service Interface. The Service Interface is a web interface built into the software of the GNSS/DGNSS Receiver. No installation of software is necessary. You access it from a computer with a standard Internet browser (Firefox or Chrome recommended) or on the Control Panel.

Important

The GNSS/DGNSS Receiver is blocked for normal use for as long as communication with the Service Interface is ongoing.

The GNSS/DGNSS Receiver raises the alarm **Connection lost to Receiver**.

Click  and **Logout** to reboot the GNSS/DGNSS Receiver.

5.2.1 To access the Service Interface

You can start the Service Interface in several ways:

- *PC with Thrane Management Application (TMA)*
- *PC and an Internet browser*
- *Via the Control Panel*

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. Make sure that DC power is provided for the GNSS/DGNSS Receiver.
2. Connect a PC to the same network as the GNSS/DGNSS Receiver (preferably a direct connection to the Ethernet connector of the GNSS/DGNSS Receiver).
3. Start the TMA (v. 1.05 or higher) and click on the GNSS/DGNSS Receiver (TT-6588 DGNSS or GNSS).

- Click the icon **Management** and then **Web interface**. The web interface opens in a browser window.



Figure 5-1: Accessing the web interface using the TMA

PC and an Internet browser

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

- Switch on the Control Panel and make sure that DC power is provided for the GNSS/DGNSS Receiver. Find the IP address of the GNSS/DGNSS Receiver, see the manual of the SAILOR 6004 Control Panel (98-136644).
- Connect a PC to the same network as the GNSS/DGNSS Receiver.
- Open an Internet browser and enter the IP address of the GNSS/DGNSS Receiver, for example:

http://10.10.8.45

The start screen of the Service Interface is shown. This screen has the tabs **Status** and **NMEA**. Read more about the NMEA tab in *NMEA Trace tool* on page 5-5.

Via the Control Panel

You can access the Service Interface directly from the Control Panel. This is useful if you want to make a software update directly via the Control Panel if a PC is not available or if you just want to make a quick change of a single parameter.

Do as follows:

- Switch on the Control Panel and make sure that DC power is provided for the GNSS/DGNSS Receiver
- Tap **System > Applications**.
- Tap  in the top right corner and **Device List**.
- Tap the unit, e.g. TT-6588 DGNSS.
- Tap  in the upper right corner and tap Service Interface.

The start screen of the Service Interface is shown.

5.2.2 Status

The first screen after start up of the Service Interface is the status screen. Here you can see the platform type, current software version and the serial number of the GNSS/DGNSS Receiver. This information is useful to note before contacting an authorized dealer for technical service.

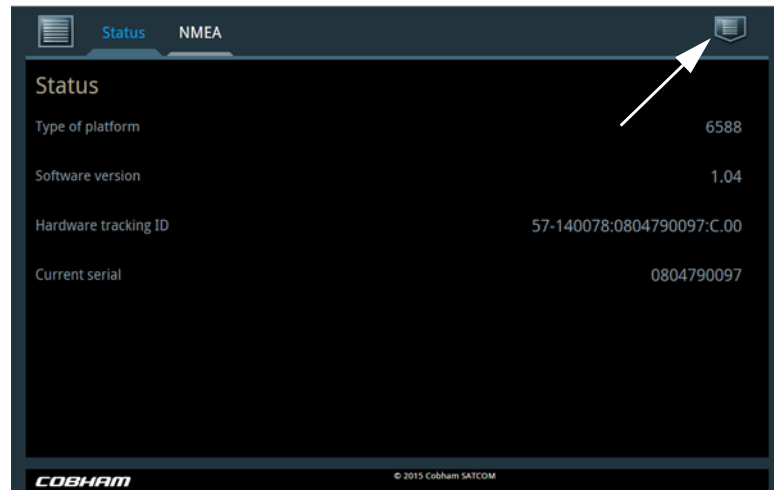


Figure 5-2: Start screen of the Service Interface

1. Click  in the upper right corner and click **Login**.
2. Enter the user name and password.
User name: **admin**
Password: **sailorsailor**

After successful login further tabs are shown:

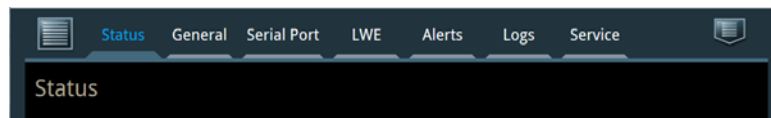


Figure 5-3: Tabs after login

Each tab holds different settings that can be set. After having changed the configuration click **Submit** to store the new settings in the GNSS/DGNSS Receiver.

You must enter some general settings during the installation.

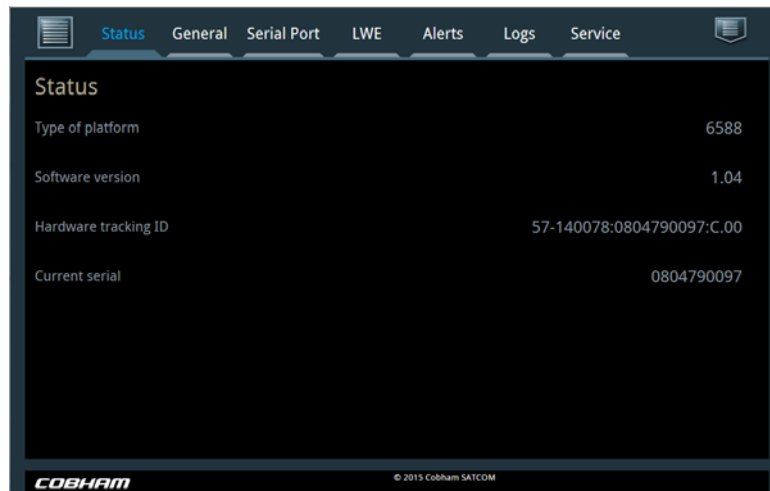


Figure 5-4: Service Interface – Status page

5.2.3 NMEA Trace tool

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 GNSS/DGNSS Receiver as in normal operation.

To start the NMEA Trace tool, do as follows:

1. Access the login page of the Service Interface, see *Configuration with the Service Interface* on page 5-2.

Note

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

2. Click the tab **NMEA**.

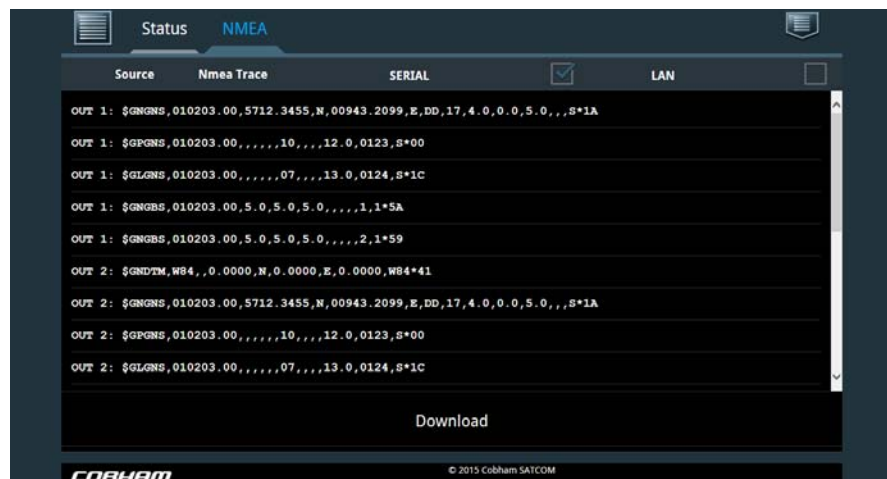


Figure 5-5: NMEA, Serial (example)

3. Click **SERIAL** to see the NMEA data sent to and from all serial ports on the receiver.
4. Click **LAN** to see all the LWE messages sent to and from the receiver.
5. After ended tracing click **Download** to save the trace log file.

5.2.4 General settings

This section describes how to configure the main functionality of the GNSS/DGNSS Receiver. In this tab you can set up if the receiver uses the internal beacon receiver and if the receiver is a part of a system with multiple receivers. The settings for **Antenna offset**, **Speed log** and **Ethernet** are also described here.

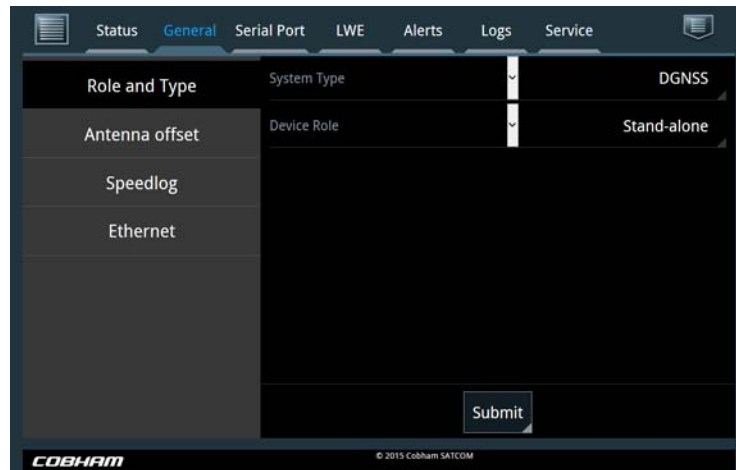


Figure 5-6: General settings

Role and Type

In **System Type** you can configure whether the receiver should function as a GNSS or DGNSS receiver:

- GNSS (default) if connected to a SAILOR 6285 GNSS Antenna - Active
- DGNSS receiver if connected to a SAILOR 6286 DGNSS Antenna - Active.

To select the system type do as follows:

1. Click the field **System Type**.
2. Select the receiver type in the drop-down menu.
3. Click **Submit** if you have no further changes, or continue to select the device role.

In **Device Role** you can configure the GNSS/DGNSS Receiver as a stand-alone receiver or a receiver in a multiple-receiver system, with two or three receivers connected to the same Control Panel. In this case one Control Panel can be used to control all three receivers. Each receiver provides position information via the serial ports. See the figure below for an

example of a multiple-receiver system where the serial ports are used for position information.

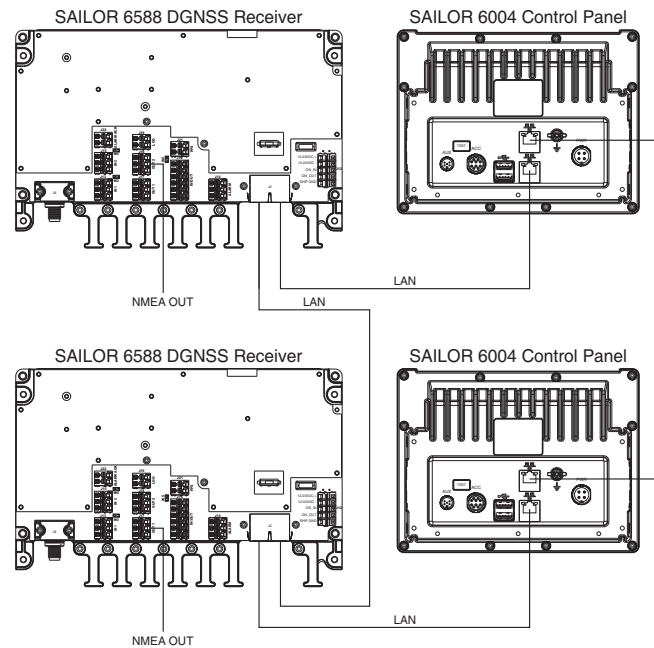


Figure 5-7: System with multiple receivers

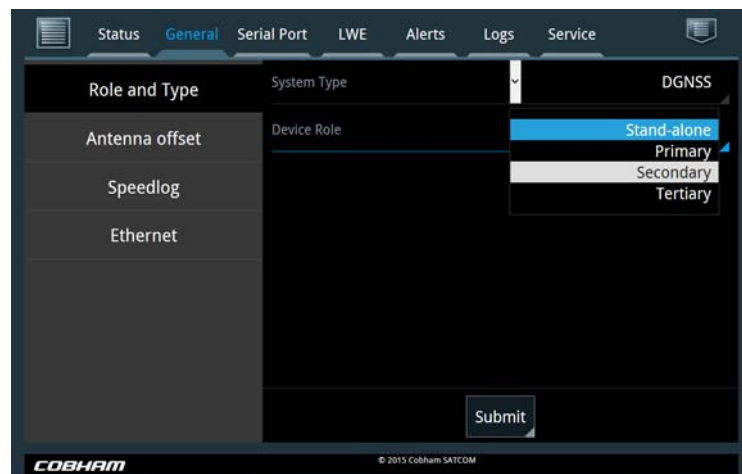


Figure 5-8: General, role and Type, Device Role

When the type and/or role of the receiver has changed you must re-install the DGNSS app on the SAILOR 6004 Control Panel.

When configured as a system with multiple receivers the startup screen of the app will look different from a stand-alone system. Two or three GNSS or DGNSS icons are shown on the startup screen, each icon with a number in the bottom left corner, corresponding to the device role of the receiver. This notation is also shown when an alert is reported.

Role of the receiver	Notation in icon on the Control Panel
Stand-alone (default)	none
Primary	1
Secondary	2
Tertiary	3

Table 5-1: Roles

To select the device role do as follows:

1. Click the field **Device Role**.
2. Select the receiver role in the drop-down menu.
3. Click **Submit**.

Antenna offset

The GNSS/DGNSS antenna can be located anywhere on the vessel. The antenna offset feature can adjust the position to any given location on the vessel. You can enter two antenna offsets, the **Common Reference** and the **Ship Center**.

This feature can be useful if some external equipment calculates the offset and some other does not.

In serial ports and LWE configurations you can set up offset correction for either ship center or the sum of ship center and the common reference for each port independently. The position shown on the Control Panel is always the sum of the antenna offsets.

The forward offset is used to set the forward/backward distance from the antenna to the reference point. A positive value will compensate the position towards the bow and a negative value will compensate towards the stern.

The starboard offset is used to set the port/starboard distance from the antenna to the reference point. A positive value will compensate the position towards starboard and a negative value will compensate towards port.

Note

True heading data is required to calculate the antenna position offset. The offset will be zero if there is no valid heading data and the GNSS/DGNSS Receiver raises the alert Heading Data Lost.

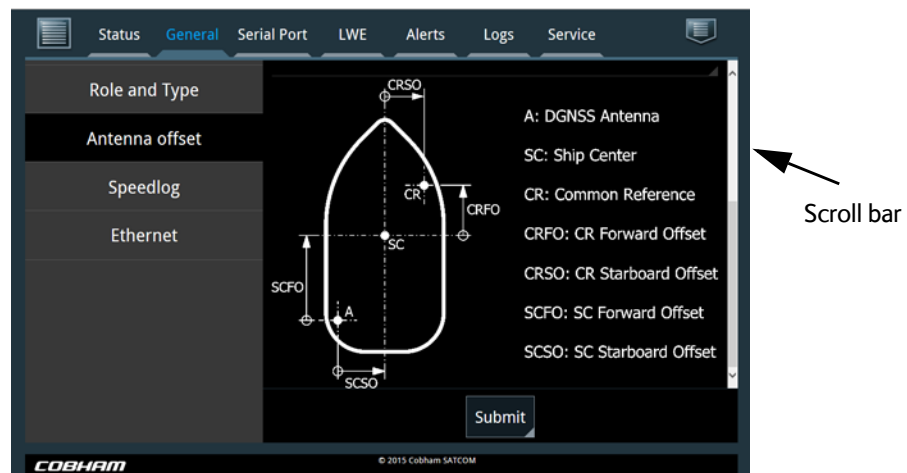


Figure 5-9: General, Antenna Offset

To set up the antenna offset do as follows:

1. In the **Ship Center** offset enter the distance from the antenna to the ship's center.
2. In the **Common Reference** enter the distance from the ship's center to e.g. the radar.
3. Click **Submit**.

Speedlog

To set up the speed log do as follows:

1. Click the field **Pulses per NM**.
2. Select the number of pulses per NM. The options are 100, 200, 300 and 400.
3. Click **Submit**.

See section 4.7 for further details about the speed log output port.

Ethernet

In this section you set up the basic settings for the Ethernet interface. If you want to connect the SAILOR 6588 GNSS/DGNSS Receiver with other SAILOR products in a ring you must enable RSTP.



Figure 5-10: General, Ethernet

RSTP	Description
RSTP Enabled (default)	Under normal circumstances it is not necessary to disable RSTP.
RSTP Priority	The RSTP priority is calculated from the MAC address of the device. Under normal circumstances it is not necessary to change the priority

Table 5-2: Ethernet, RSTP

The IP Mode can be DHCP (default) or Static. If there is no DHCP server available to the receiver, the device uses self-assignment of a link local address with an IP address in the range of 169.254.1.0 through 169.254.254.255. Other SAILOR devices can find the DGNSS by service location protocol (SLP), no manual setup is needed. The IP address range is chosen by the device according to RFC 3927.

If the network design requires manual IP address setup, do as follows:

1. Click the field **IP Mode** and select **Static**.
2. Enter IP, Netmask, Gateway and DNS server. It is recommended to follow IEC61162-450 IP range when using manual IP address setup: 172.16.0.1 through 172.31.255.254.
3. Click **Submit**.

5.2.5 Serial Port

There are two outputs (OUT 1 and OUT 2), two inputs (IN 1 and IN 2) and one bidirectional port (IN/OUT). All serial ports support IEC61162 sentences and RTCM correction data. The electrical interface is described in chapter 4.

The screenshot shows the 'Serial Port' configuration page. At the top, there are tabs: Status, General, Serial Port (active), LWE, Alerts, Logs, and Service. Below the tabs, the 'IN/OUT' section is expanded, showing a list of settings:

- IN/OUT**: Enabled (checked)
- IN 1**: Baud Rate (38400)
- IN 2**: NMEA Version (IEC61162-1 Ed.4)
- OUT 1**: Estimated Port Load % (12)
- OUT 2**: RTCM (Output and Input checkboxes)
- GNSS**: Antenna offset correction (OFF)

A 'Submit' button is located at the bottom right of the configuration area. The COBHAM logo and copyright notice '© 2015 Cobham SATCOM' are visible at the bottom of the interface.

Figure 5-11: Serial Port

Talker identifiers

The following rules for talker identifiers apply for all serial ports.

Output sentences use the talker identifiers specified in IEC 61162-1, corresponding to the satellite system in use. You can change the satellite system in the setting **Use GNSS Systems** in the app on SAILOR 6004 Control Panel, see the user manual. The following table shows a mapping from the used GNSS system and the NMEA Talker Identifier used for output sentences.

GNSS system	NMEA Talker Identifier
GPS (default)	GP
GLONASS	GL
GPS/GLONASS	GN

Table 5-3: NMEA Talker Identifier

Any NMEA Talker Identifier is accepted for the supported input sentences.

IN/OUT

The IN/OUT port is a configurable bidirectional serial port. The configuration page has the following sections:

- RTCM
- GNSS
- Alert
- Radio Beacon
- Heading Sensor

The first four lines are the general setup for the port.

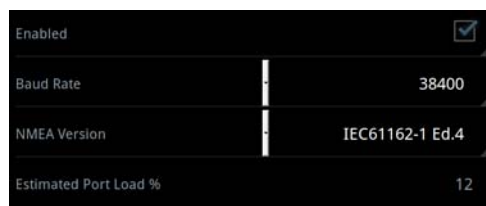


Figure 5-12: Serial Port, IN/OUT

Item	Description
Enabled	Enabled (default) or disabled. The entire IN /OUT port can be enabled or disabled. If the port is disabled (no check mark), all inputs and outputs are disabled.

Table 5-4: Serial Port, IN/OUT settings

Item	Description
Baud Rate	Use the drop-down list to select the baud rate, if needed. • 4800 baud • 9600 baud • 19200 baud • 38400 baud (default)
NMEA Version	Use the drop-down list to select the baud rate, if needed. • IEC61162-1 Ed.2 • IEC61162-1 Ed.3 • IEC61162-1 Ed.4
Estimated Port Load %	An estimated port load is calculated depending on the selected baud rate, the selected output sentences and the interval of each sentence. If the port load is above 85% the value is colored red as a warning. It is recommended to have a port load below 85% to ensure that no data is lost.

Table 5-4: Serial Port, IN/OUT settings (Continued)

To update the port load click **Submit**.

Check the port load to ensure that it is still within the limits.

RTCM

In GNSS mode, RTCM can be both input and output. Enabling RTCM output means that RTCM data will be forwarded on the output port.

In DGNSS mode it is only possible to enable output. If RTCM is enabled all NMEA output for the port will be automatically disabled, in order not to mix NMEA and RTCM data. In this case enabling RTCM output means that the RTCM data received on the port marked as RTCM input is forwarded and output to this port.



Figure 5-13: Serial Port, RTCM

RTCM Item	Description
Output	Enabled or disabled (default) Click to enable RTCM output.

Table 5-5: Serial Port, RTCM settings

RTCM Item	Description
Input	Enabled or disabled (default) Click to enable RTCM input. (GNSS mode only) Make sure that only one port is selected with RTCM input enabled. Otherwise the decoding and application of RTCM data will not function correctly.

Table 5-5: Serial Port, RTCM settings

To send the settings to the receiver click **Submit**.

GNSS

Figure 5-14: Serial Port, GNSS

GNSS Item	Description
Antenna offset correction	In the sentences containing position information (GGA, GLL, GNS and RMC) you can add the antenna offset specified in the General settings. The antenna offset can be set to: Off (default) Ship Center Ship Center + Common Reference If it is necessary that some sentences contain antenna offset and others do not, you must configure this on two different serial ports.

Table 5-6: Serial Port, GNSS

GNSS Item	Description
Allow GGA in GLONASS/ COMBINED mode	Enabled or disabled (default) In IEC61162-1 the GGA sentence is only specified for GPS. If the GGA sentence is required in GLONASS mode or GPS/GLONASS mode it must be specifically allowed by enabling this setting. Note that the GGA sentence must be enabled in the output sentences for this setting to take effect. In this case the sentence is equal to the original sentence except that the "Number of satellites in use" field is in the range 00-99.
Output	Enabled (default) or disabled All enabled GNSS sentences, from the list below, can be enabled or disabled. They are enabled when there is a check mark in the box to the right. Enabling GNSS output makes the sentence configuration below take effect. If GNSS output is disabled here, no GNSS sentences will be transmitted, overriding the individual sentence configuration.
Sentences DTM, GBS, GNS, RMC, ZDA, GGA, VTG, GLL, GSV, GSA	Select the interval at which each sentence shall be sent or select OFF to disable it. Intervals range from 0.5 s to 300 s. An interval of 2 s means that the sentence is sent every 2 seconds. Check the port load after you have submitted the changes.

Table 5-6: Serial Port, GNSS (Continued)

Alert



Figure 5-15: Serial Port, Alert

Alert Item	Description
Output	Enabled (default) or disabled. Enabling Alert output makes the sentence configuration below take effect. If Alert output is disabled here, no Alert sentences will be transmitted, overriding the individual sentence configuration. Alert sentences, from the list below, can be enabled (check mark) or disabled (no check mark) individually.

Table 5-7: Serial Port, Alert

Alert Item	Description
Sentences ALR, ALF, ALC	Select the alert sentences to be enabled for transmission. IEC62923 Ed.1 adds support for the alert sentences ALF, ALC and ACM, which replace the old ALR and ACK sentences described in IEC61162-1 Ed.4. For backwards compatibility with older equipment, it is possible to enable the ALR sentence. In that case it is recommended to disable the sentences ALC, and ALF in order to bring down the total port load. It is not possible to set an interval for the alert sentences. Check the port load after you have submitted the changes.
Input	All enabled (check mark) or disabled (no check mark).
Sentences	No individual sentence configuration is possible for Alert input sentences.

Table 5-7: Serial Port, Alert

Radio Beacon

The sentences defined under **Radio Beacon** are used for setting up the internal beacon receiver. This is only used when the device role is set to DGNSS.

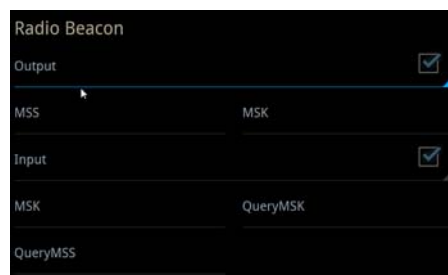


Figure 5-16: Serial Port, Radio Beacon

Radio Beacon Item	Description
Output	All items in Radio Beacon Output enabled (default) (check mark) or disabled (no check mark).
Sentences	No individual sentence configuration is possible for Radio Beacon output sentences.
Input	All items in Radio Beacon Input enabled (default) (check mark) or disabled (no check mark).
Sentences	No individual sentence configuration is possible for Radio Beacon input sentences.

Table 5-8: Serial Port, Radio Beacon

Heading Sensor

The receiver can process heading information from different heading sensor sentences.

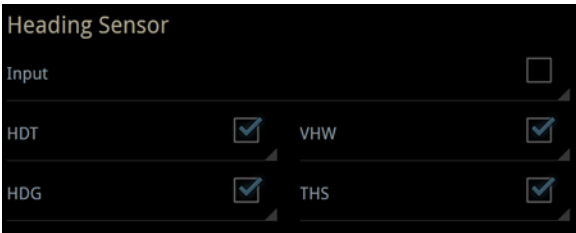


Figure 5-17: Serial Port, Heading Sensor

Heading Sensor Item	Description
Input	Enabling Heading Sensor Input makes the sentence configuration below take effect. If Heading Sensor input is disabled here, no sentences will be parsed, overriding the individual sentence configuration. Set a check mark to enable the output (default) of the sentences below.
Sentences HDT, HDG, VHW, THS	Select the sentences to use for heading information. Check the port load after you have submitted the changes.

Table 5-9: Serial Port, Heading Sensor

Heartbeat

A heartbeat supervision sentence (HBT) can be sent from the receiver.

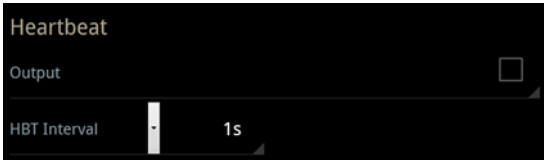


Figure 5-18: Serial Port, Heartbeat

Heartbeat Item	Description
Output	Enabling Heartbeat output (default) makes the sentence configuration below take effect.
Sentences	Select at which interval the HBT sentence shall be sent. The interval can be set in the range from 1 s to 600 s. An interval of e.g. 10 s means that the sentence is sent every 10 seconds. Check the port load after submitting the changes.

Table 5-10: Serial Port, Heartbeat

The HBT heartbeat input sentence is always enabled on the port and is therefore not shown. If available, heartbeat input is used by the GNSS/DGNSS Receiver to correctly manage transfer of alert responsibility.

IN 1 and IN 2

The IN 1 and IN 2 port are two independent serial inputs to the SAILOR 6588 GNSS/DGNSS Receiver. The port configurations for IN 1 and IN 2 are identical, they are only explained once. The configuration page has the following sections.

- RTCM (GNSS mode only)
- Heading Sensor

The first three lines are the general setup for the port.



Figure 5-19: Serial Port, IN 1, IN 2

Item	Description
Enabled	The IN 1 and IN 2 ports can be enabled or disabled. Enabling IN 1 and IN 2 makes the port configuration below take effect
Baud Rate	Use the drop-down list to select the baud rate, if needed. • 4800 baud (default) • 9600 baud • 19200 baud • 38400 baud
NMEA Version	The NMEA version used is IEC61162-1 Ed.4.

Table 5-11: Serial Port, IN 1, IN 2

RTCM

In GNSS mode RTCM can come from an external device. The use of RTCM data can be configured in the app on the Control Panel (GNSS > Settings > Radio Beacon > External RTCM Correction).



Figure 5-20: Serial Port, IN 1, IN 2, RTCM

RTCM Item	Description
Input	Select to enable RTCM input. (GNSS mode only) (default setting: disabled)

Table 5-12: Serial Port, IN 1, IN 2, RTCM

Heading Sensor

The receiver can process heading information from different heading sensor sentences.

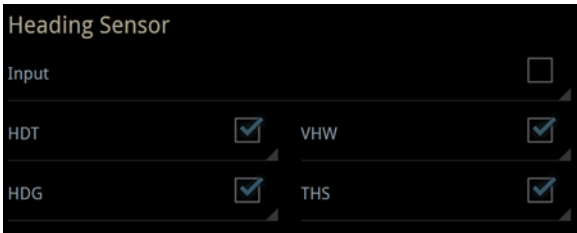


Figure 5-21: Serial Port, IN 1, IN 2, Heading Sensor

Item	Description
Input	All items in Heading Sensor Input enabled (default) (check mark) or disabled (no check mark).
Sentences	Select the sentences to use for heading information. Check the port load after you have submitted the changes.

Table 5-13: Serial Port, IN 1, IN 2, Heading Sensor

OUT 1 and OUT 2

OUT 1 and OUT 2 are two independent serial outputs on the SAILOR 6588 GNSS/DGNSS Receiver. The port configurations for OUT 1 and OUT 2 are identical, they are only explained once. The configuration page has the following sections:

- RTCM
- GNSS
- Alert
- Radio Beacon

The first four lines are the general setup for the port.

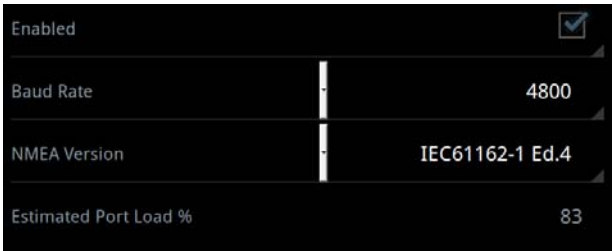


Figure 5-22: Serial Port, OUT 1 and OUT 2

Item	Description
Enabled	The OUT 1 and OUT 2 ports can be enabled or disabled. Enabling OUT 1 and OUT 2 makes the port configuration below take effect.
Baud Rate	Use the drop-down list to select the baud rate, if needed. 4800 baud (default) 9600 baud 19200 baud 38400 baud
NMEA Version	Use the drop-down list to select the baud rate, if needed. - IEC61162-1 Ed.2 - IEC61162-1 Ed.3 - IEC61162-1 Ed.4
Port Load %	An estimated port load is calculated depending on the selected baud rate the output sentences selected and the interval of each sentence. The port load is updated after clicking Submit. If the port load is above 85% the value is colored red as a warning. It is recommended to have a port load below 85% to ensure that no data is lost.

Table 5-14: Serial Port, OUT 1 and OUT 2

To update the port load click **Submit**.

Check the port load to ensure that it is still within the limits.

RTCM

In GNSS mode, RTCM can be both input and output. Enabling RTCM output means that RTCM data will be forwarded on the output port.

In DGNSS mode it is only possible to enable output. If RTCM is enabled all NMEA output for the port will be automatically disabled, in order not to mix NMEA and RTCM data. In this case enabling RTCM output means that the RTCM data received on the port marked as RTCM input is forwarded and output to this port.



Figure 5-23: Serial Port, OUT 1 and OUT 2, RTCM

RTCM Item	Description
Output	Enabled (default) or disabled All enabled GNSS sentences, from the list below, can be enabled or disabled. They are enabled when there is a check mark in the box to the right. Enabling GNSS output makes the sentence configuration below take effect. If GNSS output is disabled here, no GNSS sentences will be transmitted, overriding the individual sentence configuration.

Table 5-15: Serial Port, OUT 1, OUT 2, RTCM

GNSS

GNSS

Antenna offset correction: OFF

Allow GGA in GLONASS/COMBINED mode: ☐

Output: ☒

DTM Interval: 1 s

GBS Interval: 1 s

GNS Interval: 1 s

RMC Interval: 1 s

ZDA Interval: 1 s

GGA Interval: OFF

VTG Interval: OFF

GLL Interval: OFF

GSV Interval: OFF

GSA Interval: OFF

Figure 5-24: Serial Port, OUT 1 and OUT 2, GNSS

GNSS Item	Description
Antenna offset correction	In the sentences containing position information (GGA, GLL, GNS and RMC) you can add the antenna offset specified in the General settings. The antenna offset can be set to: Off (default) Ship Center Ship Center + Common Reference If it is necessary that some sentences contain antenna offset and others do not, you must configure this on two different serial ports.

Table 5-16: Serial Port, OUT 1 and OUT 2, GNSS

GNSS Item	Description
Allow GGA in GLONASS/COM-BINED mode	Enabled or disabled (default) In IEC61162-1 the GGA sentence is only specified for GPS. If the GGA sentence is required in GLONASS mode or GPS/GLONASS mode it must be specifically allowed by enabling this setting. In this case the sentence is equal to the original sentence except that the "Number of satellites in use" field is in the range 00-99.
Output	Enabled (default) or disabled All enabled GNSS sentences, from the list below, can be enabled or disabled. They are enabled when there is a check mark in the box to the right. Enabling GNSS output makes the sentence configuration below take effect. If GNSS output is disabled here, no GNSS sentences will be transmitted, overriding the individual sentence configuration.
NMEA Sentences DTM, GBS, GGA, GNS, RMC, VTG, ZDA, GLL, GSV, GSA	Select the interval at which each sentence shall be sent, or select OFF to disable it. Intervals range from 0.5s to 300s. Example: An interval of 2 s means that the sentence is sent every 2 seconds.

Table 5-16: Serial Port, OUT 1 and OUT 2, GNSS (Continued)

Check the port load after submitting the changes.

Alert

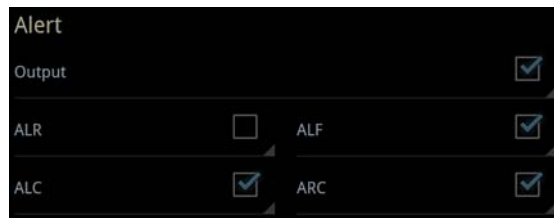


Figure 5-25: Serial Port, OUT 1 and OUT 2, Alert

Alert Item	Description
Output	Enabling Alert output makes the sentence configuration below take effect. If Alert output is disabled here, no Alert sentences will be transmitted, overriding the individual sentence configuration. Alert sentences, from the list below, can be enabled (check mark) or disabled (no check mark) individually.
Sentences	Select the alert sentences to be enabled for transmission. It is not possible to set an interval for the alert sentences. Check the port load after submitting the changes.

Table 5-17: Serial Port, OUT 1 and OUT 2, Alert

Heartbeat

A heartbeat supervision sentence (HBT) can be sent from the receiver.

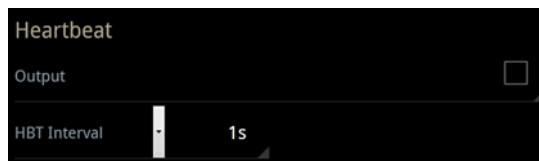


Figure 5-26: Serial Port, OUT 1 and OUT 2, Heartbeat

Heartbeat Item	Description
Output	Enabling Heartbeat output makes the sentence configuration below take effect.
Sentences	Select at which interval the HBT sentence shall be sent. The interval can be set in the range from 1 s to 600 s. An interval of e.g. 10 s means that the sentence is sent every 10 seconds. Check the port load after submitting the changes.

Table 5-18: Serial Port, OUT 1 and OUT 2, Heartbeat

5.2.6 LWE

This section describes how to configure LWE (Light Weight Ethernet) on the SAILOR 6588 GNSS/DGNSS Receiver. The SAILOR 6588 GNSS/DGNSS Receiver has one LWE output channel used for pure broadcast data, LWE Broadcast, and five channels for point-to-point communication with other LWE devices, LWE1 - LWE5, each with their own, unique LWE Talker ID.

The configuration page has the following sections:

- LWE Broadcast
- LWE 1
- LWE 2
- LWE 3
- LWE 4
- LWE 5
- Transmission groups

Note

For interconnection of SAILOR LWE devices with LWE devices of other producers it is recommended to use a router to protect the SAILOR devices from irrelevant traffic and other network functions in the bridge network.

5.2.7 LWE Broadcast

In this section you can configure what data is output by the DGNSS service function as pure broadcast data (no destination LWE Talker ID).

The configuration page has the following sections:

- GNSS
- Alert
- Heartbeat

Broadcast of the sentences specified below can be enabled or disabled.



Figure 5-27: LWE Broadcast, Enabled

Item	Description
Enabled	The LWE Broadcast port can be enabled or disabled. Enabling the LWE Broadcast port makes the configuration below take effect.
Port Load	In order not to overload the network, the DGNSS Receiver has a limit on outgoing LWE traffic of 16000 bps. If LWE traffic load increases above this value, outgoing LWE packets are automatically dropped. In order not to exceed the limit and thereby cause dropped packets, an estimated total LWE load is calculated depending on the output sentences selected and the interval of each sentence. The load is updated after clicking Submit. If the total load is above 85% the value is colored red as a warning. It is recommended to have a total LWE load below 85% to ensure that no LWE data is lost.

Table 5-19: LWE Broadcast, Enabled

To update the port load click **Submit**.

Check the port load to ensure that it is still within the limits.

GNSS

The screenshot shows the GNSS configuration screen. At the top, 'GNSS' is the title. Below it, 'Antenna offset correction' is set to 'OFF'. 'Allow GGA in GLONASS/COMBINED mode' has an unchecked checkbox. 'Output' has a checked checkbox. Below these are two columns of settings, each with a dropdown menu and a value: DTM Interval (1 s), GBS Interval (1 s), GNS Interval (1 s), RMC Interval (1 s), ZDA Interval (1 s), GGA Interval (OFF), VTG Interval (OFF), GLL Interval (OFF), GSV Interval (OFF), and GSA Interval (OFF).

Figure 5-28: LWE Broadcast, GNSS

GNSS Item	Description
Antenna offset correction	In the sentences containing position information (GGA, GLL, GNS and RMC) you can add the antenna offset specified in the General settings. The antenna offset can be set to: • Off (default) • Ship Center • Ship Center + Common Reference If it is necessary that some sentences contain antenna offset and others do not, you must configure this on two different serial ports.
Allow GGA in GLONASS/COMBINED mode	Enabled or disabled (default) In IEC61162-1 Ed. 4 the GGA sentence is only specified for GPS. If the GGA sentence is required in GLONASS mode or GPS/GLONASS mode it must be specifically allowed by enabling this setting. In this case the sentence is equal to the original sentence except that the "Number of satellites in use" field is in the range 00-99.
Output	Enabled (default) or disabled All enabled GNSS sentences, from the list below, can be enabled or disabled. They are enabled when there is a check mark in the box to the right. Enabling GNSS output makes the sentence configuration below take effect. If GNSS output is disabled here, no GNSS sentences will be transmitted, overriding the individual sentence configuration.

Table 5-20: LWE Broadcast, GNSS

GNSS Item	Description
NMEA Sentences DTM, GBS, GGA, GNS, RMC, VTG, ZDA, GLL, GSV, GSA	Select the interval at which each sentence shall be sent, or select OFF to disable it. Intervals range from 0.5s to 300s. Example: An interval of 2 s means that the sentence is sent every 2 seconds.

Table 5-20: LWE Broadcast, GNSS (Continued)

Check the port load after submitting the changes.

Alert

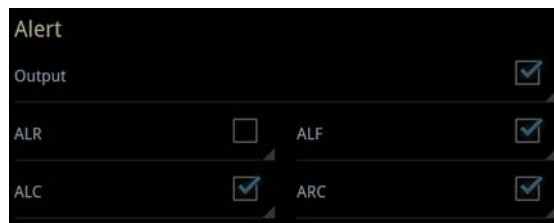


Figure 5-29: LWE Broadcast, Alert

Alert Item	Description
Output	Enabling Alert output makes the sentence configuration below take effect. If Alert output is disabled here, no Alert sentences will be transmitted, overriding the individual sentence configuration. Alert sentences, from the list below, can be enabled (check mark) or disabled (no check mark) individually.
Sentences	Select the alert sentences to be enabled for transmission. It is not possible to set an interval for the alert sentences.

Table 5-21: LWE Broadcast, Alert

Check the port load after submitting the changes.

Heartbeat

A heartbeat supervision sentence (HBT) can be sent from the receiver.

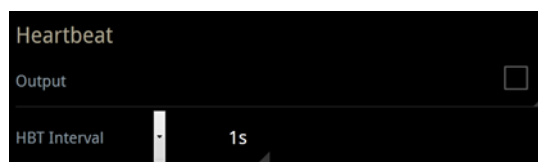


Figure 5-30: LWE Broadcast, Heartbeat

Heartbeat Item	Description
Output	Enabling Heartbeat output makes the sentence configuration below take effect.
Sentences	Select at which interval the HBT sentence shall be sent. The interval can be set in the range from 1 s to 600 s. An interval of e.g. 10 s means that the sentence is sent every 10 seconds. Check the port load after submitting the changes.

Table 5-22: LWE Broadcast, Heartbeat

5.2.8 LWE1 to LWE5

These sections are used to configure channels for point-to-point specific communication with up to five other LWE devices, each with their own, unique LWE Talker ID.

LWE1 to LWE5 also function as a white list of LWE Talker ID's to ensure that the SAILOR 6588 GNSS/DGNSS Receiver does not get identical information from more than one physical sensor device (identified by the talker ID).

Figure 5-31: LWE 1 to LWE 5

Item	Description
Enabled	The LWE listener can be enabled or disabled
Total LWE load %	In order not to overload the network, the DGNSS Receiver has a limit on outgoing LWE traffic of 16000 bps. If LWE traffic load increases above this value, outgoing LWE packets are automatically dropped. In order not to exceed the limit and thereby cause dropped packets, an estimated total LWE load is calculated depending on the output sentences selected and the interval of each sentence. The load is updated after clicking Submit. If the total load is above 85% the value is colored red as a warning. It is recommended to have a total LWE load below 85% to ensure that no LWE data is lost.

Table 5-23: LWE 1 to LWE 5, Heading Sensor

Item	Description
Talker ID	Enter the talker ID for the sensor to be used.
Input	Enabling Heading Sensor Input makes the sentence configuration below take effect. If Heading Sensor input is disabled here, no sentences will be parsed, overriding the individual sentence configuration. Set a check mark to enable the output of the sentences below.

Table 5-23: LWE 1 to LWE 5, Heading Sensor

5.2.9 Other Sentence Groups

Like the serial ports, LWE1 - LWE5 support the Alert and Beacon Receiver communication. However they are always enabled, not configurable and not shown in the Service Interface. See the table below for a list of additionally supported sentences.

Section	Supported Sentences
Alert	ALF, ALC, ACM, ACK
Beacon Receiver	MSS, MSK, QueryMSK, QueryMSS

Table 5-24: LWE 1 to LWE 5, other sentences

Note that Alert sentences that are not output as a response to a specific request/query are transmitted using the LWE Broadcast in order to save bandwidth.

5.2.10 Transmission groups

In this section you can change the transmission groups used for the LWE input and output. All outgoing LWE traffic is transmitted on the Output Tx Group and only LWE devices transmitting on one of the Input Groups Input Tx Group0 - Input Tx Group2 will be heard. Therefore it must be ensured that the LWE devices setup for point-to-point communication with the DGNSS Receiver transmit on one of the three Input transmission groups.

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

Table 5-25: Destination multicast addresses and port numbers

Transmission group	Category	Multicast address	Destination port
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 5-25: Destination multicast addresses and port numbers

5.2.11 Alerts

In the Service Interface you can enable and disable the alerts listed in the figure below. The same can be done in the GNSS or DGNSS application on the Control Panel.

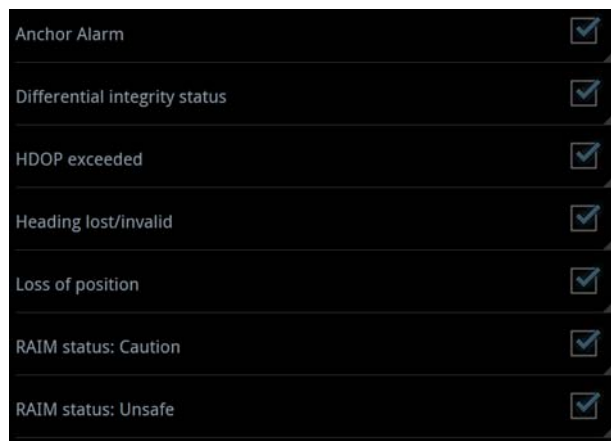


Figure 5-32: Alerts

5.2.12 Logs

The tab Logs shows the Syslog. You can download and save the Syslog.

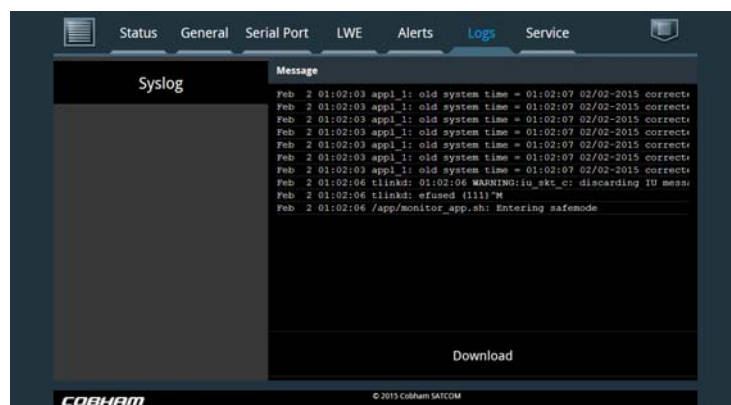


Figure 5-33: Logs: Syslog

5.2.13 Service

In the Service section you can make a software upgrade, copy the configuration data and reset the GNSS/DGNSS Receiver to factory default settings. Copying the configuration allows you to make a clone of the current configuration of the SAILOR 6588 GNSS/DGNSS Receiver. Note that the receivers involved must have the same firmware.

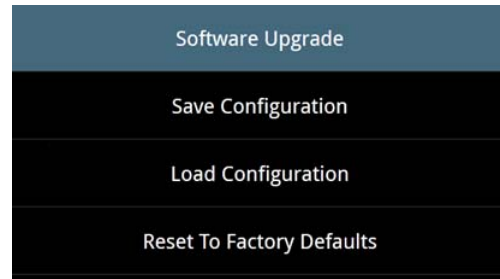


Figure 5-34: Service

Item	Description
Software Upgrade	Click this field to upload new software to the receiver from e.g. a USB storage device. Browse to the software file (file extension .tiff) and click Open. The new software is loaded into the receiver. Wait until the message Software upload done is shown.
Save Configuration	Click to save the current configuration to a file.
Load Configuration	Click to upload a configuration file to the receiver. Browse to the configuration file (file extension .tar.gz) and click Open. Wait until the configuration is loaded and you are asked to log in again.
Reset to Factory Defaults	Click to reset the SAILOR 6588 GNSS/DGNSS Receiver to factory default settings. All user settings, new radio beacon stations and beacon messages are deleted.

Table 5-26: Service

Service & maintenance

This chapter has the following sections:

- *Contact for support*
- *Maintenance*
- *Software update*
- *Alert and notification management*
- *List of alerts*
- *Troubleshooting guide*
- *Warranty and returning units for repair*

6.1 Contact for support

Contact your authorized dealer for technical service and support of the GNSS/DGNSS Receiver. Before contacting your authorized dealer you can go through the troubleshooting guide to solve some of the most common operational problems.

Software version

You find the software versions for the following units in the system app of the Control Panel:

- GNSS/DGNSS Receiver:
Tap **System > Applications**.
Tap the icon in the upper right corner
Tap **Device List**
Tap the GNSS/DGNSS Receiver.
- GNSS/DGNSS App: Tap **System > Applications > DGNSS**
- Control Panel: Tap **System > About > Version**

On these pages you also find the serial number of the unit.

IP addresses

You find the IP addresses for the following units in the GNSS/DGNSS app or the system app of the Control Panel:

- GNSS/DGNSS Receiver: as described above in *Software version*.
GNSS/DGNSS Receiver without a Control Panel: ThraneLINK Management Application.
See also *Software update using the TMA* on page 6-2.
- Control Panel: System app, tap **System > About > Network > IP address**

6.2 Maintenance

6.2.1 Preventive maintenance

Maintenance of the DGNSS Receiver 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 GNSS/DGNSS Receiver, SAILOR 6285 GNSS Antenna - Active, SAILOR 6286 DGNSS Antenna - Active and 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.

6.3 Software update

You can update the software of the GNSS/DGNSS Receiver in the following ways:

- *Software update using the TMA*
- *Software update using the Service Interface*
- *Software update directly via the Control Panel*
- *Software incompatibility (Issue detected)*

6.3.1 Software update using the TMA

1. Download the TMA (ThraneLINK Management Application) from the Cobham eSupport web site (Self-Service Center, SSC. The SSC is in the Service and Support section, 24-7 Service). Make sure to use version 1.05 or higher.
2. Make sure that your PC is on the same network as the GNSS/DGNSS Receiver.
3. Connect the PC to a free LAN interface of the GNSS/DGNSS Receiver.



Figure 6-1: LAN connectors of the GNSS/DGNSS Receiver

4. Start the TMA on your PC. The GNSS/DGNSS Receiver is automatically detected.
5. Click the icon for the GNSS/DGNSS Receiver. The **field Status** must show **Connected**. The icon **Software update** pulsates yellow when a new software version is detected for the GNSS/DGNSS Receiver. The TMA searches all devices connected via USB for new software. (To add an additional search path 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).

6. 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**.

6.3.2 Software update using the Service Interface

1. Have the new software ready, e.g. on a USB storage device.
2. Access the GNSS/DGNSS Receiver via the Service Interface, for details see *To access the Service Interface* on page 5-2.
3. Click **Software Upgrade**.

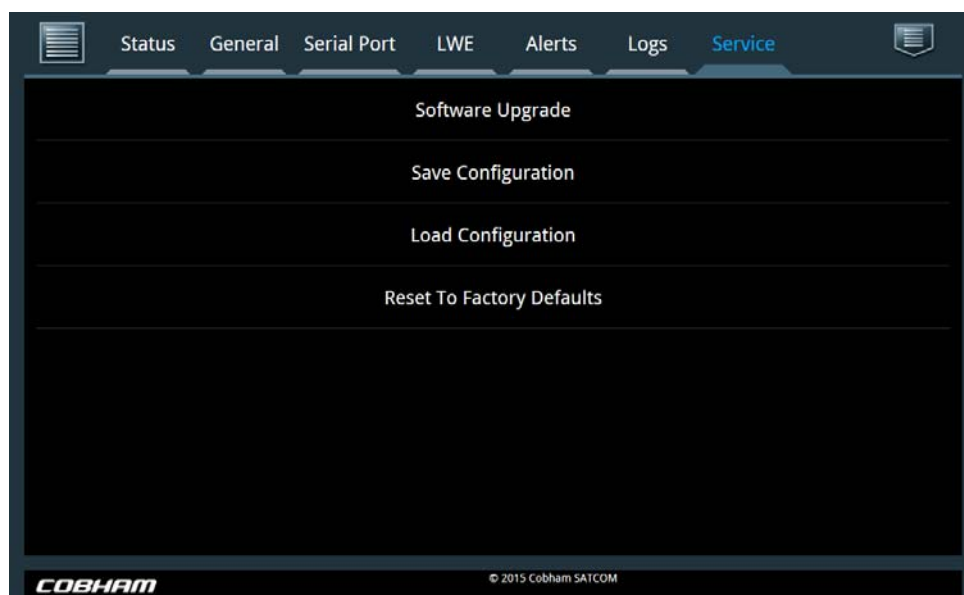


Figure 6-2: Software update with the Service Interface

4. Browse to the software file (file extension: .tiif) and select it.
5. The new software is loaded into the GNSS/DGNSS Receiver. Wait until the message Successfully completed is shown.
6. Click **Logout** to leave the Service Interface. The GNSS/DGNSS Receiver will resume normal operation.

6.3.3 Software update directly via the Control Panel

1. Copy the new software on a USB storage device.
2. Insert the USB storage device in one of the USB connectors of the Control Panel.
3. Access the GNSS/DGNSS Receiver via the Service Interface., for details see *To access the Service Interface* on page 5-2.

Important As long as the service engineer is logged into the Service Interface, the GNSS/DGNSS Receiver does not calculate positions. The Control Panel application shows a Connection lost error.

All tasks related to installation, service and maintenance are described in the installation manual.

Only a service engineer should access the Service Interface directly from the display of the Control Panel. This is useful for software update directly via the Control Panel.

Do as follows:

1. Tap **System > Applications**.
2. Tap  > **Device list**.
3. Tap the device.
4. Tap .

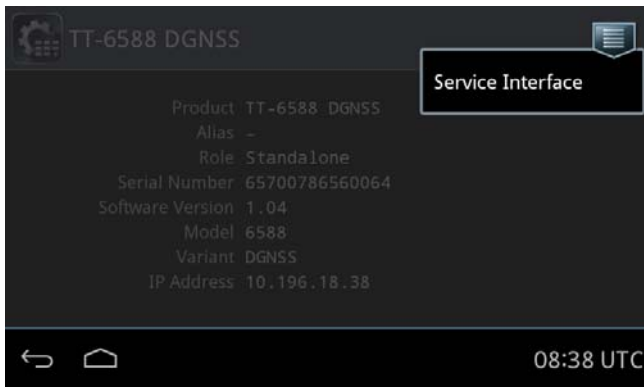


Table 6-1: Access of the Service Interface

5. Tap **Service Interface**.

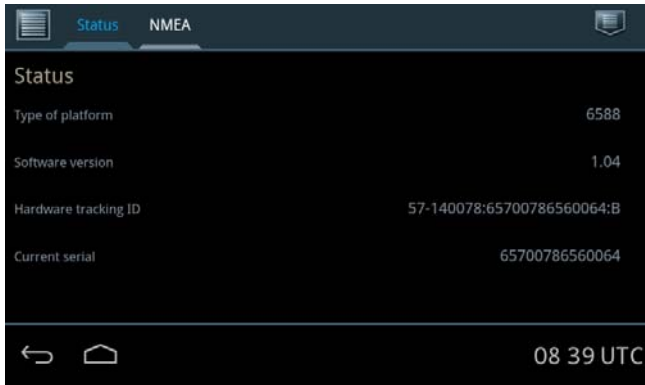


Table 6-2: Access the Service Interface

- 6. The service engineer can now tap  and **Login** and enter user name and password (administrator level).

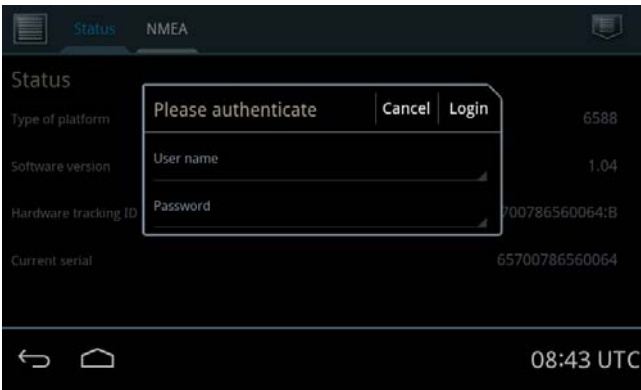


Table 6-3: Login page of the Service Interface

- 7. Tap **Service**.
- 8. Tap **Software Upgrade**.

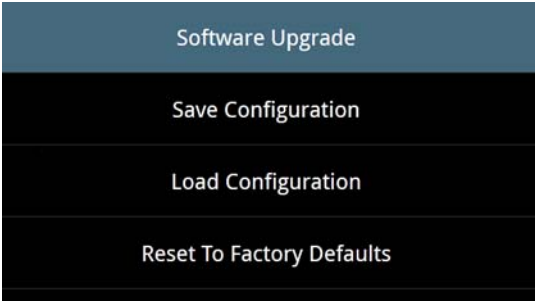


Figure 6-3: Software update

- 9. Browse to the software file (extension: .tiif) and select it.
- 10. Tap **Open**. The new software is loaded into the GNSS/DGNSS Receiver. Wait until the message **Successfully completed** is displayed.
- 11. Tap **Logout** to leave the Service Interface. The GNSS/DGNSS Receiver will resume normal operation.

6.3.4 Software incompatibility (Issue detected)

In rare cases a software incompatibility may occur in the network of connected devices, this is marked by the text **Issue Detected** on the icon of the app concerned. Refer to the manual of the Control Panel for instructions how to resolve such an issue.

6.4 Alert and notification management

The GNSS/DGNSS Receiver reports alerts of the type warning and caution.

6.4.1 Overview

Introduction to alerts and notifications

Alerts are reported and indicated by icons in the bottom bar of the Control Panel display. An alert is presented together with its alert text. An alert can be of the type alarm, warning or caution. If an alarm is not acknowledged the audible alarm signal (3 beeps) is repeated every seventh second until it is acknowledged. If a warning is not acknowledged the audible warning signal (2 beeps) is repeated every minute until it is acknowledged. The audible warning signal also disappears if the condition is rectified.

The alert list is prioritized. The most important alert is an alarm, then warning and finally caution. The most important active alerts move to the top of the list, after that the alerts with the same importance are sorted by activation time.

You can display the current list of active, unacknowledged alerts and notifications by tapping the lower right corner of the Control Panel display where the alert indication and UTC time is displayed.

Icons for alerts and notification

The following table shows the icons for alerts and notification with a description.

Icon	Name	Icon description
	Active - unacknowledged alarm	A flashing red triangle. A symbol of a loudspeaker in the middle of the triangle. This alert is accompanied by an audible alarm signal (3 beeps). This icon is displayed when there is an active unacknowledged alarm.
	Active – silenced alarm	A flashing red triangle. A symbol of a loudspeaker with a prominent diagonal line through it. This icon is displayed when there is an active silenced alarm.
	Active – acknowledged alarm	A red triangle. An exclamation mark in the middle of the triangle. This icon is displayed as long as the alarm condition is present.
	Active - responsibility transferred alarm	A red triangle. An arrow pointing towards the right in the middle of the triangle. This icon is displayed as long as the alarm condition is present.

Table 6-4: Icons for alerts and notification

Icon	Name	Icon description
	Rectified – unacknowledged alarm	A flashing red triangle. A tick mark in the middle of the triangle. This icon is displayed when the alarm condition has been rectified but not yet acknowledged.
	Active - unacknowledged warning	A flashing yellow circle with a symbol of a loudspeaker in the middle of the circle. This alert is accompanied by an audible warning signal (2 beeps). This icon is displayed when there is an active unacknowledged warning.
	Active – silenced warning	A flashing yellow circle. A symbol of a loudspeaker with a prominent diagonal line through it. This icon is displayed when there is an active silenced warning.
	Active – acknowledged warning	A yellow circle with an exclamation mark in the middle of the circle. This icon is displayed as long as the warning condition is present.
	Active - responsibility transferred warning	A yellow circle. An arrow pointing towards the right in the middle of the circle. This icon is displayed as long as the warning condition is present.
	Rectified – unacknowledged warning	A flashing yellow circle with a tick mark in the middle of the circle. This icon is displayed when the warning condition has been rectified but not yet acknowledged.
	Caution	A yellow square with an exclamation mark in the middle of the square. A caution alert disappears automatically when the caution situation is cleared.
	Notification	A notification can be that a new software version is available.

Table 6-4: Icons for alerts and notification (Continued)

Alert history

The alert history contains alerts of the last 24 hours (or maximum 1000 entries). The alert history is cleared when you switch off the Control Panel. The alerts and notifications are not saved. To display the alert history with alerts and notifications do as follows

1. Tap the **lower right corner** (UTC time).
2. Tap **History** to display a list of alerts and notifications. You can swipe through the list.
3. Tap an alert to display specific alert information.

Alert acknowledgement

Active alarms and warnings must be acknowledged. When all active alarms and warnings are acknowledged the icons stop flashing. To acknowledge an alert do as follows:

1. Tap the flashing icon in the lower right corner to display the list with alerts and notifications.
2. Tap the check box next to **ACK** to acknowledge the alert.

6.5 List of alerts

The following alerts may be reported, depending on which alerts are enabled in **DGNS > Settings > Alerts**.

W: Warning

C: Caution

Alert	Consequence	Reason	Remedy
Anchor Watch Alert (W) (ALR, ACK: ID 167) (ALC, ALF, ACN: ID 10167)		Distance from current position to reference position (anchoring position) exceeds alert distance.	Relocate the vessel.
Differential Integrity Status (W) (ID 215)	Possibly degraded position accuracy.	Station is marked unhealthy or un-monitored. The receiver has not received from station for 10 seconds or more. Word Error Rate (WER) has exceeded 10%.	Select an alternative station.
Heading Lost/invalid (W) (ALR, ACK: ID 32) (ALC, ALF, ACN: ID 10032)	The system will not be able to apply antenna offset.	Heading data from an external device has not been received for 30 seconds.	Reconnect the external device delivering heading data.

Table 6-5: List of alerts

Alert	Consequence	Reason	Remedy
HDOP Exceeded (C) (ID 210)	Degraded position accuracy.	HDOP has exceeded the user defined threshold.	Improve GNSS reception conditions. Bad reception conditions can be caused by electromagnetic noise, broken antenna/cable or nearby large structures. Make the receiver use more satellites by changing to GPS/GLONASS mode, disable corrections and/or decreasing satellite elevation limit.
Loss of position (W) (ID 212)	No position fix.	GNSS reception conditions are bad. The antenna has disconnected.	
RAIM Status: Caution (C) (ALC, ALF, ACN: ID 10163)	The accuracy level is unknown.	The receiver is using less than 6 satellites.	
RAIM Status: Unsafe (C) (ALC, ALF, ACN: ID 10162)	Possibly unreliable position fix.	The user defined accuracy limit has been exceeded.	
Alert Magnetic Model Expired (C) (ALC, ALF, ACN: ID 10168)	Possibly an inaccurate value for the magnetic variation (MAG VAR) is being calculated.	The expiry date for the build-in model of Earth's magnetic field has been exceeded.	Update the firmware to a version including the latest model coefficients. Consider to manually enter an accurate value for the local magnetic variation for temporary use.
Connection lost to receiver (W)	The system is unable to report a position.	The receiver is not powered on. The connection between the Control Panel and the receiver has been cut.	Reboot the receiver. Repair the connection between the Control Panel and the receiver.

Table 6-5: List of alerts (Continued)

6.6 Troubleshooting guide

Problem	Symptom	Remedy
The DGNSS Receiver fails to turn on.	The green power LED is off.	If the power cable is connected directly to the GNSS/DGNSS Receiver then check that the white wire in the power cable is connected to the black wire (-DC). For further details see the Installation manual. Use a volt meter to verify that the 12-24 VDC is OK on the power cable. Check if the fuse is blown.
No position fix with GPS and/or GLONASS	The system status LED in the screen Overview corresponding to the satellite system is amber.	Check the antenna cable to the antenna. Check that the antenna has free line of sight to the satellites.
Position is wrong		Check if the correct datum is selected. (Settings > General > Datum)
No update of position data	All dynamic data (time/date, position) is colored amber on the Control Panel. COG and SOG are shown with ---.-.	Check the power supplies, cabling, Ethernet connection between the GNSS/DGNSS Receiver and the Control Panel. Restart both units: GNSS/DGNSS Receiver: remove and connect power, Control Panel: use on/off button. Check that no one has logged into the Service Interface.
The time in the bottom right corner shows --:--		Select the time source via the System app. See the SAILOR 6004 installation manual.

Table 6-6: Troubleshooting

Problem	Symptom	Remedy
No beacon correction	The (lower) beacon status “LED” in the Overview screen is absent. The CORR LED on the receiver is lit and red.	Check if Differential Beacon Correction/External RTCM Correction (DGNSS/GNSS) is enabled in Settings > Radio Beacons .
	The (lower) “LED” in the Overview screen is amber. The CORR LED on the receiver is lit and red. WARNING: “Differential Integrity status” is active.	Check the antenna cable to the antenna. Check beacon selection mode is correct. Use for example Automatic Mode .
No SBAS correction	The CORR LED on the receiver is lit and red.	Check if SBAS Correction Systems is enabled in Settings .
Missing output of Magnetic variation/Course over ground, degrees magnetic in RMC/VTG sentence	Alert on connected device requiring Magnetic variation/Course over ground, degrees magnetic in RMC/VTG sentence.	Check the datum setting. The magnetic variation calculation is disabled when the datum is set to User Defined.

Table 6-6: Troubleshooting (Continued)

Problem	Symptom	Remedy
Device failure		If any of the checks and tests described in this section does not assist in resolving the difficulties experienced in the operation and/or performance of the installation, a fault may have developed in the GNSS/DGNSS System. When contacting an authorized representative, be sure to provide as much information as possible describing the observed behavior - also including the type of the GNSS/DGNSS units, serial number, and software release version. You find this information in the setup menu of the connected Control Panel.

Table 6-6: Troubleshooting (Continued)

6.7 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 www.cobham.com/satcom/service-and-support/cobham-satcom-service-and-support 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.

6.7.1 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 GNSS/DGNSS Receiver 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 6588 GNSS/DGNSS Receiver

Item	Specification
GNSS receiver	30 channel GPS, GLONASS and SBAS receiver
Position-Fix time cold start	< 45 s
PPS accuracy	±15 ns
Weight	1.3 kg
Dimensions (L x W x H)	190 x 270 x 24.5 mm
Equipment class	Protected, according to IEC 60945
Input voltage	10.8 VDC to 31.2 VDC
Power consumption	5 W (0.2 A @24 VDC input voltage)
Heat dissipation	< 10 W
Operating temperature	-15 °C to +55 °C (Operational)
Storage temperature	-30 °C to +70 °C (Storage)
Compass Safe Distance	30 cm (standard magnetic compass) 20 cm (Emergency magnetic compass)
Beacon receivers	283.5 - 325 kHz MSK three parallel receivers
Connector for GNSS or DGNSS antenna	TNC female
Connection to Control Panel	LAN

Table A-1: GNSS/DGNSS Receiver specifications

A.2 SAILOR 6285 GNSS 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 $\pm$ 1 VDC
Current consumption	Approx. 30 mA
Connector	TNC female
Cable	Coax cable, <10 dB cable loss
Operating temperature	-40 °C to +55 °C
Storage temperature	-40 °C to +70 °C

Table A-2: SAILOR 6285 GNSS Antenna - Active specifications

A.3 SAILOR 6286 DGNSS Antenna - Active

Item	Specification
Dimensions	Ø: 142 mm, H: 53 mm
Weight	0.57 kg
Mounting	Bracket mount on pipe, thread 1 1/4" x 11 TPI
Equipment class	Exposed, according to IEC 60945
Antenna type	Active patch antenna for GNSS combined with a H-Field antenna for beacons
Frequency	1560 to 1608 MHz for GNSS 283.5 to 325 kHz for beacons
Impedance	Nominal 50 Ohm
Polarization	Circular right-hand for GNSS
Coverage	Hemispherical
Selectivity	30 dB down at center ± 42 MHz for GNSS
Gain	25 dB
Supply voltage	5 $\pm$ 1 VDC
Current consumption	Approx. 50 mA
Connector	TNC female
Cable	Coax cable, <10 dB cable loss
Operating temperature	-40 °C to +55 °C
Storage temperature	-40 °C to +70 °C

Table A-3: SAILOR 6286 DGNSS Antenna - Active 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)
Resolution of the display	800x400 pixels
Screen size	152.5 x 91.44 mm

Table A-4: Control Panel specifications

a. Estimated.

NMEA sentences

B.1 NMEA sentences used

The sentences used for positional information are defined according to NMEA 0183 version 4.10 and IEC 61162-1 ed. 4.0 and IEC 61162-2 1998.

The sentences used for alert management are defined according to IEC 61924-2.

B.1.1 Overview of supported sentences

- *ACK - Acknowledge alarm (input)*
- *ACM - Alert command (input)*
- *ALC - Cyclic alert list (output)*
- *ALF - Alert sentence (output)*
- *ALR - Set alarm state (output)*
- *DTM - Datum reference (output)*
- *GBS - GNSS satellite fault detection (output)*
- *GGA - Global positioning system (GPS) fix data (output)*
- *GLL - Geographic position - Latitude/longitude (output)*
- *GNS - GNSS fix data (output)*
- *GSA - GNSS DOP and active satellites (output)*
- *GSV - GNSS satellites in view (output)*
- *HBT - Heartbeat supervision sentence (output)*
- *HDG - Heading, deviation and variation (input)*
- *HDT - Heading true (input)*
- *MSK - MSK receiver interface (input)*
- *MSS - MSK receiver signal status (output)*
- *RMC - Recommended minimum specific GNSS data (output)*
- *THS - True heading and status (input)*
- *VHW - Water speed and heading (input)*
- *VTG - Course over ground and ground speed (output)*
- *ZDA - Time and Date (output)*

B.1.2 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.1.3 ACM - Alert command (input)

\$--ACM, hhmmss.ss,aaa,x.x,x.x,c,a*hh<CR><LF>

Field	Data format	Description	Comment
1	ACM	Sentence Id	Used
2	hhmmss.ss	Time	Used
3	aaa	Manufacturer mnemonic code	Used
4	x.x	Alert identifier	Used
5	x.x	Alert instance, 1- 999999	Used
6	c	Alert command, A, Q, O or S	Used
7	a	Sentence status flag	Used

B.1.4 ALC - Cyclic alert list (output)

\$--ALC, xx,xx,xx,x.x,aaa,x.x,x.x,x.x,.....,aaa,x.x,x.x,x.x*hh<CR><LF>

Field	Data format	Description	Comment
1	ALC	Sentence Id	Used
2	xx	Total number of sentences for this message, 01 to 99	Used
3	xx	Sentence number, 01 to 99	Used
4	xx	Sequential message identifier, 00 to 99	Used
5	x.x	Number of alert entries	Used
6	aaa	Manufacturer mnemonic code	Used
7	x.x	Alert identifier	Used
8	x.x	Alert instance	Used
9	x.x	Revision counter	Used

Fields 6 to 9 can have multiple occurrences.

B.1.5 ALF - Alert sentence (output)

\$--ALF, x,x,x,hhmmss.ss,a,a,aaa,x.x,x.x,x.x,x,c---c*hh<CR><LF>

Field	Data format	Description	Comment
1	ALF	Sentence Id	Used
2	x	Total number of ALF sentences for this message	Used
3	x	Sentence number, 1 to 2	Used
4	x	Sequential message identifier, 0 to 9	Used
5	hhmmss.ss	Time of last change	Used
6	a	Alert category, A, B or C	Used
7	a	Alert priority, E, A, W or C	Used
8	a	Alert state, A, S, N, O, U or V	Used
9	aaa	Manufacturer mnemonic code	Used
10	x.x	Alert identifier	Used
11	x.x	Alert instance, 1 to 999999	Used
12	x.x	Revision counter, 1 to 99	Used
13	x	Escalation counter	Used
14	c---c	Alert text	Used

B.1.6 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.1.7 DTM - Datum reference (output)

\$--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	Used
4	x.x	Latitude offset, min	Used
5	a	Latitude offset, N/S	Used
6	x.x	Longitude offset, min	Used
7	a	Longitude offset, E/W	Used
8	x.x	Altitude offset, m	Used
9	ccc	Reference datum	Used

B.1.8 GBS - GNSS satellite fault detection (output)

\$--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	Used
7	x.x	Probability of missed detection	Used
8	x.x	Estimate of bias on failed satellite	Used
9	x.x	Standard deviation of bias estimate	Used
10	h	GNSS System ID	Used
11	h	GNSS Signal ID	Used

B.1.9 GGA - Global positioning system (GPS) fix data (output)

\$--GGA,hhmmss.ss,IIII.II,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	IIII.II	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 ^{a, b}	Used
9	x.x	HDOP	Used
10	x.x	Antenna altitude, m	Used
11	M	Units of antenna altitude, m	Used
12	x.x	Geoidal separation, m	Used
13	M	Units of geoidal separation, m	Used
14	x.x	Age of differential data	Used
15	xxxx	Differential reference station	Used

- In IEC61162-1 the GGA sentence is only specified for GPS. If the GGA sentence is required in GLONASS mode or GPS/GLONASS mode it is enabled. In that case the sentence is equal to the original sentence except that the "Number of satellites in use" field is in the range 00-99.
- This range is not valid if GGA compatibility is selected in the Service Interface.

B.1.10 GLL - Geographic position - Latitude/longitude (output)

\$--GLL,IIII.II,a,yyyyy.yy,a,hhmmss.ss,A,a*hh<CR><LF>

Field	Data format	Description	Comment
1	GLL	Sentence ID	Used
2	IIII.II	Latitude, N/S	Used
3	a	Latitude, N/S	Used
4	yyyyy.yy	Longitude, E/W	Used
5	a	Longitude, E/W	Used
6	hhmmss.ss	UTC of position	Used
7	A	Status. A=data valid V=data invalid	Used
8	a	Mode Indicator	Used

B.1.11 GNS - GNSS fix data (output)

\$--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	Used
9	x.x	HDOP	Used
10	x.x	Antenna altitude, m	Used
11	x.x	Geoidal separation	Used
12	x.x	Age of differential data	Used
13	x.x	Differential reference station	Used
14	a	Navigational status indicator	Used

B.1.12 GSA - GNSS DOP and active satellites (output)

\$--GSA, a, x, xx,xx,xx,xx,xx,xx,xx,xx,xx,xx,xx,x.x,x.x,x.x,h*hh<CR><LF>

Field	Data format	Description	Comment
1	GSA	Sentence ID	Used
2	a	Mode: M= manual, forced to operate in 2D or 3D mode, A=Automatic, allowed to automatically switch 2D/3D	Used
3	x	Mode: 1=fix not available, 2=2D, 3=3D	Used
4-15	xx,xx,xx,xx,x x,xx,xx,xx,xx, xx,xx,xx	ID numbers of satellites used in solution	Used
16	x.x	PDOP	Used
17	x.x	HDOP	Used
18	x.x	VDOP	Used

B.1.13 GSV - GNSS satellites in view (output)

\$--GSV, x, x, xx, xx, xx, xxx, xx....., xx, xx, xxx, xx, h*hh<CR><LF>

Field	Data format	Description	Comment
1	GSV	Sentence Id	Used
2	x	Total number of messages, 1 to 9	Used
3	x	Message number, 1 to 9	Used
4	xx	Total number of satellites in view	Used
5	xx	Satellite ID number	Used
6	xx	Elevation, degrees, 90° maximum	Used
7	xxx	Azimuth, degrees true, 000 to 359	Used
8	xx	SNR (C/No) 00-99 dB-Hz, null when not tracking	Used
9-16		Second and third SVs	Used
17-20	xx, xx, xxx, xx	Fourth SV	Used
21	h	Signal ID	Used

B.1.14 HBT - Heartbeat supervision sentence (output)

\$--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.1.15 HDG - Heading, deviation and variation (input)

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

Field	Data format	Description	Comment
1	HDG	Sentence Id	Used
2	x.x	Magnetic sensor heading, degrees	Used
3	x.x	Magnetic deviation	Used
4	a	Magnetic deviation, degrees E/W	Used
5	x.x	Magnetic variation	Used
6	a	Magnetic variation, degrees E/W	Used

B.1.16 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	Used

B.1.17 MSK - MSK receiver interface (input)

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

Field	Data format	Description	Comment
1	MSK	Sentence Id	Used
2	x.x	Beacon frequency (283,5 – 325,0 kHz)	Used
3	a	Auto/manual frequency, A/M	Used
4	x.x	Beacon bit rate (25, 50, 100, 200), bits/s	Used
5	a	Auto/manual bit rate A/M	Used
6	x.x	Interval for sending \$--MSS (status) in seconds	Used
7	x	Channel number	Used
8	a	Sentence status Flag	Used

B.1.18 MSS - MSK receiver signal status (output)

\$--MSS,x.x,x.x,x.x,x.x,x,x*hh<CR><LF>

Field	Data format	Description	Comment
1	MSS	Sentence Id	Used
2	x.x	Signal strength (SS), dB/1 μ V/m	Used
3	x.x	Signal-to-noise ratio (SNR), dB	Used
4	x.x	Beacon frequency, 283,5 kHz to 325,0 kHz	Used
5	x.x	Beacon bit rate (25, 50, 100, 200) bits/s	Used
6	x	Channel number	Used

B.1.19 RMC - Recommended minimum specific GNSS data (output)

\$--RMC, hhmmss.ss,a,lll.ll,A,yyyyy.yy,a,x.x,x.x,xxxxxx,x.x,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	lll.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	Used ^a
12	a	Magnetic variation, E/W	Used ^a
13	a	Mode indicator	Used
14	a	Navigational status	Used

a. A null field is transmitted if the datum is set to User Defined.

B.1.20 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.1.21 VHW - Water speed and heading (input)

\$--VHW, x.x, T, x.x, M, x.x, N, x.x, K*hh<CR><LF>

Field	Data format	Description	Comment
1	VHW	Sentence Id	Used
2	x.x	Heading, degrees true	Used
3	T	Heading, degrees true	Used
4	x.x	Heading, degrees	Not used
5	M	Heading, degrees magnetic	Not used
6	x.x	Speed	Not used
7	N	Speed, knots	Not used
8	x.x	Speed	Not used
9	K	Speed, km/h	Not used

B.1.22 VTG - Course over ground and ground speed (output)

\$--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	Heading, degrees true	Used
4	x.x	Course over ground, degrees magnetic	Used ^a
5	M	Heading, degrees magnetic	Used
6	x.x	Speed over ground, knots	Used
7	N	Speed, knots	Used
8	x.x	Speed over ground, km/h	Used
9	K	Speed, km/h	Used
10	a	Mode indicator	Used

a. A null field is transmitted if the datum is set to User Defined.

B.1.23 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)	Used
7	xx	Local zone minutes (00 to +59)	Used

B

BAM Bridge Alert Management ,

C

COMSAR Committee on Radiocommunications and Search and Rescue.

D

DC Direct Current

DGNSS Differential GNSS

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.

E

EGNOS European Geostationary Navigation Overlay Service.

G

GAGAN GPS and Geo Augmented Navigation, to improve the accuracy of a GNSS receiver by providing reference signals.

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.

GNSS Global Navigation Satellite Systems

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. A UN organization developing and maintaining regulatory framework for shipping. This framework includes safety, environmental concerns, legal matters, technical co-operation, maritime security and the efficiency of shipping.

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
LW	Long Wave ,
LWE	Light Weight Ethernet.

M

MSAS	Multi-functional Satellite Augmentation System. It supports differential GPS to supplement the GPS system by reporting on the reliability and accuracy of those signals.
MSK	Minimum Shift Keying

P

PPS	Pulse Per Second.
-----	-------------------

R

RAIM	Receiver Autonomous Integrity Monitoring.
RTCM	Radio Technical Commission for Maritime Services, an international standards organization. The Special Committee (SC) 104 has described the Differential Global Navigation Satellite Systems (DGNSS). ,
Rx	Receive

S

SBAS	Satellite Based Augmentation System.
SDCM	System for Differential Corrections and Monitoring, a component of GLONASS.
SLP	Service Location Protocol
STP	Shielded Twisted Pair

T

TMA	Thrane Management Application
TPI	Threads Per Inch
Tx	Transmit

U

UDP	User Datagram Protocol. Part of the TCP/IP suite of protocols used for data transferring. UDP is known as a "stateless" protocol, meaning it doesn't acknowledge that the packets being sent have been received. For this reason, the UDP protocol is typically used for streaming media. While you might see skips in video or hear some fuzz in audio clips, UDP transmission prevents the playback from stopping completely.
UTC	Universal Time, Coordinated. The International Atomic Time (TAI) with leap seconds added at irregular intervals to compensate for the Earth's slowing rotation. Leap seconds are used to allow UTC to closely track UT1, which is mean solar time at the Royal Observatory, Greenwich.

W

WAAS	Wide Area Augmentation System, a navigation aid to improve accuracy and integrity of the GPS signal.
WER	Word Error Rate

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