

# AIS Class B Transceiver

## Installation and Operation Manual



SRT Marine  
Technology

**Thank you for purchasing this AIS Class B transceiver.**

This product has been engineered to offer you the highest level of performance and durability and we hope that it will provide many years of reliable service. We constantly strive to achieve the highest possible quality standards, should you encounter any problems with this product, please contact your dealer who will be pleased to offer any assistance you require.

## List of Abbreviations.

AIS	Automatic Identification System
AIS SART	AIS Search and Rescue Transmitter
AP	Access Point (Relating to WiFi behaviour)
AtoN	AIS Aid to Navigation
CD	Compact Disc
CE	European Declaration of Conformity
COG	Coarse Over Ground
COM	Common (electrical)
CPA	Closest Point of Approach
CS	Carrier Sense
DC	Direct Current
Dec	Decimal
DGPS	Differential GPS
DGNSS	Differential GNSS
DHCP	Dynamic Host Configuration Protocol
DSC	Digital Selective Calling
DTM	Datum
ECDIS	Electronic Chart Display and Information System
ENI	Unique European Vessel Identification Number
EPFS	Electronic Position Fixing System
ERI	Electronic Reporting International
ETA	Estimated Time of Arrival
EXT	External
FCC	Federal Communications Committee
GLONASS	Globalnaya Navigazionnaya Sputnikovaya Sistema
GND	Electrical Ground
GNSS	Global Navigation Satellite System
GPS	Global Positioning System

## List of Abbreviations

Hex	Hexadecimal
IEC	International Electrotechnical Commission
IMO	International Maritime Organisation
INT	Internal
IPx6	Ingress Protection (to powerful water jets)
ISO	International Standards Organisation
Kt	Knots
LAT	Latitude
LCD	Liquid Crystal Display
LON	Longitude
LR	Long Range
MKD	Minimum Keyboard and Display
MMSI	Maritime Mobile Service Identity
NC	Normally Closed (electrical)
NAV	Navigation
NM	Nautical Miles
NMEA	National Marine Electronics Association
PGN	Parameter Group Number
PI	Presentation Interface
R&TTE	Radio equipment and Telecommunications Terminal Equipment
RADAR	Radio Detection and Ranging
RAIM	Receiver Autonomous Integrity Monitoring
ROT	Rate of Turn
RX	Receive
SD	Secure Digital
SOG	Speed Over Ground
SOLAS	Safety of Life at Sea
SRM	Safety Related Message
TCP	Transmission Control Protocol

TCPA	Time to Closest Point of Approach
TNC	Threaded Neill–Concelman (a type of connector)
TPI	Threads per Inch
TX	Transmit
UDP	User Datagram Protocol
UHF	Ultra High Frequency
UTC	Universal Time Co-ordinated
VDO	AIS own-ship broadcast data
VDM	All VDL AIS messages received
VHF	Very High Frequency
VSWR	Voltage Standing Wave Ratio
WEEE	Waste Electrical & Electronic Equipment
WiFi	Wireless networking technology



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# 1 Notices



When reading this manual please pay particular attention to warnings marked with the warning triangle symbol shown on the left. These are important messages for safety, installation and usage of the transceiver.

## 1.1 Safety Warnings



This equipment must be installed in accordance with the instructions provided in this manual. Failure to do so will seriously affect its performance and reliability. It is strongly recommended that a trained technician installs and configures this product.



**This product must be connected to protective earth via the earth connection point. It is essential that the earth connection point is used in all installations, regardless of what other equipment is connected. The earth connection point must be bonded to protective earth using as short a connection as possible.**



This equipment is intended as an aid to navigation and is not a replacement for proper navigational judgement. Information provided by the equipment must not be relied upon as accurate. User decisions based upon information provided by the equipment are done so entirely at the users own risk.



Do not install this equipment in a flammable atmosphere such as in an engine room or near to fuel tanks.



It is recommended that this product is not installed in direct sunlight or under a windshield where it can be subjected to excessive solar heating.



Do not attempt to service this equipment as doing so may cause fire, electric shock or malfunction and will invalidate the warranty. If any malfunctions are detected contact your supplier or service agent.



**NOT ALL SHIPS CARRY AIS.** The Officer of the Watch should always be aware that other ships and, in particular, leisure craft, fishing vessels and warships may not be fitted with AIS. Any AIS equipment fitted on other ships as a mandatory carriage requirement may also be off based on the Master's professional judgement.

## 1.2 General Notices

### 1.2.1 Position Source

All marine AIS transceivers utilise a satellite based location system such as the GLONASS or GPS satellite networks.



The accuracy of a GNSS position fix is variable and affected by factors such as the antenna positioning, how many satellites are used to determine a position and for how long satellite information has been received.

### 1.2.2 Compass Safe Distance

The compass safe distance of this transceiver is 0.3m or greater for a 0.3° deviation.

### 1.2.3 Product Category

This product is categorized as 'protected' in accordance with the definitions provided in IEC 60945.

### 1.2.4 Disposal of Transceiver and Packaging

Please dispose of this AIS transceiver in accordance with the European WEEE Directive or with the applicable local regulations for disposal of electrical equipment. Please dispose of the packaging in an environmentally friendly manner.

### 1.2.5 Accuracy of this Manual

This manual is intended as a guide to the installation, setup and use of this product. If you are in any doubt about any aspect of this product, please contact your dealer.

## 1.3 Regulatory Statements

### 1.3.1 Declaration of Conformity - R&TTE

The manufacturer of this product declares that this product is in compliance with the essential requirements and other provisions of the R&TTE directive. The declaration of conformity is provided as a .pdf file on the product CD supplied with the product. The product carries the CE mark, notified body number and alert symbol as required by the R&TTE directive. The product is intended for sale in the following member states: Great Britain, France, Spain, Sweden, Austria, Netherlands, Portugal, Denmark, Norway, Belgium, Italy, Finland, Ireland, Luxembourg, Germany and Czech Republic.

### 1.3.2 FCC Notice



This equipment has been tested and found to comply with the limits for a class A digital device, pursuant to part 15 of the FCC Rules.

These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications.

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:

- (1) This device may not cause harmful interference, and
- (2) this device must accept any interference received, including interference that may cause undesired operation.


Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

CE0168!

### 1.3.3 Industry Canada Notice




This device complies with Industry Canada licence-exempt RSS standard(s). Operation is subject to the following two conditions:

1. This device may not cause interference, and
2. This device must accept any interference, including interference that may cause  undesired operation of the device.

This Class A  digital apparatus complies with Canadian ICES-003.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes:

1. L'appareil ne doit pas produire de brouillage, et
2. L'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le Fonctionnement.

Cet appareil numérique de la classe A  conforme à la norme NMB-003 du Canada.

## 2 Introduction

### 2.1 About AIS

The marine Automatic Identification System (AIS) is a location and vessel information reporting system. It allows vessels equipped with AIS to automatically and dynamically share and regularly update their position, speed, course and other information such as vessel identity with similarly equipped vessels. Position is derived from GLONASS or GPS and communication between vessels is by VHF digital transmissions.

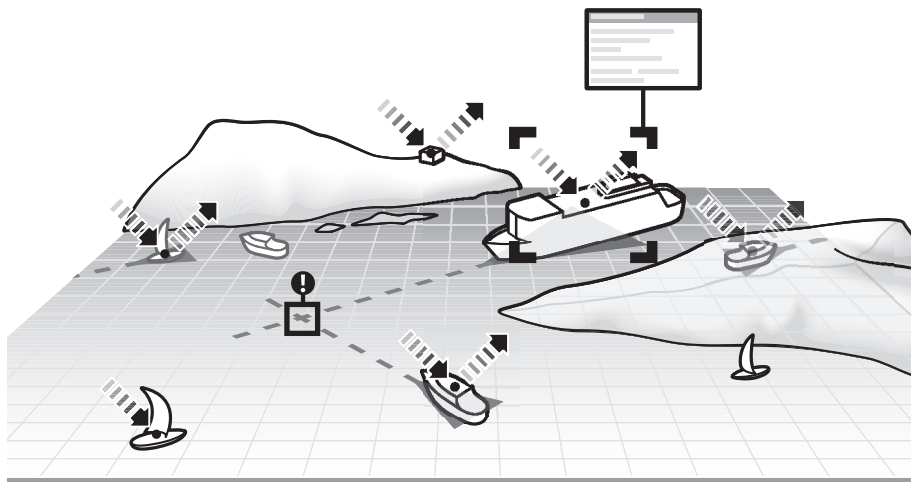


Figure 1 The AIS Network





### 3 Installation and Configuration

#### 3.1 What's in the Box?

Please ensure all items are present and if any of the items are missing please contact your dealer.

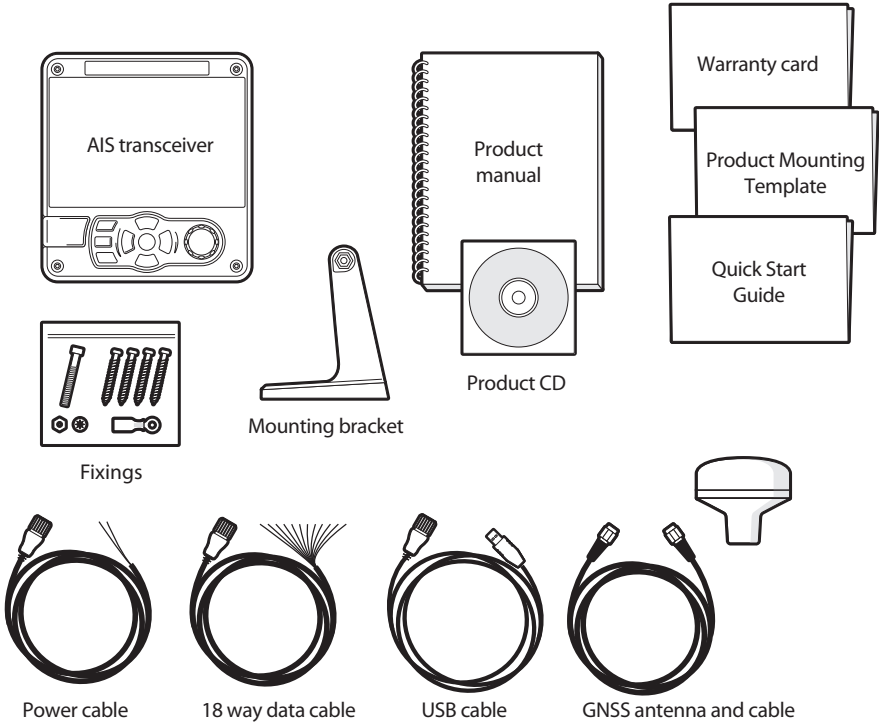


Figure 2 What's in the Box?

#### 3.2 Preparing for Installation



In addition to the items provided with the transceiver the following items will be required to complete the installation:

### **3.2.1 VHF Antenna**

Connection of a suitable VHF antenna will be required for the AIS transceiver to operate. The antenna cable should be terminated with a PL-259 (or UHF) connector. A surge arrestor should be fitted in line with VHF antenna connector. See section 3.3.3 for more information.

Please take note of the warnings listed at the start of this manual regarding the installation and use of antennas.

### **3.2.2 Antenna Cables**

The supplied GNSS antenna is provided with 10 metres (32.8ft) of cable. If this is not sufficient to reach between the desired GNSS antenna location and the AIS transceiver you will require an extension cable. Please contact your dealer for details.

### **3.2.3 GNSS Antenna Mount**

A mounting bracket is required for the supplied GNSS antenna.

### **3.2.4 Data Interface Cables**

Suitable screened, multi core cable will be required to connect the ships sensor (Heading etc.) data ports to the AIS transceiver.

## **3.3 Installation Procedures**

Before beginning installation of your AIS transceiver, please ensure that you read all of the instructions in this manual.

The following sections explain the installation process step by step for each of the main system elements. A typical system and connection diagram is provided in Figure 3

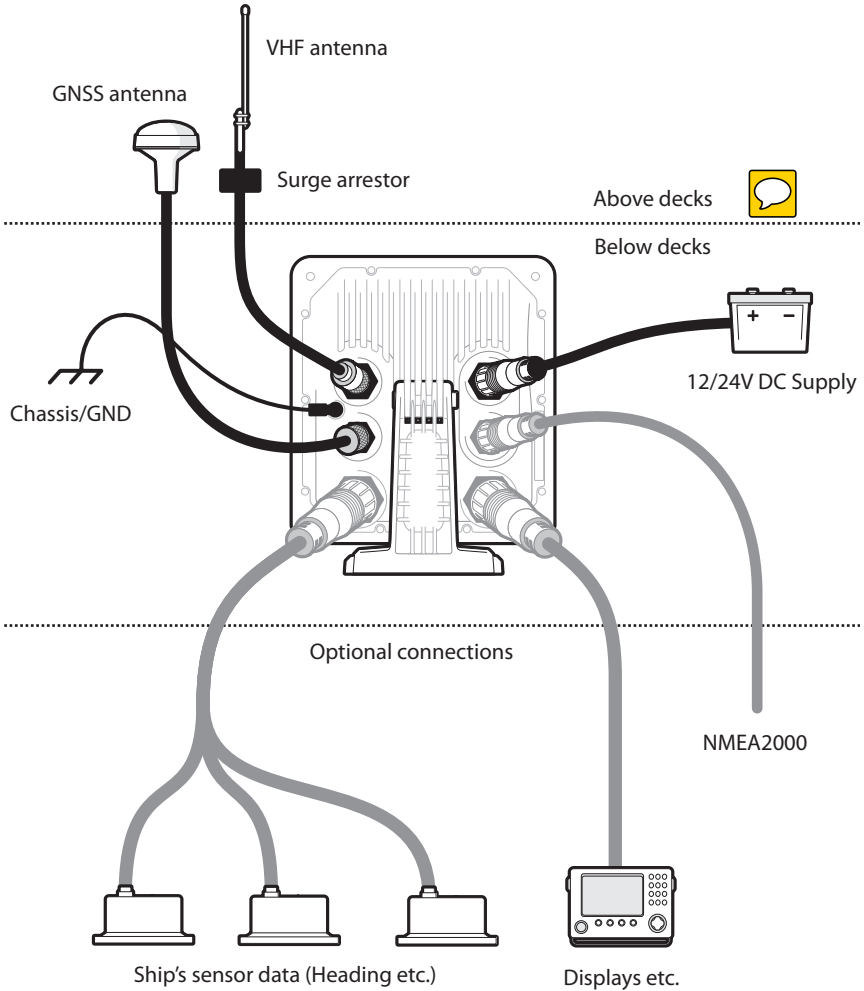
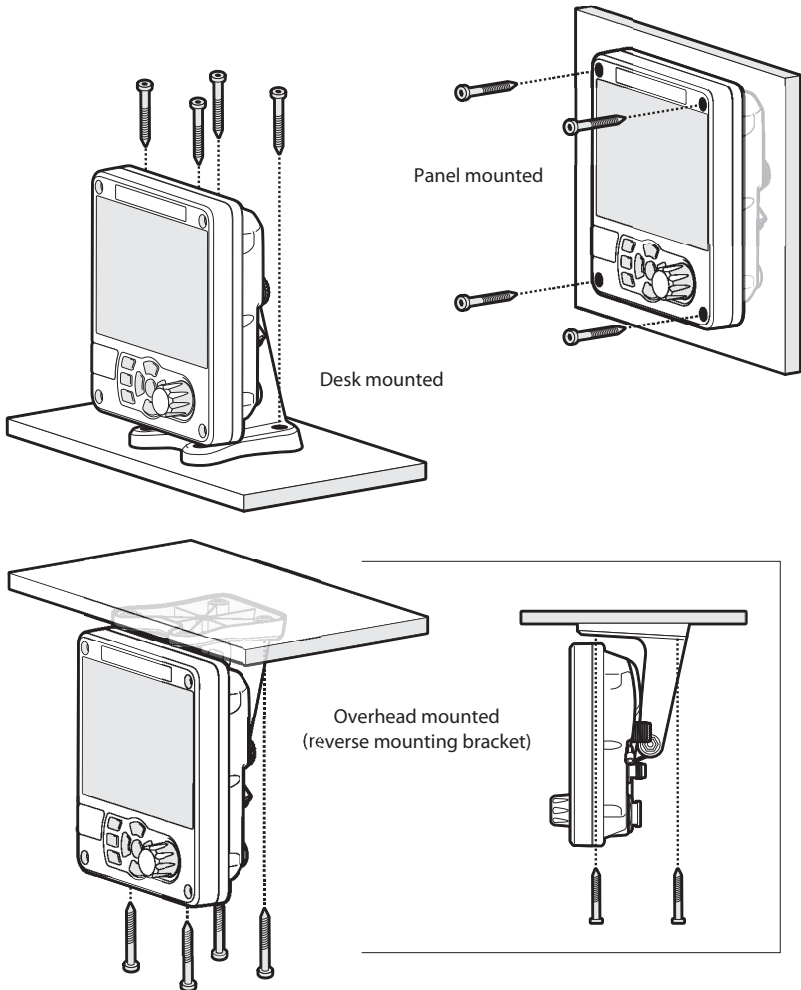


Figure 3 Typical AIS Transceiver Connection

### 3.3.1 Step 1 - Installing the AIS Transceiver

Please note the following guidelines when selecting a location for your AIS transceiver:

- The AIS transceiver must be fitted in a location where it is at least 0.3m (1ft) from a compass or any magnetic device.
- There should be adequate space around the AIS transceiver for routing of cables. See Figure 28 for details of the AIS transceiver dimensions.
- The ambient temperature around the AIS transceiver should be maintained between -15°C and +55°C (5°F to 131°F). Ensure adequate ventilation is present when panel mounting the transceiver.
- It is recommended that the AIS transceiver be installed in a 'below decks' environment protected from the weather.
- The transceiver is supplied with four self tapping screws for attachment of the AIS transceiver to a suitable surface using the supplied bracket. Please refer to Figure 5 for guidance.
- The transceiver can be panel mounted using the four self tapping screws provided. Please refer to Figure 6 for guidance. Access behind the panel is required when using this mounting option.
- The AIS transceiver should be mounted in a location where the display is visible to the user at the position from which the vessel is normally operated.



*Figure 4 Mounting the Transceiver*

Refer to Figure 28 for dimensions. A drilling and cutting template is provided with the transceiver.

To panel mount the unit it is necessary to remove the 4 off socket cap screws recessed in front of the unit. See Figure 6.

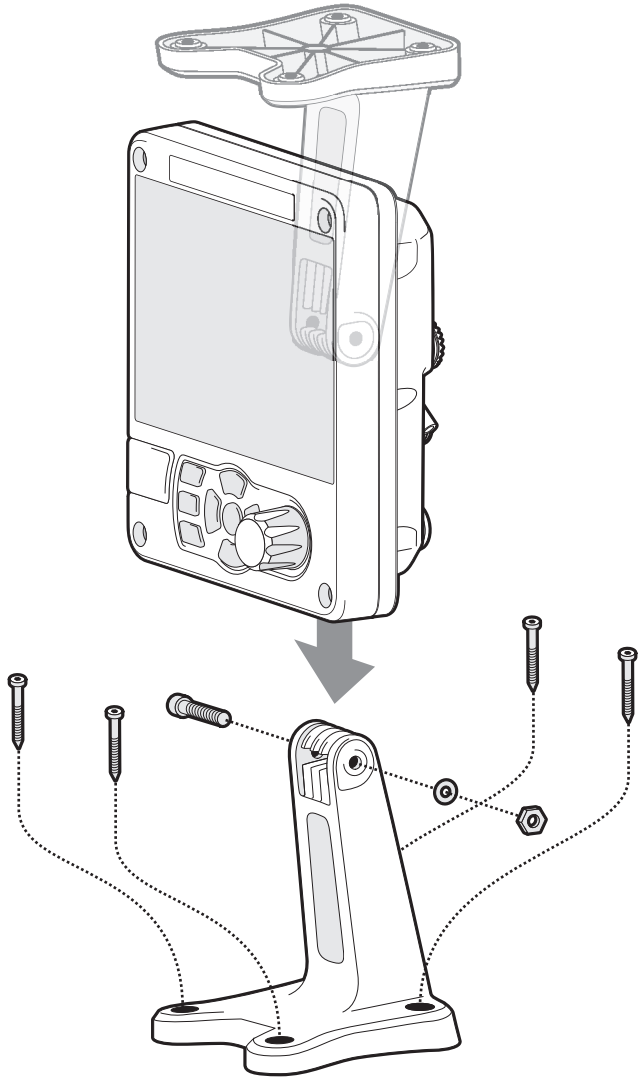
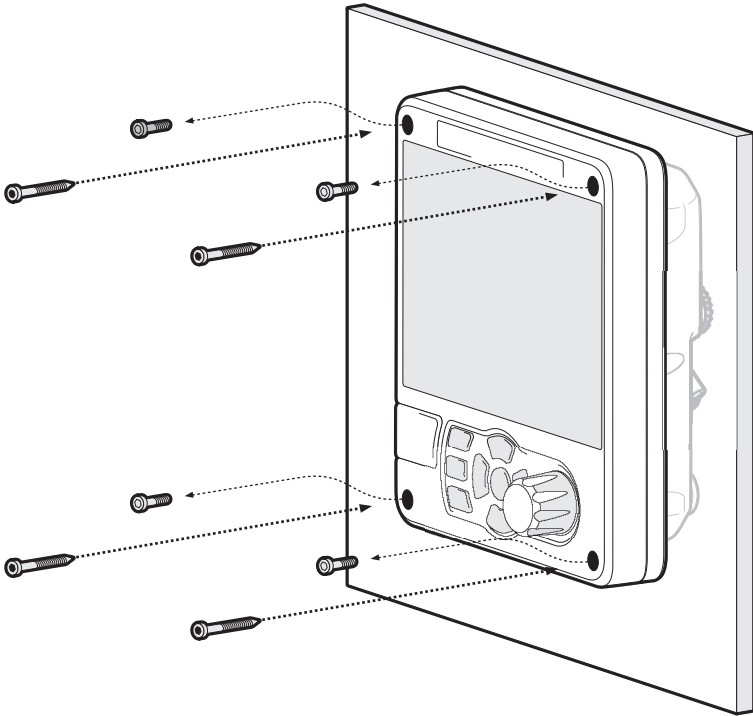


Figure 5 Desk Mounting the AIS Transceiver



*Figure 6 Panel Mounting the AIS Transceiver*

### **3.3.2 Installing the GNSS Antenna**

For mounting the GNSS antenna supplied with your AIS transceiver you will require a one inch 14 TPI pole mount. Contact your dealer to source a mount suitable for the installation location.

Please note the following guidelines when selecting a location for the GNSS antenna:

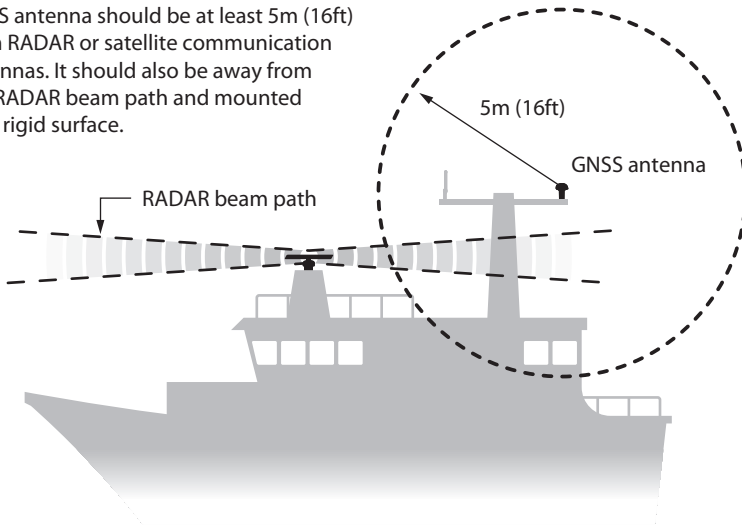
- The GNSS antenna mount should be secured to a rigid surface.
- The GNSS antenna should be located where it has a clear, unobstructed view of the sky overhead.

## Installation and Configuration

- The GNSS antenna should be mounted as high as possible, however it is not recommended to mount the antenna on the top of a high mast where the motion of the vessel will cause the antenna to move and potentially reduce the accuracy of the GNSS position.
- Route the GNSS antenna cable to the AIS transceiver. If extension cables are required all junctions should be made using appropriate co-axial connectors and made watertight.

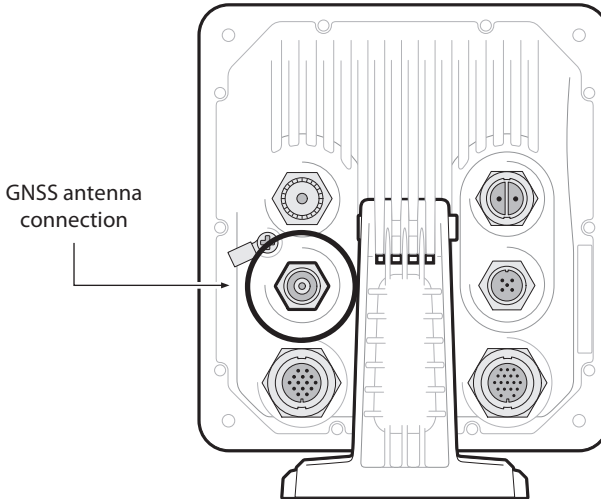
Connect the GNSS antenna cable to the GNSS connector on the AIS transceiver.

GNSS antenna should be at least 5m (16ft) from RADAR or satellite communication antennas. It should also be away from the RADAR beam path and mounted on a rigid surface.



*Figure 7 GNSS Antenna Location*





*Figure 8 GNSS Antenna Connection*

### **3.3.3 Installing the VHF Antenna**

Please note the following guidelines when selecting and locating the AIS VHF antenna:

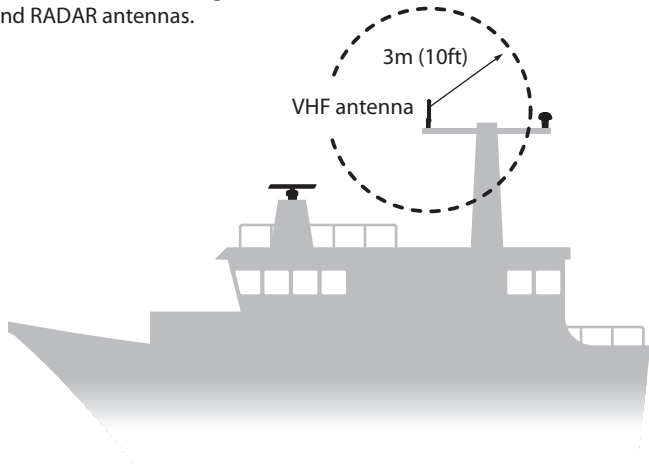
- The VHF antenna should be located as high as possible and positioned as far from other antennas as possible.
- The VHF antenna should have omnidirectional vertical polarization.
- Where possible the VHF antenna should be installed at least 3m (10ft) away from other transmitting radio, satellite and RADAR antennas.
- Ideally the AIS VHF antenna should be mounted directly above or below the ship's primary VHF radiotelephone antenna, with no horizontal separation and with a minimum of 2m vertical separation. Refer to Figure 9 for further guidance.
- The VHF antenna cable should be kept as short as possible to minimize signal loss. High quality, low loss coaxial cable appropriate to the installation location should be used.
- The VHF antenna cable should be terminated in a PL-259 co-axial connector for connection to the AIS transceiver.
- Any outdoor installed connectors in the antenna cables should be waterproof by design.

## Installation and Configuration

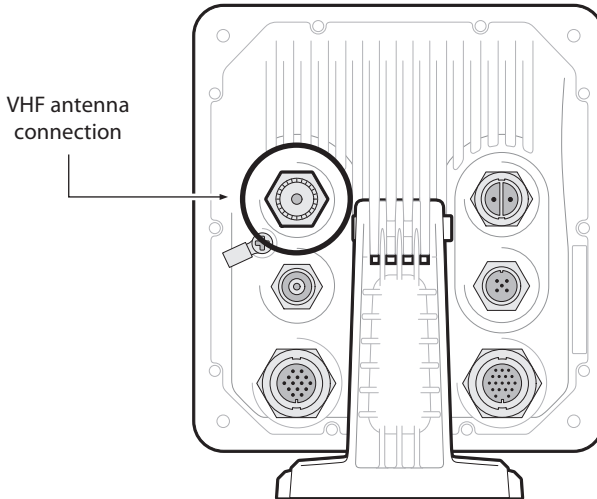
- Antenna cables should be installed in separate signal cable channels at least 10cm (4ins) away from power supply cables. Crossing of cables should be done at right angles and sharp bends in the antenna cables should be avoided.
- It is recommended that a suitable surge arrestor is fitted in-line with the VHF antenna connector.

Connect the VHF antenna cable to the VHF connector on the AIS transceiver as shown in Figure 10.

VHF antenna should be at least 3m (10ft) from other transmitting radio, satellite and RADAR antennas.



*Figure 9 VHF Antenna Location*



*Figure 10 VHF Antenna Connection*

## **3.4 Connecting the Equipment**

### **3.4.1 Data Connections**

The transceiver is supplied with a 2m (6.5ft) 18 way data cable for connection of the transceiver to external equipment. A 2m (6.5ft) 14 way data accessory cable can be purchased from your dealer for connection of other sensors"

### **3.4.2 Sensor Configuration**

The transceiver has six NMEA0183 (IEC61162-1/2) data ports for connection of ship's sensors and display equipment as described in Table 1 and Table 2. There are three input only ports for ship's sensor data and three bidirectional high speed ports for connection of display equipment.

### 3.4.3 Data Input Ports (14 way connector)

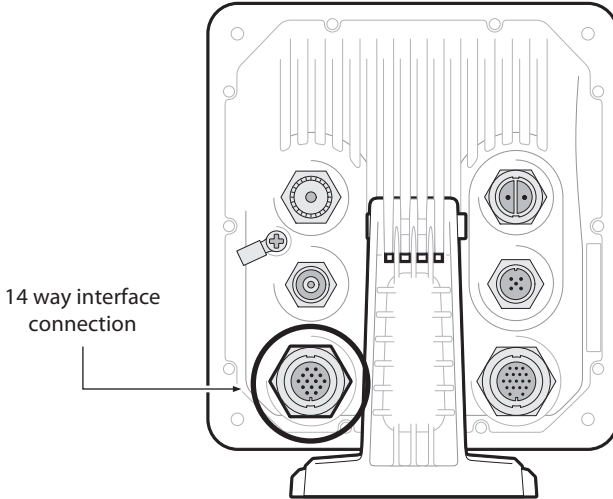


Figure 11 Serial Input Port Connection

SIGNAL	WIRE COLOUR	PIN
NOT USED	BLACK	1
NOT USED	BROWN	3
SILENT N	BLUE	6
SILENT P	RED	7
SENSOR 1 RX A	ORANGE	2
SENSOR 1 RX B	PURPLE	5
SENSOR 1 COM	GREEN	8
SENSOR 2 RX A	WHITE	9
SENSOR 2 RX B	WHITE/BLACK	12
SENSOR 2 COM	GREY	11
SENSOR 3 RX A	YELLOW	14
SENSOR 3 RX B	RED/BLACK	13
SENSOR 3 COM	PINK	10
CHASSIS	DRAIN WIRE	4

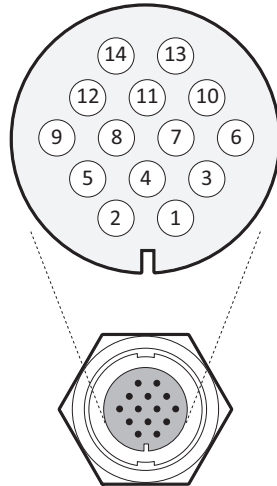


Figure 12 14 way Connector Cable Wiring Connections

Data port	Function	Type	Default Baud rate
1	Sensor 1 input	Receive only	4800
2	Sensor 2 input	Receive only	4800
3	Sensor 3 input	Receive only	4800

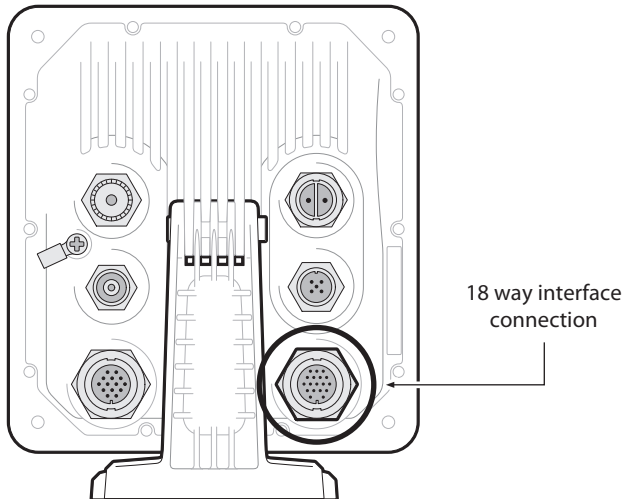
*Table 1 14 way Connector Serial Data Ports*

**Note:** Any unused ports should be terminated by a 120 Ohm resistor across RX A and RX B signals.

### 3.4.4 Silent mode switch

To activate the Silent mode switch, apply a voltage of between 2V and 30V to the SILENT P (Pin 7) and SILENT N (Pin 6) terminals of the 14 way connector.

### 3.4.5 Data Bi-directional Ports (18 way connector)



*Figure 13 Serial Bi-directional Port Connection*

SIGNAL	WIRE COLOUR	PIN
SERIAL PORT TX A	ORANGE	3
SERIAL PORT TX B	BROWN	4
SERIAL PORT RX A	PURPLE	7
SERIAL PORT RX B	BLUE	8
SERIAL PORT COM	BLACK	1
EXT DISPLAY 2 TX A	RED	2
EXT DISPLAY 2 TX B	RED/WHITE	5
EXT DISPLAY 2 RX A	PINK	6
EXT DISPLAY 2 RX B	YELLOW	10
EXT DISPLAY 2 COM	GREEN	11
ALARM NC	GREY	16
ALARM COM	WHITE	12
EXT DISPLAY 1 TX A	ORANGE/WHITE	13
EXT DISPLAY 1 TX B	BLACK/WHITE	17
EXT DISPLAY 1 RX A	BROWN/WHITE	14
EXT DISPLAY 1 RX B	YELLOW/WHITE	18
EXT DISPLAY 1 COM	GREEN/WHITE	15
CHASSIS	DRAIN WIRE	9

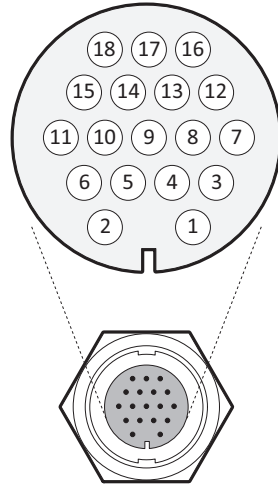


Figure 14 18 way Connector Cable Wiring Connections

Data port	Function	Type	Default Baud rate
4	External display 1	Bi-directional	38400
5	External display 2	Bi-directional	38400
6	Serial port	Bi-directional	38400

Table 2 18 way Connector Serial Data Ports

**Note:** Any unused ports should be terminated by a 120 Ohm resistor across RX A and RX B signals.

All sensor ports can be configured via the Interface settings menu which can be found under the 'System settings'-> 'Interfaces' menu option.

### 3.4.6 Alarm Connections

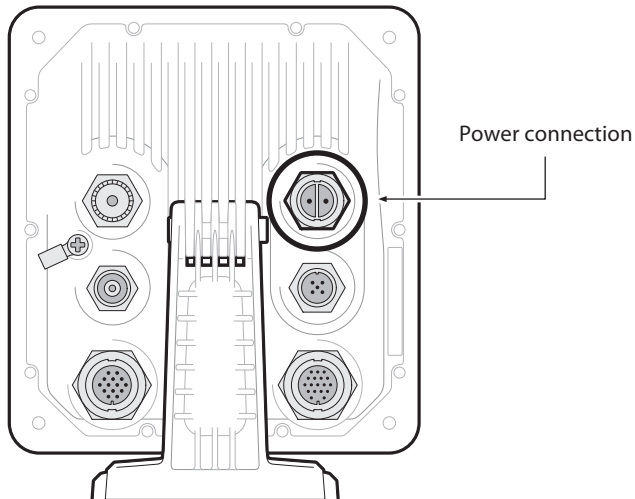
The transceiver also provides connections to the alarm relay contacts. The alarm relay connections are described in Table 3.

Alarm connection	Function	Contact rating
COM	Alarm relay common connection	2A at 220VDC or 60W maximum
NC	Alarm relay normally closed connection	

*Table 3 Alarm Relay Connections*

### 3.4.7 Power Connection

Power is connected to the transceiver via the supplied 2 way power cable as shown in Figure 15.



*Figure 15 Power Connection*

Wire colour	Function	Connect to
Red	Power supply +	12V or 24V DC power supply from ships emergency power source*
Black	Power supply -	Power supply ground

*Table 4 Power Supply Connections*

\*Connection to an emergency power source is an IMO requirement for SOLAS vessels.

The power supply current ratings and recommended fusing or circuit breaker currents are as follows:

- A 12VDC supply should be able to provide a peak current of 6.0A and be fused at 10.0A.
- A 24VDC supply should be able to provide a peak current of 4.0A and should be fused at 6.3A.

### **3.5 Grounding the Transceiver**

An M4 grounding screw and ring crimp are provided in the fixing kit to allow connection to the grounding point on the rear of the transceiver chassis as indicated in Figure 16.



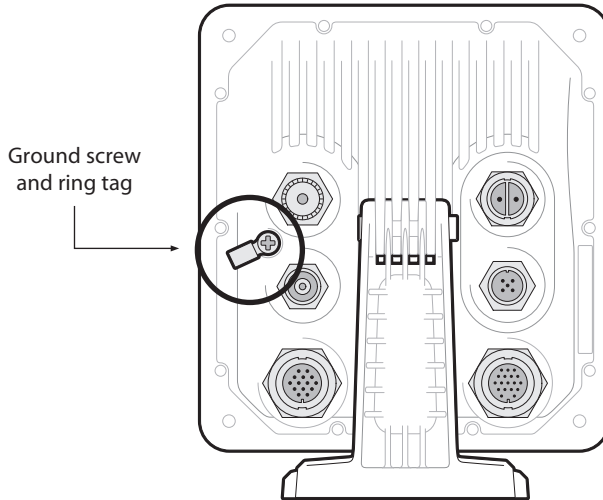


Figure 16 Grounding the Transceiver



This product **must** be connected to protective earth via the earth connection point. It is essential that the earth connection point is used in **all installations**, regardless of what other equipment is connected. The earth connection point must be bonded to protective earth using as short a connection as possible.

### 3.6 Connection to an NMEA2000 network (optional)

The AIS transceiver can be connected to an NMEA2000 network by a suitable NMEA2000 network cable available from your local dealer. If your vessel has an NMEA2000 network please refer to the relevant documentation for your NMEA2000 equipment. Once connected, and with your chart plotter also connected to your NMEA2000 network you will be able to receive AIS targets on your chart plotter.

### 3.7 USB Connection (optional)

The AIS transceiver is supplied with a USB cable for connection to a PC or Mac. The USB connector can be connected directly to the USB port on the PC or Mac via the supplied USB cable. To enable connection of the AIS transceiver to a PC the USB drivers, supplied

on the product CD, must first be installed. Driver installation is typically not required for use with a Mac.

To install the drivers please follows the steps below:

1. Insert the product CD into the PC and navigate to the USB drivers folder.
2. Double click on the setup.exe file to launch the installer.
3. Follow the on screen installation instructions to complete installation.
4. Once installed the AIS unit can be connected to the PC. The USB drivers will be installed automatically and the AIS will appear as a new COM port device.
5. Select the AIS COM port and a baud rate of 38,400 in PC based navigation software to make use of the AIS data.



**If the USB connection is removed from the PC or Mac during use you must reset the connection before further use. To reset the connection, disconnect then reapply power to the AIS before closing and relaunching any PC or Mac applications using the USB connection. Finally, reconnect the USB cable between the PC or Mac and the AIS transceiver**

### 3.8 Turning the Transceiver On

The transceiver does not have an on/off switch and will operate immediately that power is applied to the unit.

## 4 Operation

Please read the warning notices at the front of this manual before operating the AIS transceiver.

### 4.1 Using the AIS transceiver

Once the unit has been configured it is ready for use. Providing other vessels with AIS transceivers installed are within radio range of your vessel you should see their details appear on your chart plotter or PC.

These vessels will also be able to see your vessel on their chart plotter or PC. It may take up to six minutes for your full vessel details to be visible to others. Specific details of how to configure your chart plotter to make use of the AIS transceiver features will be given in your chart plotter manual.

If you are using charting software running on a PC, please refer to the instructions provided with your chart plotting software for details of how to configure it to display AIS information.

### 4.2 Display and Controls

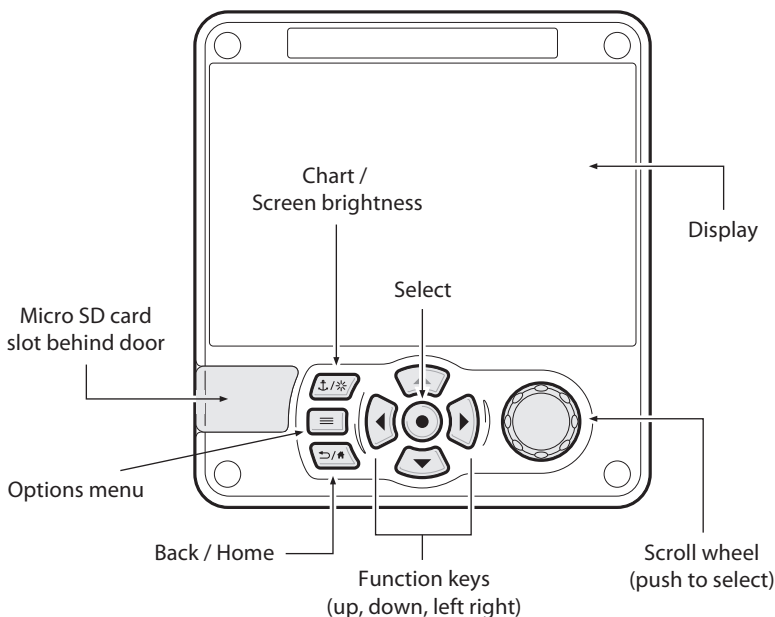


Figure 17 Transceiver Front Panel

The front panel of the transceiver is shown in Figure 17 with each control marked.

### 4.3 Button Functions

**Scroll wheel.** This is used to highlight information presented on the display. The scroll wheel can also be pressed to confirm data entry or select information.

**Chart / Screen brightness key.** When pressed with a short press will go to the Chart screen. When pressed with a long press it will go to the display brightness screen.

**Options menu key.** Provides access to additional features and relevant shortcuts on certain screens.

**Back / Home key.** When pressed with a short press cancels the current operation and moves to the previous menu or if pressed and held will return to the home screen.

**Select key.** When pressed selects the current option highlighted on the screen.

**Up, down, left and right function keys.** Provide an alternative means of navigating around the screen.

**Speaker.** The speaker is located behind the 'Scroll' wheel and can provide an audible sound when a key is pressed, a message is received, or an alarm is activated. Sounds can be enabled or disabled via the Sounds Settings menu.

**Micro SD card.** The micro SD card socket (behind the door) is provided to allow uploading of new software or charts to the transceiver.

**Display.** The display shows essential AIS operating information and allows for configuration of the transceiver via the menus.

### 4.4 Adjusting Display Brightness

Press and hold the 'Chart / Screen brightness' key. The screen will change to the Display and unit settings menu screen.

### 4.5 Changing Navigation Status

Press the 'Chart / Screen brightness' key. The screen will change to the Navigation menu screen. Move to the desired navigation status icon to select it.

## 4.6 Menu Navigation

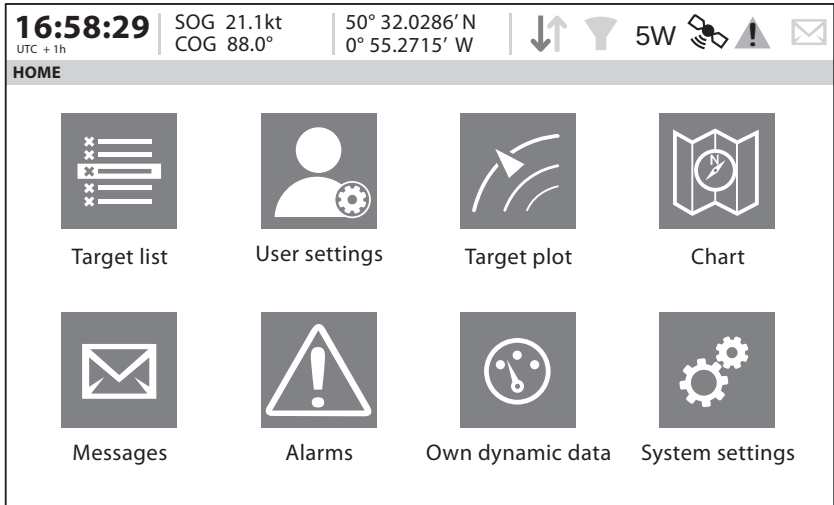


Figure 18 Home Page Menu Screen

### 4.6.1 Main / Sub Menus

Menus are displayed as a set of icons which can be navigated between using the controls. Selection of an icon will then display the information beneath in accordance with Figure 19. Pressing the *Back/home*' key will exit the menu.

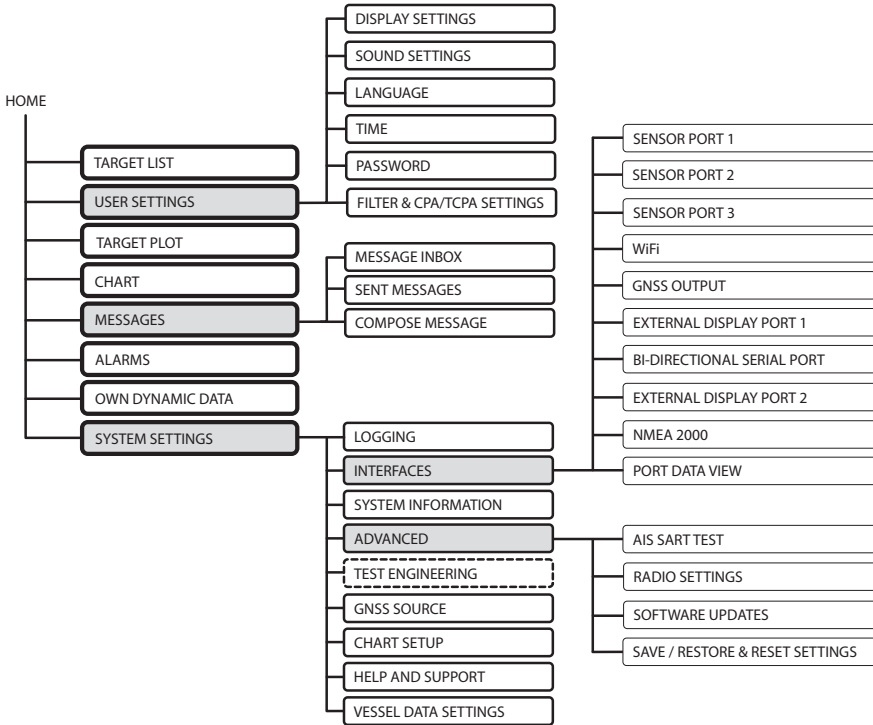


Figure 19 Main Menu Structure

### 4.6.2 Data Entry Screens

Some screens allow you to enter data, such as vessel parameters. On these screens you navigate to the desired field and select the appropriate menu item. Some data entry items require a password, this is shown by means of a 'Padlock' icon. Pressing the 'Back/home' key will exit these menus.

### 4.6.3 Keyboard/Keypad Screens

Some screens require text or numeric entry. When these are selected, a virtual keyboard is displayed which can be used to enter text or numbers.

### 4.6.4 Options Menu

On certain screens, the Options Menu will bring up a further list of functions specific to that screen.

## 4.7 Information Displayed

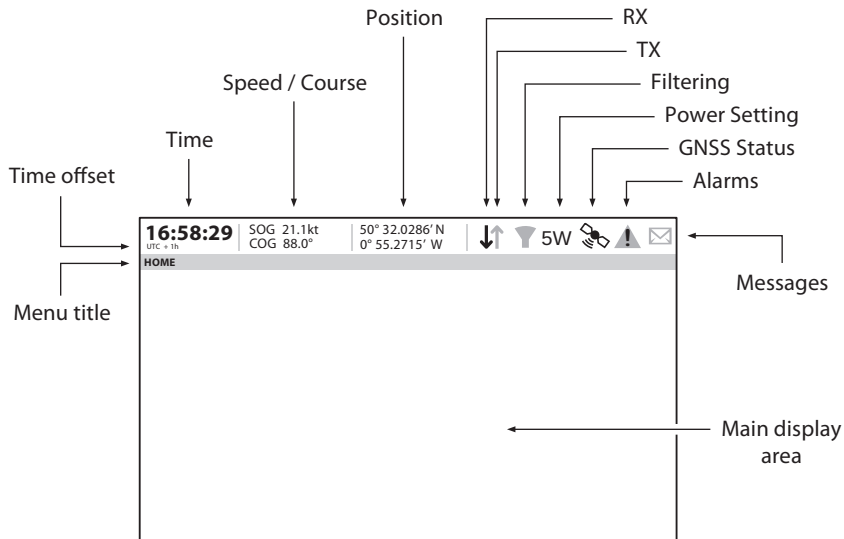


Figure 20 Display Layout

### 4.7.1 Menu Title

Refers to the current menu displayed from Figure 19.

### 4.7.2 Time

Time derived from GNSS satellites or AIS Base Stations.

### 4.7.3 Time Offset

Offset from UTC, set on the 'Time and date' menu.

### 4.7.4 Speed/Course

Vessel speed and course as taken from GNSS satellite data.

### 4.7.5 Position

Vessel position taken from GNSS source.

### 4.7.6 Icons

**RX** - Illuminates to show receiving an AIS message.

**TX** - Illuminates to show transmission of an AIS message.

**Filtering** - Illuminated to show that target filter settings apply.

**Alarms** - Displays an icon to show the presence of acknowledged or unacknowledged AIS alarms.

**Messages** - Displays an envelope icon with a number to show the presence of AIS messages received See menu 'Messages'.

**GNSS Status** - Displays an icon to show if GNSS data is being received.



GNSS Available

GNSS Unavailable

Figure 21 GNSS Icons

**Power** - Displays "1W" or "5W" to indicate the current radio power output.

#### 4.7.7 Alarms

The transceiver performs self checking functions continuously. If a self check fails a display will appear on the screen notifying the operator of this. This will be accompanied by a sound. The alarm can be acknowledged via an on-screen message. The list of currently active AIS Alarms can be displayed by accessing the 'Alarms' menu. Certain AIS Alarms can be switched off in the 'Alarm Settings' menu. The alarm conditions are displayed at the top of the screen and are represented as follows:



*New unacknowledged alarm, this will flash.*



*New acknowledged alarm.*




*No active alarms.*

Figure 22 Alarm icons



If any alarm condition persists, contact your dealer or installer.

Possible alarm conditions are listed in Table 5:

Alarm	Description
TX Malfunction	<p><b>This alarm will occur if the MMSI has not been configured.</b></p> <p>This alarm can also occur if the radio hardware has failed to select the correct frequency, that the output power is too low or a transmitter shutdown has occurred.</p> <p>In the  situation, ALR 001 is output over the PI.</p> <p>The alarm will be cleared if the transmitter recovers normal operation.</p>
RX Channel x Malfunction	<p>This alarm occurs should the receiver hardware malfunction. The receiver is identified by the value of x (as shown below).</p> <p>The following alarms will be generated over the PI in this condition:</p> <p>ALR 003 - Rx Channel 1  ALR 004 - Rx Channel 2  ALR 005 - DSC (Channel 70)</p> <p>If the receiver returns to normal operation this alarm will be cleared.</p>
Antenna VSWR exceeds limit	<p>This alarm condition can occur if the VSWR of the AIS antenna exceeds pre-defined limits. This alarm is cleared if the VSWR returns to an allowable value.</p>
No valid COG information	<p>This alarm occurs if the transceiver has no valid Course Over Ground information from any connected sensor.</p>
No valid SOG information	<p>This alarm occurs if the transceiver has no valid Speed Over Ground information from any connected sensor.</p>
Heading lost or invalid	<p>This alarm occurs if the transceiver has no valid heading information from any connected sensor, or if the heading is undefined.</p>

Alarm	Description
No sensor position in use	This alarm occurs if the transceiver has no valid position information from any connected sensor.
UTC Sync Invalid	This alarm indicates that the transmitter is no longer directly synchronized with the GNSS receiver. This may be because the GNSS receiver cannot receive sufficient satellites.
Heading sensor offset	This alarm occurs if the difference between the course over ground and heading data is greater than 45° for more than 5 minutes. This alarm only occurs if the vessel speed over ground is greater than 5 knots.

*Table 5: Alarms List*

#### 4.7.8 Messages

AIS text messages and Safety Related Messages (SRMs) can be received from other AIS equipped vessels and also sent to specific vessels (addressed messages) or sent to all vessels in range (broadcast messages).

Reception of an AIS text message is indicated by the presence of the message icon at the top of the screen. This icon is shown whenever there are unread AIS text messages. Messages can be reviewed and replied to via the In-box. The transceiver can store up to a maximum of 20 messages in the In-box and 20 messages in the Sent folder. If the number of messages exceeds 20 then the oldest message will be overwritten.

When a Safety Related Message is received the user will be notified immediately with a pop-up showing the message. Standard text messages are not displayed on receipt, however the message icon will be displayed at the top of the screen.

AIS messages can be viewed, created and transmitted from the 'Messages' menu.

The available options are:

Compose - takes you to the message composition screen

In-box - takes you to the received message list view

Sent - shows a list of recently sent messages.

To compose a new message, select the type of message from the drop down menu and the destination. This can be by directly entering the MMSI, or by selecting from a list of visible targets.

The message text is entered using the on screen keyboard. Messages are limited to 80 characters in length.



**Class B transceivers are permitted to receive broadcast SRMs and broadcast text messages, however this function is not mandatory. Class B transceivers are not able to receive addressed SRM or text messages. There is therefore no guarantee that text messages or SRMs sent to a Class B transceiver will be received.**

#### 4.7.9 Chart

The AIS transceiver contains an application which will display AIS targets received, along with its own vessel position on a chart style plot.

The chart can be scrolled up, down, left, and right using the '*Function*' keys. Zooming in and out is via the '*Scroll*' wheel.

Targets can be selected by moving the cross hairs over a target and pressing the '*Select*' key.

The '*Options*' menu is also available for more advanced features.

Within the '*Options*' menu, the chart can be oriented to either North, Heading, or Course Up. The chart can be set so that the own vessel position is always in the centre of the screen and kept in the centre if '*Centre Tracking*' is enabled.

The chart can be de-cluttered by hiding filtered targets, or the own vessel icon, from the display.

SOG vectors can also be displayed on the screen if this item is selected from the '*Options*' menu.

Some of the layers displayed on the chart can be removed to provide more clarity on the display. The '*Chart Settings*' screen provides a way of modifying these.

The chart feature is an aid for the display of information only and should not be used for vessel navigation.

#### 4.7.10 Help and Support Screen

This screen is available from the '*System Settings*' menu and provides contact information for the product manufacturer.

It also provides relevant information from the User Manual.

### 4.7.11 User Settings Screen

From this screen, it is possible to set the display brightness, set the display to a day or night colour scheme and configure the sounds emitted by the device. It is also possible from this screen to set the UTC time offset, change the password, change the filter settings and display the menus in a number of non-English languages.

## 4.8 Configuring Vessel Information

### 4.8.1 Pre-configuration Checks

To proceed with configuration the steps in Section 3 should already have been completed.

### 4.8.2 Configuring Vessel Identification Information

The transceiver must be configured with information about the vessel on which it is installed prior to operation. The following information is required to be entered in the 'Vessel data settings' menu:

- MMSI - Vessel MMSI number, this can usually be found on the ships VHF radio license and should be the same MMSI as used for the VHF / DSC radio.
- Ship Name (limited to 20 characters)
- Call sign - Vessel radio call sign (limited to 7 characters)
- Ship type - Selected from the menu provided.
- Dimensions of the location of the GNSS antenna connected directly to the AIS transceiver (Internal GNSS)



**Please ensure that you enter all vessel data accurately. Failure to do so could result in other vessels failing to identify your vessel correctly. The vessel MMSI can only be programmed once using proAIS2, please take care to program your MMSI correctly. If you need to change the MMSI for any reason, please contact your dealer who will arrange to have the MMSI reset.**

### 4.8.3 Configuring the GNSS Receiver

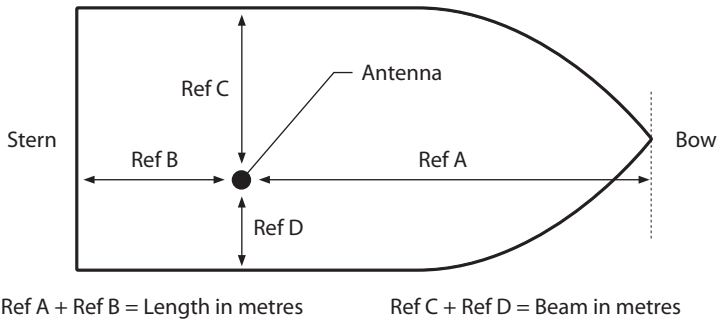
The GNSS receiver can be configured to operate in one of three modes:

- GLONASS and GPS – in this mode the position fix is derived from both the GLONASS and GPS network in parallel. This mode is the default setting and gives the best performance.
- GPS – in this mode only GPS satellites are used for the position fix.

- GLONASS – in this mode only GLONASS satellites are used for the position fix.

The operating mode can be selected from the 'GNSS source' option in the 'Advanced' settings menu.

The antenna dimensions should be entered in metres according to the diagram provided in Figure 23.



*Figure 23 Vessel Dimension Measurement*

## 4.9 Passwords and Security

The WiFi feature in this transceiver require a password to be entered. In order to do this, you will be prompted with the password entry screen.

The password entry screen is shown in Figure 24. Highlight the required character, then press 'Select' to enter that character. When all characters of the password have been entered, select 'OK'.

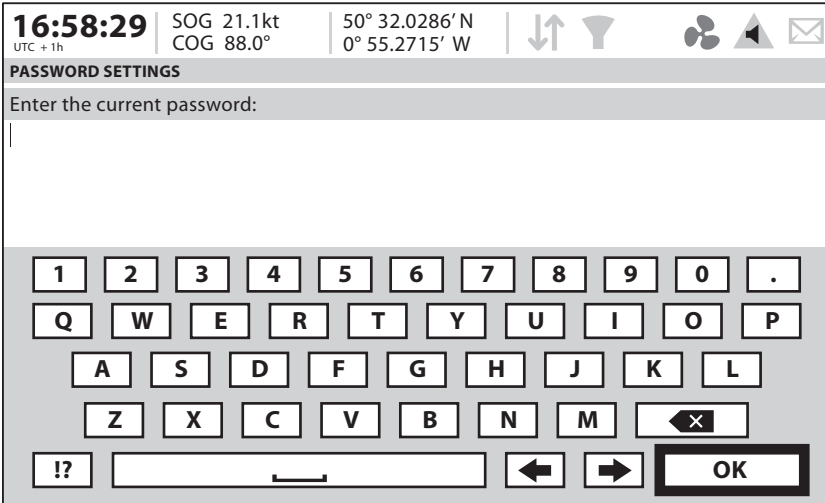


Figure 24 Enter Password Screen

Following configuration of the transceiver the password should be changed from its default value of '0000' (four zeros) to another alpha numeric code. Password change is carried out by selecting 'User Settings' -> 'Password'.

## 4.10 Confirming Correct Operation

Following entry of the vessel and voyage information the transceiver will commence normal operation. Correct operation should be verified as follows:

1. Select the 'Own dynamic data' option from the main menu.
2. Check that the displayed position, course, speed and heading are correct by comparing to the display associated to the connected position source and other data sources.
3. Check that the 'TX' icon flashes periodically.

4. If the vessel is in an area where other AIS equipped vessels are present press the '*Back / Home*' key and select '*Target list*' to check that data from other AIS equipped vessels is displayed.
5. Go to the '*System settings / System Information*' screen and select '*Hardware status*', check that the supply voltage and antenna VSWR are correct.

The transceiver is now operational and should remain powered unless authorised by the local maritime authority. The installation record at the rear of this manual should be completed and left on board the vessel.

## 4.11 Displaying AIS Targets

### 4.11.1 Target List

The Target List Screen is the primary screen for displaying AIS targets received. This is the first screen displayed when the unit is switched on, but can also be accessed from the Target List option on the main menu.

<div style="display: flex; justify-content: space-between; align-items: center;"> <span><b>16:58:29</b> UTC +1h</span> <span>SOG 21.1kt COG 88.0°</span> <span>50° 32.0286' N 0° 55.2715' W</span> <div style="display: flex; align-items: center; gap: 10px;"> <span>↕</span> <span>📶</span> <span>5W</span> <span>📶</span> <span>🚫</span> <span>⚠️</span> <span>✉️</span> </div> </div>							
TARGET LIST							
NAME/MMSI	Range	Bearing	CPA	TCPA	Type	Age	
DUBLIN FISHER	3.15NM	120.8°	3.15NM	-	⚠️	1m 50s	
PROXIMITY CRAFT	15.5NM	22.6°	15.5NM	-	⚠️	1m 47s	
ATLANTIC PRIDE	6.9NM	37.20	6.9NM	-	⚠️	0m 1s	
212222222	6.7NM	313.4°	6.7NM	-	⚠️	0m 36s	
EMSLAKE	-	-	-	-	⚠️	0m 45s	
PIER 4	5.2NM	86.6°	5.2NM	5h 38m	⚠️	0m 6s	
444110175	35.8NM	167.3°	35.8NM	-	⚠️	0m 5s	

Visible: 12 Filtered out: 0

Figure 25 Target List Screen

By default the target list is sorted by range but can be sorted on any column by using the left and right 'Function' keys to select a column and pressing the 'Select' key to sort either in ascending or descending order. Navigation up and down the list is via the up and down arrow keys or scroll wheel. Selecting a highlighted target using the Select key will bring up more details of that target. The *Options* menu on this screen provides additional actions which can be performed on the target list.

Different symbols are shown for an AIS target depending on the type of target and its status, these are shown in . These symbols are common to the Target list, Target plot and Chart displays.





Figure 26 AIS target symbols displayed

### 4.11.2 Target Filtering

From the Target List options menu, if 'Show Filter Settings' is selected, a screen is displayed indicating which filter parameters can be set to reduce the amount of data displayed on screen. This screen can also be accessed through 'System Settings'-> 'User Settings'.



Filters can be toggled on and off on the target list by pressing the 'Options menu' key and selecting 'Toggle filters off'. The bottom line of the target list shows how many targets are visible or filtered out. If a filter is set, the filter icon is displayed at the top of the screen.

The Filters icon does not represent CPA/TCPA alarm settings.

### 4.11.3 CPA/TCPA Settings

The transceiver can be configured to filter out approaching vessels which fall within certain limits. The Closest Point of Approach (CPA) defines a boundary around the own vessel upon which, if breached, will trigger the filter. Time to Closest Point of Approach (TCPA) can only be set if CPA is set, and will trigger the filter if the time to the CPA limit is breached.

These parameters are set on the 'Filtering and CPA/TCPA Settings' menu.

The target list shows targets which trigger the TCPA/CPA filter red.

These CPA/TCPA figures are calculated solely on AIS data and should not be used for anti-collision purposes.

**Note:** Setting the CPA/TCPA filter will not activate the Filters Icon.

### 4.11.4 Target Plot

The Target Plot screen shows the location of other AIS equipped vessels and shore stations relative to your own vessel. The target plot screen provides a basic overview of AIS targets and should not be regarded as a substitute for

display of AIS information on a dedicated electronic chart display system (ECDIS).

The plot range can be adjusted by rotating the scroll wheel which cycles through the ranges 0.2NM up to 100NM. The range relates to the radius of the outer range ring shown on the screen.

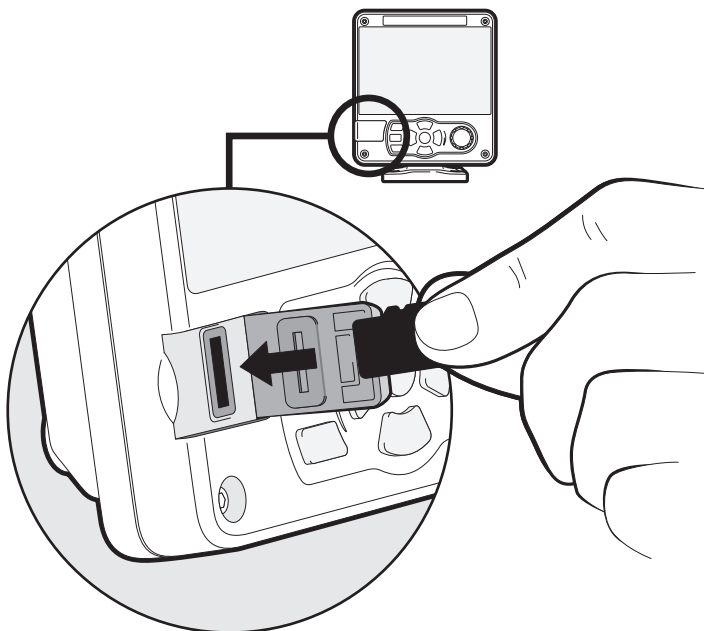
Individual targets can be selected by using the arrow keys. When selected a square outline will appear around the target and the vessel details will be shown on the left hand side of the screen.

By pressing the options menu key, additional display features can be selected. If the Own Vessel Details option is selected the left hand side of the screen will change to show own vessel dynamic data.

If the MOB Details Display option is selected, the target plot will change to show only AIS-MOB, AIS-SART, and AIS-EPIRB devices. The left hand side of the screen will show the range and relative bearing to whichever target is currently highlighted using the arrow keys.

### **4.12 Micro SD card data input**

On the front of the transceiver under the door on the lower left hand side is a socket for a Micro SD memory card. See Figure 27. This can be used for loading new navigation charts or to upgrade the unit firmware. Note the orientation of the Micro SD card, which is critical to ensure the product is not damaged.



*Figure 27 Micro SD card Socket*

#### **4.12.1 Loading New Charts**

The transceiver always contains a basic low resolution world chart.

More detailed resolution charts can be purchased and overlaid onto the transceiver's chart display.

The transceiver will read only Jepperson C-MAP MAX format Micro SD cards. See your dealer for available charts for your region.

Insert a C-MAP Micro SD card into the Micro SD card socket. The transceiver will then automatically overlay that higher resolution chart region onto the relevant region on the transceiver's world chart.

Remove the Micro SD card and the region will revert back to the basic world-chart.

#### **4.12.2 Upgrading the Unit Firmware**

If a Micro SD card that contains valid upgrade firmware is inserted into the card socket, the unit will recognize the new firmware and will display a message asking you if you want to install it. The system will guide you to the appropriate menu screen, where the firmware update can be applied.

### **4.12.3 Logging Ports to the Micro SD card**

If a Micro SD card is inserted into the card socket, the AIS transceiver can be configured to output specific data to the card. This is accessed from the individual port menu (from *the 'System settings' -> 'Interfaces' menu.*) If the *'Log port to SD Card'* option is set to *'On'*, data will be output from that port to the Micro SD card, if one is inserted into the card socket. Only one port can be logged to the Micro SD card at a time.

### **4.12.4 Saving/Loading Settings**

From the *'Save/Restore& reset settings'* menu, all system settings and transceiver configuration data can be saved to the Micro SD card, if one is inserted into the card socket. Settings previously saved can be restored, thus restoring the transceiver to a previous configuration. *'Reset settings'* will restore the unit to its factory defaults and is protected by the unit password.

## **4.13 WiFi Feature**

The AIS transceiver provides features to operate with vessel WiFi networks, or to create its own network. Access the WiFi menu through *'Interfaces' -> 'WiFi settings'*.

### **4.13.1 Client Mode**

If client mode is selected, the transceiver will search for available WiFi networks to connect to. If one is selected a password may be required, and upon connection the details of the connection will be shown in the bottom right corner of the screen. Once a WiFi connection is made, the transceiver will output a range of NMEA sentences over the selected WiFi port.

### **4.13.2 Access Point Mode**

If the transceiver is configured as a WiFi access point (AP) it will create its own WiFi network, allowing other WiFi enabled devices to connect to it. Once connections are made, a range of NMEA sentences will be transmitted from the transceiver to any connected devices.

### **4.13.3 Advanced WiFi Features**

Within the *'WiFi'* screen, certain parameters can be changed such as Channel Number, Protocol, Port, Encryption, etc. These are recommended for advanced users only.

WiFi is switched off by selecting *'Disable'* in the *'Select Operating mode'* box.

## 5 Technical Information

### 5.1 AIS Transceiver Overall Dimensions

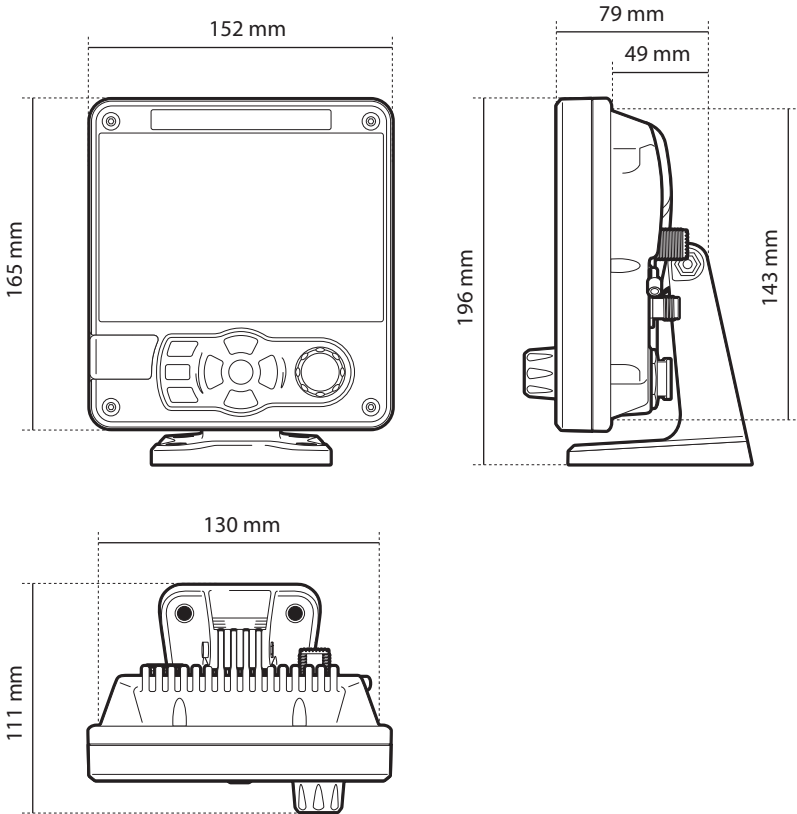
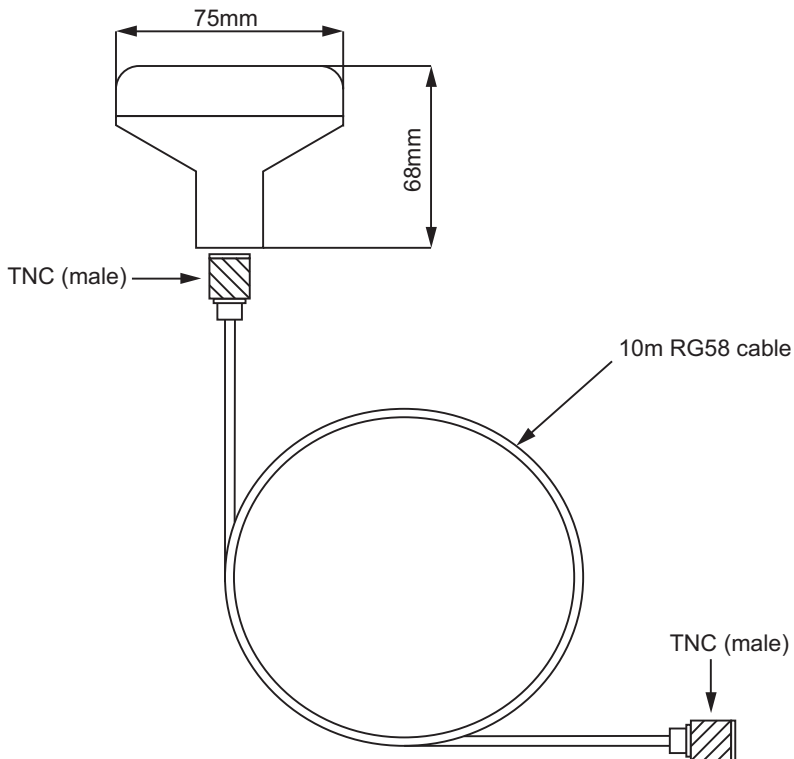


Figure 28 Transceiver Dimensions

## 5.2 GNSS Antenna Drawing



*Figure 29 GNSS Antenna*

\* The dimensions of the supplied antenna may vary from those shown here.

## 6 Technical Specification

### 6.1 Applicable Equipment Standards

<p>IEC62287-2 Ed. 1.0 2013-03</p>	<p>Maritime navigation and radiocommunication equipment and systems - Class B shipborne equipment of the universal automatic identification system (AIS) – Part 2: Self organising time division multiple access (SOTDMA) techniques</p>
<p>IEC60945 4th Ed. 2002-08</p>	<p>Maritime navigation and radio communication equipment and systems – General requirements – Methods of testing and required test results</p>
<p>IEC61162-1 Ed. 4.0 2010-11</p>	<p>Maritime navigation and radio communication equipment and systems – Digital interfaces - Single talker and multiple listeners</p>
<p>IEC61162-2 Ed. 1.0 1998-09</p>	<p>Maritime navigation and radio communication equipment and systems – Digital interfaces - Single talker and multiple listeners, high speed transmission</p>
<p>IEC61162-3 2008+A2:2014</p>	<p>Maritime navigation and radio communication equipment and systems - Digital interfaces - Part 3: Serial data instrument network.</p>
<p>ITU-R M.1371-5 02/2014</p>	<p>Technical characteristics for an automatic identification system using time division multiple access in the VHF maritime mobile band</p>
<p>IEC61108-1 2nd Ed. 2003-07</p>	<p>Global Navigation Satellite Systems (GNSS) – Part 1: Global positioning system (GPS) - Receiver equipment - Performance standards, methods of testing and required test results</p>
<p>IEC6118-02 1st Ed. 1998-06</p>	<p>Global navigation satellite systems (GNSS) - Part 2: Global navigation satellite system (GLONASS) - Receiver equipment - Performance standards, methods of testing and required test results</p>

## 6.2 Product Category

Product Category	This product is categorized as 'protected' in accordance with the definitions provided in IEC 60945
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## 6.3 Physical

Transceiver Dimensions	152mm x 165mm x 111mm (WxHxD), see Figure 28 for drawing)
Transceiver Weight	1.5kg
Compass Safe Distance	0.3m (Transceiver)

## 6.4 Environmental

Operating Temperature Range	-15°C to +55°C
Maximum Operating Humidity	90% at +40°C, non-condensing
Water Ingress Rating	IPx6 and IPx7

## 6.5 Electrical

Supply Voltage	12 to 24V DC (absolute min 10.8V, absolute max 31.2 V)
Power Consumption	< 12W
Current Consumption @12 VDC Supply	0.9A typical, 6.0A peak
Current consumption @24 VDC supply	0.5A typical, 4.0A peak



## 6.6 Display and User Interface

Display	800 x 480 pixel colour LCD with adjustable backlight
Luminance	500cd/m <sup>2</sup> max, 75cd/m <sup>2</sup> default
Recommended Viewing Distance	45cm
Keypad	Five function keys and three menu keys with adjustable backlight
Rotary Control	Encoder with push function
Speaker	600mW@750Hz 11mm x 15mm

## 6.7 Internal GNSS

Receiver Channels	32 channels GPS and GLONASS operating modes
Time to First Fix	Typically 26 seconds
Frequency	L1 GPS band, 1575.42MHz and L1 GLONASS band 1597.1 - 1609.5MHz
Accuracy	2.5m CEP / 5.0m SEP without differential correction 2.0m CEP / 3.0m SEP with SBAS or RTCM DGPS correction
Antenna Requirement	Active antenna (5V bias) with gain >15dB

## 6.8 TDMA Transmitter

Frequency Range	156.025MHz to 162.025MHz
Channel Bandwidth	25kHz
Output Power	1W or 12.5W (Automatic selection)
Data Transmission Rate	9600 bits/s
Modulation Mode	25kHz GMSK

## 6.9 TDMA receiver

Number of Receivers	3
Frequency Range	156.025MHz to 162.025MHz
Channel Bandwidth	25kHz
Sensitivity	<-107dBm for 20% PER
Modulation Mode	25kHz GMSK
Adjacent Channel Selectivity	70dB
Spurious Response Rejection	70dB

## 6.10 DSC Receiver

Number of Receivers	1
Frequency	156.525MHz (Channel 70)
Channel Bandwidth	25kHz
Sensitivity	-107dBm @ BER <math>10^{-2}</math>
Modulation mode	25kHz AFSK
Adjacent channel selectivity	70dB
Spurious response rejection	70dB

## 6.11 RF Connections

VHF Antenna Connection	SO-239 / UHF
VHF Port Impedance	50 Ohms
GNSS Antenna Connections	TNC female
GNSS Port Impedance	50 Ohms

## 6.12 Data interface

Sensor Data Input Ports	
Number of Ports	3
Standard	IEC61162-1 / -2
Baud Rate	4800 baud or 38400 baud
Port Impedance	54K Ohms
Bidirectional Data Ports (including pilot port)	
Number of Ports	3
Standard	IEC61162-1 / -2
Baud Rate	4800 or 38400 baud
Port Impedance	54K Ohm
Silent Mode port	
Port Impedance	10K Ohms
NMEA 2000 Port	
Load Equivalency Number (LEN)	1

### 6.13 Power and Data Connector Information

Power Connector	Chogori 22002525-04-RC	Mating Half	Chogori 22002221-01
18 way Data Connector	Chogori 23018525-04-RC	Mating Half	Chogori 23018221-01
14 way Data Connector	Chogori 23014525-05-RC	Mating Half	Chogori 23014221-01

### 6.14 Open Source Licences

This product contains open source software. For details please see the ‘*System information*’ screen.

### 6.15 Product Versions

At delivery, the product contains the following software and hardware versions:

MKD Software: 130400.01.09

MKD Firmware: 130400.01.09

Modem Software: 130200.01.02

MKD Hardware: 1

Modem Hardware:1

The ‘*System Information*’ screen will display the currently installed software and hardware versions on the transceiver. If this differs from that stated here, please check Online for an updated manual.



Manufacturer's Code: xxx  
NMEA 2000 Product Code: xxxxx



SRT Marine  
Technology

201-0707:1