

## PRODUCT MANUAL

# NAUTICAST B2

## Class-B AIS Transponder

Art. No. 300 1001



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#### GENERAL WARNINGS

All marine Automatic Identification System (AIS) units utilize a satellite based system such as the Global Positioning Satellite (GPS) network or the Global Navigation Satellite System (GLONASS) network to determine their position. The accuracy of these networks is variable and is affected by factors such as the antenna positioning, the number of satellites that are available to determine a position and how long satellite information has been received for. It is desirable wherever possible to verify both your vessel's AIS derived position data and other vessels' AIS derived position data with visual or radar based observations.

The compass safe distance of this unit is 0.55m or greater for 0.3° deviation.

In most countries the operation of an AIS unit is included under the vessel's marine VHF license provisions. The vessel onto which the AIS unit is to be installed must therefore possess a valid VHF radiotelephone license which lists the AIS system and the vessel Call Sign and MMSI number. Please contact the relevant authority in your country for more information.

#### LIMITED WARRANTY

This product is warranted against factory defect in material and workmanship for a period of 24 months from the date of purchase. During the warranty period Nauticast GmbH will repair or at its option, replace the product at no cost to the buyer provided that a return authorization is obtained from Nauticast GmbH, Lützowgasse 12-14 / 3. OG, 1140 Vienna, Austria (see Contact & Support information). This warranty does not apply if the product has been damaged by accident or misuse, or as a result of service or modification by unauthorized service personnel. For authorized service partners see our homepage [www.nauticast.com](http://www.nauticast.com) or contact Nauticast support directly.

Warranty and certification void if device is opened.

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## History of Changes in this Product Manual

Date	Version	Status	Comments
2013-07-31	1.14	Release	First Official Release
2013-08-19	1.15	Release	Editorial Changes
2014-07-14	1.2	Release	Editorial Changes
2014-09-30	2.0	Release	Structure updated, introduced new troubleshooting guide

## Software/firmware dependencies

This revision of the manual is valid for the latest software/firmware versions listed below and any newer releases. Please check [www.nauticast.com/downloads](http://www.nauticast.com/downloads) for available updates.

Date	B2 Firmware	Status	Comments
2014-11-16	FW01.3033-006	Release	Improvements to ship list data, minor parameter changes

Date	Link2AIS	Status	Comments
2013-06-28	3.0	Released	
2014-04-17	3.1	Released	Minor changes in interface
2014-11-25	3.2	Released	Bug fixes, interface changes, new debug mode for data logging

## Safety warnings

This AIS transponder is solely an aid to navigation and can under no circumstances provide complete and accurate navigation information. AIS is not a replacement for vigilant human lookouts and other navigation aids such as RADAR. The performance of the transceiver may be seriously impaired if not installed as instructed in the product manual or due to other factors such as weather and or nearby transmitting devices. Compatibility with other systems may vary and relies on third party systems recognising the standard outputs from the transceiver. The manufacturer reserves the right to update and change these specifications at any time and without notice.

## Safety of Life Systems

Nauticast devices may only be used in safety of life devices or systems with the express written approval of Nauticast. The unsolicited and untested use of Nauticast devices in safety of life devices or systems may jeopardize the safety or the life of the user or other persons.

## Important information for US customers

There are specific laws in the USA regarding the configuration of AIS Class B transceivers. If you are a US resident and intend to use your AIS Class B transceiver in US waters, you should make sure that your retailer has configured your product prior to supplying it to you. If your AIS transceiver has not been pre-configured please contact your dealer for details of how to have it configured. **In the United States the MMSI and static data may only be entered by an authorized dealer; the end user of the equipment is not authorised to enter or change their own vessel data.**

## 1 WHAT IS AIS?

AIS stands for **A**utomatic **I**dentification **S**ystem. AIS increases the navigational safety and helps avoid collisions by interchanging vessel identification and route data between nearby ships and land based stations. This makes identifying ships and their planned course much easier when not in sight (e.g. at night, in radar blind arcs or shadows or at larger distance).

According to IALA regulations, AIS is defined as follows:

AIS is a broadcast transponder system, operating in the VHF maritime mobile band (using two VHF channels: 87B - 161.975MHz and 88B - 162.025MHz). It is capable of sending ship information such as identification, position, course, speed and more, to other ships and to shore. It can handle multiple reports at rapid update rates and uses Carrier Sense Time Division Multiple Access (CSTDMA) technology to meet these high broadcast rates and ensure reliable and robust ship to ship operation.

The IMO defines the performance standards as follows:

Ship to ship working, ship to shore working, including long range application, automatic and continuous operation, provision of information messaging via PC and utilization of maritime VHF channels .

The Modules:

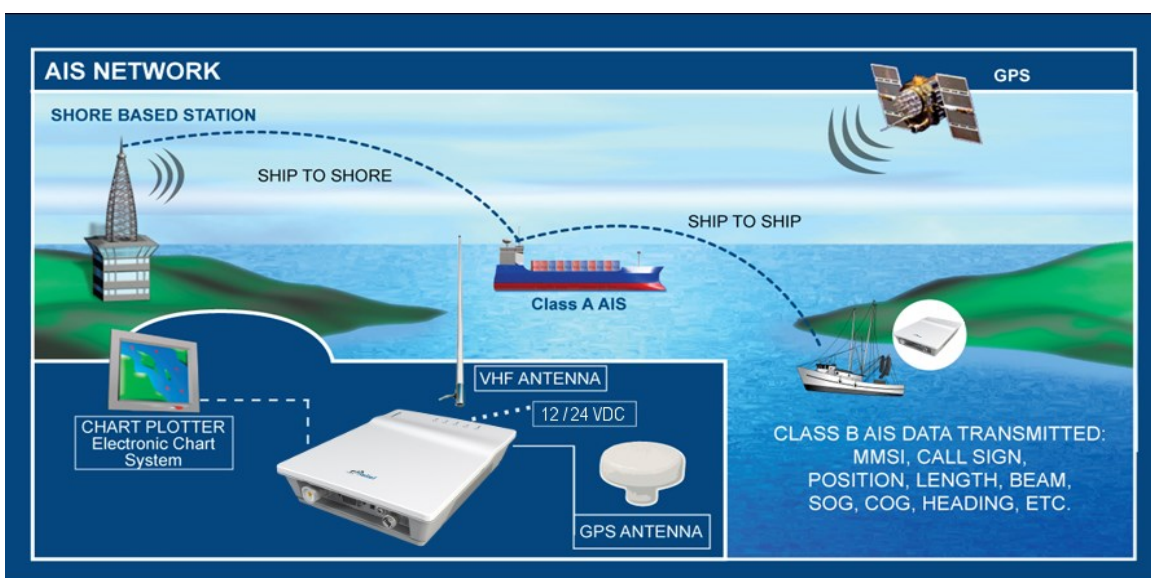
GPS system, AIS Transponder, VHF Antenna, and the Power Supply (appropriate application software connects the individual modules).

AIS systems are required to operate in a variety of modes:

The system shall be capable of

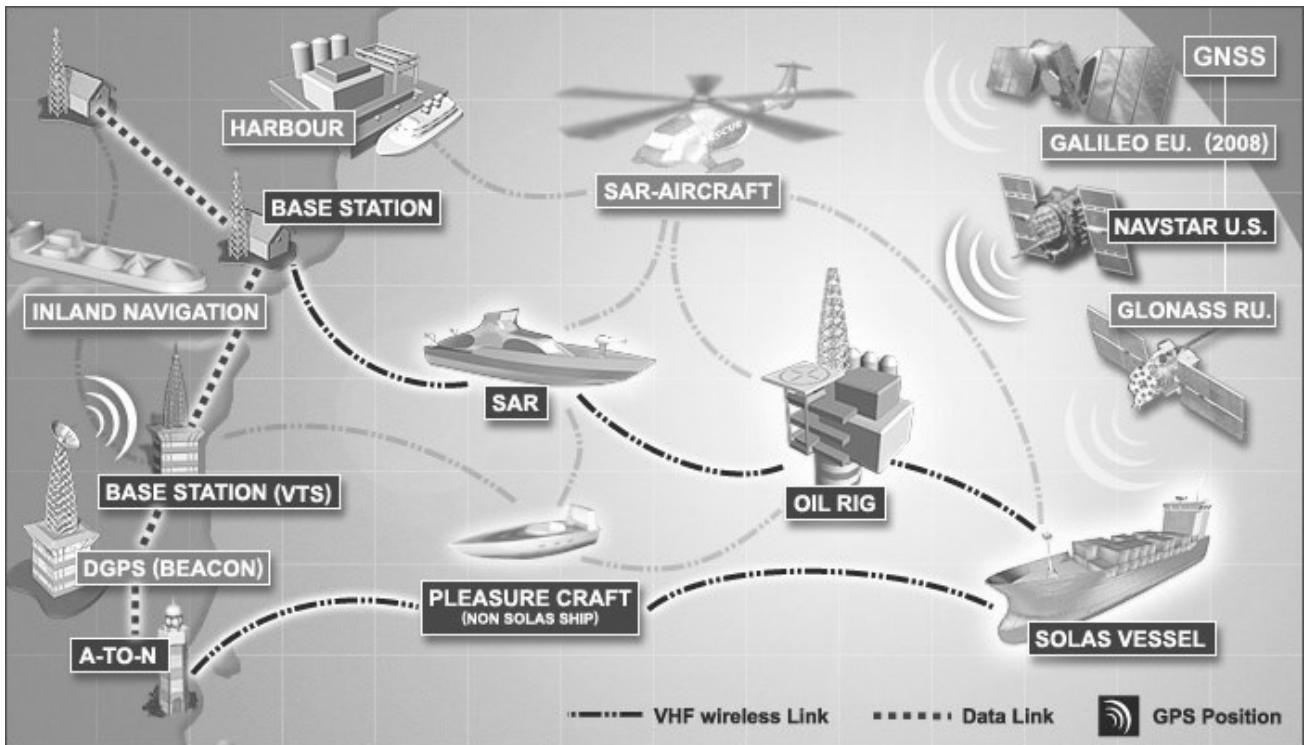
- An "**autonomous and continuous**" mode for operation in all areas. This is the default mode but can be forced to/from the following alternatives by an entitled authority;
- An "**assigned**" mode for operation in an area subject to an entitled authority responsible for traffic monitoring; data transmission interval and/or time slots may be set remotely;
- A "**polling or controlled**" mode, where data transfer occurs in response to polling from a ship or entitled authority.

This illustration depicts a typical AIS System where two or more AIS equipped vessels (and shore based systems) are automatically communicating with each other:



The illustration below depicts a typical Nauticast B2 installation in a common environment. When the Nauticast B2 is connected to the vessel's power supply and both VHF and GPS antenna it fulfils the requirement for standard operation. The scenario shows a full AIS coverage area (including all applications and complete shore infrastructure).

### 1.1 AIS Classes



There are two classes of AIS units fitted to vessels, Class-A and Class-B. In addition to those, AIS base stations may be employed by the Coastguard, port authorities and other authorized bodies. AIS units acting as Aids to Navigation (A to N) can also be fitted to fixed and floating navigation markers such as channel markers and buoys.

Class-A units are a mandatory fit under the safety of life at sea (SOLAS) convention to vessels above 300 gross tons or those that carry more than 11 passengers in international waters. Many other commercial vessels and some leisure craft are fitted with Class-A units voluntarily. Class-B units are designed for vessels which do not fall under the mandatory Class-A requirements.

**The Nauticast B2 is a fully compliant Class-B AIS unit.**



Information transmitted from vessels that have a Class-A AIS transponder on board include:

- Name of Vessel
- Speed (SOG)
- Position
- MMSI Number
- Rate of Turn
- Destination
- Call Sign
- Course (COG)
- Navigational Status
- IMO Number
- Vessel Dimensions
- ETA
- Type of Vessel
- Heading
- Cargo
- Status
- Draft

Information transmitted from vessels that have a Class-B AIS transponder on-board include:

- Name of Vessel
- Speed (SOG)
- Position
- MMSI Number
- Call Sign
- Vessel Dimensions
- Type of Vessel
- Heading
- Course (COG)

## 1.2 Position Information Source

The marine AIS system uses position information derived from networks such as the Global Positioning Satellite (GPS) or the Global Navigation Satellite System (GLONASS) in order to determine the location of the AIS unit and thus the vessel to which it is fitted. The Nauticast B2 utilizes the GPS satellite network.

## 2 Installation

### 2.1 The contents of this box

Before proceeding with the installation of the Nauticast B2 please check the contents of the box, which should include:

- The Nauticast B2 AIS transponder
- Mounting plate
- Power Cable
- USB Cable
- VHF Antenna with connection cable and mount
- GPS Antenna with connection cable and mount
- Documentation and Software CD containing:
  - Nauticast B2 Product Manual
  - Nauticast B2 Product Sheet
  - Link2AIS Setup
  - Link2AIS User Guide
  - + other Documentation and Information Material

Installation should be completed in 3 separate steps. Complete each step before proceeding to the next:

1. Install the Link2AIS software onto your PC (please see our website <http://www.nauticast.com/content/link2ais> for the latest version).
2. Enter your ship's data (MMSI, Vessel Name, Call sign, Length, Beam etc.) into the Link2AIS software and save them onto the Nauticast B2 (only USB connection necessary).
3. Install your Nauticast B2 hardware to your vessel.

## 2.2 Software Prerequisites

The Link2AIS-software is designed to operate with Microsoft Windows® operating systems. The recommended minimum system requirements are:

- Microsoft Windows® XP SP2 or above till Microsoft Windows® 8.1.
- Recommended screen resolution of 1280 x 1024 (although the Link2AIS-software can operate on screens with smaller resolution, with the use of scroll bars).
- One free USB port – minimum USB 2.0.
- A pointing device (mouse or equivalent).
- An Internet Browser used for the help system.

## 2.3 Installing the Link2AIS software onto your PC

The Link2AIS-software is part of the Nauticast B2-bundle or may be downloaded from the webpage of Nauticast GmbH. Unzip the package when necessary, locate the file Setup.exe in the "Software" folder on the enclosed CD and double click on this file to start the installation process. Follow the screen prompts to install the Link2AIS software.

**\* Refer to the Software User Guide ('Help – Link2AIS-Help', section Documentation) for detailed installation instructions.**

A Start Menu folder and a shortcut on your desktop will be created with the name 'Link2AIS'. This short cut should be used to launch the application.

## 2.4 Enter your ship's data

NOTE: To program your Nauticast B2 you will need to connect it to a personal computer or a notebook with the Link2AIS software installed. There is no external power source needed when using a USB connection. If you intend to use the optional data cable (product no.: 3001004) on the vessel, we recommend you still perform the configuration of the Nauticast B2 via USB, in order to make programming your device easier.

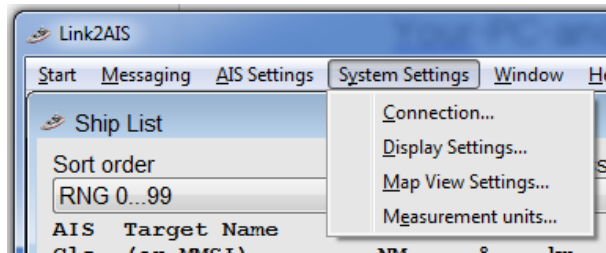
### 2.4.1 Connecting the Nauticast B2 to your PC

- Connect the Nauticast B2 to your PC/notebook using USB. The LEDs on the device will first cycle through. Then the PWR LED and the ERR LED will stay on, while the TX LED flashes. This is the normal system behaviour if the device is only connected to the USB port and no antennas are attached.  
Make sure the device is recognized correctly by your PC (Windows shows a message on the task panel what COM port has been assigned).

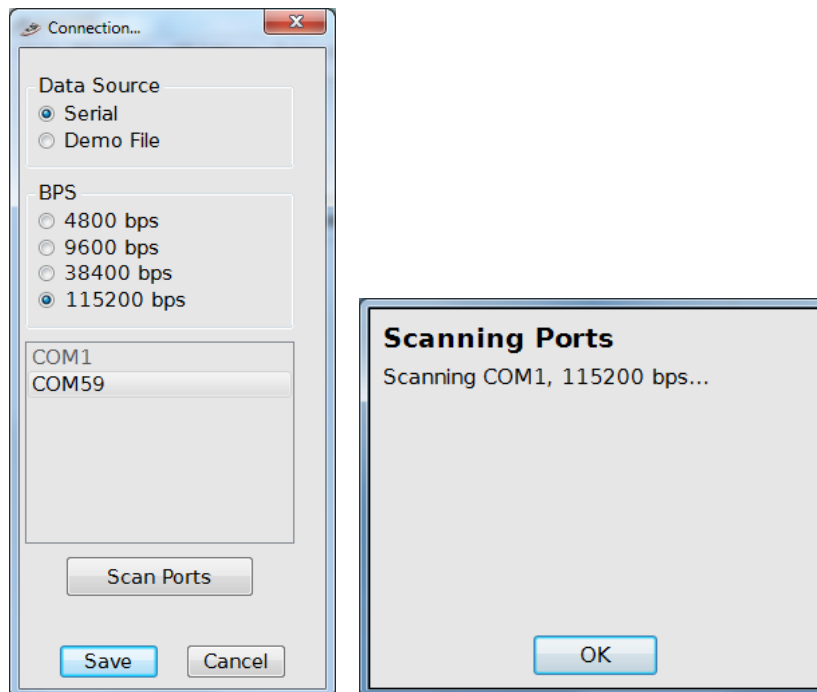




- Start the Link2AIS software program on the PC.
- Open the connection settings:



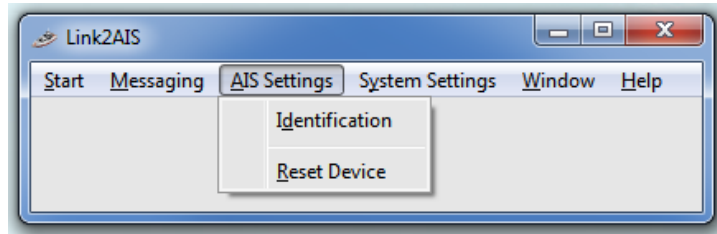
- By pressing 'Scan Ports' the software checks the available ports for the device and gives you a suggestion when ready. The serial port (port number can be found in the device manager of Windows) can also be selected manually from the menu. Click 'Save' when the right port is selected. For the Nauticast B2 115200 bps need to be used.



- Once a connection is established the application is ready to use. Any error messages shown during USB-only connection can be ignored (such as send and receive errors, position errors etc.).
- There is a context based Help available which explains what each data entry field means and what sort of data is expected. The help system is started by pressing the F1 key on your PC or via the menu "Help".

#### 2.4.2 Configuring Software and Nauticast B2 static data

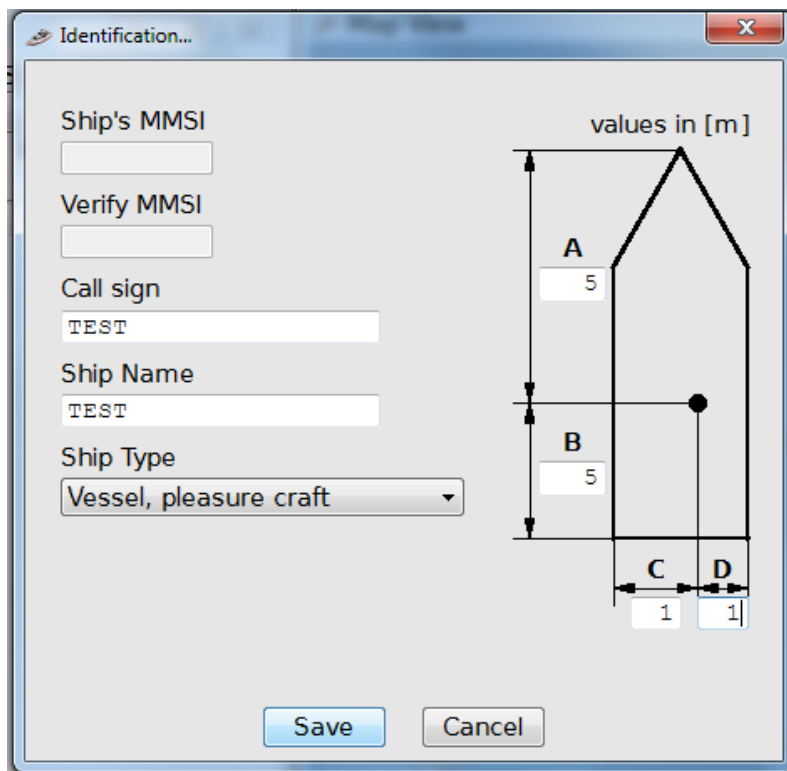
- The functions of Link2AIS are arranged in a series of menus. Depending on the version of Link2AIS installed not all menu entries shown below may be visible.
- Open 'AIS Settings' - 'Identification'. This will display the 'Static Data' for the connected transponder. This includes the vessel's name, call sign, MMSI number and other fixed information.



- To configure the transponder all of the data fields must be filled and saved.

#### ⓘ CAUTION:

For security reasons the MMSI of the vessel cannot be changed by the end user once they are programmed. Do NOT program the MMSI unless you are certain you have the correct information. Please check the number entered carefully. If the MMSI is programmed incorrectly or has to be changed at a later date you have to contact your supplier or Nauticast GmbH ([www.nauticast.com](http://www.nauticast.com)) for a MMSI reset.



Enter vessel information items in the appropriate boxes:

- MMSI number - enter the vessel's Maritime Mobile Service Identity number (see warning and further notes regarding MMSI below!)
- Call Sign - enter the vessel's radio call sign (7 characters maximum)
- Ship name - enter the name of the vessel (20 characters maximum)
- Select the most appropriate vessel type from the drop down menu.
- Enter the vessel's dimensions as follows, rounded to the nearest meter:
  - Dimension A - distance from GPS antenna location to bow
  - Dimension B - distance from GPS antenna location to stern
  - Dimension C - distance from GPS antenna location to max. port
  - Dimension D - distance from GPS antenna to max. starboard



**CAUTION:**

**If no valid MMSI is entered (MMSI is pre-set to 00000000) the AIS transponder will only operate in Receive mode, which means the vessel's position is NOT transmitted. As a consequence, the TX LED will remain on (indicating a transmission error) even when all antennas and main power are connected.**

When you have entered all of the vessel's data click the 'Save' button to program this configuration into the AIS transponder.

A warning will be displayed asking you to verify the MMSI number. The MMSI can only be changed by your dealer once programmed into the transponder. You can change all other data (except the MMSI) at any time, should the need arise. Please check the MMSI and if the number is incorrect, click the 'No' button to cancel programming of the MMSI.

Click the 'Yes' button if the MMSI is correct.

When reopening the 'Identification' window you can now see the vessel information stored on the device. The MMSI number will be displayed with a grey background, to indicate that it has been programmed and cannot be changed.

You can now disconnect the device from the USB cable / PC and install the hardware on your vessel. A PC is not necessary for normal operation but can be useful to display all AIS data, maps and system status. For connecting a Chart Plotter please refer to section 3 "Connecting external equipment".

For additional information about the Link2AIS software please refer to the Link2AIS Software User Guide ('Help – Link2AIS-Help', section Documentation).

## 2.5 Installing your Nauticast B2 hardware

### 2.5.1 Installation hints

We strongly recommend that:

- The GPS antenna is mounted in an elevated position and free of shadow effects from the ship's rig or other super-structure.
- The GPS antenna has a free view through 360 degrees with a vertical angle of 5 to 90 degrees above the horizon.
- As the received GPS signal is very sensitive to noise and interference generated by other on-board transmitters, ensure that the GPS antenna is placed as far away as possible from radar, Inmarsat and Iridium transmitters and that the GPS antenna is not mounted within the direct radar or Inmarsat beams.
- It is also important that the MF/HF and other VHF transmitter antennas are kept as far away as possible from the GPS antenna. It is good practice never to install a GPS antenna within a radius of 2 meters from these antennas.
- The VHF antenna should be mounted with at least two meters of vertical separation from any other VHF antenna, e.g. those used for speech or DCS communication.
- The Nauticast B2 transponder should be mounted on a vertical bulkhead or surface with the end featuring connectors / cables in the downward position. Use the provided mounting plate. The mounting location must be protected from weather (e.g. rain, snow, ..) and direct water spray. The best place, therefore, is at the navigation desk, under the helm station or some other suitable location in the cabin.
- Safe distance to other electronic equipment should be half a meter.
- The GPS, VHF, power and data cables need to be secured to the bulkhead within 6" to 12" (15 to 30cm) from the connectors.

#### **CAUTION:**

- Use only the parts and cables provided with the Nauticast B2 set or Nauticast accessories to connect antennas, power and display devices in order to ensure the proper functioning of the system. When attaching other parts to the system follow the technical recommendations in section 4.3 "Using different antennas".
- Do not connect the Nauticast B2 unit to a main line 110/220V AC electrical supply, as it could cause electric shock or fire. Only use 12-24V DC power sources!
- Do not connect the Nauticast B2 unit to a DC supply exceeding 24V DC or reverse the supply polarity, because it may cause damage to the unit. Ensure that the power supply is limited in accordance with EN 60950-1:2006 and protected with a fuse or breakers not exceeding the specifications listed in this manual.
- The length of either data or power cable must not exceed 3 meters.
- Do not apply excessive force to connectors during installation!
- The Nauticast B2 unit is designed for operation in the temperature range -25 °C to +55 °C. Do not install (or use) the Nauticast B2 unit in environments which exceed this range.
- Connecting a mismatched VHF antenna, leaving the VHF antenna port disconnected or shorting the VHF antenna port will activate the VSWR alarm, will cause the unit to stop sending position reports and can cause damage to the transponder and activate the Error LED.

### 2.5.2 Connecting the antennas

Connect the down-lead from the VHF antenna to the VHF antenna port and connect the down-lead of the GPS antenna to the GPS antenna port. Please see 8.1 APPENDIX A – Block Diagram for proper antenna installation.

### 2.5.3 Connecting Power

Connect the power cable to a 12 VDC or 24 VDC power supply, capable of supplying 2A peak to the DC power lead (red = positive, black = negative) and plug the power connector into the Nauticast B2. Please see the Appendix B of this manual for details of the power, data and RF cables supplied.

### 2.5.4 Mounting the Nauticast B2

Attach the mounting plate with Phillips self tapping head screws (10-32 x 1,2) on a vertical surface. Please see Appendix C for the mounting plate's exact dimensions.

Then insert the Nauticast B2 main unit and press down firmly until it snaps in.



### 2.5.5 Installation Check

You now have successfully completed the installation of your Nauticast B2 AIS system. After connecting the main power supply allow the system 5 minutes to calibrate and start operation.

Then check the LED status. Normal operation is indicated by:

PWR: green (note: LED will be a dimmer shade of green on USB power supply as well)  
However, USB-only power supply is NOT sufficient for full operation,  
so make sure 12-24VDC main power is actually supplied!

TX: off

ERR: off

CH1, CH2: blinking green, amber or red  
(when actual transmissions occur, dark in between transmissions)

When you encounter a different behaviour please consult section 4 Operation of your Nauticast B2.

### 3 Connecting external equipment

External equipment can be any device complying with NMEA0183 standard or a PC with appropriate AIS software installed. For information about the data see section 4.2 Data Port Messages (NMEA 0183).

#### 3.1 Connecting to a PC

The connection to a PC can be established either via USB (provides a Virtual Serial Interface) or with the optional Data Cable (prod. No.: 3001004) and a serial interface (RS232), if the latter is available.

#### 3.2 Connecting to other marine equipment via NMEA0183 (optional data cable required)

All other devices that support the NMEA0183 standard can be connected with Cable 1 (RS422) of the optional Data Cable (prod. No.: 3001004). (see Appendix B for more details).

**Note: Connections via USB and RS232 use a Baud rate of 115200 by default. If you are connecting through RS422 the default Baud rate is 38400. Please make sure to adjust the port settings on any connected equipment accordingly.**

#### 3.3 Connecting an alarm relay (optional data cable required)

An alarm relay (prod. no.: 3001009) can be connected with Cable 3 of the optional Data Cable (prod. no.: 3001004). (see Appendix B for more details).

#### 3.4 Silent mode (optional data cable required)

By connecting a silent mode switch with Cable 3 of the optional Data Cable (prod. no.: 3001004) the transmitting function of the Nauticast B2 can be switched off on on. (see Appendix B for more details).

Note: The TX LED will start flashing when the silent mode is active.

#### 3.5 External LED status indicators (optional data cable required)

If the Nauticast B2 is not visible and the status LEDs should still be monitored, external LEDs can be connected with Cable 4 of the optional Data Cable (prod. no.: 3001004). (see Appendix B for more details).



**Note: The optional data cable provides the functions on the 4 output cables simultaneously. Therefore only one cable is needed.**



## 4 Operation of your Nauticast B2

### 4.1 Interpreting Status LEDs

Please note that a proper 12 / 24 VDC power supply is necessary for the B2 to operate flawlessly. The USB connection will not suffice!

All Class B Devices and hence the Nauticast B2 have a lower priority than Class A devices and base stations whenever the AIS-channel is highly loaded.

Class B devices send with lower power than class A devices. Therefore a class A device may be visible to the Nauticast B2, while the reverse may sometimes not be the case.



#### 4.1.1 PWR

A green LED indicates that the unit is connected to an external power source.

NOTE: LED will be a dimmer shade of green on USB power supply as well; however, USB-only power supply is NOT sufficient for full operation, so make sure 12-24VDC main power is actually supplied if you want to operate the B2 in normal operational mode (i.e. transmitting AIS data to other ships)

#### 4.1.2 TX (Timeout)

This LED will show up in amber if the unit has failed to transmit a position report during the last two reporting intervals.

Reasons for missing reporting intervals might be (examples):

- Message 23 "quiet period"
- A high VDL load
- Positional information unavailable
- Transmissions disabled
- Irregularities in the power supply (USB power alone is insufficient for sending!)
- Connection problems with one of the antennas
- Unit has not been configured

#### 4.1.3 ERR - Error

An amber LED shows up if the unit has failed its integrity test. The unit is equipped with built-in integrity tests (BIIT) which is performed in parallel with standard AIS operation.

The BIIT provide the following test functions:

- Receiver monitoring of background noise level – indicates if background noise level exceeds -77dBm

- GPS antenna connection – indicates open or shorted circuit
- GPS module – indicates if module has failed

#### 4.1.4 CH1 and CH2 – channel information

- Two tri-colour LEDs briefly light up (flash), indicating activity of channel 1 and channel 2:
- Green flash: channel has received an AIS message
- Amber (red and green): channel is transmitting
- Red indicates the channel is in DSC mode

## 4.2 Data Port Messages (NMEA 0183)

The data port will output the following:

- Details of relevant AIS transmissions received (VDM messages)
- Details of AIS transmissions sent (VDO messages)
- Details of channel management messages received (VDM messages)
- Alarm messages generated by the BIIT function (ALR messages)
- System notifications generated by the transponder (TXT messages)
- GPS information (RMC, GSA, GSV)

The data port will accept the following inputs:

- Programming information (SSD, proprietary command PNAU)
- Alarm acknowledgements (ACK)

For more information about the interface protocol refer to the latest "PROTOCOL SPECIFICATION" of the Nauticast B2 or contact our Technical Support Team (see Section: Contact & Support information).

## 4.3 Using different antennas

It is possible to use different antennas than the ones provided with the Nauticast B2. For instance, a combined antenna for VHF and GPS ("combi antenna") can be used, if there is not enough space to fit two antennas on the vessel without disturbing other equipment. A combined antenna solution is available on our website (prod. no.: 1001027 – "AC Marine VHF/GPS-2").

If other antennas are being used, please take note of the following minimal requirements:

### 4.3.1 GPS Antenna

The Nauticast B2 has a TNC female bulkhead connector. This port provides a 5V DC feed for an active GPS antenna, required by the Nauticast B2 unit (i.e. it should incorporate an LNA). Therefore, the GPS antenna must be an active type using 5V. The antenna must be suitable for marine applications (index of protection, ruggedness, means of mounting, etc.). An antenna should be selected with a gain (in dB) depending on the length of cable between the antenna and the AIS unit. After subtraction of cable and connector losses a minimum total gain of 20 dB should be available at the Nauticast B2 unit GPS antenna connector. The GPS antenna must be a dedicated antenna, i.e. not shared with any other GPS receiver. Installation of the GPS antenna is crucial for flawless operation of the built in GPS receiver, which in turn is used for timing of the transmitted time slots and for the supply of navigational information.

### 4.3.2 VHF Antenna

The Nauticast B2 has a UHF female bulkhead connector . The VHF antenna employed for AIS use:

- Must be a dedicated antenna, i.e. not shared with any other VHF transmitter/receiver.
- Must be suitable for marine applications (index of protection, ruggedness, means of mounting, etc.).
- Should be omni-directional and vertically polarized with unity gain (0 dB) with a bandwidth sufficient to maintain VSWR <1.5 over the frequency range 156 – 163 MHz. As a minimum the 3dB bandwidth must cover the two AIS channels and the DSC Channel.
- Should be mounted at least 2 meter apart from any other VHF antenna used for speech or

DCS communication.

#### 4.4 Standards

The Nauticast B2 complies with all standards under the European R&TTE directive Article 3.1(a), 3.1(b), 3.2 and 3.3(e). Among other, these standards have been implemented:

- IEC 62287-1: 2006-03 Maritime navigation and radio communication equipment and systems – Class-B ship borne equipment of the automatic identification system (AIS) – Part 1: Carrier-sense time division multiple access (CSTDMA) techniques
- IEC 60945: 2002-08 Maritime navigation and radio communication equipment and systems – General requirements – Methods of testing and required test results
- IEC 61162-1: Maritime navigation and radio communication equipment and systems – Digital interfaces – Part 1: Single talker and multiple listeners
- IEC 61108-1: GLOBAL NAVIGATION SATELLITE SYSTEMS (GNSS) – Part 1: Global positioning system (GPS) -Receiver equipment - Performance standards, methods of testing and required test results
- EN 301 843-1 v2.1: Electromagnetic compatibility and Radio spectrum Matters (ERM); Electromagnetic Compatibility (EMC) standard for marine radio equipment and services; Part 1: Common technical requirements
- EN 50383: 2002 Basic standard for calculation and measurement of electromagnetic field strength and SAR related to human exposure from radio base stations and fixed terminal stations for wireless telecommunications system (110MHz – 40GHz)
- EN 60950-1:2006 Information technology equipment – Safety – Part 1: General requirements

#### 5 Maintenance and Troubleshooting

**WARNING:** Unauthorized opening of the Nauticast B2 (case) will invalidate the warranty!

**CAUTION:** Avoid using chemical solvents to clean the Nauticast B2 as some solvents can damage the case material. To clean, wipe down with a damp cloth.

**NOTE:** The Nauticast B2 contains no user serviceable parts.

If you are experiencing unexpected behaviour or malfunctioning of the Nauticast B2, please follow the instructions in section 8.8 **Appendix H – Diagnostics and Troubleshooting**. If the problem is still unsolved, please attach a PC, start Link2AIS and log AIS data in operation for at least 2-3 hours as described in the same section. Contact [support@nauticast.com](mailto:support@nauticast.com) with the log file attached.

#### 6 Contact & Support information

Contact your local dealer for Nauticast B2 support. Please see our Website [www.nauticast.com](http://www.nauticast.com) for Dealer / Service Listings.

##### **Nauticast GmbH**

Lützowgasse 12-14 / 3. OG  
1140 Vienna  
Austria

Tel: +43 (1) 5 237 237-223  
Fax: +43 (1) 5 237 237-150  
Mail: [technical.support@nauticast.com](mailto:technical.support@nauticast.com)  
Web: [www.nauticast.com](http://www.nauticast.com)

## 7 Technical Details

### 7.1 Product Specification

Product Number:	3001001
Model Number:	Nauticast B2
Size:	195x145x35mm
Power:	12 VDC (24VDC) 3W average power consumption, 12W peak consumption 1A (0,5A) peak current
Electrical Interfaces:	USB, RS232: Baud rate 115200 RS422: Baud rate 38400
VHF receivers:	2 AIS receivers (shared between AIS and DSC) 1 DSC receiver (shared between AIS and DSC) Frequency 156–162MHz Sensitivity @ -107dBm < 20% PER
VHF transmitter:	1 Transmitter Output PWR 2W nominal Frequency 161–162MHz
Internal GPS Receiver:	48 channel 1 Hz Update rate 5V DC Antenna feed IEC61108-1 compliant
5 LEDs	
PWR	Green Connected to power supply (both USB and main!)
TX	Amber Transmit Timeout
ERR	Amber Rx noise level >77dBm GPS antenna connection failure GPS module failure
CH1 Tricolour	Green - Receive AIS data Amber - Transmit AIS data Red - DSC data mode
CH2 Tricolour	Green - Receive AIS data Amber - Transmit AIS data Red - DSC data mode
Environmental Class	"Protected" according to IEC 60945-Ed.4
Compass Safe Distance	0,55m

### 7.2 Information Reporting Intervals

The Nauticast Class-B AIS will transmit position reports (Message 18) in reporting intervals of

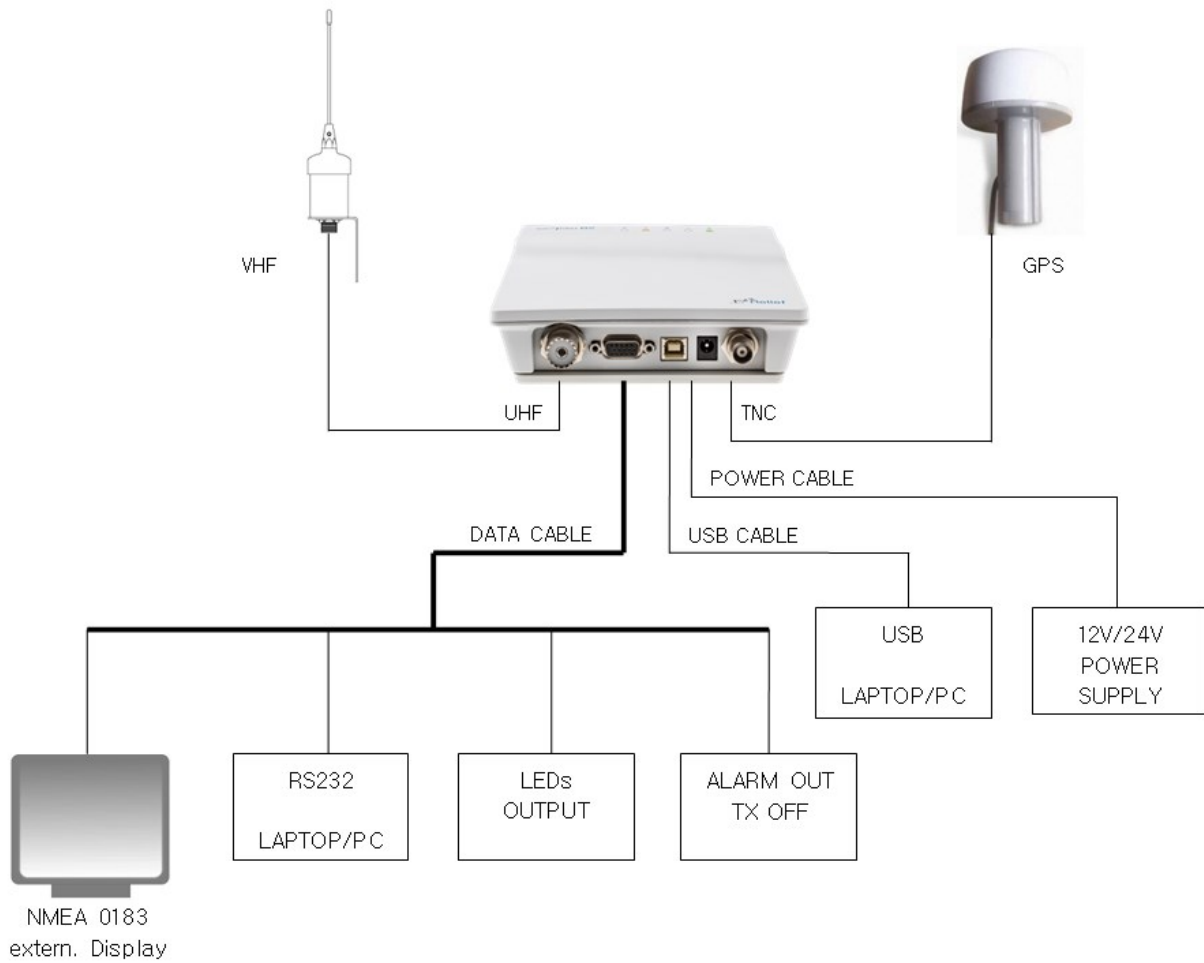
- Every 30 seconds: if Speed over Ground (SOG) is > 2 kn;
- Every 3 Minutes: if (Speed over Ground) SOG is ≤ 2 kn;
- These transmission intervals will be observed only if the device is connected to 12-24VDC power supply; the device will not transmit when connected to USB power supply alone!

Transmissions by any class B device, and therefore also the B2, are subject to available time slots in the broadcast area of the device; e.g. a command received by Message 23 or a large number of class A devices can override the reporting interval!

Static Data sub messages 24A and 24B will be transmitted every 6 minutes in addition to and independent of the position report.

## 8 Appendix

### 8.1 APPENDIX A – Block Diagram



#### System Block Diagram

**(Note: Mount your unit with cable/connector side down)**

Power supply, PC, NMEA compatible devices not included

Data Cable optional

## 8.2 APPENDIX B – Pin Layout / Cable Connections

### Class-B POWER CABLE

Description	Wire Type	Color	AWG
12VDC-24VDC +	Copper	RED	24
GND -	Copper	BLACK	24

### Class-B DATA CABLE

Description	DB15	Wire Type	Color	AWG	CABLE #
RS422 TX A (output)	15	Copper	YELLOW	24	CABLE 1
RS422 TX B (output)	5	Copper	GREEN	24	CABLE 1
RS422 RX A (input)	4	Copper	WHITE	24	CABLE 1
RS422 RX B (input)	10	Copper	GREY	24	CABLE 1
RS232 TX (output)	9	Copper	GREEN	24	CABLE 2
RS232 RX (input)	13	Copper	WHITE	24	CABLE 2
GND	2	Copper	BROWN	24	CABLE 2
GND	7	Copper	BROWN	24	CABLE 3
TX OFF (silent mode)	6	Copper	GREEN	24	CABLE 3
ALARM OUT	11	Copper	YELLOW	24	CABLE 3
+	14	Copper	GREY	24	CABLE 3
CH2 LED RED	3	Copper	BROWN	24	CABLE 4
TX TIMEOUT LED	8	Copper	WHITE	24	CABLE 4
ERROR LED	12	Copper	YELLOW	24	CABLE 4
CH1 LED RED	1	Copper	GREEN	24	CABLE 4
+	14	Copper	GREY	24	CABLE 4

### Use of the Data Cable (Part No. 300 1004)

#### CABLE 1:

Connect the appropriate cable ends to the designated NMEA 0183 device (Baud rate 38400).

Wire end Nauticast B2	Possible end of attached NMEA device
RS422 TX A, yellow	connect to RX A (+)
RS422 TX B, green	connect to RX B (-)
RS422 RX A, white	connect to TX A (+)
RS422 RX B, grey	connect to TX B (-)

#### CABLE 2:

Connect the D-SUB 9-pin connector to a matching RS232 serial interface (directly to the PC or using a serial to USB adapter). This connection uses a Baud rate of 115200 by default.

#### CABLE 3:

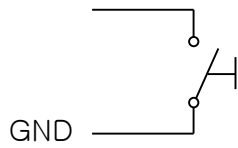
##### TX OFF:

You have to connect a switch between TX OFF (green) and GND (brown). To turn transmission off, the switch has to be activated:

TX OFF

TX OFF





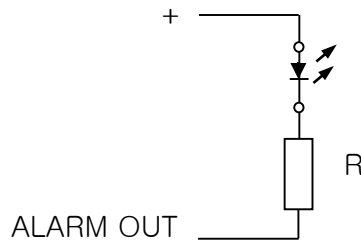
Transmission ON



Transmission OFF

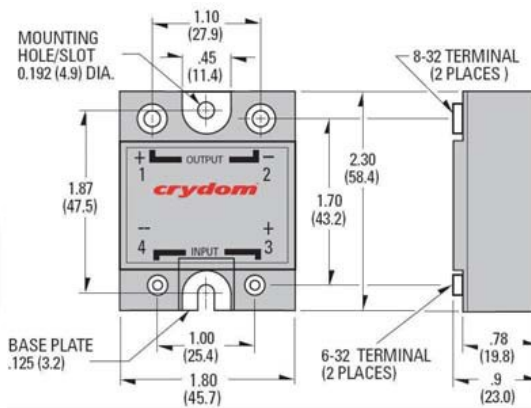
**ALARM OUT:**

If you want to signal an alarm with a LED only, you can connect the LED with a series resistor R between + (grey) and ALARM OUT (yellow). Depending on the Voltage used for the Nauticast B2 you either have to use a 470Ω (calculated 500Ω) resistor (LED:  $U_F=2V$ ,  $I_F=20mA$ ) when using 12VDC or a 1kΩ (calculated 1100Ω) when using 24VDC. See calculation in the Section for CABLE 4.

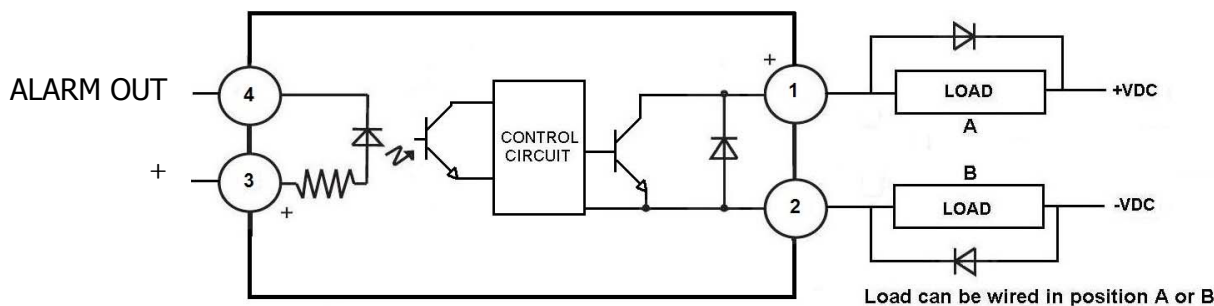


**How to connect a LED to Alarm OUT**

The next figures show the alarm relay (prod. no.: 3001009) and its dimensions, explain how to connect the alarm relay to the data cable and how to connect the load (alarm circuit) to the alarm relay. The input voltage of the alarm relay is matched with the operating voltage of the Nauticast B2. The operating voltage of the alarm relay is 3 to 60 VDC with a load current of 0.1 to 2 A (3A when using a heat sink).



**Alarm Relay with dimensions**

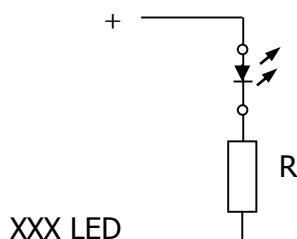


DC Inductive loads must be diode suppressed to prevent damage to SSR

### Connection of the Alarm Relay

#### CABLE 4:

Depending on the Voltage used for the Nauticast B2 you have to calculate the series resistor which is connected with the LED between the + wire (grey) and the OUTPUT wire (CH1 LED RED, green; CH2 LED RED, brown; TX TIMEOUT LED, white; ERROR LED, yellow). A series resistor of 330Ω (calculated 350Ω) for 12VDC and 910Ω or 1kΩ (calculated 950Ω) for 24VDC are needed - see calculation below.



### How to connect a LED to XXX LED OUT

Calculation of the series resistor: Used variables

U... operating voltage of the Nauticast B2

U<sub>F</sub>... Forward Voltage of LED [V]

I<sub>F</sub>... Forward Current of LED[V]

R... Series Resistor[Ω]

P... Power consumption of the resistor[W]

$$R = \frac{U - U_F}{I_F}$$

Examples:

U=12V, U<sub>F</sub>=2V, I<sub>F</sub>=20mA:

$$R = \frac{12V - 2V}{0.02A} = \frac{10V}{0.02A} = 500\Omega$$

As there is already a 150Ω resistor included for the LED OUT ports, you have to subtract this from the 500Ω. Therefore 350Ω is the result.

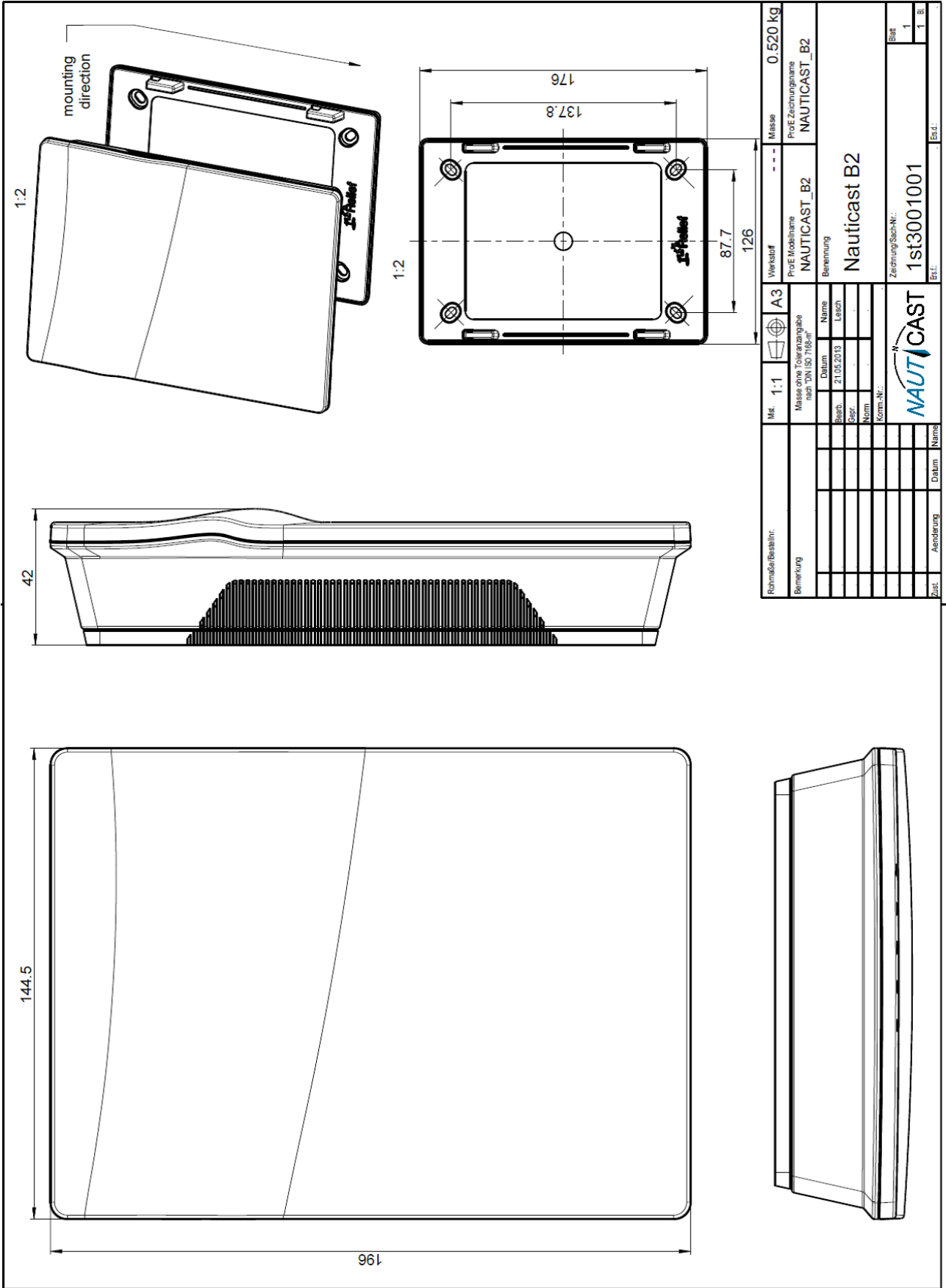
(!) The ALARM OUT has no resistor included therefore 500Ω is the result. (see CABLE 3)

U=24V, U<sub>F</sub>=2V, I<sub>F</sub>=20mA:

$$R = \frac{24V - 2V}{0.02A} = \frac{22V}{0.02A} = 1100\Omega$$

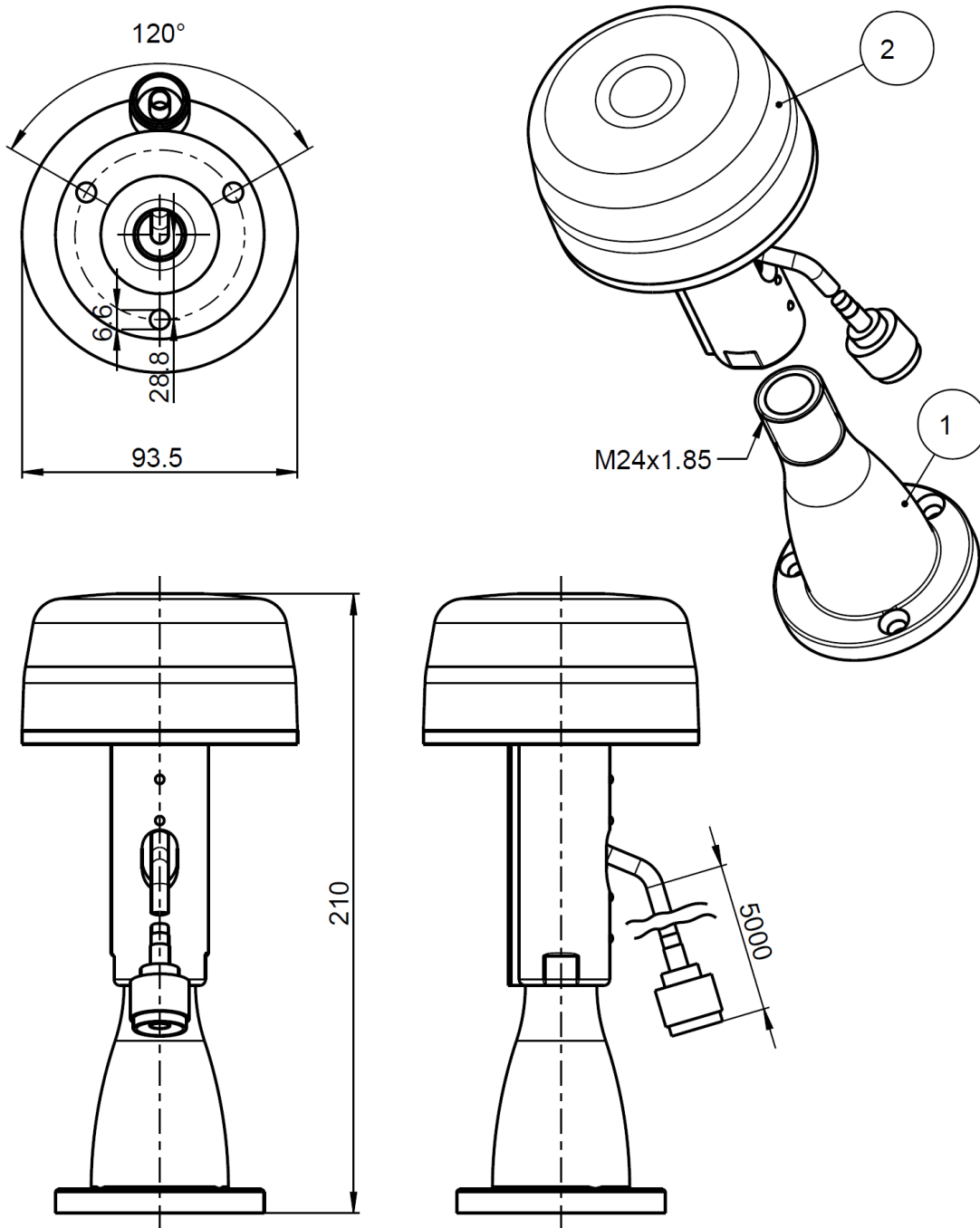
As there is already a 150Ω resistor included for the LED OUT ports, you have to subtract this from the 1100Ω. Therefore 950Ω is the result. (!) ALARM OUT has no resistor included, therefore the result is 1100Ω (see CABLE 3).

### 8.3 APPENDIX C – Dimensions Nauticast B2



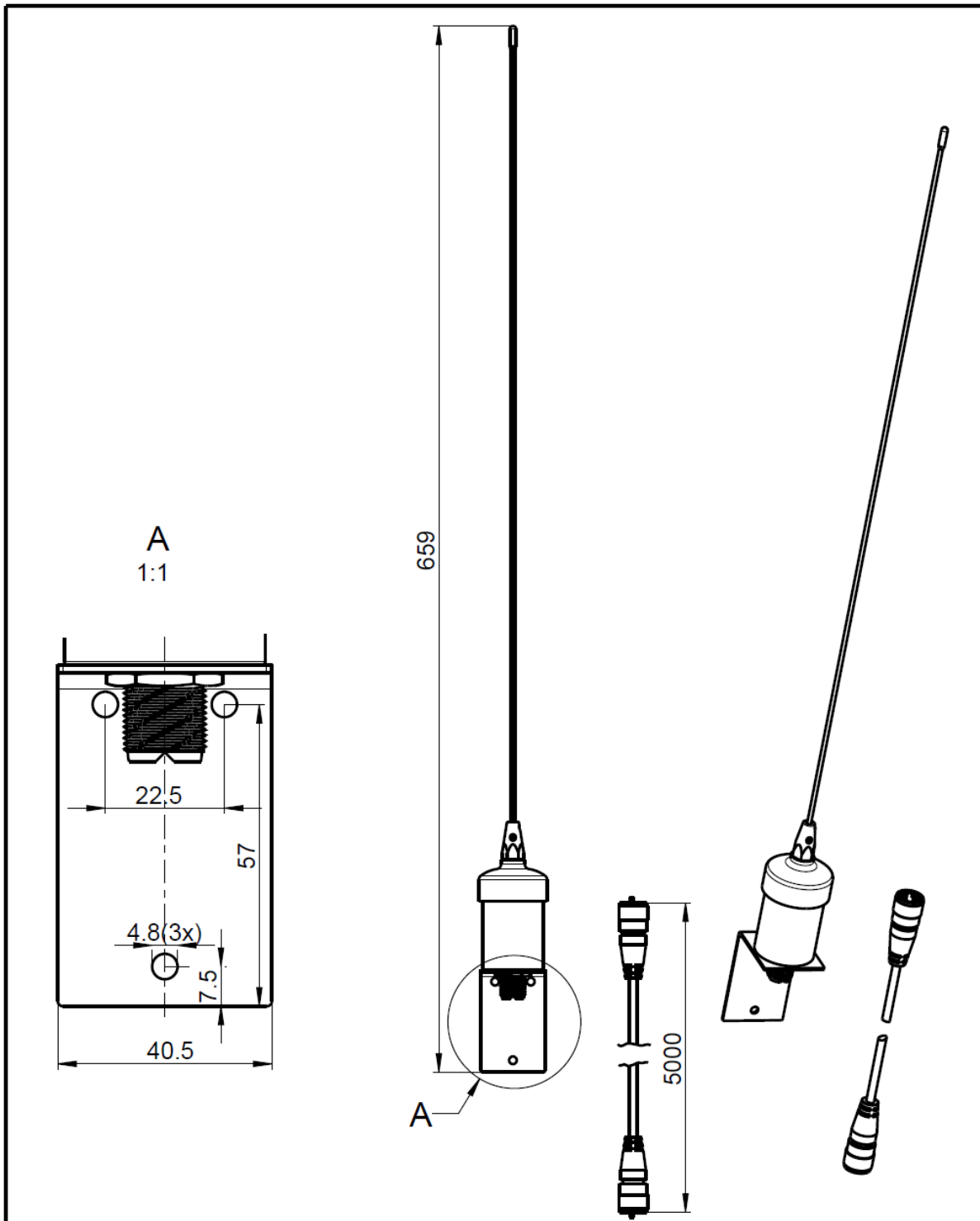
### 8.4 Appendix D – GPS Antenna

Pos.	Benennung	Sachnr./Normbez.	Werkstoff	Masse	Anz.
1	GPS Antenna mount	1st3001002-2		0.030	1
2	AIS GPS Antenna with 5m cable	1st3001002-1		0.335	1



Rohmaße/Bestellnr.		Mst. 1:2		A4	Werkstoff	Masse 0.365 kg
Bemerkung		Masse ohne Toleranzangabe nach "DIN ISO 2768-m"			Pro/E Modellname AIS_GPS_ANTENNA	Pro/E Zeichnungsname BBTGPS
		Datum	Name		Benennung	
		Bearb. 22.05.2013.	Lesch		AIS GPS Antenna	
		Gepr.				
		Norm				
		Komm.-Nr.:				
					Zeichnung/Sach-Nr.:	Blatt
					1st3001002	
Zust.	Aenderung	Datum	Name	Ers.f.:	Ers.d.:	1 Bl.

## 8.5 Appendix E – VHF Antenna




Rohmaße/Bestellnr.	Mst. 3:10		A4	Werkstoff	Masse 0.224 kg		
Bemerkung	Masse ohne Toleranzangabe nach "DIN ISO 2768-m"			Pro/E Modellname VH-3200_EXTERIOR	Pro/E Zeichnungsname VH-3200_EXTERIOR		
		Datum	Name	Benennung AIS VHF Antenna			
		Bearb.		Zeichnung/Sach-Nr.: 1st3001003			
		Gepr.				Blatt 1	
		Norm				1 Bl.	
		Komm.-Nr.:		Ers.f.:	Ers.d.:		
Zust.	Aenderung	Datum	Name				

## 8.6 Appendix F – Declaration of Conformity

EG – Konformitätserklärung  
 EC – Declaration of Conformity  
 Déclaration CE de Conformité



Diese Konformitätserklärung bestätigt, dass das unten benannte Produkt den Auflagen der Direktive 1999/5/EC des europäischen Parlaments und der R&TTE – Richtlinie entspricht. Das Produkt ist mit dem CE Kennzeichen der benannten Stelle akkreditiert.  
 We hereby declare that the following product is in conformity with the Directive 1999/5/EC of the European Parliament and the Council on Radio and Telecommunications Terminal Equipment (R&TTE), and has been type examined as follows. This product is labelled with the CE mark and notified body number as required by the R&TTE directive.  
 Cette déclaration de conformité déclare que le produit est conforme à Directive 1999/5/EC du Parlement Européen et du Conseil concernant les équipements hertziens et les équipements terminaux de télécommunications (R&TTE) et était examiné comme suit. Le produit est marqué avec le logo CE et le numéro du organisme notifié comme obligatoire par la directive R&TTE.

Produktbezeichnung: Product Name / Nom du produit	<b>NAUTICAST™ B2</b>
Zertifikate der benannten Stellen: Certificates from the notified Body / Certificats des Organismes Notifiés	Type examination certificate no. <b>Phoenix Testlab GmbH Notified Body No. 0700</b> <b>Nr.: 13-110681a</b> (R&TTE Certificate)  <b>Bundesamt für Seeschifffahrt und Hydrographie (BSH)</b> <b>Nr.: BSH/4542/001/43228008/14</b> (Baumusterprüfbescheinigung)
Spezifizierte Standards: Specified Standard(s) / Standard(s) Spécifié(s)	IMO MSC.74(69) Annex 3 ITU-R M. 825-3, 1998 ITU-R M. 1084-4, 2001 ITU-R M. 1371-4, 2010 <sup>1</sup> IEC 62287-1 Ed.2.0, 2010 IEC 60945 Ed. 4.0, 2002 <sup>2</sup> IEC 61108-1 Ed.2.0, 2003 <sup>2</sup> IEC 61162-1 Ed.4.0, 2010 <sup>2</sup> IEC 61162-2 Ed.1.0, 1998 <sup>2</sup> <sup>1</sup> soweit relevant für / as relevant to / si relevant à <b>AIS Class B</b> <sup>2</sup> beschränkt auf / Limited to requirements of / limitée à <b>IEC 62287-1</b>
Dokumentnummer: Document number / Num. du document	2014-03
Anschrift: Address / Adresse	Nauticast GmbH Lützowgasse 12-14 / 3. OG, AT-1140 Vienna, Austria
Hersteller: Manufacturer / Fabricant	Nauticast GmbH Lützowgasse 12-14 / 3. OG, AT-1140 Vienna, Austria
Ort, Datum: place, date / Lieu, Date	Wien / Vienna / Vienne, 2014-09-01
Unterschrift: Signature / Signature	 Wolfgang Ogrisek Managing Director

Diese Erklärung bescheinigt die Übereinstimmung mit den genannten Richtlinien, ist jedoch keine Zusicherung von Eigenschaften. Die Sicherheitshinweise der mitgelieferten Produktdokumentation sind zu beachten.

This declaration certifies the compliance with the indicated directives but implies no warranty of properties. The safety instructions of the accompanying product documentation shall be observed.

Cette déclaration certifie la conformité avec les directives indiquées mais n'implique aucune garantie des propriétés. Les instructions de sécurité de la documentation accompagnant le produit doivent être suivies.

ISO 9001:2008 Zertifizierung / ISO 9001:2008 Certification / ISO 9001:2008 Certification

Nauticast GmbH hat ein Qualitätsmanagement System nach ISO 9001:2008 implementiert, ist ISO-zertifiziert und wurde zuletzt am 22. August 2014 zertifiziert.

Nauticast GmbH maintains a Quality Management System according to ISO 9001:2008, is ISO and received the latest ISO certification 22<sup>nd</sup> August 2014.

Nauticast GmbH dispose d' un système de gestion de la qualité selon la norme ISO 9001: 2008, et a reçu dernièrement la certification ISO en 22 Août 2014.



## 8.7 Appendix F – BSH Class B Type Approval



### Bundesrepublik Deutschland

Federal Republic of Germany

### Bundesamt für Seeschifffahrt und Hydrographie

Federal Maritime and Hydrographic Agency



BUNDESAMT FÜR  
SEESCHIFFFAHRT  
UND  
HYDROGRAPHIE

### Baumusterprüfbescheinigung

Type examination certificate no.

Nr. BSH/4542/001/4322808/14

Die Navigationsausrüstung **AIS Class B**  
*The navigation equipment:*

mit der Typbezeichnung **Nauticast B2**  
*with the type designation*

des Herstellers **Nauticast GmbH**  
*of the manufacturer*  
**Lützowgasse 12-14/ 3. OG**  
**1140 Vienna**  
**AUSTRIA**

zusätzliche Handelsnamen  
*additional trade names*

ist nach den folgenden Normen/Standards geprüft worden:  
*has been type-tested in accordance with the following standards:*

Norm/Standard	Prüfnorm/Test Standard
IMO MSC.74(69) Annex 3	IEC 60945 Ed. 4.0, 2002 <sup>2</sup>
ITU-R M. 825-3, 1998	IEC 61108-1 Ed.2.0, 2003 <sup>2</sup>
ITU-R.M. 1084-4, 2001	IEC 61162-1 Ed.4.0, 2010 <sup>2</sup>
ITU-R M. 1371-4, 2010 <sup>1</sup>	IEC 61162-2 Ed.1.0, 1998 <sup>2</sup>
	IEC 62287-1 Ed.2.0, 2010

<sup>1</sup> as relevant to AIS Class B

<sup>2</sup> Limited to requirements of IEC 62287-1

und wird für den Antragsteller **Nauticast GmbH**  
*and has been approved for the applicant*

für den nachstehenden Verwendungszweck zugelassen: **AIS Class B**  
*for the following application:*

Die Zulassung berechtigt zur Anbringung der Baumsternummer (Nr. der Baumusterprüfbescheinigung).  
*With the approval it is granted, that the equipment can be labelled with the type approval number (no. of the Type examination certificate).*

Ausgabedatum: 2014-08-07  
*Date of issue:*

Ausgegeben **Bundesamt für Seeschifffahrt und Hydrographie**  
durch: **Bernhard-Nocht-Str. 78, 20359 Hamburg**  
Issued by: **Germany**

Ablaufdatum: 2018-08-08  
*Expiry date:*

Dienstsiegel  
*Official seal*



Im Auftrag  
*For the Federal Maritime and Hydrographic Agency*  
Hans-Karl von Arnim

Diese Baumusterprüfbescheinigung besteht aus 2 Seiten.  
*This Type examination certificate consists of 2 pages.*

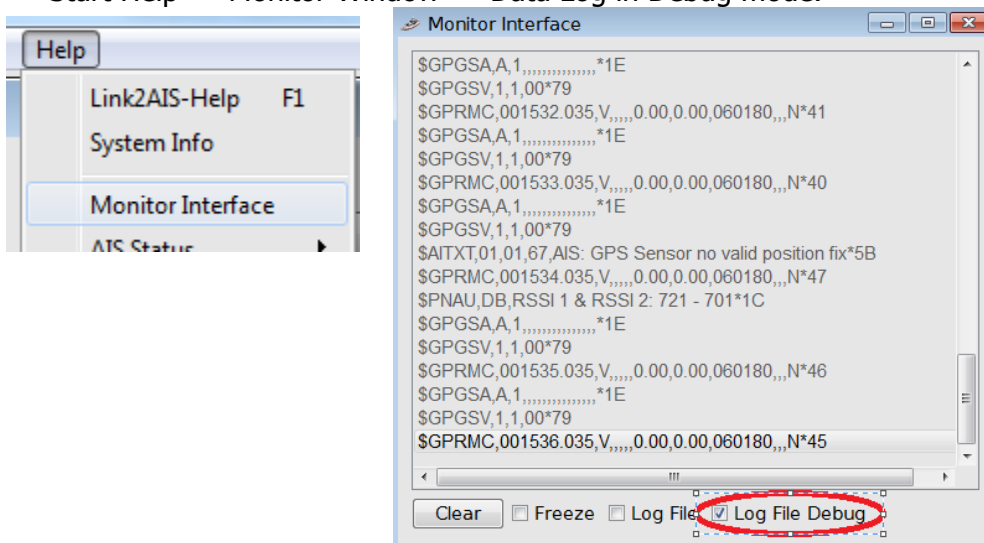
## 8.8 Appendix H – Diagnostics and Troubleshooting

B2 state	LED colour			Description / Reasons (in order of likelihood)	Solutions
	PWR	TX	ERR		
1	(off)	(off)	(off)	No power supply (neither 12-24VDC nor via USB cable)	a. Connect 12-24VDC power supply; b. Check fuses and/or cables. c. If problem persists: Check condition of batteries / load regulator using a multi-meter
2	constant green	(off)	(off)	normal operation	
3	constant green	constant amber	(off)	1. MMSI not programmed or invalid MMSI	Program valid MMSI into B2, using the Link2AIS software provided
				2. VHF or GPS Antenna connection is faulty	a. Check antenna connectors on both ends (2 for VHF, 2 for GPS); unplug, clean, reconnect and screw in tightly b. check VHF antenna for shorts, connection with metal/conductors c. check antenna cabling for blank patches, wear & tear; repair
				3. No valid GPS position information	a. Make sure GPS Antenna is not covered / obstructed b. Check GPS Antenna for visible signs of damage
				4. High VHF channel load (=VHF traffic) near ship a. Busy area (lots of marine traffic) and SOG < 2kn, e.g in and near harbours: b. Quiet area or at high sea and SOG > 2kn:	Wait for 15-20 minutes  Wait for 10 minutes
				5. AIS Message 23 (Group Assignment) has been received from base station and calls for a quiet period	Wait for at least 15-20 minutes; base station will change group assignment, i.e. lift quiet periods
4	constant green	blinking amber	(off)	1. Silent Mode activated	Deactivate Silent Mode (if it was activated involuntarily)
				2. if no Silent Switch is installed or Silent Mode is definitely not activated: Problem with main 12-24VDC power supply	a. Connect 12-24VDC power supply; b. Check fuses and/or cables. c. If problem persists: Check condition of batteries / load regulator using a multi-meter

B2 state	LED colour			Description / Reasons (in order of likelihood)	Solutions
	PWR	TX	ERR		
5	constant green	(off)	constant amber	1. VHF channel (background) noise interferes with proper reception of AIS messages	Restart device and wait for 10 minutes
				2. GPS antenna connection problem (open circuit)	a. Check GPS antenna connector on device; unplug, clean, reconnect and screw in tightly b. Check GPS antenna cabling for blank patches, wear & tear all the way from device to antenna If not using the original Nauticast GPS antenna: Make sure you use an active 5VDC GPS antenna.
6	constant green	constant amber	constant amber	Same reasons as No. 5, but now two subsequent transmission cycles have been missed (depending on required transmission frequency: after approx. 1 or 7 minutes)	See solutions listed for No. 5
7	constant green	blinking amber	constant amber	Main 12-24VDC power supply problem	a. Connect 12-24VDC power supply; b. Check fuses and/or cables. c. If problem persists: Check condition of batteries / load regulator using a multi-meter

If the problem remains unsolved after completing the instructions above, we kindly ask you to contact Nauticast Support with a log file (ideally: 2-3 hours of voyage) of your Nauticast B2 in operation. To create the log:

- Reconfigure the Nauticast B2 as described in Chapter 2 Installation. Connect to 12V or 24V power.
- Connect a PC with Link2AIS installed.
- Start Help -> Monitor Window -> Data Log in Debug mode.



- Locate the log-file named yy-mm-dd@hhmm in directory C:/Nauticast/Logs and send it to [support@nauticast.com](mailto:support@nauticast.com) with a description of the problems encountered. Nauticast support will analyze the data and get back to you regarding further steps.





For more information  
and the latest updates visit us at

**[www.nauticast.com](http://www.nauticast.com)**



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[office@nauticast.com](mailto:office@nauticast.com)