

# ***AI3000 AIS Receiver***



## ***Installation and Quick Reference Guide***

| <b>Contents</b>                | <b>Page Number</b> |
|--------------------------------|--------------------|
| Disclaimer and warranty        | 2                  |
| Contents of this box           | 2                  |
| Brief background to AIS        | 3                  |
| Introduction                   | 3                  |
| Installing the AI3000 receiver | 5                  |
| Correct operation              | 8                  |
| Fault finding                  | 9                  |
| Technical specifications       | 10                 |
| Appendix A – Data format       | 11                 |

## Disclaimer

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***This product is designed to aid navigation and should be used to augment normal navigational procedures and practices. It is the users responsibility to use this product prudently.***

***Neither Euronav, nor their distributors or dealers accept responsibility or liability either to the product user or their estate for any accident, loss, injury or damage whatsoever arising out of the use or of liability to use this product.***

*Note; The AI3000 is a receive only unit and does not comply with the mandatory SO-LAS carriage requirements for most commercial vessels to fit Class A AIS Transponders. The receive only unit is suitable for any vessel wanting to monitor (but not transmit own ship details) any vessels fitted with AIS transponders in the local vicinity.*

## Limited Warranty

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Euronav warrants this product to be free from defects in materials and manufacture for one year from the date of purchase. Euronav will, at its sole option, repair or replace any components that fail in normal use. Such repairs or replacement will be made at no charge to the customer for parts and labour. The customer is, however, responsible for any transportation costs. This warranty does not cover failures due to abuse, misuse, accident or unauthorized alteration or repairs. A returns number must be given before any unit is sent back for repair.

## Contents of this Box

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This box contains:

- AI3000 AIS receiver unit with trunnion mounting bracket
- Interface cable for connection to PC
- Interface cable for NMEA connection
- Power cable (12/ 24 volts)
- This guide

## Brief Background to AIS

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AIS was designed to fulfill a need for vessels to know the position, details and navigational intentions of other vessels within VHF range for improved safety and collision avoidance. Most commercial vessels are required to fit AIS transponders by December 2004. The transponders use VHF frequencies to transmit details of their own vessel and receive details from other vessels or navigation aid within VHF range.

## Introduction

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AI3000 is a low cost, high performance AIS receive only unit, that enables the reception of information from vessels fitted with AIS transponders at a fraction of the cost of a conventional transponder.

The AI3000 installation is quick and simple, requiring only the connection to a VHF aerial (not supplied) and a computer (PC) or other device (e.g. plotter). Note these must have software which is compatible with AIS standard output to display this information.

Information received by the AI3000 is then transmitted via the serial data cable so that it can be displayed on compatible vessel navigation systems, vessel monitoring or other applications.

Information transmitted from vessels fitted with class 'A' Transponders includes:

### Static Information

- Name
- Type of vessel
- Call sign
- MMSI number
- IMO number
- Draft
- Size of vessel

### Dynamic Information

- Vessel position
- SOG
- COG
- Rate of turn
- Heading
- Status
- Destination
- ETA

*Note: Not all the above information is necessarily transmitted by every vessel.*

Information from AIS transponders carried by most commercial / other vessels or navigation aids are transmitted at different rates as specified below (Information source ITU Recommendations Technical Document ITU - R M.1371 - 1);

### Static information

Every 6 min or, when data has been amended, or on request.

### Dynamic information

Dependent on speed and course alteration according to Table 1 and 2.

Note: Class 'B' transponder's transmit dynamic data less frequently (3 mins) and there is less vessel (static) information.

**Table 1**

**Class A shipborne mobile equipment reporting intervals**

| <b>Ship's dynamic conditions</b>                            | <b>Reporting interval</b> |
|---|---------------------------|
| Ship at anchor or moored and not moving faster than 3 knots | 3 Minutes                 |
| Ship at anchor or moored and moving faster than 3 knots     | 10 Seconds                |
| Ship 0-14 knots   | 10 Seconds                |
| Ship 0-14 knots and changing course                         | 3 1/3 Seconds             |
| Ship 14-23 knots  | 6 Seconds                 |
| Ship 14-23 knots and changing course                        | 2 Seconds                 |
| Ship >23 knots  | 2 Seconds                 |
| Ship >23 knots and changing course                          | 2 Seconds                 |

**Table 2**

**Reporting intervals for equipment other than Class A shipborne mobile equipment**

| <b>Platform's condition</b>                                       | <b>Reporting interval</b> |
|---|---------------------------|
| Class B shipborne mobile equipment not moving faster than 2 knots | 3 Minutes                 |
| Class B shipborne mobile equipment moving 2-14 knots              | 30 Seconds                |
| Class B shipborne mobile equipment moving 14-23 knots             | 15 Seconds                |
| Class B shipborne mobile equipment moving >23 knots               | 5 Seconds                 |
| Search and rescue aircraft (airborne mobile equipment)            | 10 Seconds                |
| Aids to navigation  | 3 Minutes                 |
| AIS base station  | 10 Seconds                |

## Installing the AI3000 Receiver

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The AI3000 is supplied with a power cable and data cables for connection to a PC serial port or an NMEA device.

**The AI3000 Receiver is not supplied with a VHF antenna** as the type of antenna and cable requirements are different for various types of vessel. You need to provide a suitable VHF antenna before the receiver will operate fully. These can be obtained from a local marine chandler or electronics outlet. The antenna connector type is BNC, 50 ohms and cable recommended should be equal or better than RG214.

### General tips on antenna location

Installing the VHF antenna for AIS on a vessel is a compromise between the following items:

- Antenna separation
- Clear view of the horizon
- Antenna height

### Antenna separation

AIS transponders use frequencies on the high side of the marine mobile band (Channel 1 is 161.975 MHz, Channel 2 is 162.025MHz). The frequencies are close to the duplex channels used for marine communication.

The AIS VHF antenna should be separated as much as possible from the voice VHF installations used for main communication to avoid unnecessary interference. Best separation is achieved by installing the antennas over each other or on separate sides of the mast. The VHF antenna should be mounted at least 3 meters away from and out of the transmitting beam of high-power transmitters or other VHF antenna installations.

### Clear view of the horizon

The AIS VHF antenna should be mounted with a relative clear view of the horizon. Large obstructions might shade the AIS radio communication in certain directions.

### Antenna height

AIS uses VHF radio frequencies, whose propagation is close to line of sight, therefore, the higher the antenna location the longer the range.

## Mounting the AI3000 receiver

The AI3000 receiver comes with a trunnion mount to secure to a bulkhead or shelf. Select a location away from excessive heat sources, such as heating vents or equipment heat exhausts and avoid areas where there is a high flow of moisture or humid salt air (e.g. port holes/windows, and hatches that are open to the outside) and high levels of vibrations and shocks.



Rear view of the AI3000

## Connections

### Power

Connect the power lead to a 12 or 24 volt DC supply. This should be connected to a breaker switch panel preferably with a fuse rated 1 Amp. Pin connections are shown below.

|       |       |                          |
|-------|-------|--------------------------|
| Pin 1 | RED   | + Positive 9 to 30 volts |
| Pin 2 | BLACK | - Negative               |

### Data

The data connector enables one of the two cables supplied to connect either to a PC serial port (or USB port by using a suitable USB - serial adapter cable) or a NMEA device e.g. plotter or GPS.

Physical connections detail of both cables is provided overleaf.

### **9 Pin D – 9 Pin D cable - For use with PC's**

Use this cable to connect the AI3000 receiver to a PC serial (or USB) port. Connect one end of the cable to the AIS receiver data connector and the other end to the PC serial port. This is an RS232 output which is compatible with PC serial ports.

If you do not have a free serial port then you can use a USB to serial converter to add a serial port to your PC. You can purchase a USB to serial converter from Euronav or a computer accessory supplier. Make sure the adaptor has a driver for your operating system.

Note: the RS232 9 pin output connector on the AI3000 is wired as

RS232 Output to PC                      2= Signal (+)                      5= Ground

### **9 Pin D – bare ended cable (for use with chart plotters/radars)**

|   |        |               |
|---|--------|---------------|
| 1 | BROWN  | NMEA Output - |
| 4 | YELLOW | NMEA Output + |
| 8 | GREY   | NMEA Input +  |
| 9 | BLACK  | NMEA Input -  |

### **Other connections (for advanced use)**

|   |        |   |
|---|--------|---|
| 2 | RED    | + RS232 Output                          |
| 3 | ORANGE | + RS232 Input (Reserved)                |
| 5 | GREEN  | -RS232 Ground Return                    |
| 6 | BLUE   | Engineering Input - not for normal use  |
| 7 | VIOLET | Engineering Output - not for normal use |

The output data is a VDM string at 38.4k baud rate.

## Correct operation

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Operation of the AI3000 unit is fully automatic and only requires power, VHF and data cable connection. Once you have supplies power to the AI3000 unit the green light marked ON should illuminate.



The reception and correct decoding of an AIS message is indicated by the momentary flash of the appropriate Channel light.

Data is then transmitted for visual or textual viewing on a suitable electronic charting systems (such as seaPro) or other systems/device.



## Fault finding

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### No power light is displayed

Check that the power lead is connected to a 12 or 24 volt DC supply and the polarity of the supply is correct (red = +ve and black is -ve).

### Channel 1 and Channel 2 lights do not flash

Make sure that a suitable VHF antenna is fitted and correctly connected.

Make sure that the antenna is correctly positioned - i.e. at a suitable location to visibly 'see' vessels.

*Note; Until the deadlines for mandatory fitment are reached, ships may not have fitted a Transponder, therefore if a ship is sailing past and no signal is received there may be no fault with the AI3000 receiver.*

### Channel 1 and Channel 2 lights flash but no data is received

If the red channel lights flash then data is being received from nearby vessels.

Make sure the correct data cable is connected to the PC or NMEA device.

Make sure that on the PC application or device that the correct port is assigned and the correct baud rate is setup. The correct baud rate is 38400.

## PRODUCT SUPPORT

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## Technical specifications

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AI3000 is a compact dual channel synthesised VHF receiver designed to receive and decode AIS transmissions from vessels etc. All currently defined messages are supported, including those for Class A and Class B transponders (Message 24) that are expressed via the VDM sentence.

### Electrical

Power supply range : 9 - 30 Volts DC  
Power consumption : 400mW

### Output

Baud rate : 38400 Baud (38.4Kb)  
Format : ITU/ NMEA 0183  
Output message : VDM

### Receiver

Frequency : AIS 161.975 MHz  
AIS 162.025 MHz  
Channel spacing : 25KHz  
Sensitivity : -112dBm  
Demodulation : GMSK  
Data Rate : 9600  
Antenna impedance : 50 ohms

### Physical

Dimensions : Depth: 140mm, Width: 120mm, Height: 50mm  
Weight : 600g  
Mounting : Trunnion bracket  
Connectors : Antenna BNC  
Output port: 9 pin D socket  
Power: 2 pole plug

CE approval to: EN61000-6-3:2001  
EN61000-6-1:2001  
EN60945 (EMC)

## APPENDIX A - Data output

Following is to help engineers developing software that interfaces to the AI3000. For most users the application software will fully decode the data for you.

The AI3000 outputs the AIS data using the standard VDM sentence. The format of the VDM sentence consist of a human readable text part and a binary data part,

```
!xxVDM,t,n,s,c,binary data,f*hh<CR><LF>
```

! = Indicates sentence with encapsulated binary data  
xx = Talker identified typical 'AI'  
t = total number of sentences in message 1-9  
n = this sentence number 1-9  
s = sequential message identifier 0-9 used to identify sentences belonging to the same data transmission  
c = AIS channel A or B  
f = number of fill I bits 0-5 cannot be null  
hh checksum

To further decode the messages you will need copies of the following

- ITU-R M.1371-1 AIS specification ([www.itu.int](http://www.itu.int))
- NMEA 0183 specifications ([www.nmea.org](http://www.nmea.org))

Both these are comprehensive and copyrighted documents.