

PRODUCT MANUAL

NAUTICAST B2

Class-B AIS Transponder

Prod.no. 300 1001

Prod.no. 300 1020



Nauticast GmbH
Lützowgasse 12-14 / 3.OG
1140 Vienna, Austria
T: +43 (1) 5 237 237-0
F: +43 (1) 5 237 237-150
office@nauticast.com

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GENERAL WARNINGS

An AIS device is a means of communication and relieves the skipper from standard communication for the coordination of course information with other ships and the traffic control. AIS devices are no navigation devices and do not replace good seamanship or any other navigational aids such as RADAR. It is the responsibility of the skipper to ensure safe operation of the ship and to gain knowledge of water, current hazards and other navigation-relevant information.

The function of AIS equipment may be affected by internal and external influences or by defects. Influencing factors are, for example, electromagnetic environment, interference from other radio emissions, weather, "visibility" and availability of satellites of the positioning system, physical obstacles to VHF propagation or the quality of the device and in particular the antenna installation. It is therefore necessary to regularly check the functioning of the AIS and the quality of the data output by the AIS.

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

Every AIS device needs to be registered with the competent authority for radio communication. 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 (Maritime Mobile Service Identity) number. Please contact the relevant authority in your country for more information.

NOTE FOR OPERATION IN THE USA

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.

If your AIS transceiver has not been pre-configured please contact your dealer for details of how to have it configured.

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. In any warranty case please contact your dealer or Nauticast GmbH, Lützowgasse 12-14 / 3. OG, 1140 Vienna, Austria (see Contact & Support information). This warranty does not apply if the defect is caused by mechanical or electrical forces beyond the specifications in this manual or as a result of service or modification by unauthorized personnel. For authorized service partners see our homepage 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
2018-01-31	2.5	Release	Adaptations to Link2AIS 4.0
2019-02-28	2.6	Release	Communication test
2021-02-10	2.7	Release	Minor adaptation

Software/firmware dependencies

This revision of the manual is valid for the latest software/firmware versions listed below.

Date	B2 Firmware	Status	Comments
2017-10-31	FW3033-010	Release	Improvements for firmware update
2018-06-27	FW3033-12	Release	Communication test, internal optimizations for transmission behaviour

Date	Link2AIS	Status	Comments
2017-10-31	4.0	Released	New menu structure, Silent Mode Switch, collision warning
2018-05-16	4.1	Release	Status bar, Communication test
2018-09-07	4.2	Release	Update for Link2AIS, guided troubleshooting, vessel types added, display corrections for HR Screens and Windows scaling

1 WHAT IS AIS?

1.1 The AIS Standard

AIS stands for "Automatic Identification System". AIS-devices permanently send and receive standardized digital messages with significant ship information such as vessel name, MMSI, callsign and navigational data on two exclusively reserved channels of the marine radio band (channel 87B 161.975 MHz and channel 88B 162.025 MHz). This allows vessels to be identified without eye contact and their position to be located (eg. at night, in bad weather, at blind spots of the radar or at a great distance). AIS devices thereby increase the safety of the navigation and contribute to the avoidance of collisions. For the participation in the AIS network technically only a corresponding AIS device is necessary.

AIS is a worldwide standard based essentially on 2 pillars:

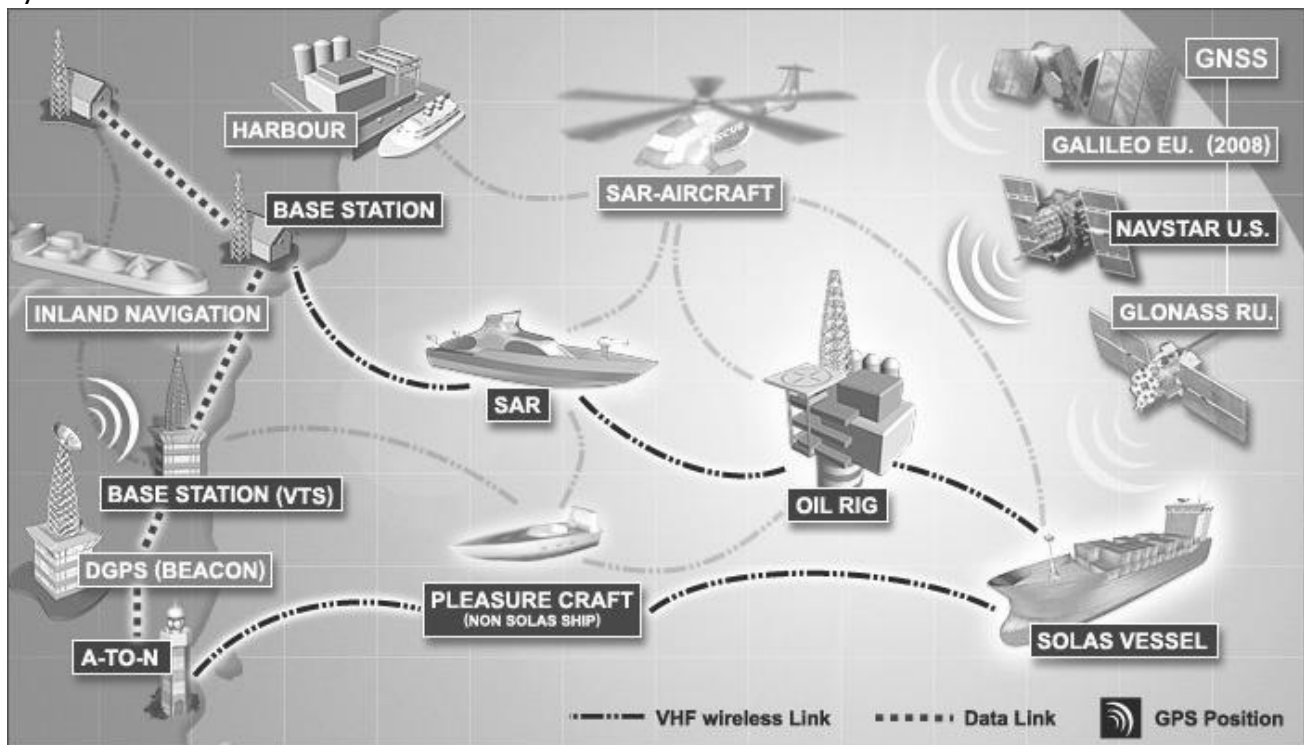
- International Telecommunication Union (ITU) radio standard: currently ITU-R M.1371-5 and M.825-3 and M. 1084-5.
- AIS International Maritime Organization (IMO) Standards of Operation: IMO Resolution MSC.74 (69) Annex 3

AIS devices are part of the Global Maritime Distress and Safety System (GMDSS).

1.2 The "AIS family"

The AIS standard is not only supported by devices on ships, but increasingly also on land by base stations, on marine and river infrastructure such as buoys, offshore platforms, on aircraft in the framework of sea rescue operations and as a personal safety device.

The following exhibit illustrates a typical AIS network in which multiple AIS-equipped ships and systems communicate with each other on land and in the air.



1.2.1 Class A

Class A devices comply with the highest AIS standards and are typically installed on all major vessels (carriage requirement for vessels above 300 gross tons since 2004). On large vessels AIS targets, ie other ships, are visualized on very large electronic chart systems (ECDIS). This ensures that even small ships are visible when sending out AIS messages. Class A devices transmit at 12.5W and take precedence over Class B devices in overcrowded regions when transmitting.

1.2.2 Inland AIS

AIS is not only used at sea but also on inland waterways. There are minimal differences to the class A standard.

1.2.3 Class B

Class B devices are simplified devices for recreational shipping and transmit with 2W transmission power. With a good antenna installation and generally favorable conditions this allows for up to 15 km range.

1.2.4 AIS Base Station

AIS base stations of naval authorities serve to monitor and control shipping. Base stations can also control the functions of AIS devices (eg. broadcasting intervals).

1.2.5 AIS AtoN (Aids to Navigation) Stations

AtoNs mark facilities such as buoys, platforms, wind farms and provide navigation support. AtoNs can also transmit (encrypted) individual messages, for example, to forward sensor information.

1.2.6 AIS SAR (Search and Rescue Aircraft)

AIS for helicopters and aircraft participating in Maritime Search and Rescue operations.

1.2.7 AIS SART (Search and Rescue Transmitter)

Is in a lifeboat or on a life jacket and sends AIS position signals in an emergency. These are received by AIS-equipped ships within a radius of up to 10km and can facilitate the search operation. SART do not trigger a distress alert (GMDSS emergency procedure).

1.2.8 AIS EPIRB (Emergency Position Indicating Radio Beacon) and AIS PLB (Personal Locator Beacon)

EPIRBs and PLBs are functionally very similar devices that issue a distress alert (GMDSS emergency procedure) with position notice. EPIRBs are associated with a boat, PLBs with a person. Traditionally, satellite signals have been sent. Now additionally or exclusively AIS signals are sent out.

1.3 Information transmitted by AIS transponder

The following table contains data sent by Class A devices. **Information sent by Class B is in blue and bold print:**

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

1.4 Transmission Intervals

AIS devices send different messages with different standardized content. For example, static ship data such as the ship's name will only be sent out every 6 minutes independent from the position report (same for class A and class B). Dynamic data such as speed and course over ground are transmitted by Class A equipment at intervals of 2 sec (speed > 23 knots) up to 3 min (ship at anchor), and in class B equipment at intervals of 5 sec to 3 min.

The Nauticast B2 transmits position reports (Message 18) at intervals of

- 30 seconds: when sailing (SOG) > 2kn;
- 3 minutes when sailing (SOG) < 2kn

The transmission intervals can be controlled by base stations and also depend on the availability of time slots in the transmission area.

2 Installation

2.1 Contents of the Nauticast B2 Set (p/n: 300 1001)

(*: contents of Nauticast B2 device (p/n: 300 1020)

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

- The Nauticast B2 AIS transponder (p/n: 300 1010) *
- Mounting plate *
- Power Cable *
- USB Cable *
- VHF Antenna with connection cable and mount
- GPS Antenna with connection cable and mount
- Data Cable for NMEA0183 (p/n: 300 1012) *
- Printed manual (English, 32 pages) *

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

1. Install the Link2AIS software onto your PC (Windows).
2. Enter your ship's data (MMSI, Vessel Name, Call sign, Length, Beam, ship type) into the Link2AIS software and save them onto the Nauticast B2 (only USB connection necessary).
3. Install your Nauticast B2 hardware on 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 7, 8, 8.1 or 10
- 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 may be downloaded from the homepage of Nauticast GmbH (<https://www.nauticast.com/en/cms/downloads>). Unzip the package when necessary, double click on 'setup.exe' to start the installation process. Follow the screen prompts to install the Link2AIS software.

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

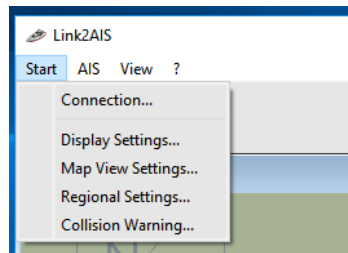
2.4.1 Connecting the Nauticast B2 to your PC

Connect the Nauticast B2 to your PC/notebook where Link2AIS is installed. We recommend using the USB connection as then no other external power source is necessary for the Nauticast B2. If you use the data cable (p/n 300 1012 or 300 1004) for connecting, the Nauticast B2 needs to be connected to a 12VDC or 24 VDC power source and the serial connection established after that. Make sure the device is recognized correctly by your PC (Windows shows a message on the task panel what COM port has been assigned).

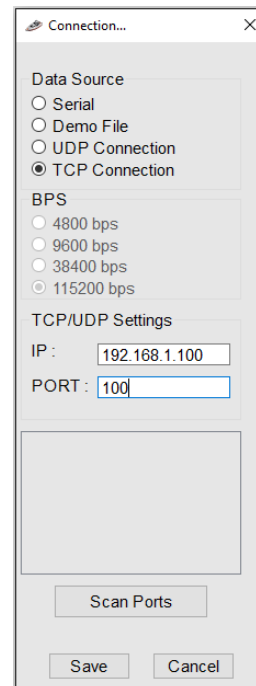
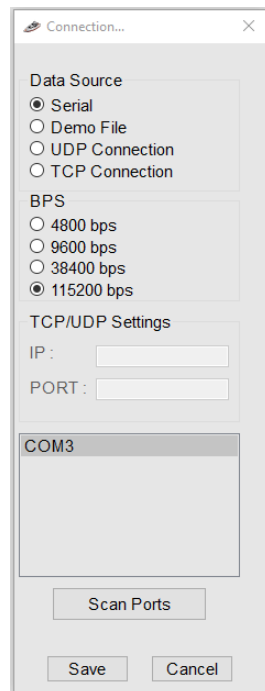
Alternatively the connection for programming the Nauticast B2 may also be established via the Nauticast W1 Serial to Wifi server (TCP protocol).



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



- By pressing 'Scan Ports' the software checks the available ports for the device and gives you a suggestion when an AIS device is found. 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.
- If you are using the Nauticast W1 for programming the Nauticast B2, please use analogous settings as in the exhibit below. Detailed instructions can be found in the Product Manual of the Nauticast W1.

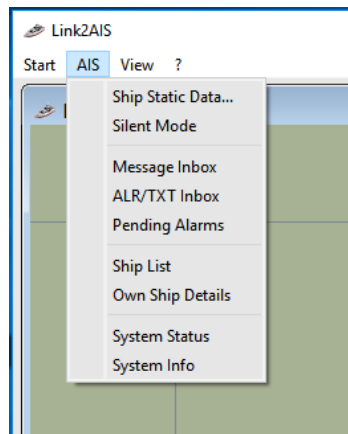


2.4.2 Configuring Software and Nauticast B2 static data

- Once a connection is established, you can start programming static data into the

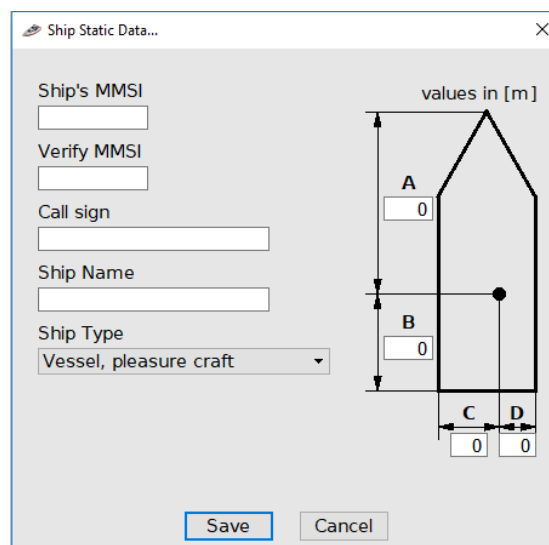
Nauticast B2. Any error messages shown during USB-only connection can be ignored (such as send and receive errors, position errors etc.). There is a context based Help available. The help system is started by pressing the F1 key on your PC or via the menu '? – Link2AIS Help'.

- The functions of Link2AIS are arranged in several menus. The menu will adapt dynamically to the the connection status and device type connected. Hence not all menu entries shown below may be visible.
- Open 'AIS – Ship Static Data'. This will display the 'Static Data' for the connected Nauticast B2. This includes the vessel's name, call sign, MMSI number and other fixed information. For a Nauticast B2 in factory settings, the fields will be empty.



Enter all vessel information in the appropriate fields:

- MMSI number - enter the vessel's Maritime Mobile Service Identity number (see warning and further notes regarding MMSI below!)
- Repeat input of the MMSI to prevent typos
- Call Sign - enter the vessel's radio call sign (7 characters minimum)
- Ship name - enter the name of the vessel (20 characters maximum)
- Select the 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 port
 - Dimension D - distance from GPS antenna to starboard



2.4.3 Transferring and saving static data to the Nauticast B2

CAUTION:

For security reasons the MMSI cannot be changed by the end user once they are programmed. Please check the number entered carefully. You can change all other static data (except the MMSI) at any time by running Link2AIS, should the need arise. If the MMSI is programmed incorrectly or has to be changed later on date you have to contact your Nauticast dealer or Nauticast GmbH (www.nauticast.com) for a MMSI reset.

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. Please check the MMSI.

- if the MMSI is not correct, click the 'No' button to cancel programming of the MMSI.
- Click the 'Yes' button if the MMSI is correct.

The 'Identification' window will refresh and show the current vessel information stored in 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 AIS data, maps and system status.

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 on the vessel

2.5.1 Installation hints

- The GPS antenna needs a free view to the sky through 360 degrees with a vertical angle of 5 to 90 degrees above the horizon and free of shadow effects from the ship's rig or other super-structure. Avoid mounting in strongly fluctuating places, such as at the top of the mast. GPS reception may be affected by DC motors, coils and other electrical equipment. Make sure that the GPS antenna is as far away as possible from Radar, Inmarsat and Iridium antennas and is not located directly in their transmission beam. Keep a minimum distance of 2m to MF / HF and other VHF transmitting antennas.
- The decisive criterion for a good signal range is a high and free-standing position of the VHF antenna. Make sure that the VHF antenna is as far away as possible from radar, Inmarsat and Iridium antennas and is not located directly in their transmission beam. Maintain a minimum distance of 2m (ideally vertically offset) to MF / HF and other VHF transmit antennas and also people's permanent location.
- The supplied VHF antenna can be shared with other VHF transmitters / receivers using a VHF-splitter. The splitter must be suitable for use with an AIS transponder (receive and transmit). A splitter for an AIS receiver is not suitable.
- The Nauticast B2 transponder should be mounted on a vertical bulkhead or surface with the 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. Keep a safe distance to other electronic equipment of at least 0.55m.
- The cables (GPS, VHF, power and data) need to be secured to the bulkhead within 6" to 12" (15 to 30cm) from the connectors. Run cables in cable ducts, avoiding strains, sharp bends or edges and kinks in the cables. Do not route cables through very hot areas, near motors, other electrical equipment, or electromagnetically radiating components.

2.5.2 Warnings

- We recommend using the parts and cables provided with the Nauticast B2 to connect antennas, power and display devices in order to ensure the proper functioning of the system.
- Do not connect the Nauticast B2 unit to a main line 110/220V AC electrical supply as this 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 and mind the supply polarity.
- 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 -15 °C to +55 °C. Do not install (or use) the Nauticast B2 unit in environments which exceed this range.
- Connecting a mismatched or defect VHF antenna, leaving the VHF antenna port disconnected or shorting the VHF antenna socket, will prevent the unit from properly sending position reports and may cause damage to the transponder.

2.5.3 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.



2.5.4 Connecting the antennas

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

2.5.5 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)). Make sure the power supply is stable and protected by fuses or circuit breakers. If the DC power source is shared with multiple loads, make sure 2A is available for the Nauticast B2. Then plug the power connector into the Nauticast B2. Please see 8.2 APPENDIX B – Pin Layout / Cable Connections of this manual for details of the power, data and RF cables supplied.

2.5.6 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

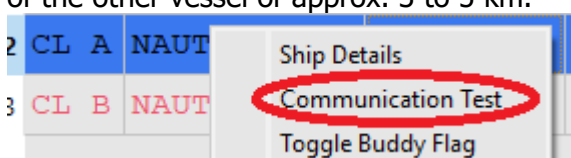
ERR: off

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.

2.5.7 Communication test

By right-clicking on a vessel in the ship list, an autonomous test of 2-way transmission with the other device can be performed. The test does not require operator intervention. We recommend a distance of the other vessel of approx. 3 to 5 km.



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 4.3 "Data Port Messages (NMEA 0183)". Please note that a USB connection disables the serial interfaces (RS232 and RS422), therefore they can't be used simultaneously. However the RS232 and the RS422 interfaces and all other ports of the data cable will communicate at the same time.

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 Data Cable (p/n 300 1012 or optional p/n 300 1004) and a serial interface (RS232), if the latter is available on the PC. Alternatively data can be broadcast via Wifi by connecting to a Nauticast W1 Serial to Wifi Server.

3.2 Connecting to other marine equipment via NMEA0183

All other devices that support the NMEA0183 standard can be connected with Cable 1 (RS422) or Cable 2 (RS232) of the Data Cable (p/n 300 1012 or optional p/n 300 1004). (see 8.2 Appendix B for more details).



Data cable 300 1004 / 300 1012

On connecting your Nauticast B2 to a chart plotter, please check the details for the settings in your chart plotter manual. Each chart plotter behaves slightly differently.

Furthermore make sure you choose the correct NMEA channel as most devices have several input channels. The Baud rate for the channel must be set to 38400 when using the RS422 interface and 115200 when using the RS232 interface.

In the table for cable 1 of the data cable below you can find the wire connections for a chart plotter or any other attached NMEA compatible device.

CABLE 1 (RS422):

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

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

CABLE 2 (RS232):

Connect the D-SUB 9-pin connector to a matching RS232 serial interface. This connection uses a Baud rate of 115200 by default.

3.3 Alarm Output / Connecting an alarm relay

There are 2 ways to signal an alarm output from Cable 3 of the Data Cable:

- LED visualisation
- Connected alarm relay

LED visualisation:

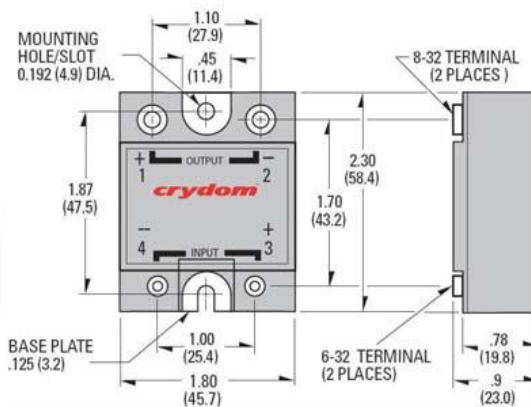
If you want to signal an alarm with a LED only, you can connect the LED with a series resistor R between + (grey) and ALARM OUT (yellow). Depending on the Voltage used for the Nauticast B2 you either have to use a 470Ω (calculated 500Ω) resistor (LED: $U_F=2V$, $I_F=20mA$) when using 12VDC or a 1kΩ (calculated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



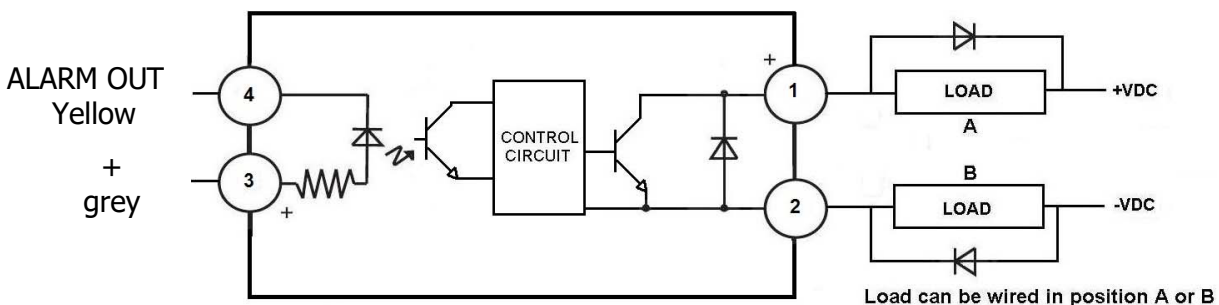
How to connect a LED to Alarm OUT (cable 3)

Alarm Relay:

The optional alarm relay (p/n 300 1009) needs to be connected to the yellow and grey wires of cable 3 of the data cable. The input voltage of the alarm relay is matched to 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 2A (3A when using a heat sink).



Alarm Relay with dimensions

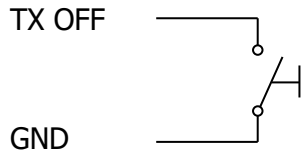


DC Inductive loads must be diode suppressed to prevent damage to SSR

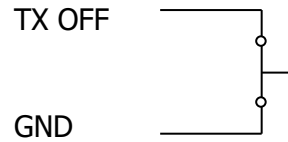
Connection of the Alarm Relay

3.4 Silent mode

By connecting a silent mode switch with Cable 3 of the Data Cable (p/n 300 1012 or optional p/n 300 1004) the transmitting function of the Nauticast B2 can be switched off and on. You have to connect a switch between TX OFF (green) and GND (brown). To turn transmission off, the switch has to be activated:



Transmission ON



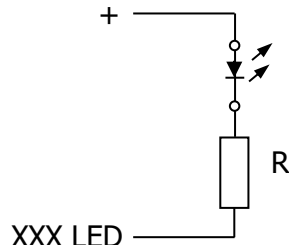
Transmission OFF

Alternatively the Silent mode may also be activated in Link2AIS when connected.
 Note: The TX LED will start flashing amber when the silent mode is active.

3.5 External LED status indicators (optional data cable p/n 300 1004 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 (p/n 300 1004).

Depending on the Voltage used for the Nauticast B2 you have to connect a series resistor 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 350Ω for 12VDC and 910Ω or 1kΩ for 24VDC is needed for a typical LED with a forward voltage of 2V and a forward current of 0.2A. For a calculation with different values please contact us at support@nauticast.com.



How to connect a LED to XXX LED OUT

Note: there is already a 150Ω resistor included for the LED OUT ports on cable 4, but not on the ALARM OUT on cable 3. Therefore the resistance needed on cable 3 needs to be higher than on cable 4.

3.6 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:

3.6.1 GPS Antenna

The Nauticast B2 uses a 5VDC active GPS antenna (i.e. it should incorporate an LNA) and has a TNC female connector. The antenna must be suitable for marine applications (protection, ruggedness, means of mounting). 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 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.

3.6.2 VHF Antenna

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

- .. can in principle be any marine VHF antenna, working in the marine band from 156-163 MHz. Dedicated AIS antennas have their characteristics optimized for the AIS

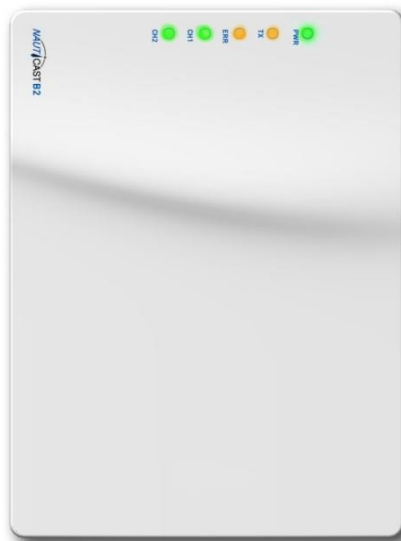
- frequencies and may thereby improve sending and receiving performance.
- .. may only be shared with other VHF equipment by the use of suitable switches.
 - .. must be suitable for marine applications (index of protection, ruggedness, means of mounting, etc.).
 - .. must be omni-directional and vertically polarized with unity gain 0 dB. A VSWR <1.5 has to be maintained over the frequency range 156 – 163 MHz.

4 Operation of your Nauticast B2

4.1 Note

- If no valid MMSI is entered (MMSI is pre-set to 000000000) 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 flash amber even when all antennas and main power are connected.
- There is no transmission without a valid GPS position.
- AIS devices use satellite networks such as the Global Positioning System (GPS) or the Global Navigation Satellite System (GLONASS) to determine their position. The Nauticast B2 uses the GPS network.
- Static ship data and dynamic position and heading data are transmitted at different times in different messages. Therefore after switching on the AIS, you will see ships with their MMSI only in the ship list. After some time, the ship's name is assigned, because static data are sent less frequently.
- 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 not be the case at larger distances.
- 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. Omitted transmissions of the Nauticast B2 will be rescheduled and retried as soon as possible.

4.2 Interpreting Status LEDs



4.2.1 PWR

A green LED indicates that the unit is connected to a 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).

4.2.2 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):

- Unit (MMSI) has not been configured
- A high VDL load
- GPS/Positional information unavailable
- Connection problems with one of the antennas

- Transmission disabled
- Irregularities in the power supply (USB power alone is insufficient for sending!)
- Message 23 “quiet period”

4.2.3 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

4.2.4 CH1 and CH2 – channel information

Two tri-colour LEDs briefly light up (flash), indicating activity on channel 1 and channel 2:

- Green flash: channel has received an AIS message
- Amber flash: channel is transmitting
- Red: indicates the channel is in DSC mode

4.3 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)

4.4 Standards

The Nauticast B2 complies with all standards under the European RED directive. 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 61162-2 Ed.1.0, 1998: Maritime navigation and radiocommunication equipment and systems – Digital interfaces – Part 2: Single talker and multiple listeners, high-speed transmission
- 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
- IMO MSC. 74(69) Annex 3: Adoption of new and amended performance standards
- ITU-R M. 825-3, 1998: Characteristics of a transponder system using digital selective calling techniques for use with vessel traffic services and ship-to-ship identification
- ITU-R M. 1084-4, 2001: Interim solutions for improved efficiency in the use of the band 156-174 MHz by stations in the maritime mobile service
- ITU-R M. 1371-4, 2010: Technical characteristics for an automatic identification system using time-division multiple access in the VHF maritime mobile band

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 8.9 APPENDIX I – Diagnostics and Troubleshooting. If the problem is still unsolved, please connect 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 with the log file attached.

6 Contact & Support information

Contact your local dealer for Nauticast B2 support. Please see our Website www.nauticast.com for Dealer / Service Listings.

Nauticast GmbH

Lützowgasse 12-14 / 3. OG

1140 Vienna

Austria

Tel: +43 (1) 5 237 237-240

Fax: +43 (1) 5 237 237-150

Mail: support@nauticast.com

Web: www.nauticast.com

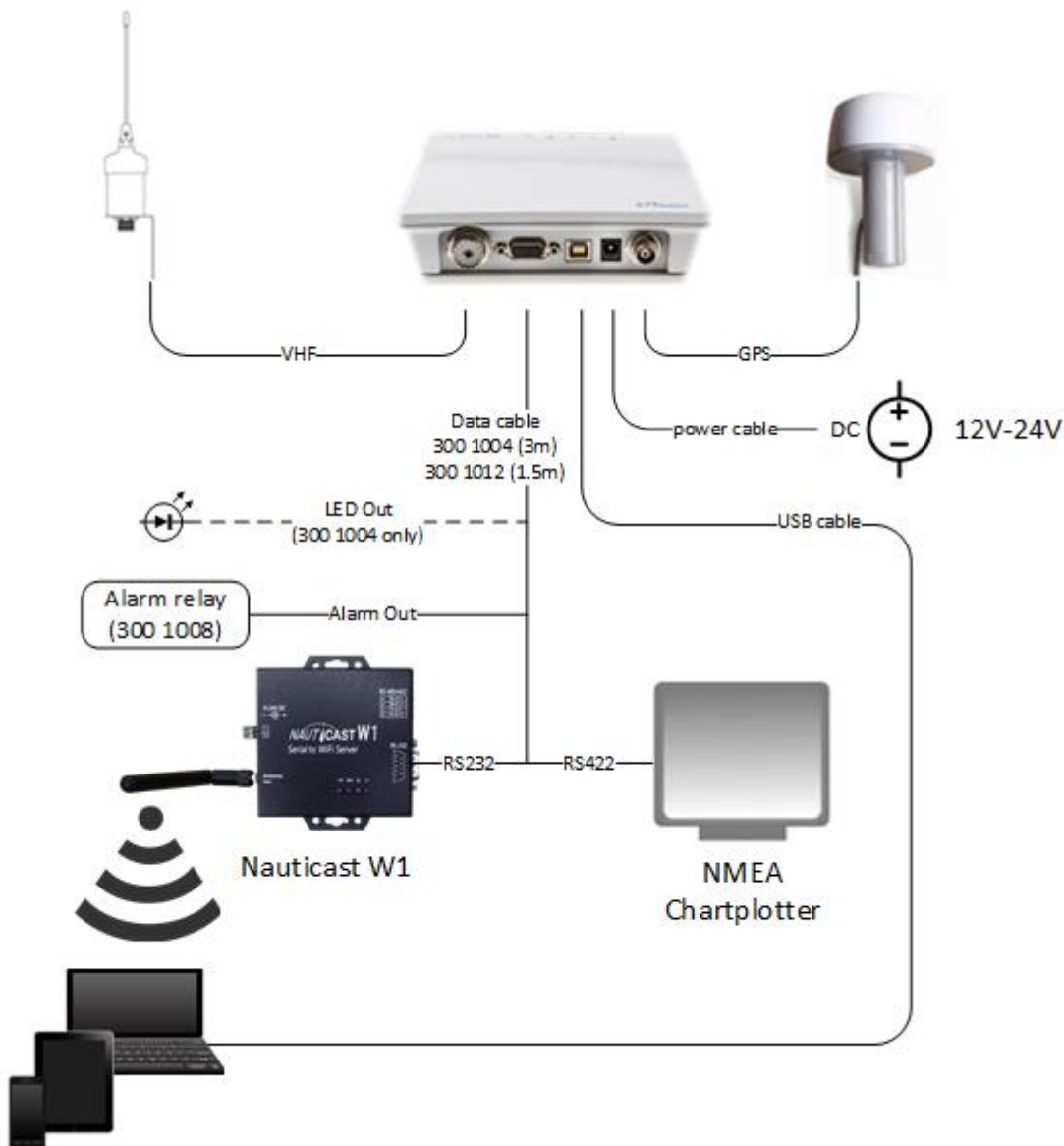
7 Technical Details

7.1 Product Specification

Product Number:	300 1010 Distributed as complete set including antennas as p/n 300 1001 or as device only (with all cables and without antennas) as p/n 300 1020
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: baudrate 115200 (configurable) RS422: baudrate 38400 (configurable)
VHF receivers:	2 AIS receivers (shared between AIS and DSC) 1 DSC receiver (shared between AIS and DSC) Frequency 156–162.025 MHz Sensitivity @ -111dBm < 20% PER
VHF transmitter:	1 Transmitter Output PWR 2W nominal Frequency 161.975, 162.025MHz
Internal GPS Receiver:	48 channels 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 -15°C bis +55°C
Compass Safe Distance	0,55m

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 p/n 300 1012 included in set p/n 300 1001, data cable p/n 300 1004 optional)

8.2 APPENDIX B – Pin Layout / Cable Connections

Nauticast B2 POWER CABLE

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

Nauticast B2 Data Cable (p/n 300 1004)

Description	DB15	Wire Type	Color	AWG	CABLE #
RS422 TX B (+) (output)	15	Copper	YELLOW	24	CABLE 1 (3m)
RS422 TX A (-) (output)	5	Copper	GREEN	24	CABLE 1
RS422 RX B (+) (input)	4	Copper	WHITE	24	CABLE 1
RS422 RX A (-) (input)	10	Copper	GREY	24	CABLE 1
RS232 TX (output)	9	Copper	GREEN	24	CABLE 2 (3m)
RS232 RX (input)	13	Copper	WHITE	24	CABLE 2
GND	2	Copper	BROWN	24	CABLE 2
GND	7	Copper	BROWN	24	CABLE 3 (3m)
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 (3m)
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

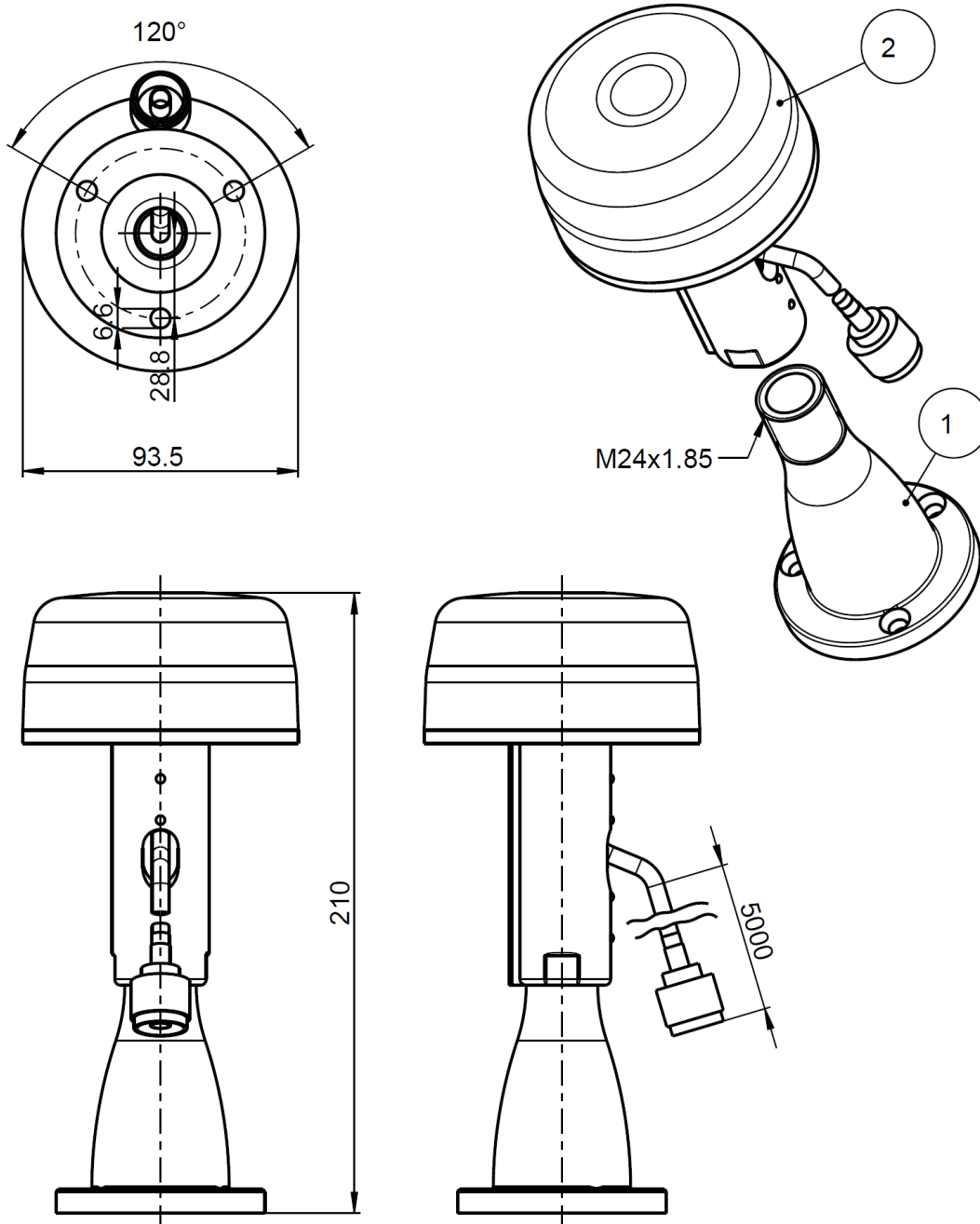
Nauticast B2 Data Cable (p/n 300 1012)

Data cable p/n 300 1012 is identical with p/n 300 1004 except for the following differences:

- Cable 4: omitted
- Cable 1 and Cable 2 are 1.5m long instead of 3m
- Cable 3 is 0.2m long instead of 3m

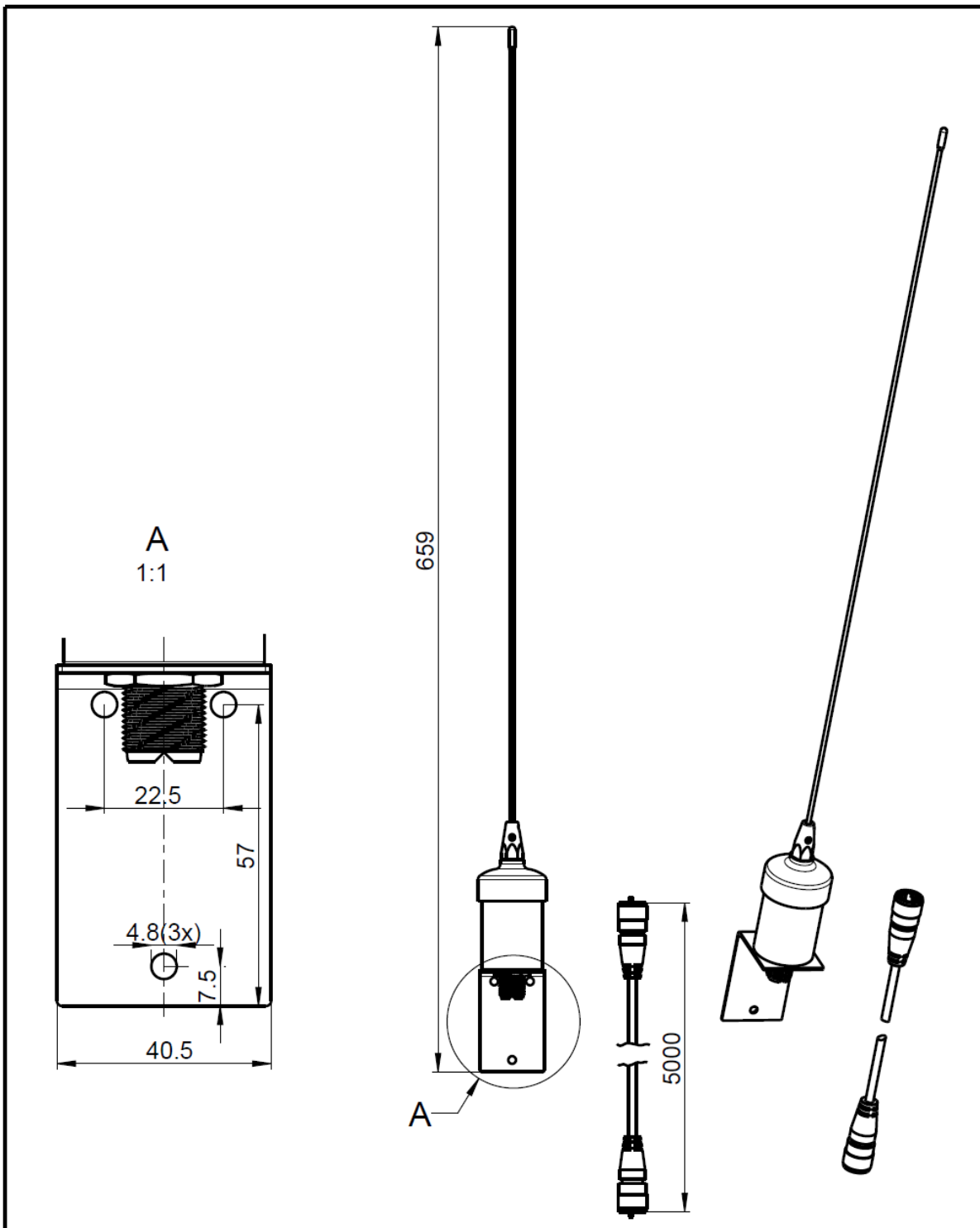
8.4 APPENDIX D – GPS Antenna

Pos.	Benennung	Sachnr./Normbez.	Werkstoff	Masse	Anz.
1	GPS Antenna mount	3001002-2		0.030	1
2	AIS GPS Antenna with 5m cable	3001002-1		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	
	Gep.				
	Norm				
	Komm.-Nr.:				
				Zeichnung/Sach-Nr.: 3001002	Blatt 1
Zust.	Aenderung	Datum	Name	Ers.f.:	Ers.d.:

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.: 3001003		
			Gepr.				
			Norm				
			Komm.-Nr.:			Blatt 1 1 Bl.	
Zust.	Aenderung	Datum				Ers.f.:	Ers.d.:

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 Richtlinie 2014/53/EU (RED) des europäischen Parlaments und Rates über die Bereitstellung von Funkanlagen 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 2014/53/EU of the European Parliament and of the Council on radio equipment (RED) and has been type examined as follows. This product is labelled with the CE mark and notified body number as required by the RED directive.

Cette déclaration de conformité déclare que le produit est conforme à Directive 2014/53/CE du Parlement Européen et du Conseil concernant les équipements de télécommunications (RED) et était examiné comme suit. Le produit est marqué avec le logo CE et le numéro de l'organisme notifié comme obligatoire par la directive R&TTE.

Produktbezeichnung: Product Name / Nom du produit	NAUTICAST B2
Zertifikate der benannten Stellen: Certificates from the notified Body / Certificats des Organismes Notifiés	Type examination certificate no. Phoenix Testlab GmbH Notified Body No. 0700 Nr.: 13-110681a Bundesaamt für Seeschifffahrt und Hydrographie (BSH) No. 735 Nr.: BSH/4542/001/43228008/14 (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 IEC 62287-1 Ed. 2.0, 2010 IEC 60945 Ed. 4.0, 2002 IEC 61108-1 Ed. 2.0, 2003 IEC 61162-1 Ed. 4.0, 2010 IEC 61162-2 Ed. 1.0, 1998 soweit relevant für / as relevant to / si relevant à AIS-Class B beschränkt auf / limited to requirements of / limitée à IEC 62287-1
Dokumentnummer: Document number / Num. du document	2018-04
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, 2018-09-01
Unterschrift: Signature / Signature	 → Vinzenz Janik → 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 9001:2015 Zertifizierung / ISO 9001:2015 Certification / ISO 9001:2015 Certification

Nauticast GmbH hat ein Qualitätsmanagement System nach ISO 9001:2015 implementiert, ist ISO-zertifiziert und wurde zuletzt am 23. August 2018 zertifiziert.

Nauticast GmbH maintains a Quality Management System according to ISO 9001:2015, is ISO and received the latest ISO certification 23rd August 2018.

Nauticast GmbH dispose d'un système de gestion de la qualité selon la norme ISO 9001:2015, et a reçu dernièrement la certification ISO en 23 août 2018.



8.7 APPENDIX G – 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 ²
ITU-R M. 825-3, 1998	IEC 61108-1 Ed.2.0, 2003 ²
ITU-R.M. 1084-4, 2001	IEC 61162-1 Ed.4.0, 2010 ²
ITU-R M. 1371-4, 2010 ¹	IEC 61162-2 Ed.1.0, 1998 ²
	IEC 62287-1 Ed.2.0, 2010

¹ as relevant to AIS Class B

² 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 Baumusternummer (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 – FCC Class B Type Approval

telefication bv
The Netherlands
Chamber of Commerce
51565536
www.telefication.com



TCB

GRANT OF EQUIPMENT
AUTHORIZATION

TCB

Certification
Issued Under the Authority of the
Federal Communications Commission
By:

Telefication B.V.
Edisonstraat 12a
Zevenaar, 6902 PK
Netherlands

Date of
Grant: 04/21/2015

Application
Dated: 04/21/2015

Nauticast GmbH
Luetzowgasse 12-14/3.OG
Vienna, 1140
Austria

Attention: Vinzenz Janik

NOT TRANSFERABLE

EQUIPMENT AUTHORIZATION is hereby issued to the named GRANTEE, and is VALID ONLY for the equipment identified hereon for use under the Commission's Rules and Regulations listed below.

FCC IDENTIFIER: 2AEI1NAUTICASTB2
Name of Grantee: Nauticast GmbH
Equipment Class: Automatic Identification Systems
Notes: NAUTICAST B2

<u>Grant Notes</u>	<u>FCC Rule Parts</u>	<u>Frequency Range (MHZ)</u>	<u>Output Watts</u>	<u>Frequency Tolerance</u>	<u>Emission Designator</u>
	80	156.0 - 163.0	2.0	3.0 PM	16K0GWX
	80	156.525 - 156.525	2.0	3.0 PM	14K2G2B

In addition to the labels or other identifying information required under §§ 2.925 and 2.926 of this chapter, each Class B AIS device shall include a conspicuous label that includes: (i) instructions on how to accurately program into the device and confirm static data pertaining to the vessel in which the device is or will be installed; and (ii) the following statement: WARNING: It is a violation of the rules of the Federal Communications Commission to input an MMSI that has not been properly assigned to the end user, or to otherwise input any inaccurate data in this device. Instructions on how to accurately enter and confirm static data in the device shall also be included in the user manual for the device.

Certificate No: 152180278/AA/00	W.J.M. Jong Manager Product Certification	<i>i.o. BJ</i>
------------------------------------	--	----------------

laboratory

certification

approvals

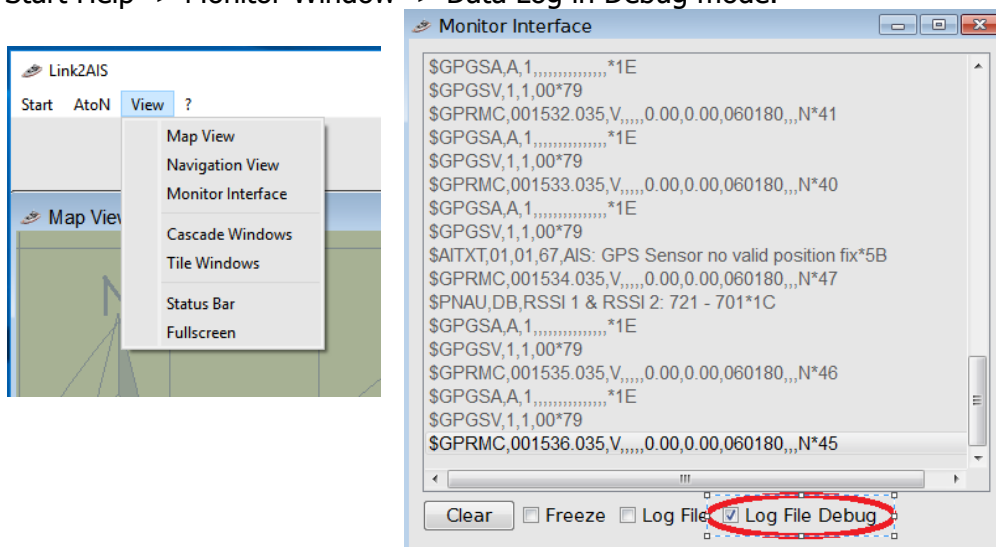
8.9 APPENDIX I – Diagnostics and Troubleshooting

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 missing insulation, 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 2. GPS antenna connection problem (open circuit)	Restart device and wait for 10 minutes a. Check GPS antenna connector on device; unplug, clean, reconnect and screw in tightly b. Check GPS antenna cabling for pieces missing insulation, 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 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 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:

- Make sure the Nauticast B2 is properly installed 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 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



Nauticast GmbH
Lützowgasse 12-14 / 3.OG
1140 Vienna, Austria
T: +43 (1) 5 237 237-0
F: +43 (1) 5 237 237-150
office@nauticast.com