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A750

AIS Class A / Inland AIS

INSTALLATION and OPERATION MANUAL

General Information

Manual Edition 1.4

i. Copyright

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ii. Disclaimer

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iii. Safety Warning

It is important to know that AIS is designed for the purpose of anti-collision and serves as a complement to navigation. It is not the absolute navigational equipment and does not replace any navigational system installed on board.
Any AIS device cannot guarantee monitoring and receiving signals from all vessels in the surroundings unless those vessels are equipped with AIS devices.

ELECTRICAL SHOCK HAZARD

Improper disassemble or modification could cause electrical shocks, fire, or personal injury.
Only qualified personnel could work on the interior of the equipment.

MAKE SURE THE POWER SOURCE AND THE POWER INPUT ARE MATCH

Incorrect power sources will damage the equipment and may even result in fire.
Please ensure the correct power input on the adaptor before installation.

AVOID DIRECT CONTACT WITH RAIN OR SPLASHING WATER

Electrical shock or fire could be resulted if water leaks into the equipment.

NOTE/INFORMATION

Important notices and information will be noted in this Installation and Operation Manual

iv. Product Category

This product is categorized as “protected” in accordance with the requirements as defined in IEC 60945.

v. Compass Safe Distance

Safe distance to the transponder (and junction box) unit is:
Standard-magnetic-compass: 0.30 m
Steering-magnetic-compass: 0.30 m

vi. RF Exposure Safe Distance

A750 has been tested and meets applicable limits for radio frequency (RF) exposure. This device generates and radiates RF electromagnetic energy and requires a Maximum Permissible Exposure of 1.9 m from the antenna during operation.

vii. Hardware / Software Version

The model name/number, hardware information, and firmware (software) version of the transponder can be identified through MKD at MENU/DIAGNOSTICS/VERSION. The software maintenance/upgrade of the transponder can be carried out on board via MicroSD card. The onboard documentation as described in Appendix C can be used to assist reflecting software maintenance records.

viii. Type Approval

The AMEC A750 AIS transponder complies with applicable international standards and is type approved in accordance with the European Marine Equipment Directive.

ix. Declaration of Conformity

Hereby, Alltek Marine Electronics Corp. (AMEC) declares that this A750 is in compliance with the essential requirements and other relevant provisions of Directive 2014/90/EU.

A copy of the Declaration of Conformity can be obtained on-line from under "Download":

https://www.alltekmarine.com/products/ais-class-a/A750

x. Disposal Instruction

Do not dispose of this device with unsorted waste.

Improper disposal may be harmful to the environment and human health. Please refer to your local waste authority for information on return and collection systems in your area.

xi. Contact Information

For sales, services, and technical supports, please contact your local AMEC representatives or Alltek Marine Electronics Corp at www.alltekmarine.com or sales@alltekmarine.com or service@alltekmarine.com

Revision History

Edition	Description	Date
Ed. 0.5	Preliminary edition for approval test	April 8, 2022
Ed. 1.0	Frist Release	September 21, 2022
Ed. 1.2	Add Ethernet related description in chapter 4 & 5	December 29, 2022
Ed. 1.3	Add IP address ranges	Jeanery 12, 2023
Ed. 1.4	Changes in 4.7.1 Own Ship, 4.7.2 Target List, 4.8.1 User Customize (Dimmer Mode), 4.8.3 I/O Port Settings (Checksum), 4.8.4 Password Setting; add Nominal viewing distance in 5.6.	Mar 13, 2023

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1 WHAT IS AIS?

The Automatic Identification System (AIS) is a Very High Frequency (VHF) radio broadcasting system that transfers packets of data over the VHF data link (VDL) and enables AIS equipped vessels and shore-based stations to exchange identification information and navigational data. Ships with AIS transponders continually transmit their ID, position, course, speed and other data to all nearby ships and shore stations. Such information can aid greatly in situational awareness and provide a means to assist in collision avoidance.

AIS equipment is standardized by ITU, IEC, IALA and IMO and is subject to approval by a certification body. The following AIS devices have been developed for variant applications.

- **AIS Class A:**
  mandated by the IMO for vessels of 300 gross tonnages and upwards engaged on international voyages, cargo ships of 500 gross tonnages and upwards, as well as passenger ships. It transmits typically on 12.5 watts output power.
- **AIS Class B:**
  provides limited functionality and is intended for non-SOLAS commercial vessels and recreational vessels. It transmits typically on 2 watts output power.
- **AIS Receiver:**
  only receives AIS signal and it does not have transmitter to send out AIS signal. Suitable for recreational vessel that does not want to send out its vessel information.
- **AIS Base Station:**
  is provided by aids-to-navigation authorities to enable the ship to shore / shore to ship transmission of information. Networked AIS Base Stations can assist in providing overall maritime domain awareness.
- **AIS AtoN (Aids to Navigation):**
  provides an opportunity to transmit position and status of buoys and lights through the same VDL, which can then show up on AIS-ready devices within the range.
- **AIS SART:**
  Search and Rescue Transmitter using AIS can be used to assist in determining the location of a vessel in distress. It is typically used on life rafts.
- **AIS on Search and Rescue (SAR) Aircraft:**
  used on airplanes and helicopters to assist search and rescue operation.

2 SYSTEM OVERVIEW

2.1 Product Description

The **AMEC model A750** is a new generation **AIS Class A transponder** fully compliance with IMO, IEC, and ITU international standards. It provides a compact single box solution, easy to install and operate. The product is designed with advanced technology which sets a new standard for quality, performance, and value. It is an excellent choice for SOLAS vessels, commercial ships, professional vessels, and non-SOLAS applications.

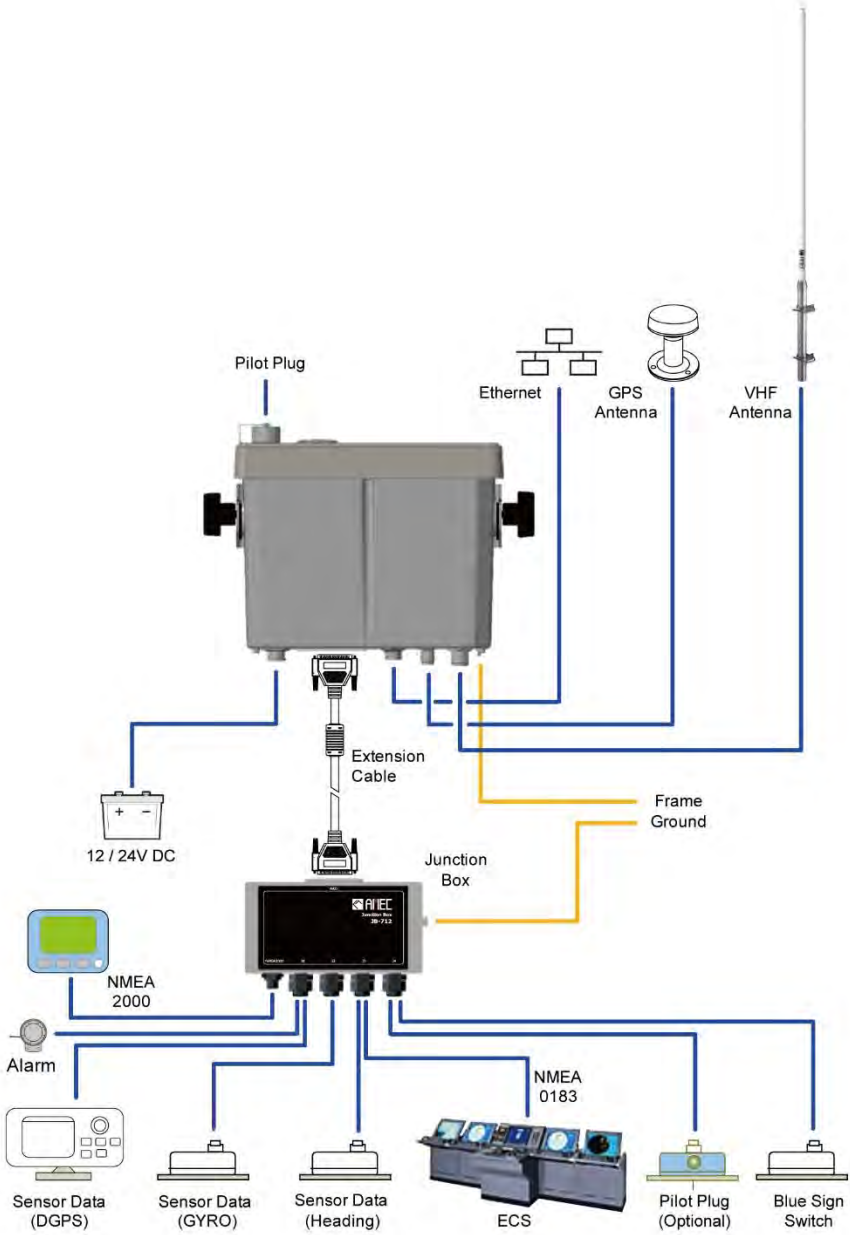
The A750 can be connected to the ship's sensors as required by the IALA guidelines through junction box. The device can also interface external navigation and presentation systems that support IEC 61162-1 related sentences. It is also capable for connection to Long Range system like Inmarsat C. The A750 supports both SOLAS and Inland AIS mode which is configurable by the software.

The color LCD display and menu keypads provide an intuitive graphical user-friendly interface to the system. It can display the location of other vessels, aids to navigation and search and rescue vessels. The AIS transmit and receive status are shown on the screen which helps user to know the working status of the unit easily. The LCD and keypad can also be used to send and receive messages, perform configuration as well as supervise the system status.

2.2 A750 Main Features

- Compact AIS Class A solution, easy to install and operate
- Fully compliant with IMO, IEC, and ITU international standards
- Color 4.3" LCD display with variant display modes
- User-friendly intuitive GUI & keypad operation
- IMO/Inland AIS mode selectable
- Multiple sensor input ports and bi-directional data ports
- USB, NMEA2000, and Ethernet connectivity, SD card for software upgrade
- Support type P of BAM function type

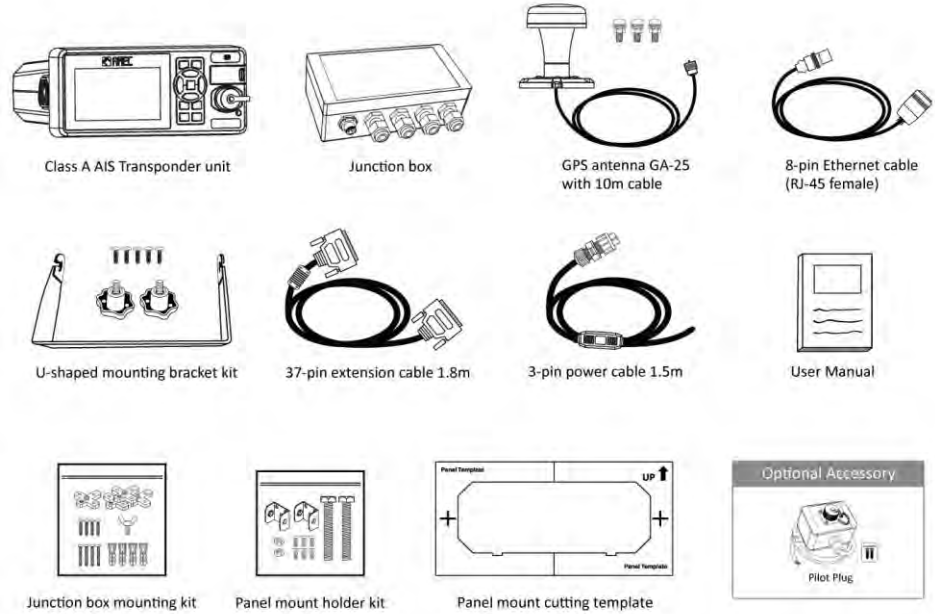
2.3 Interconnection Diagram



3 INSTALLATION

3.1 Equipment in the Box

The standard supply in the package includes the following items. Please contact your local representative if any item is missing.



3.2 Installation Procedures

Please familiarize the manual content before begin installation. Use the following recommended steps for installation.

1) Mount the transponder unit to a desired location
2) Mount junction box
3) Install VHF antenna
4) Install GPS antenna
5) Connect all external sensors and data interfaces to the junction box
6) Connect all required cables to the main transponder unit
7) Power on the main transponder unit
8) Complete configuration setting
9) Perform system functional test

3.3 RF Cable Requirements

The following RF cables are recommended to install the A750.

- **VHF Antenna Cable**
  Type: 5D-FB or equivalent
  Connector: PL-259 (Male)
- **GPS Antenna Cable**
  Type: RG58A/U or equivalent
  Connector: TNC (Male)
  Cable and connector are supplied as part of the GPS antenna.

3.4 VHF Antenna Installation

The quality and positioning of the antenna are the most important factors dictating AIS performance. It is recommended that a VHF antenna with omni directional vertical polarization be specifically tuned for AIS operation band. Since the range of VHF signals is largely decided by line of sight distance, the VHF antenna should be placed as high as possible and at least 5 meters away from any constructions made of conductive materials.

To avoid interference, the VHF antenna location should be placed accordingly as diagram below:

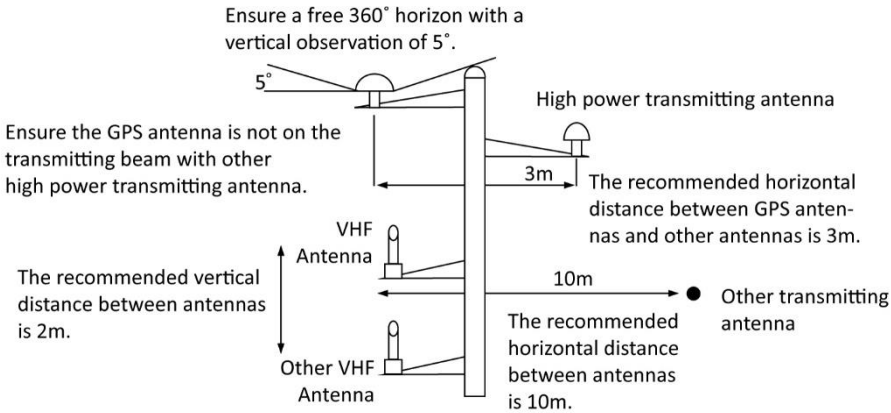


Figure 1 **VHF/GPS Antenna Locations**

3.5 GNSS (GPS) Antenna Installation

The GPS antenna must be installed where it has a clear view of the sky, so that it may access the horizon freely with 360° degrees, with a vertical observation of 5 to 90 degrees above the horizon as illustrated below.

GPS ANTENNA LOCATION

Enter the GPS antenna location data in “SHIP SETTING” after the installation.

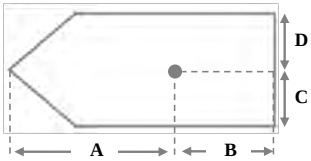


Figure 2 **GPS Antenna location**

3.6 Mounting A750

Use the following guidelines to check the installation location for your AIS transponder:

- The AIS transponder should be mounted in a location that is accessible and readable to user at all time.
- The transponder should be installed in a protected environment away from direct rain and water contact.
- The transponder is designed to operate in an environment with -25°C ~ 55°C temperature. Environments with excessive heat may cause damages to the transponder.
- The transponder should not be installed near flammable or hazardous environments.
- The AIS transponder should be installed at least 0.5m away from magnetic compasses.

3.6.1 Mounting A750 Transponder Main Unit

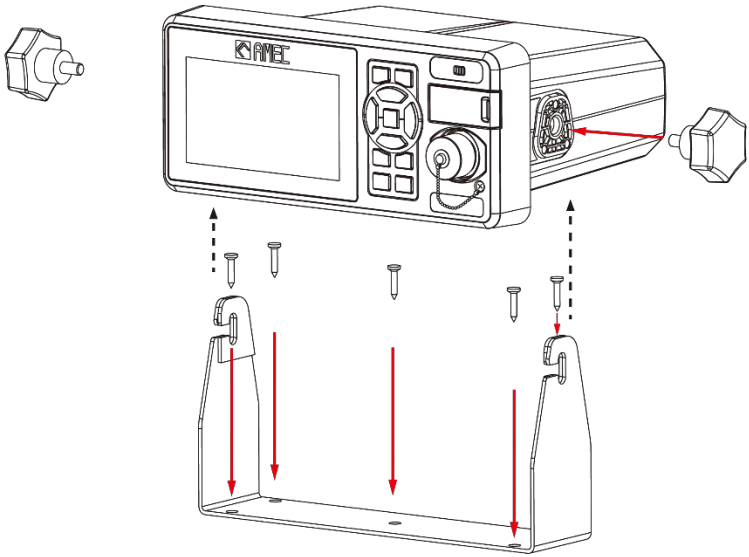


Figure 3 **Mounting A750 Main Unit**

Panel Mounting (1)

1. Line up the mounting template on control panel to sketch an outline for the cutting area.
2. Using a jigsaw carefully cut along the sketched cutting area.
3. If necessary, clean up edge with glass paper or file.
4. Mount the transponder through the opening.
5. From the rear, install the mounting brackets with the M3X8 screws.
6. Apply the mounting bracket screw (brackets are directional, ensure correct one is fitted to each side) on each side for a firm fix.

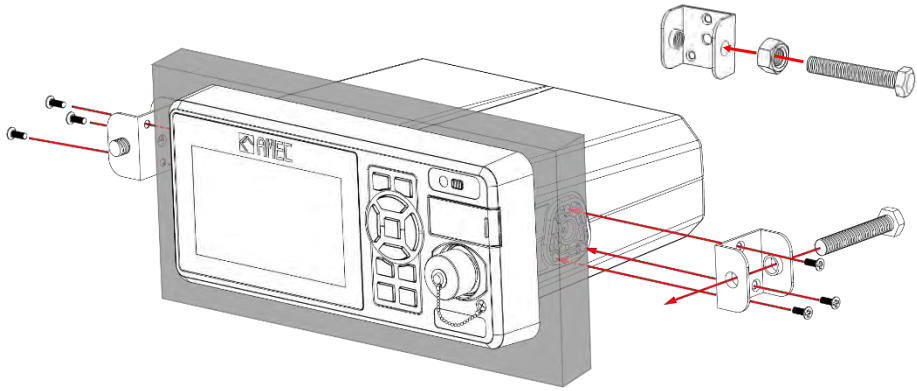


Figure 4 **Panel Mounting (1)**

Panel Mounting (2)

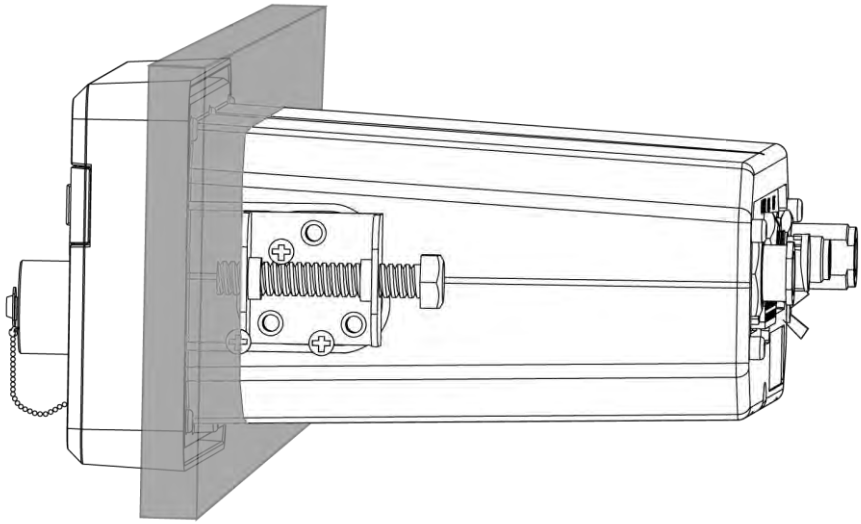


Figure 5 **Panel Mounting (2)**

3.6.2 Mounting Junction Box

Mounting Junction Box (1)

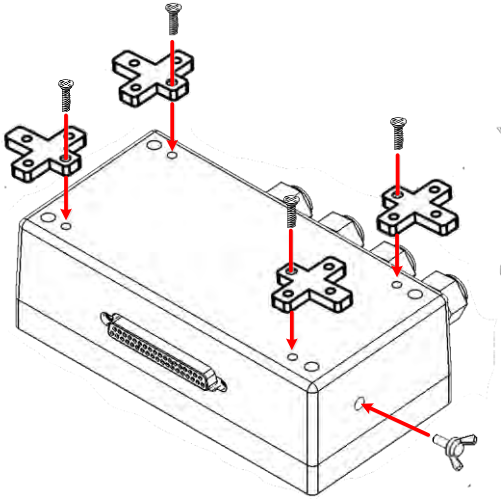


Figure 6 **Mounting Junction Box (1)**

Mounting Junction Box (2)

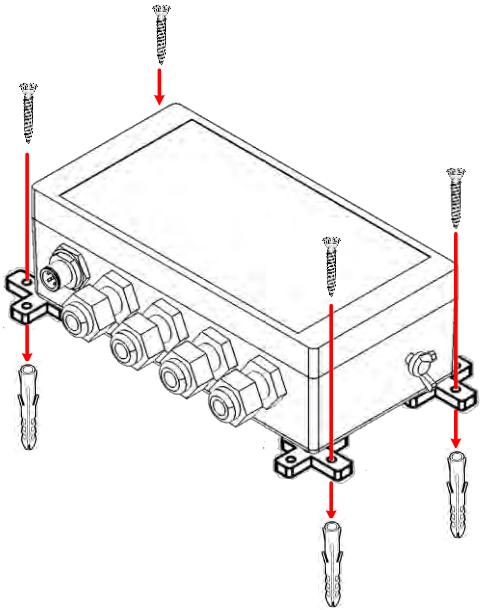


Figure 7 **Mounting Junction Box (2)**

3.7 A750 External Connectors (Transponder Main Unit)

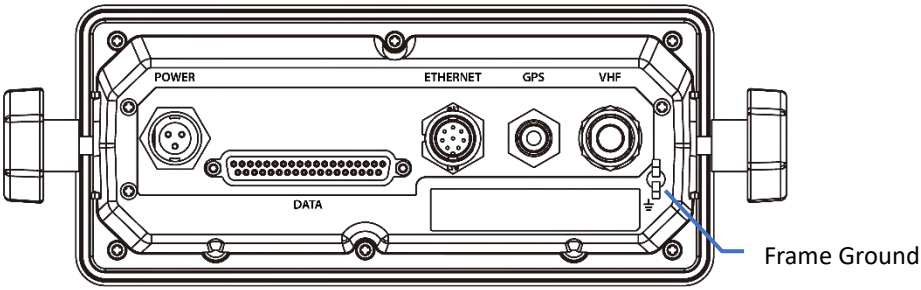


Figure 8 **A750 Rear View**

NAME	DESCRIPTION	TYPE
POWER	Power input connector	Round type, 3 pins
ETHERNET	10Base-T/ 100Base-TX	Round type, 8 pins
GPS	GPS antenna connector	TNC (female)
VHF	VHF antenna connector	SO-239 (female)
DATA	Connect to Junction Box/ Connect to sensor or data ports	D-Sub 37 pins
Frame Ground	Connect to ship frame	

Vessel power supply requirement

Connect to the ship's power source, ideally an uninterrupted power supply (UPS), through a 2-pole switched fused supply to allow isolation for servicing. Power requirement is typical 24V DC (2A minimum) or 12V DC (4A minimum). Required conductor area, cable length 0-10m is 1.5 mm2 ø minimum.

Note: The Class A power supply requirement should comply with IMO guidelines for the class of vessel concerned. National authorities and classification societies may have their own power supply requirements; these should also be considered.

Note: Some boats require frame ground connection of all electronic devices on the ship frame.

3.8 External Connectors (Junction Box)

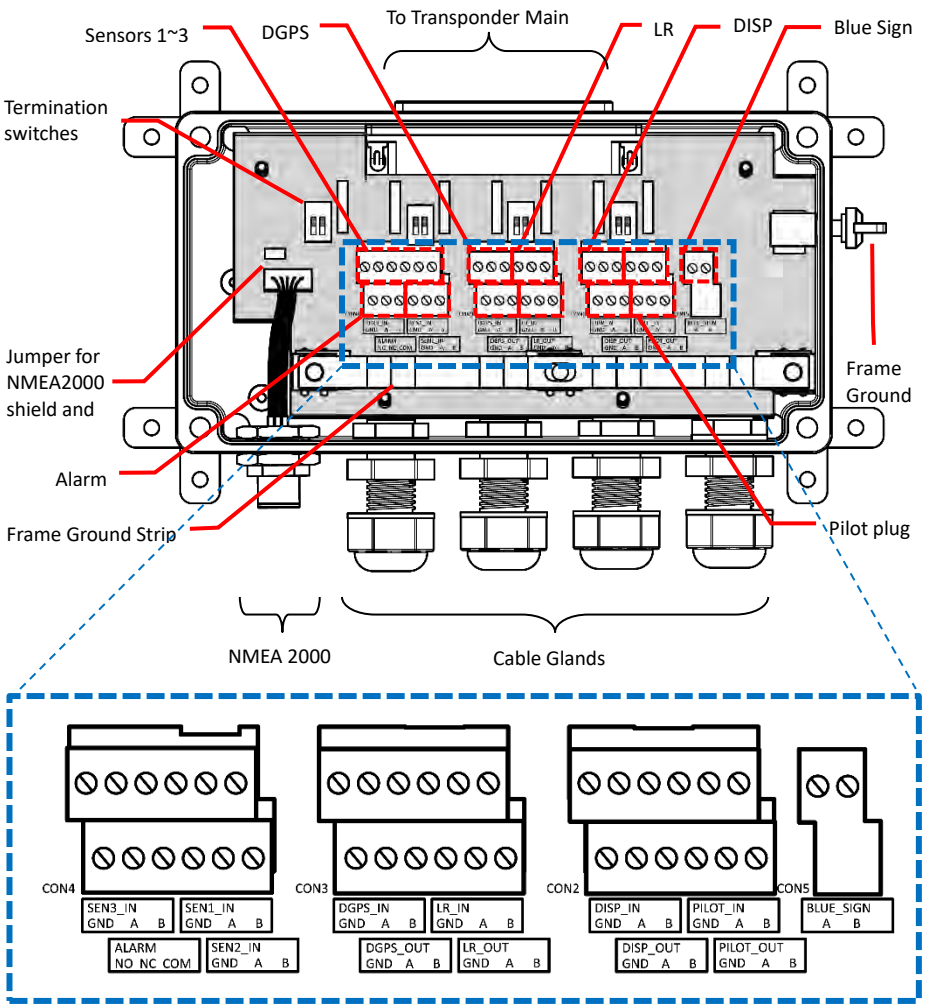


Figure 9 **External Connectors (Junction Box)**

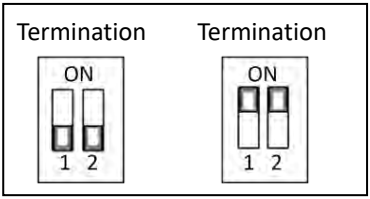
CONNECTOR	LABEL NAME	DESCRIPTION	FUNCTION USAGE
Sensor 1 *1)	SEN1_IN GND	Sensor 1 ground	Connect to data sources such as heading, gyro, or other type of sensors.
	SEN1_IN A	Sensor 1 input A	
	SEN1_IN B	Sensor 1 input B	
Sensor 2 *1)	SEN2_IN GND	Sensor 2 ground	Connect to data sources such as heading, gyro, or other type of sensors.
	SEN2_IN A	Sensor 2 input A	
	SEN2_IN B	Sensor 2 input B	
Sensor 3 *1)	SEN3_IN GND	Sensor 3 ground	Connect to data sources such as heading, gyro, or other type of sensors.
	SEN3_IN A	Sensor 3 input A	
	SEN3_IN B	Sensor 3 input B	
Pilot Plug *1)	PILOT_IN GND	Input Ground	Pilot Plug port
	PILOT_IN A	Input A	
	PILOT_IN B	Input B	
	PILOT_OUT GND	Output Ground	
	PILOT_OUT A	Output A	
	PILOT_OUT B	Output B	
Alarm *1)	ALARM NO	Alarm normally open	ALARM NC is not supported
	ALARM COM	Alarm common	
DGPS Input *1)	DGPS_IN GND	DGPS input ground	DGPS sensor
	DGPS_IN A	DGPS input A	
	DGPS_IN B	DGPS input B	
DGPS Output *1)	DGPS_OUT GND	DGPS output ground	DGPS sensor
	DGPS_ OUT A	DGPS output A	
	DGPS_ OUT B	DGPS output B	
LR Input *1)	LR_IN GND	LR input ground	Long range input
	LR_IN A	LR input A	
	LR_IN B	LR input B	
LR Output *1)	LR_OUT	LR output ground	Long range output

	GND		
	LR_ OUT A	LR output A	
	LR_ OUT B	LR output B	
Display *1)	DISP_IN GND	DISP input ground	Connect to the data output of an external display system such as ECDIS.
	DISP_IN A	DISP input A	
	DISP_IN B	DISP input B	
	DISP_OUT GND	DISP output ground	Connect to the data input of an external display system such as ECDIS.
	DISP_OUT A	DISP output A	
	DISP_OUT B	DISP output B	
Blue Sign	BLUE_SIGN A		Connect to a blue sign switch.
	BLUE_SIGN B		

NOTES:

*1) Baud rate support: 38400 (default), 9600, 4800.

2) Suitable electric wire gauge (single wire) for installing Junction Box: AWG 26 ~ 16. See diagram below.

ITEM	USAGE
Termination Switches	The switches provide line termination configuration. 
Jumper for NMEA2000 shield and ground	The jumper's purpose is to wire together NMEA2000 cable's shield and ground. Depending on your scenario, you may choose not to connect them together.

3.9 Connecting Extension Cable

Use the 37-pin- extension cable (1.8M) provided in the package connect A750 to the junction box.

Note: The side of extension cable with a core should be connected close to the A750 main unit.

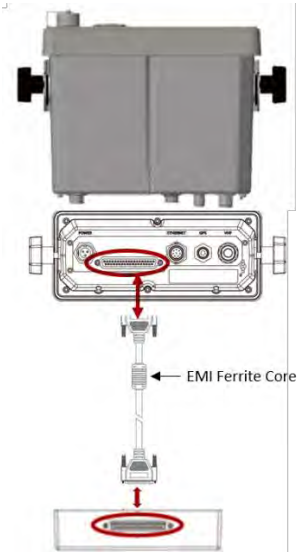


Figure 10 **Connecting A750 with Junction Box**

3.10 Connecting to Power Supply

The A750 requires a 12V or 24V DC power supply (9.6 to 31.2V operation range) capable of supplying 4A peak current. The red wire and the black wire on the 3-pin cable are used to connect the power supply's positive and negative terminals. A 5 Amp fuse or circuit breaker must be used in the connection between the power supply and the unit.

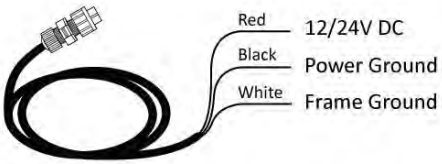
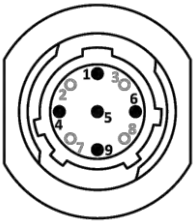


Figure 11 **A750 Power Connection**

3.11 Pilot Plug Connection

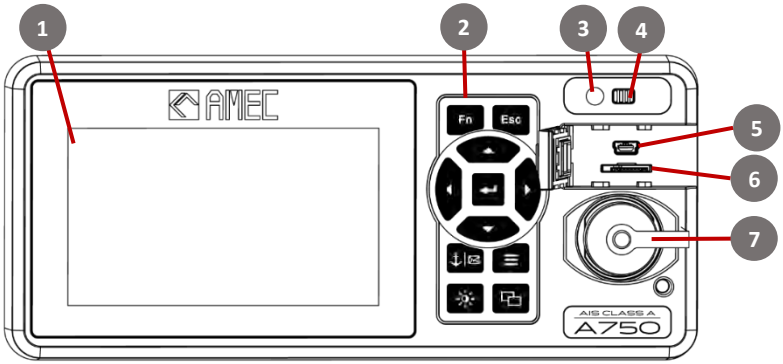
The A750 has an integrated pilot plug on the front panel with the IMO standard AMP connector. Open the waterproof lid to connect the PPU (Personal Pilot Unit). When needed, an optional pilot plug is available for purchase to be connected through the junction box.
It is recommended to keep the pilot plug lid closed when not in use.



Pilot plug	Signal Type
Pin 9	RS-422 GND
Pin 1	RS-422 TX-A
Pin 5	RS-422 RX-A
Pin 4	RS-422 TX-B
Pin 6	RS-422 RX-B

4 OPERATION

4.1 Front Panel Overview



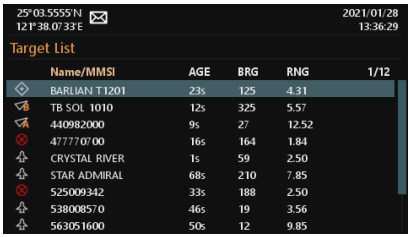
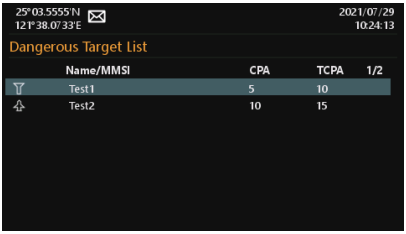
1 LCD Display 2 Keypad 3 Light Sensor 4 Beeper
5 USB 6 SD Card 7 Pilot Plug

Keypad Description:

Item	Icon	Name	Function(s) when pressed
1	Fn	FUNCTION	● **Radar View**: Select chart orientation and type of target to show ● **Target List**: Select sort method and what type of target to show
2	Esc	ESC	● **MENU**: Go back to the previous level ● Long Press: Go to **Alert List**
3		Voyage /SRM	● Short Press: Go to **Voyage** ● Long Press: Go to **Send SRM**
4		MENU	● Go to **MENU**
5		Screen brightness	● Quick switch of screen brightness (5 levels) ● Long Press: Change screen brightness to 1st level (screen protection)
6		DISP	● Short Press: Display modes rotating ● Long Press: Go to **User Customize**
7		Enter	● Confirm the currently selected item
8		Arrow Key	● Move the selection cursor ● **Radar View**: Up-Down: change scale ● Right-Left: select target ● **Ship Detail**: Right-Left: change page

4.2 Display Modes

For quick access, users can rotate display modes by simply pressing the button.

Display Mode	Screen Shot	Purpose
Radar View		Displays all targets on **Radar View** (Refer to section 4.2.1 Radar View)
AIS Target List		Shows all received ship data (Refer to section 4.7.2 AIS Targets)
Dangerous Target List		Shows all dangerous AIS targets presently (Refer to section 4.7.6 Dangerous Target List)
GNSS Satellite Information		Shows the GNSS satellite current usage status (Refer to section 4.7.4 GNSS Status)

4.2.1 Radar View

Radar View displays own ship and target ships' statuses, and their correlations. It is a proportional chart scale showing the current ratio displayed. The distance between the inner and outer circles (1 grid) is the number displayed on the scale at left bottom. You can adjust the scale to display ships in different distances.

Radar View supports three ship orientation modes, North up, Head up, and Course up.

N-up	**NORTH UP**	The orientation is fixed and true north is always pointing up.
H-up	**HEAD UP**	The orientation is determined by the direction of own ship's bow.
C-up	**COURSE UP**	The orientation is determined by the own ship's traveling course.

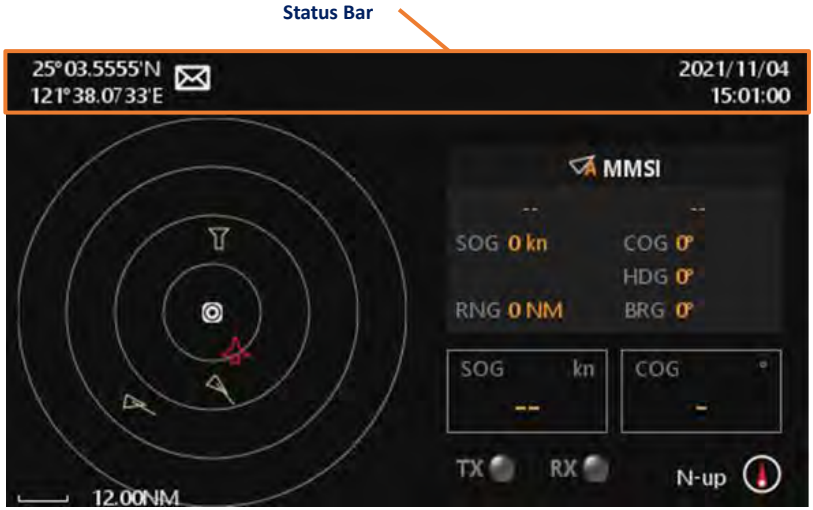
4.2.2 Target Symbol Description

Symbols for each AIS target displayed on the **Radar View** are described as below:

Own Ship	**GPS Reception: No GPS / Color: White** Without GPS reception, own ship needs to be located manually.
AIS Target	**Color: Green** Ship equipped with AIS system in the surrounding sea will appear on the Radar View as an AIS target.
Selected Target	**Color: Green / Flashing Colored Frame** Use the arrow keys to select any target on the Radar View. After selected, press ↵ and the detailed information on each target can be viewed.
Dangerous Target	**Color: Red / Circled Frame** When distance to a ship is smaller than CPA/TCPA, the target will be circled in RED. Use the arrow keys to select the dangerous target and to view its detailed information.
AtoN (Real)	**Color: Green / Plus Sign** The icon will be displayed if any AIS AtoN (Aids to Navigation) Real station is in the range of reception.
AtoN (Virtual)	**Color: Green / Plus Sign and Undercut** The icon will be displayed if any AIS AtoN (Aids to Navigation) virtual station is in the range of reception.
SAR	**Color: Green** The icon will be displayed if any SAR air plane is in the range of reception.
SART	**Color: Green / Cross** The icon will be displayed if any SART message is sent out.
Base Station	**Color: Green** The icon will be displayed when any AIS base station is in the reception range.

4.2.3 Status Bar

The **Status Bar** constantly indicates own ship position, GPS status, SRM, ALR (alert state), and Date (YYYY/MM/DD) & Time. It will indicate IL (Inland) and/or B (Blue Sign) when the system is running Inland mode.



	Inbox SRM：Unread incoming SRM
	LR Inbox：UnACK long-range interrogation
	Alert State：active – unacknowledged
	Alert State：active – silenced
	Alert State：rectified – unacknowledged
	Alert State：active – acknowledged
	Caution : active-Caution
IL	Indicate the system is running Inland mode
1W	Low RF Tx power mode
B	Indicate Blue Sign device is connected

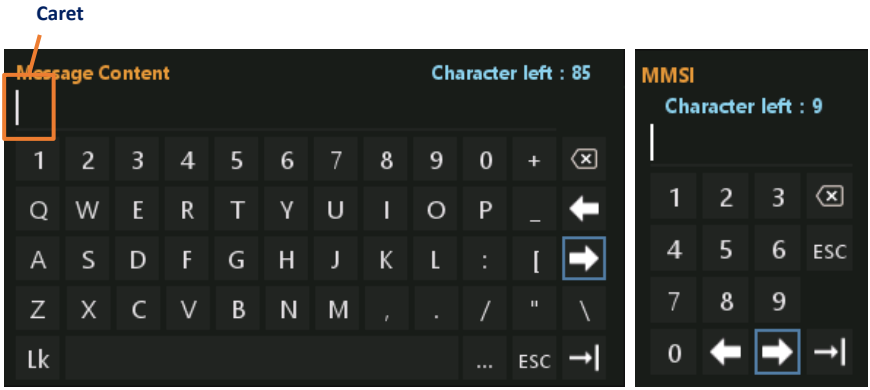
4.2.4 Transmission and Reception Bar

The **Transmission & Reception Bar,** at bottom of **Radar View**, constantly displays real time status of AIS transmission and reception, and ship orientation mode.

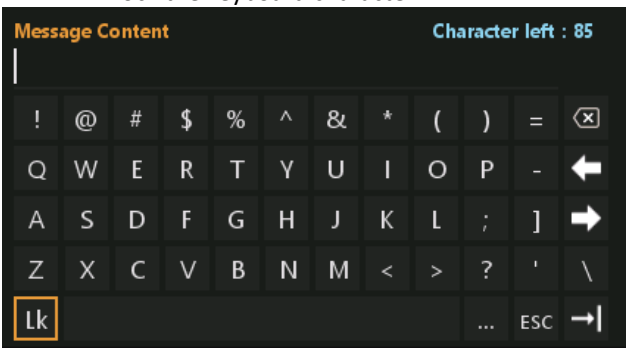
Item Number	Name	Function	
1	**Indicators** TX RX		No transmissions & receptions: No flash
			Reception of AIS message: Flash green color
			Transmission of AIS message: Flash orange color
2	**Ship Orientation Mode**	N-up	North up
		C-up	Course up
		H-up	Head up
3	**Compass**		Indicate north direction
4	**Scale**		0.05NM ~ 24NM

4.3 Keyboard

Keyboard will pop up when getting into **AIS Settings, Send SRM,** etc. pages.
The following two keyboards are used when entering text and the right one is only for entering numbers.
Upon keyboard showing up on screen, user can use physical arrow keys on device front panel to traverse and select character for editing text.

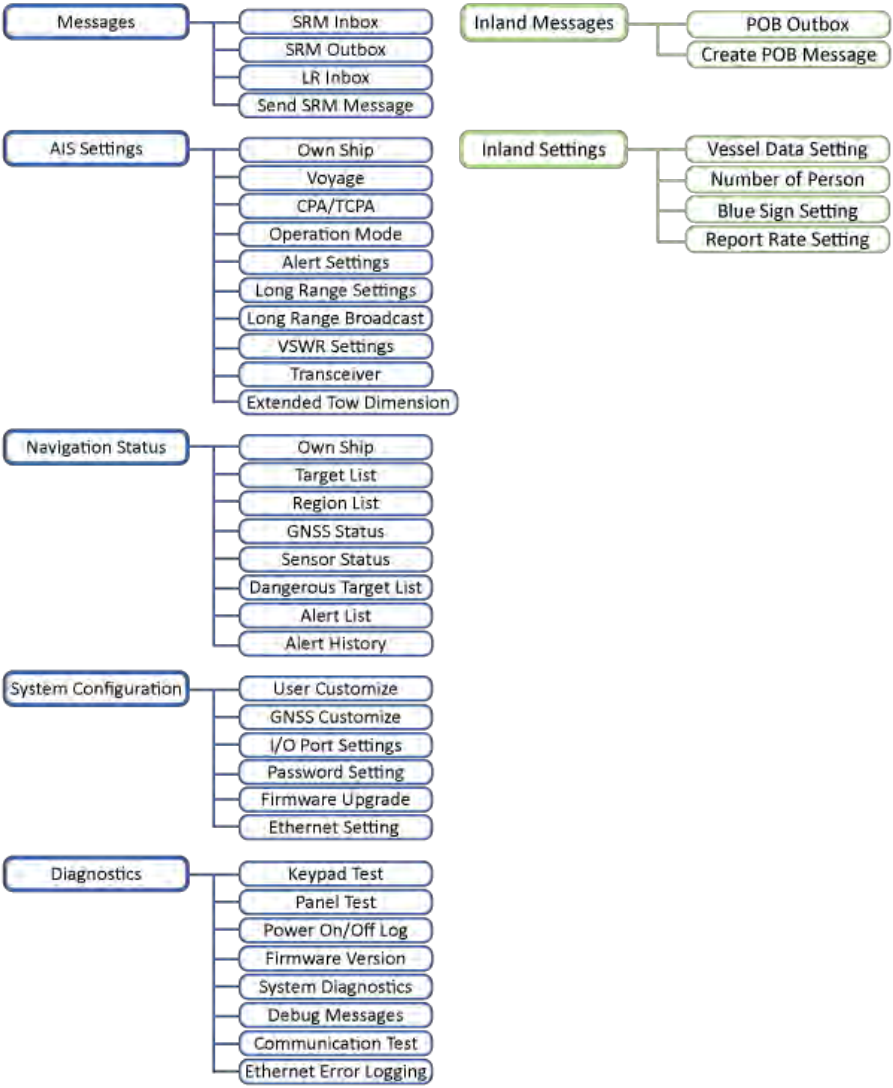


- - Use to move the caret index
- - Confirm the entering value. (Hot key: press for 2 seconds)
- - Delete one character
- Esc - Leave the keyboard. (Hot key: press Esc)
- ... - Change the keyboard character. The keyboard character will change back after entering one character.
- Lk - Lock the keyboard character



4.4 Menu Tree Overview

Press ≡ to enter main MENU. There are 5 menu choices, and additional 2 menu choices for Inland mode. Each menu holds related sub-menu as depicted below.



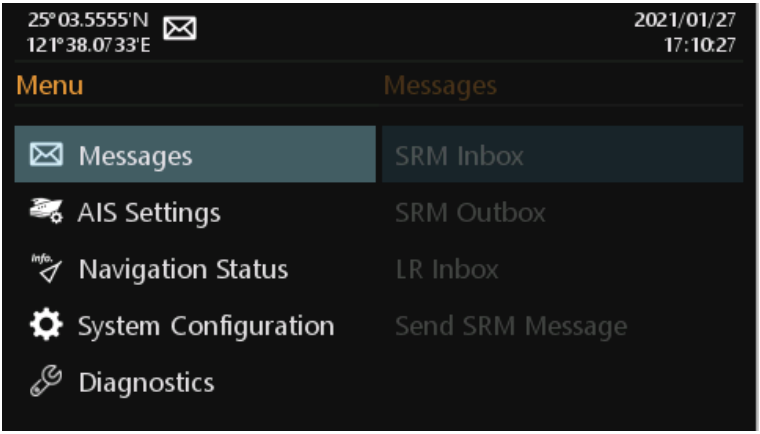
4.4.1 Menu Item Brief Description

Messages	
SRM Inbox	Log of safety related messages (SRM) received
SRM Outbox	Log of safety related messages (SRM) sent
LR INBOX	Log of received inquiry messages from long-range interrogation
Send SRM	Send SRM
AIS Settings	
Own Ship	Your vessel setting (password required, default is 000000)
VOYAGE	Navigation setting
CPA / TCPA	CPA / TCPA setting
Operation Mode	Configure AIS mode to SOLAS or INLAND, and SART Test Mode
Alert Settings	Enable or disable Alert
Long Range Settings	Long Range settings
Long Range Broadcast	Long Range broadcast channel setting
VSWR Settings	VSWR (voltage standing wave ratio) setting
Transceiver	Configure silent mode and RF Tx power condition and External switch function
Extended Tow Dimension	Setting extended dimension values used by towing vessels. (When Navigation status is set to 12)
Navigation Status	
Own Ship	Your vessel information
Target List	Navigation status and boat information of other AIS-equipped vessels.
Region List	Regional information status
GNSS Status	Display GNSS statuses
Sensor Status	Display sensor statuses
Dangerous Target List	Dangerous ship list
Alert List	Display all activated alert.
Alert History	Log of activated alert
System Configuration	
User Customize	Personalization settings

GNSS Customize	GNSS settings
I/O Port Settings	I/O port settings
Password Setting	Password change (default password: 000000)
Firmware Upgrade	Firmware upgrade
Ethernet Setting	Ethernet setting
Diagnostics	
Keypad Test	Button key test
Panel Test	LCD panel test
Power On/Off Log	Device activated log
Firmware Version	Firmware version
System Diagnostics	System diagnostics
Debug Messages	Debug messages
Communication Test	Test communication link
Ethernet Error Logging	Display Ethernet Error Logging
Inland Messages	
POB Outbox	Log of Person On Board message (RFM55 or IFM16) sent
Create POB Message	Create Person On Board message (RFM55 or IFM16)
Inland Settings	
Vessel Data Setting	Configure vessel data
Number of Person	Set number of persons
Blue Sign Setting	Set blue sign settings
Report Rate Setting	Set report rate settings

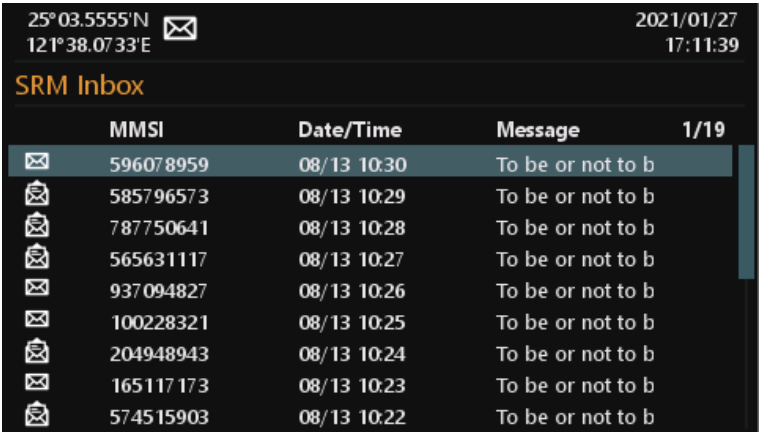
4.5 Messages

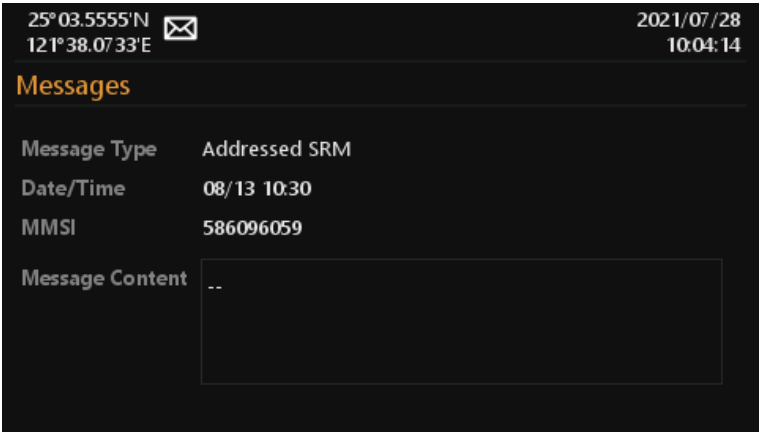
When a SRM (Safety Related Messages) from other AIS equipped vessels is received, the status bar will display ✉, the new message icon.



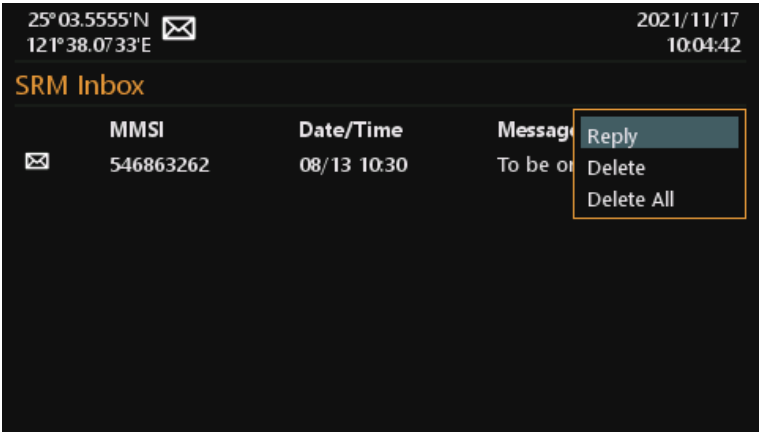
4.5.1 SRM Inbox

You can read received SRM under Inbox. Use ▲ ▼ to traverse the message list and highlight your choice. Read the message content by pressing ↵.



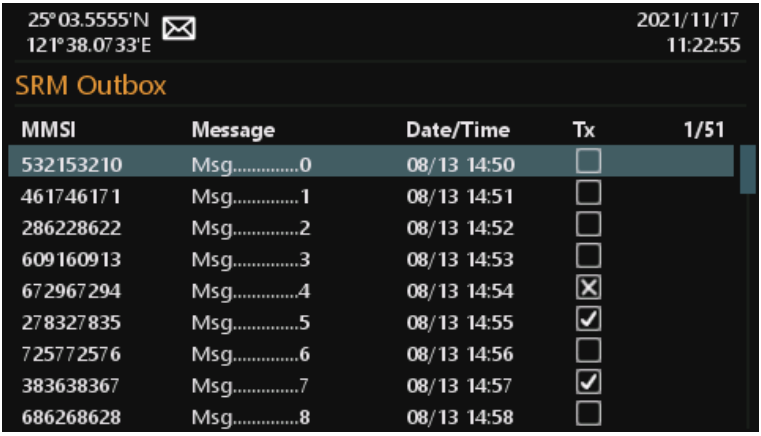


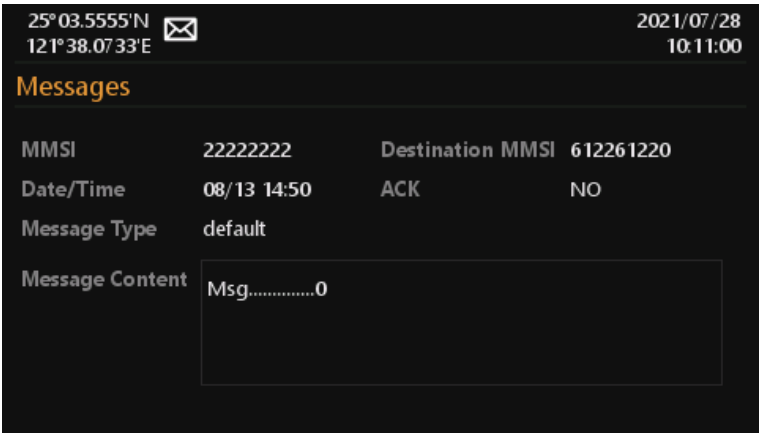
When pressing Fn, system will show 3 options. You can choose to **reply** the highlighted message or **delete** it or **delete all** messages in SRM Inbox. Press ↵ to confirm your choice.



4.5.2 SRM Outbox

You can read all sent SRM under Outbox. Use ▲ ▼ to traverse the message list and highlight your choice. Read the message content by pressing ↵. In Tx column, you can see 3 different icons. ☐ means the device is still sending the message. After sending the message, Tx column will show ☑ that means the message has been successfully sent, if failure it will show ☒.

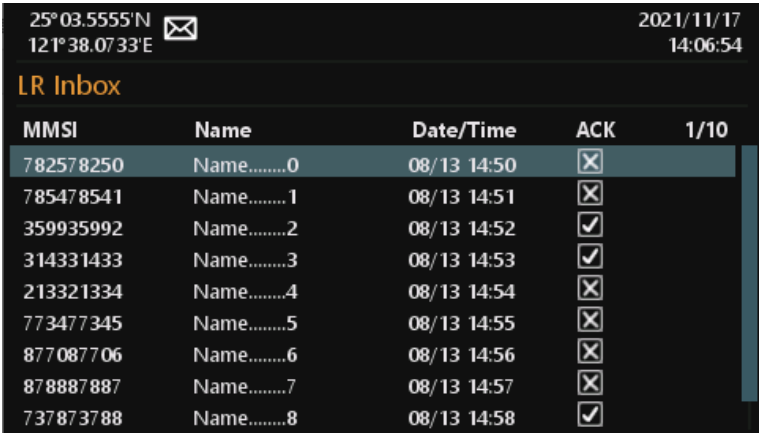


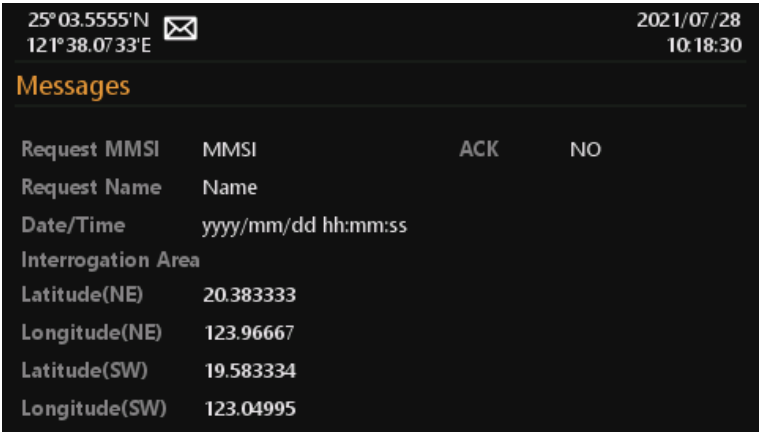


When pressing Fn, system will show 3 options. You can choose to **reply** the highlighted message or **delete** it or **delete all** messages in SRM Inbox. Press ↵ to confirm your choice.

4.5.3 Long Range Inbox

When the transponder is connected to a long range communication system via the long range communication port then long range interrogations may be received. These are requests for information from a distant base station beyond normal AIS operation range. LONG RANGE Inbox holds all received Long Range Interrogation messages.



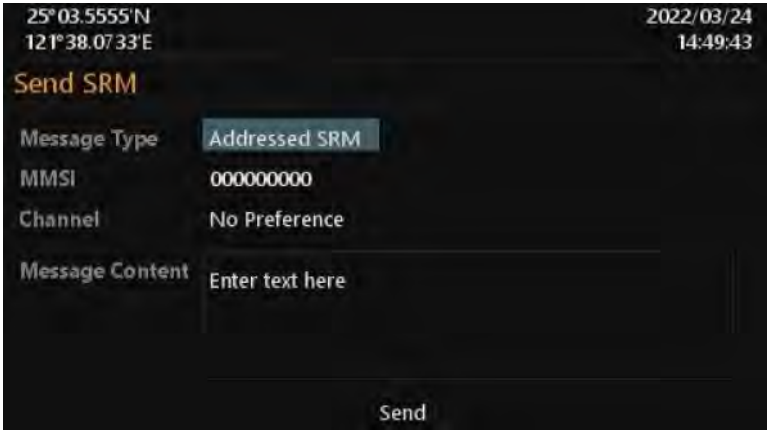


Use ▲ ▼ to traverse the message list and highlight your choice. Read the message content by pressing ↵.

When pressing Fn, system will ask whether the highlighted message should be acknowledged. Press ↵ to confirm your choice.

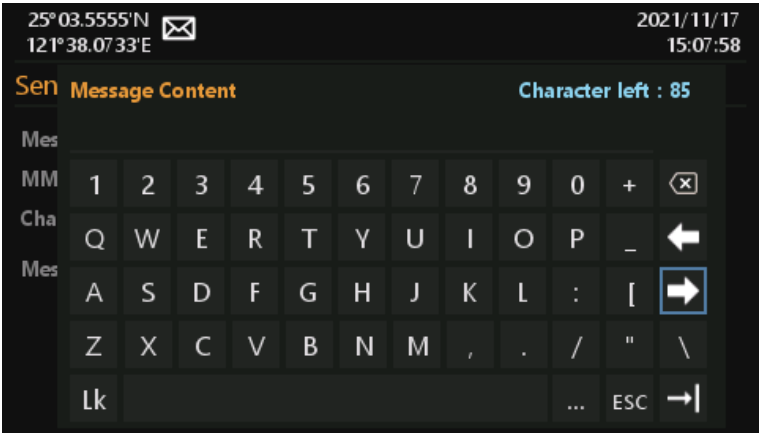
4.5.4 Send SRM

This submenu allows the users to compose a Safety Related Message (SRM). Maximum length for the message is 85 characters. **Message Type** gives you the option to send the broadcast message or the addressed message. If the user chooses to send the addressed message, the system will show **MMSI** below the **Message Type**.


25°03.5555'N
121°38.0733'E
2022/03/24
14:49:43
Send SRM
Message Type
Addressed SRM
MMSI
000000000
Channel
No Preference
Message Content
Enter text here
Send

25°03.5555'N
121°38.0733'E
2022/03/24
14:50:20
Send SRM
Message Type
Addressed SRM
MMSI
000000000
Channel
No Preference
Message Content
Enter text here
Send
MMSI
Character left : 9
1 2 3
4 5 6 ESC
7 8 9
0

After entering the MMSI number, choose the **Channel**. It gives you the option to send message through channel A, B or Both A&B. By No Preference, which is the default option, the system will select the channel automatically. Then, compose the message.

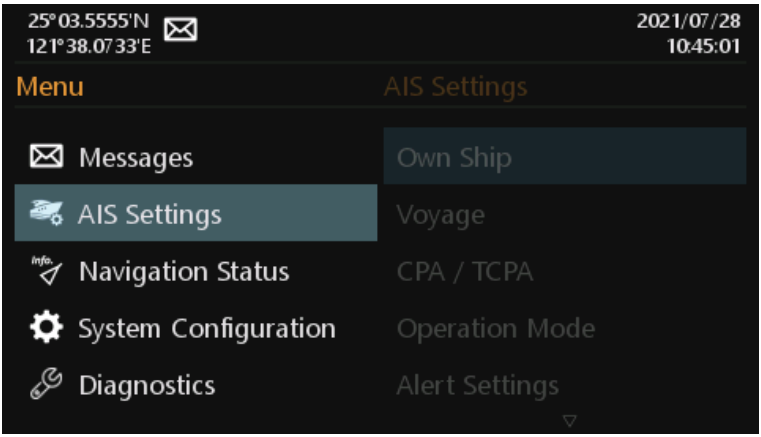


To send the message, press the send button on the bottom of the view and the system will ask whether to send the message. Select **YES** to send and return to Messages submenu, **NO** to cancel and stay at this view.

To leave this page, press Esc and the system will ask whether to leave this view. Select YES to leave, NO to stay at this view. For simple use, press Esc two times and the system will return to the Messages submenu.

4.6 AIS Settings

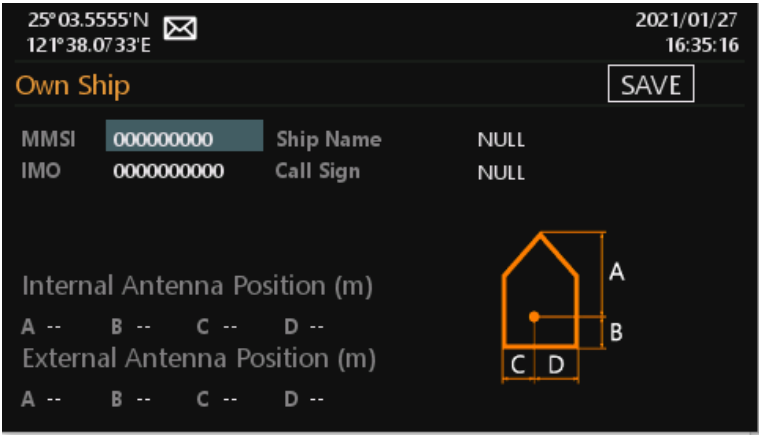
This menu list provides access to settings that are required during installation of the transponder. There are a total of 9 submenus.



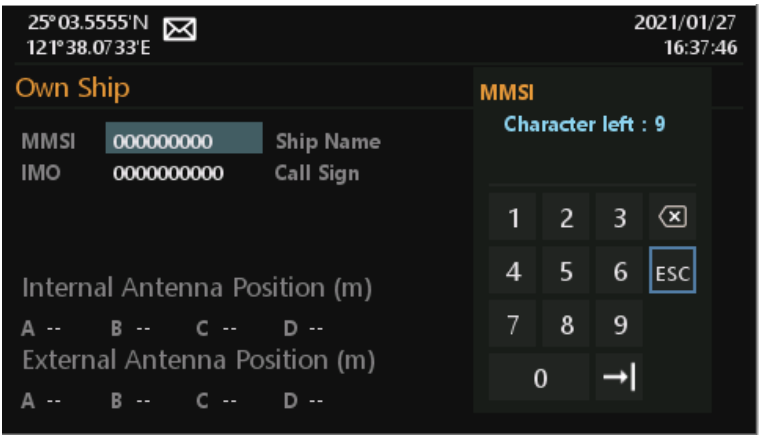
4.6.1 Own Ship

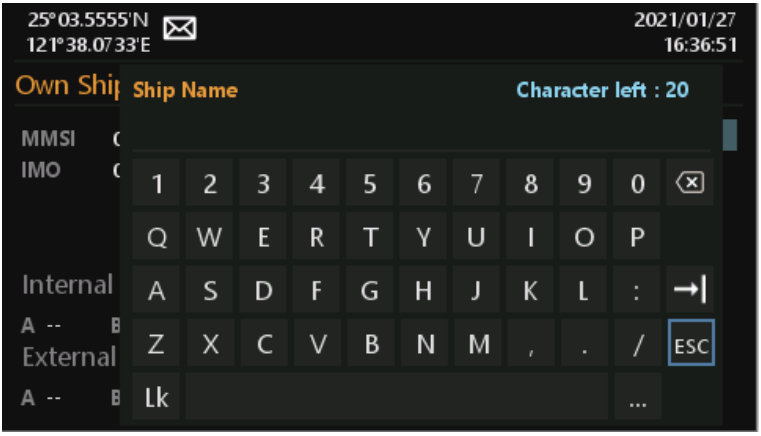
This section is password protected and can only be saved using the password.
The following information about the vessel should be correctly set up by installation prior to operation.

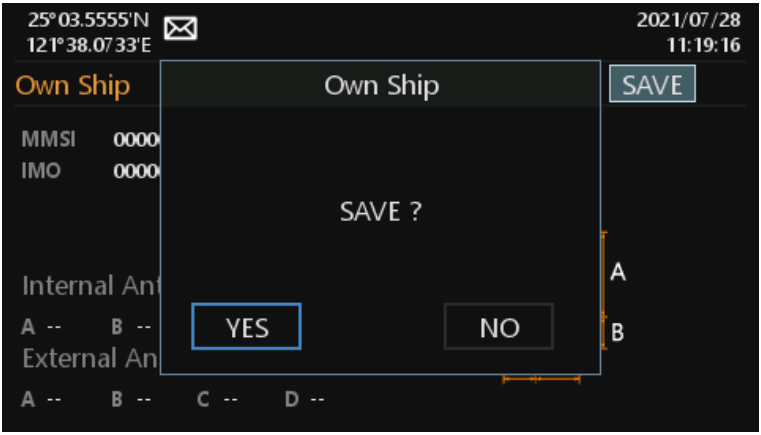
- MMSI -
- Ship Name – limited to 20 characters
- IMO -
- Call Sign – vessel radio call sign (limited to 7 characters)
- Position of internal GPS antenna – giving the location of the GNSS antenna connected to the AIS transceiver (integrated internal GPS receiver)
- Position of external GPS antenna – giving the location of the GNSS antenna connected to any external position source connected to the AIS transceiver
- Length and Beam – measured length and width of the ship (inland mode only)

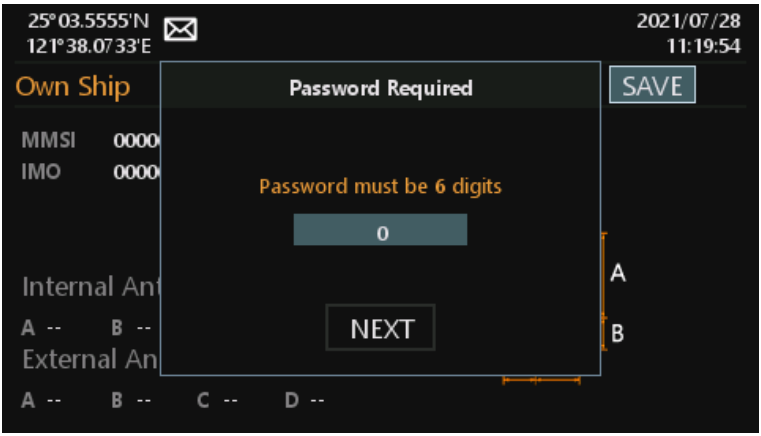

25°03.5555'N
121°38.0733'E
2021/01/27
16:35:16
Own Ship
SAVE
MMSI
000000000
Ship Name
NULL
IMO
0000000000
Call Sign
NULL
Internal Antenna Position (m)
A -- B -- C -- D --
External Antenna Position (m)
A -- B -- C -- D --
A
B
C
D

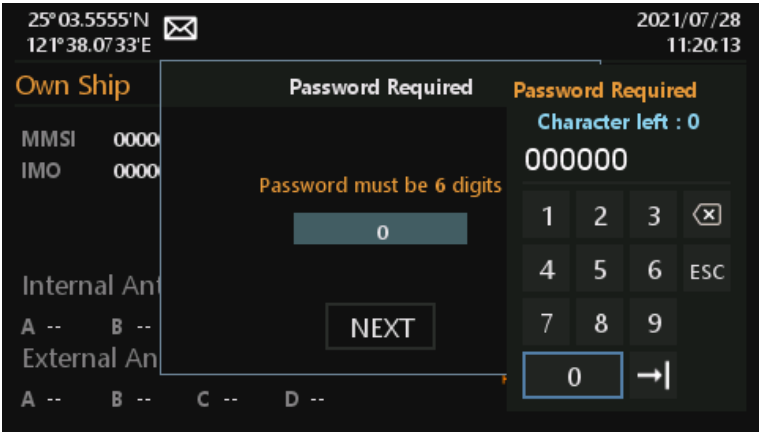
25°03.5555'N
121°38.0733'E
IL
2021/11/22
10:31:45
Own Ship(Inland)
SAVE
MMSI
000000000
Ship Name
--
IMO
0000000000
Call Sign
--
Length and Beam (m)
LS -- BS --
Internal Antenna Position (m)
A -- B -- C -- D --
External Antenna Position (m)
A -- B -- C -- D --
A
B
C
D

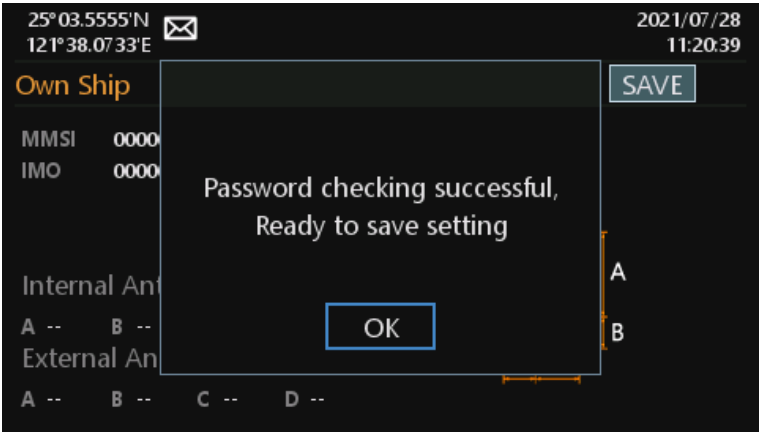

25°03.5555'N
121°38.0733'E
2021/01/27
16:37:46
Own Ship
MMSI
000000000
Ship Name
IMO
0000000000
Call Sign
Internal Antenna Position (m)
A -- B -- C -- D --
External Antenna Position (m)
A -- B -- C -- D --
MMSI
Character left : 9
1 2 3
4 5 6 ESC
7 8 9
0


25°03.5555'N
121°38.0733'E
2021/01/27
16:36:51
Own Shi
Ship Name
Character left : 20
MMSI
IMO
1 2 3 4 5 6 7 8 9 0
Q W E R T Y U I O P
A S D F G H J K L :
Z X C V B N M , . / ESC
Lk ...
Internal
A -- B
External
A -- B


25°03.5555'N
121°38.0733'E
2021/07/28
11:19:16
Own Ship
Own Ship
SAVE
MMSI 0000
IMO 0000
SAVE ?
YES
NO
A
B
Internal Ant
A -- B --
External An
A -- B -- C -- D --


25°03.5555'N
121°38.0733'E
2021/07/28
11:19:54
Own Ship
Password Required
SAVE
MMSI 0000
IMO 0000
Password must be 6 digits
0
NEXT
A
B
Internal Ant
A -- B --
External An
A -- B -- C -- D --


25°03.5555'N
121°38.0733'E
2021/07/28
11:20:13
Own Ship
MMSI 0000
IMO 0000
Password Required
Password must be 6 digits
0
NEXT
Password Required
Character left : 0
000000
1 2 3
4 5 6 ESC
7 8 9
0
Internal Ant
A -- B --
External An
A -- B -- C -- D --


25°03.5555'N
121°38.0733'E
2021/07/28
11:20:39
Own Ship
SAVE
MMSI 0000
IMO 0000
Password checking successful,
Ready to save setting
OK
A
B
Internal Ant
A -- B --
External An
A -- B -- C -- D --

4.6.2 Voyage

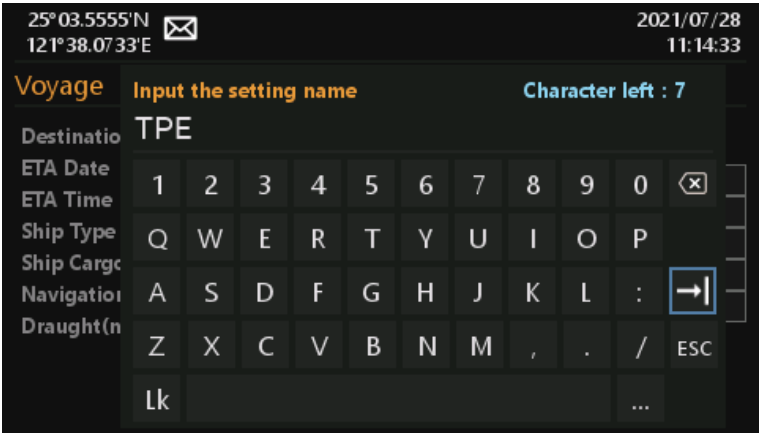
In this submenu the following navigational information can be configured:

- Destination - Ship's next destination port (limited to 20 characters).
- ETA Date - Estimated date of arrival at destination (using UTC time)
- ETA Time - Estimated time of arrival at destination (using UTC time)
- Ship Type - use direction keys to select the type of vessel from the list
- Ship Cargo - use direction keys to select the type of vessel from the list
- Navigation status – use direction keys to select the suitable status from the list

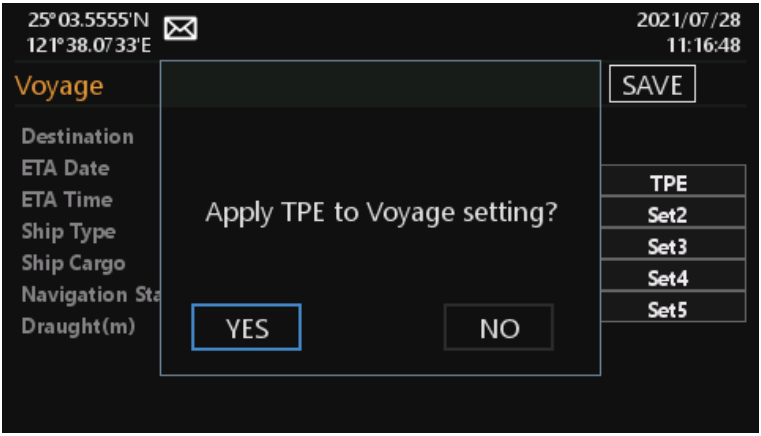
Notice: if Ship Type is Tanker, by regulation, whenever the ship navigation status is "Moored", the transponder's transmission power is automatically changed to 1W for safety measures.

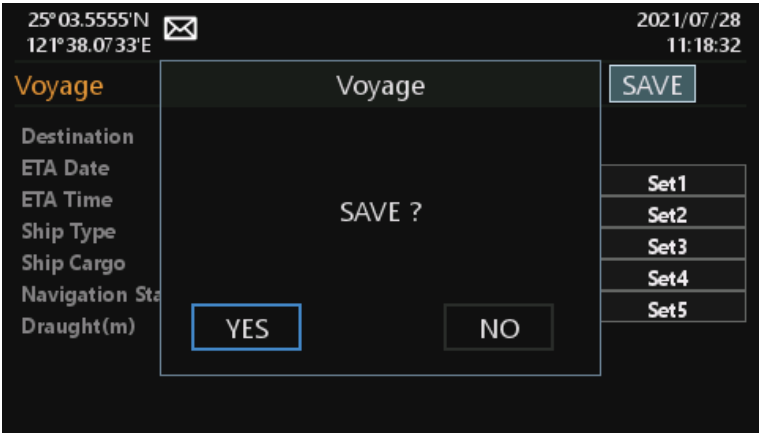
At the right side of the view, you can see a block (Set1~Set5) when pressing Fn , you can input the setting name and then the system will save the current voyage setting to this Set. Next time, if you want to use the same setting, just select the Set, you saved, and press ↵. The system will apply the setting to the current voyage value.

25°03.5555'N
121°38.0733'E
2021/07/28
11:07:42
Voyage
SAVE
Destination NULL
ETA Date mm/dd
ETA Time hh:mm
Ship Type 30 - Vessel Fishing
Ship Cargo 0 - All ships of this type
Navigation Status 15 - Undefined
Draught(m) 25.5
Set1
Set2
Set3
Set4
Set5


25°03.5555'N
121°38.0733'E
2021/07/28
11:14:33
Voyage
Input the setting name
Character left : 7
TPE
1 2 3 4 5 6 7 8 9 0
Q W E R T Y U I O P
A S D F G H J K L :
Z X C V B N M , . / ESC
Lk ...

25°03.5555'N
121°38.0733'E
2021/07/28
11:15:46
Voyage
SAVE
Destination NULL
ETA Date mm/dd
ETA Time hh:mm
Ship Type 30 - Vessel Fishing
Ship Cargo 0 - All ships of this type
Navigation Status 15 - Undefined
Draught(m) 25.5
TPE
Set2
Set3
Set4
Set5


25°03.5555'N
121°38.0733'E
2021/07/28
11:16:48
Voyage
SAVE
Destination
ETA Date
ETA Time
Ship Type
Ship Cargo
Navigation Sta
Draught(m)
Apply TPE to Voyage setting?
YES
NO
TPE
Set2
Set3
Set4
Set5


25°03.5555'N
121°38.0733'E
2021/07/28
11:18:32
Voyage
Voyage
SAVE
Destination
ETA Date
ETA Time
Ship Type
Ship Cargo
Navigation Sta
Draught(m)
SAVE ?
YES
NO
Set1
Set2
Set3
Set4
Set5

4.6.3 CPA/TCPA

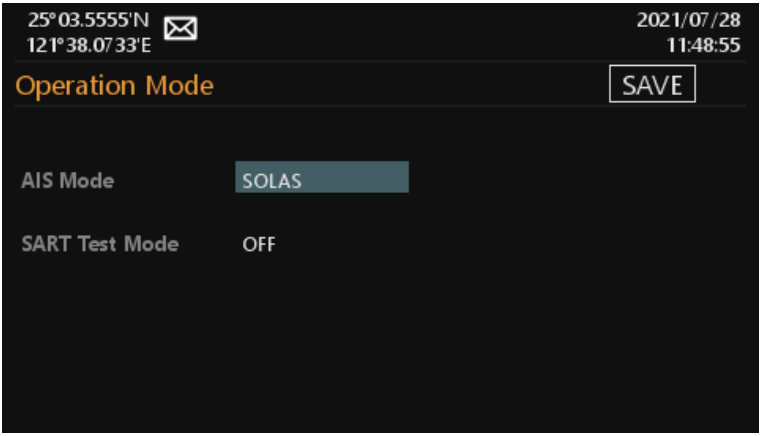
In this submenu the closest point of approach (CPA) and time to CPA (TCPA) can be set. The vessels with insufficient CPA and TCPA will be displayed in the dangerous list and radar view with red color.

- CPA - in nautical miles
- TCPA - in minutes

To save the setting, select the SAVE button in the view and press ↵. The system will ask whether the changes should be saved. Select YES to save or NO to discard and return to AIS settings submenu.

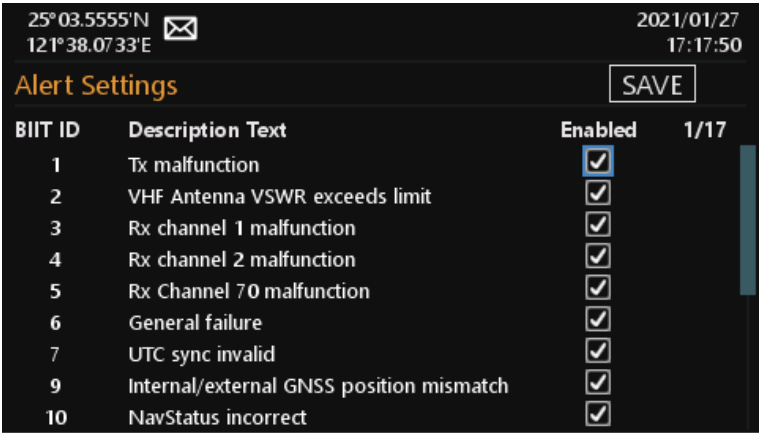
4.6.4 Operation Mode

You can configure the transponder to operate in SOLAS or INLAND mode. Each mode has some specific submenu and menu options. Displaying the SART Test on the A750 screen can be enabled or disabled by configuration setting (ON/OFF) as well.



4.6.5 Alert Settings

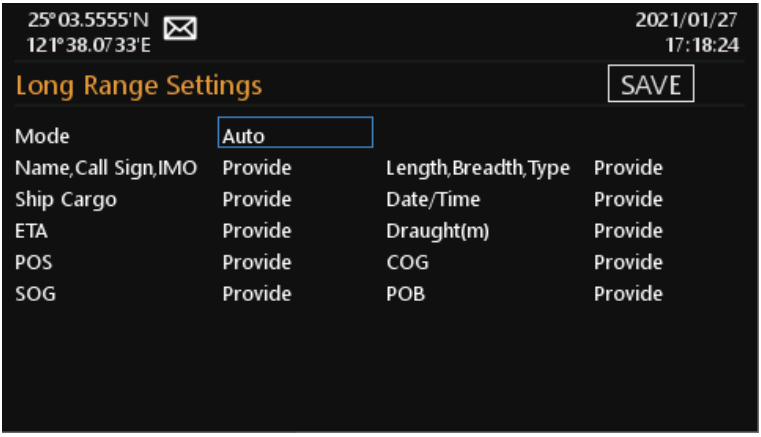
This submenu can be used to enable or disable ALF sentence. For instance, if an ALF sentence is disabled, the corresponding alarm would not activate.



4.6.6 Long Range Settings

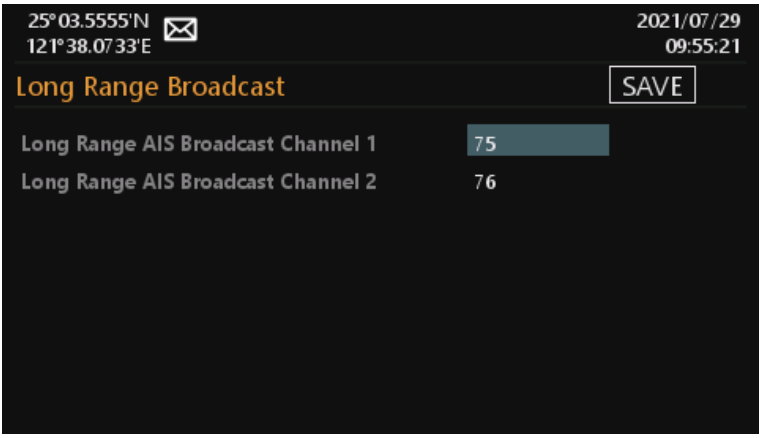
This section is password protected and can only be saved using the password.
This option provides user choices to auto-response remote interrogation and settings of the response information.

You can either set **Mode** to either Auto or Manual. The setting for the rest of information is either Provide or Not Provide.



4.6.7 Long Range Broadcast

This section is password protected and can only be saved using the password.
Class A transmits Message 27 every 3 minutes through the channels alternately.
Provided here are the options to change the transmitting channel for Message 27.

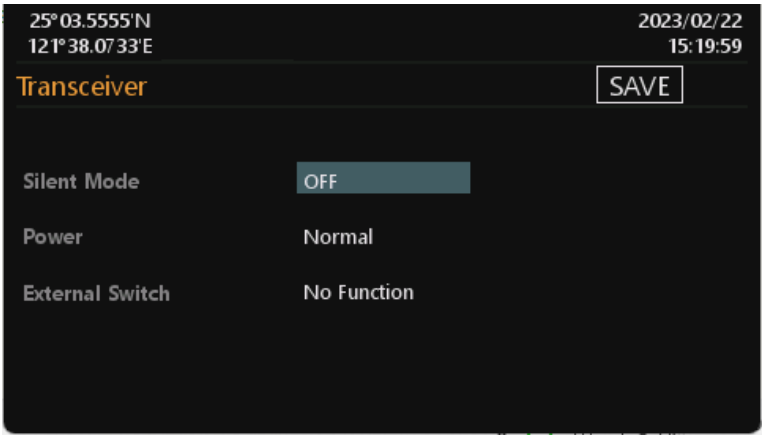


4.6.8 VSWR Settings

The VSWR setting function allows the fine-adjustment of VSWR threshold according to the cable length and VHF antenna characteristics.

4.6.9 Transceiver

This section is password protected and can only be accessed using the password. The submenu allows the users to switch on or off the transmission and enable to switch the transmission power between 12.5W, as “normal”, and 1W.
The External Switch (SOLAS Mode Only) allows the user to set “No Function”, “Silent Mode” and “Low TX Power Mode” function for “BLUE_SIGN” connector on Junction Box.



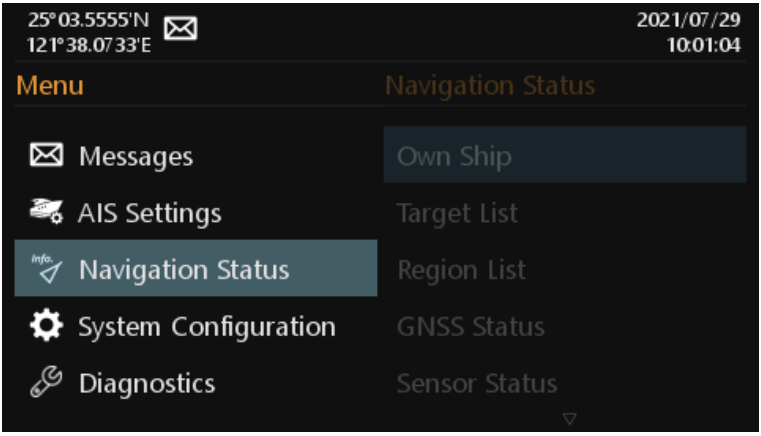
4.6.10 Extended Tow Dimension

This option provides users to setting extended dimension values used by towing vessels.

Under the following two conditions, this option will appear in the Menu.

1. AIS operate mode is INLAND mode or
2. Navigational status is 12 in SOLAS mode.

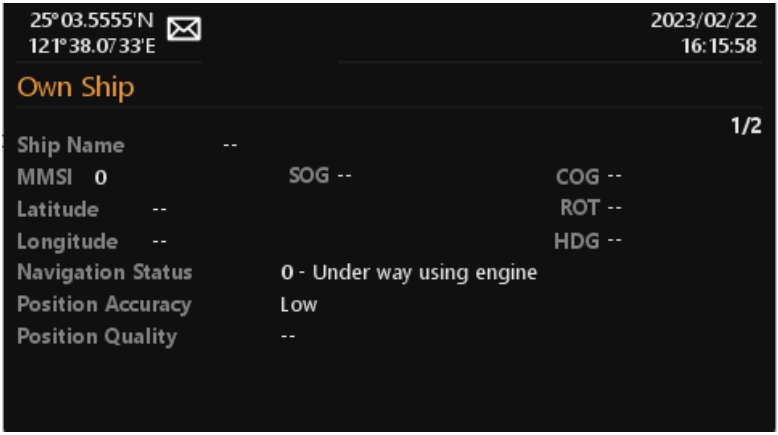
4.7 Navigation Status



4.7.1 Own Ship

This option displays the full information on your ship, including both dynamic and static data. Use direction keys to change between dynamic and static information.

- **Static data and Dynamic data**

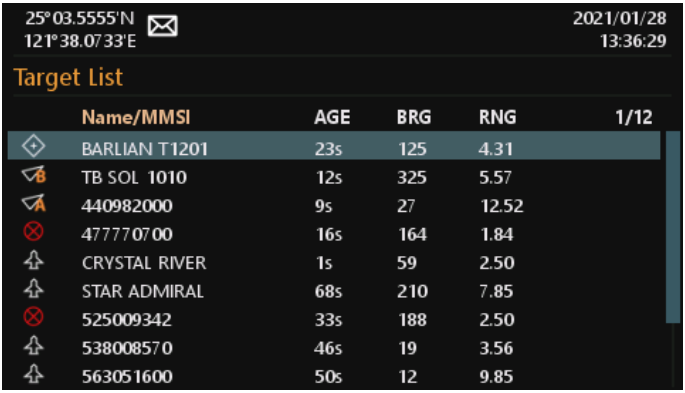


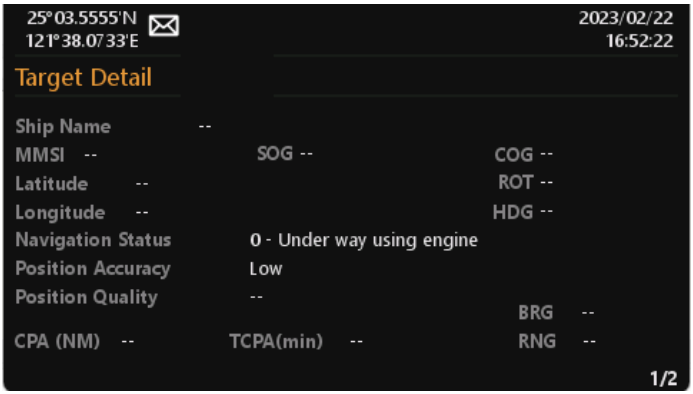
- **Inland Vessel Information**

The following information is only available under inland mode.

4.7.2 Target List

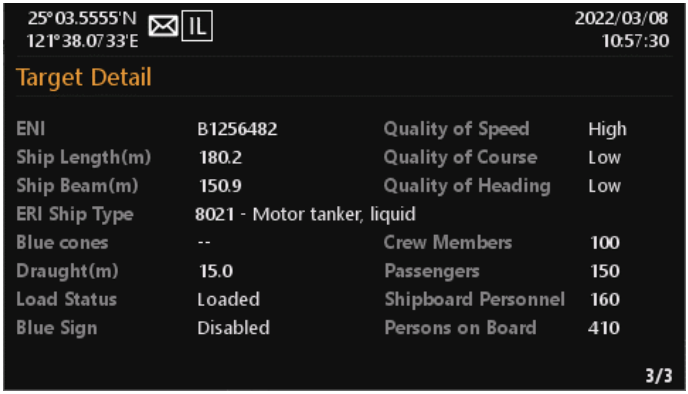
This option displays all received AIS information of other vessels including dynamic and static information. Use direction keys to select AIS target and then press ↵ to go through dynamic and static information of the selected vessel. There are two pages of ship details for SOLAS mode and another one page for Inland mode.





Use direction keys to continue reading the dynamic and static information of the selected vessel.

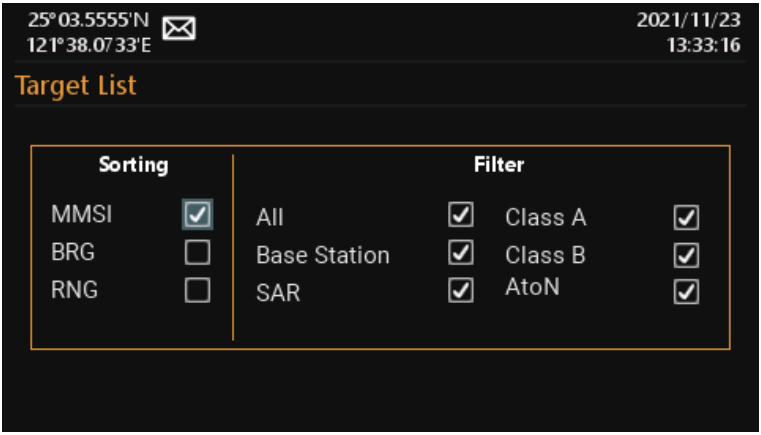
Additional inland information is available under inland mode.



- **Sorting vessels**

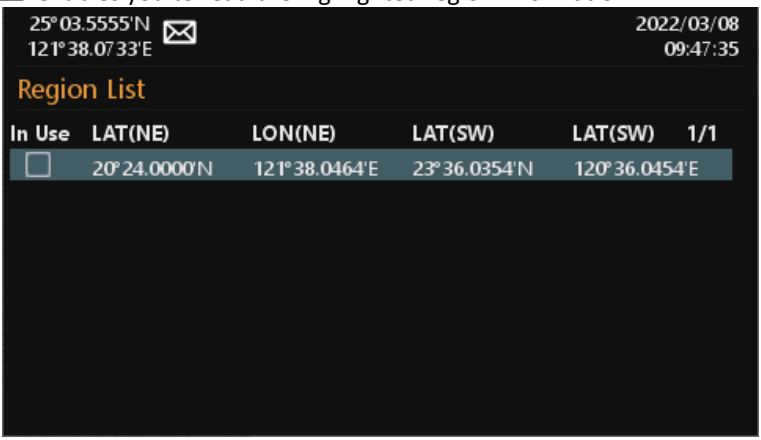
In the list, press Fn will open the pop-up window and user can sort the list according to vessels' MMSI, direction (BRG), or distance (RNG). Also user can choose what kinds of ship type whether should be displayed in the target list.

In the screenshot of the Target List, one subtitle has different color between others indicates the current sorting method.



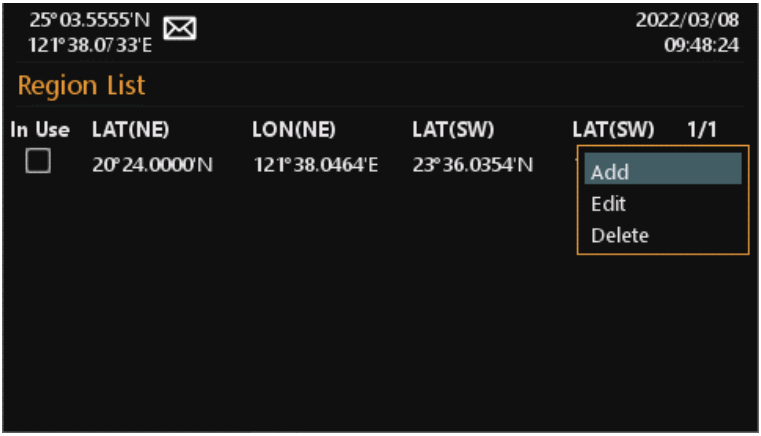
4.7.3 Region List

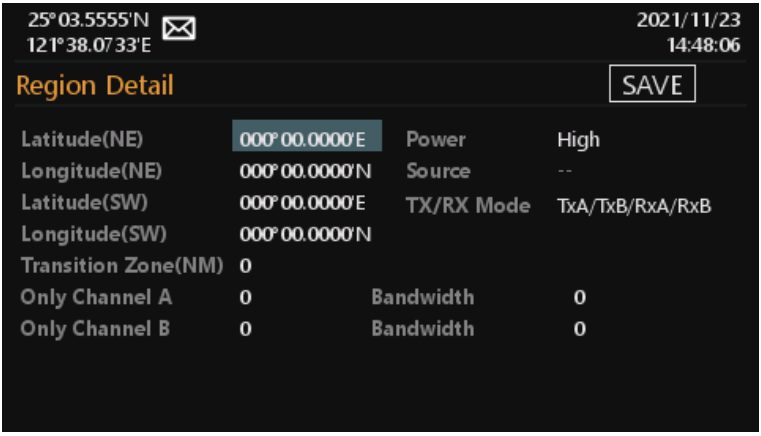
The region list displays all saved region areas. Use direction keys to traverse the list. Press ↵ enables you to read the highlighted region information.



- **Editing or Adding region content**

You can add or modify the region area setting by pressing Fn at the region list page. Use direction keys to select the field to edit, then press ↵ to enter the value.

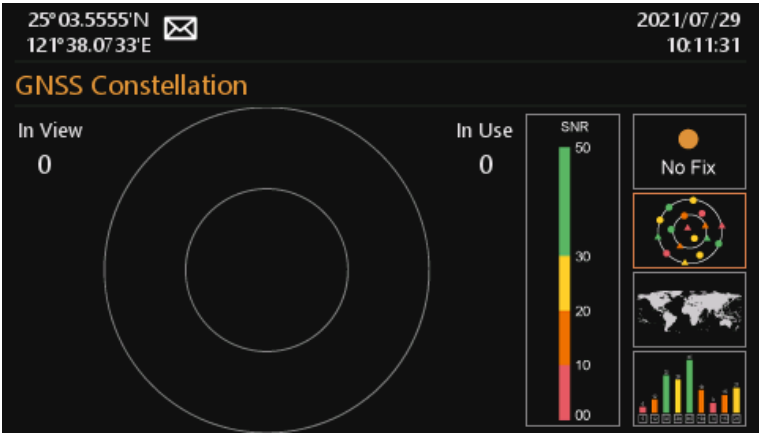




4.7.4 GNSS Status

In this submenu the following GNSS information is displayed:

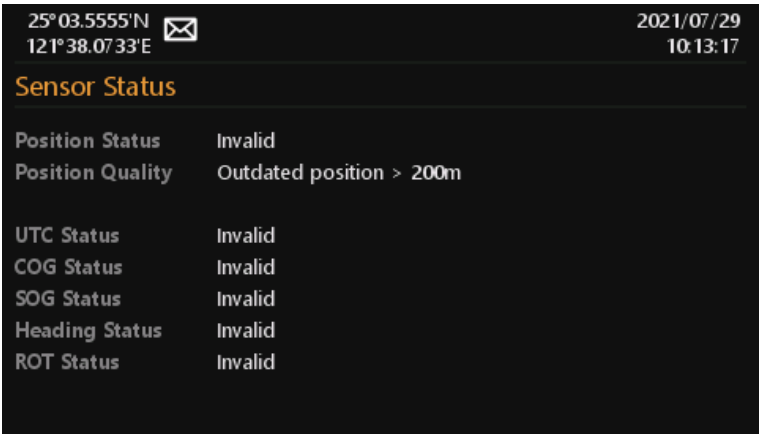
- GNSS Status - show device's GNSS data
- GNSS Constellation - GNSS source location distribution
- Ship Location -
- Satellite Signal to Noise Ratio - GNSS source signal magnitude


25°03.5555'N
121°38.0733'E
2021/07/29
10:11:31
GNSS Constellation
In View
0
In Use
0
SNR
50
30
20
10
00
No Fix

25°03.5555'N
121°38.0733'E
2021/01/27
17:37:38
Ship Location
No Fix

25°03.5555'N
121°38.0733'E
2021/07/29
10:11:55
Satellite Signal to Noise Ratio
No Fix
0
0
0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0

4.7.5 Sensor Status



Display sensor statuses:

SENSOR	STATUS
Position Status	External position source other than GNSS Internal GNSS in use External GNSS in use Internal DGNSS in use (corrected; beacon) Internal DGNSS in use (corrected; Message 17) External DGNSS in use
Position Quality	No position Manual position Dead reckoning position valid position with no time stamp Position > 10m Position with RAIM > 10 m Position <= 10 m Position with RAIM <= 10 m Outdated position > 200 m
UTC Status	Valid / Invalid (Note 1)
COG Status	Internal COG / External COG / Invalid
SOG Status	Internal SOG / External SOG / Invalid
Heading Status	Valid / Invalid
ROT Status	Valid / Other ROT / Invalid
Note 1: When AIS not connected with internal GPS, UTC got lost and time unsynchronized, then the A750 will continue operation using indirect or semaphore synchronization.	

4.7.6 Dangerous Target List

With the setup of closest point of approach (CPA) and time to CPA (TCPA), this submenu provides an efficient way to monitor vessels with insufficient CPA and TCPA. The dangerous targets can also be observed on radar view (with red color).

Use direction keys to traverse the list and press ↵ to read information of the selected vessel.

4.7.7 Alert List

A750 features SART/MOB alarm that can appear any time during operation. When SART/MOB message is received, the ! or icon will appear in the status bar with beeping sounds twice from the buzzer.

There are 2 ways to access the Alert List: either through Main Menu/Navigation Status/Alert List or with the hot key by holding Esc for 3 seconds and the system will enter the Alert List screen. Another hot key in Alert List, by pressing Fn you can select the alert between the first and the last.
The list shows all current AIS alerts and their status. Use direction keys to navigate the list. You can acknowledge (ACK) the alert message by pressing ↵. The system will ask for confirmation if the chosen alert should be acknowledged. If the alert has not yet acknowledged, an indication icon will appear in the status bar till all acknowledged are made.

The transponder performs a function self-check continuously. If a self-check fails an alarm will occur. The Appendix shows all possible alarm scenarios.

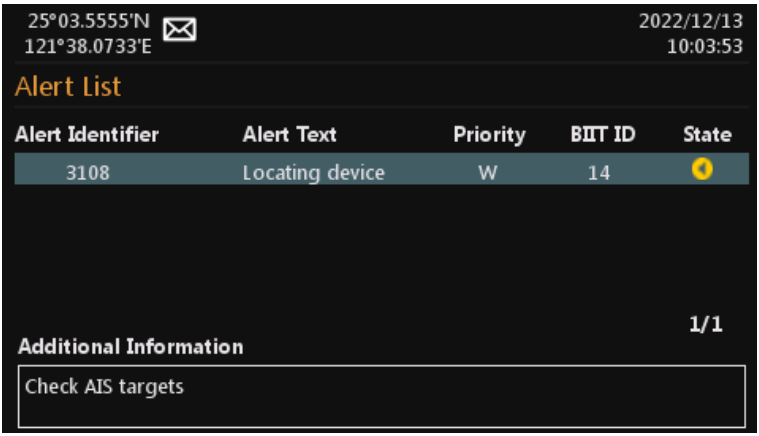


Table – BAM alert instance

Alert ID	Alert text	Additional information	Prio	Cat	Escal	BIIT ID
3108	Locating device	Check AIS targets	W	B	W	14
3062	General fault	Check AIS equipment	W	B	W	6
3008	Transceiver fail	Not transmitting, check AIS	W	B	W	1
		Not receiving, check AIS	W	B	W	3、4
3015	Lost position	Own ship position not transmitted	W	B	W	26
3116	Impaired radio	Reduced coverage (antenna VSWR)	C	B		2
		Ch1 inoperative, check AIS	C	B		3
		Ch2 inoperative, check AIS	C	B		4
		DSC inoperative	C	B		5
3113	Sync in fallback	Check AIS for UTC time synchronisation	C	B		7
3003	Lost ext EPFS	Check external position sensor	C	B		25
3119	Missing	Not transmitting COG	C	B		30

	COG					
	Missing SOG	Not transmitting SOG	C	B		29
	Missing Heading	Not transmitting Heading	C	B		32
	Missing ROT	Not transmitting Rate of Turn	C	B		35
3013	Doubtful GNSS	Int/Ext GNSS position mismatch	C	B		9
	Doubtful heading	Difference with COG exceeds limit	C	B		11
3019	Wrong NavStatus	Check NavStatus setting	C	B		10
3009	Lost MKD	Cannot display safety related messages	C	B		8
Note 1, Alert priority (Prio): W (Warning) 、C (Caution) Note 2, BIIT ID 1 is generated if there is a malfunction in the transmitter hardware or the MMSI is set to “0".						

Table – Alert state and audible annunciation for warnings

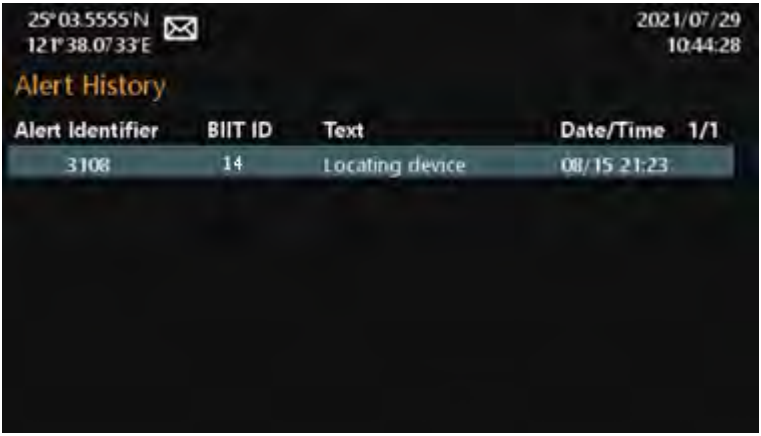
Alert state	Visual presentation	Audible annunciation
V: active – unacknowledged		2 short audible signals and repeated as a warning after 3 minutes
S: active – silenced		None
A: active – acknowledged		None
U: rectified – unacknowledged		None

Table – Alert state and audible annunciation for cautions

Alert state	Visual presentation	Audible annunciation
A: active		None

4.7.8 **Alert History**

This submenu lists all recorded alarm and its time of occurrence.

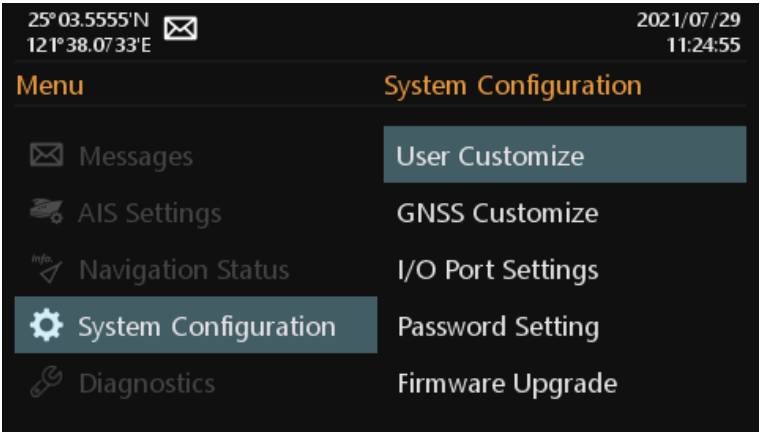


4.8 System Configuration

System configuration provides access to user configurable preferences for A750. All user settings are stored within the transponder and will be maintained if the power supply is switched off.

After the setting is done, press SAVE button in the view and the system will ask whether the changes should be saved.

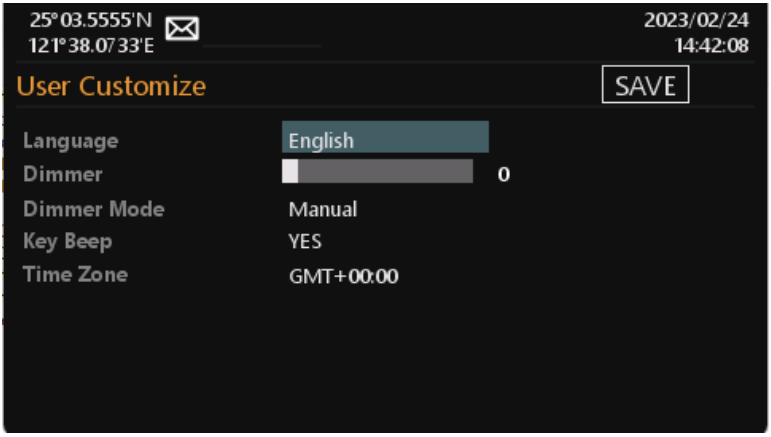
Select YES to save or NO to discard and return to System Configuration submenu.



4.8.1 User Customize

Customize provides personalization settings:

- Language - select the user interface language from the available language options
- Dimmer - brightness setting from 0 (low) to 10 (high)
- Dimmer Mode – set the Dimmer Mode to Auto or Manual
- Key Beep - turn on or off the key beep
- Time Zone - set the time zone

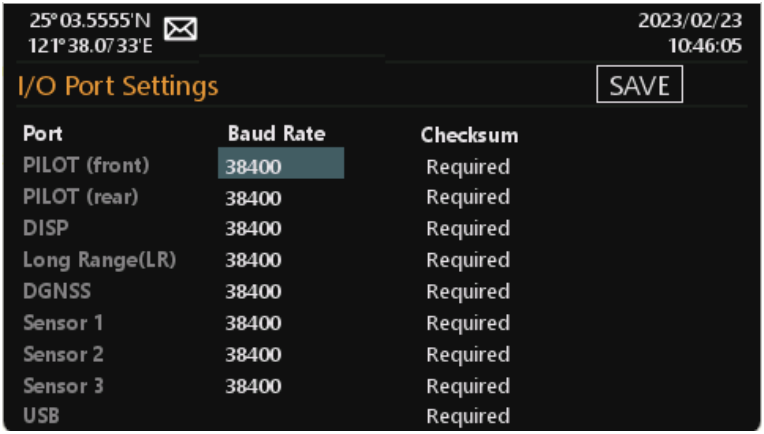


4.8.2 GNSS Customize

This submenu allows the user to change the supplied voltage of the GNSS antenna between 3.3V and 5V and choose the GNSS system. It also enable to switch the operating altitude.

4.8.3 I/O Port Settings

This option provides an overview of baud rates and checksum on all ports.



4.8.4 Password Setting

This submenu enables users to change user password. Certain important information stored within the transponder can only be changed with the password. Password is required for the access of the following chapters:

Own ship - contains information about MMSI, vessel name, IMO, call sign and dimension.

Long Range Settings -

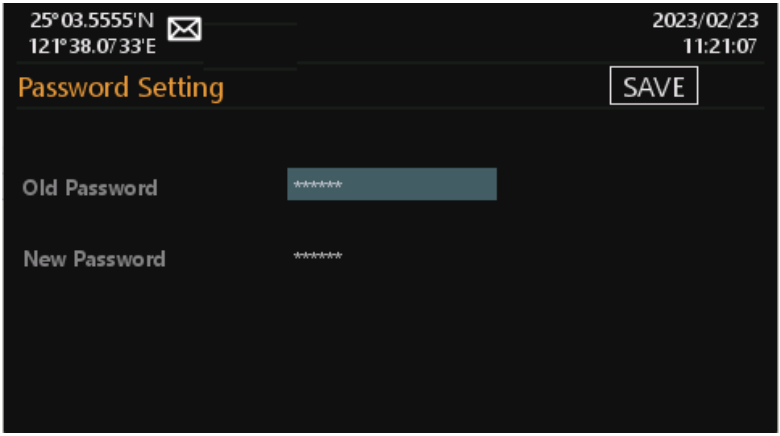
Long Range Broadcast -

Transceiver - enables the option to activate/deactivate AIS transmission

I/O Port Settings - about baud rate configuration of sensors

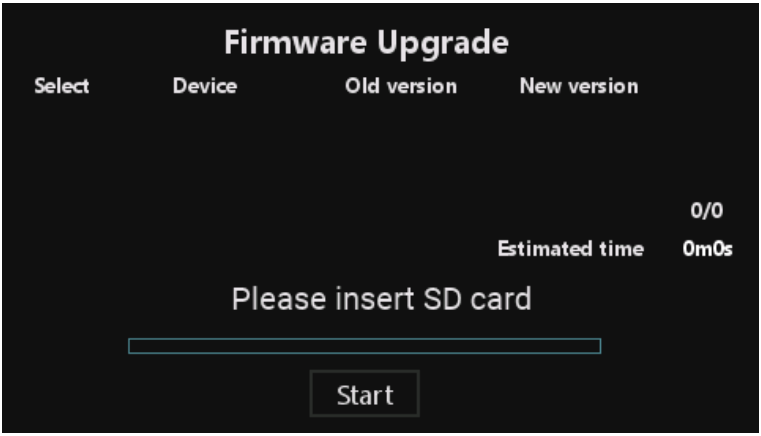
Default password: “000000”

Use direction keys to select **Old Password**, **New Password** and then press ↵ to enter value. To save the settings, press SAVE button in the view and the system will ask whether the changes should be saved. Select YES to save or NO to discard and return to System Configuration submenu.



4.8.5 Firmware Upgrade

This option provides users to upgrade the transponder version.



4.8.6 Ethernet Setting

The default IP address and Mask is 192.168.0.100/24. Input groups NAVD, TGTD and SATD are always enabled.

In this submenu the following Ethernet setting can be configured:

- IP address and network mask of AIS transceiver

  Valid IP address ranges are shown as below:
  10.0.0.0 ~ 10.255.255.255 (10/8 prefix)
  172.16.0.0 ~ 172.31.255.255 (172.16/12 prefix)
  192.168.0.0 ~ 192.168.255.255 (192.168/16 prefix)

- SFI of AIS transceiver

  SFI Range for AIS is AI0000 ~ AI9999. If SFI is AI9999(default), A750 will not send data to Ethernet.

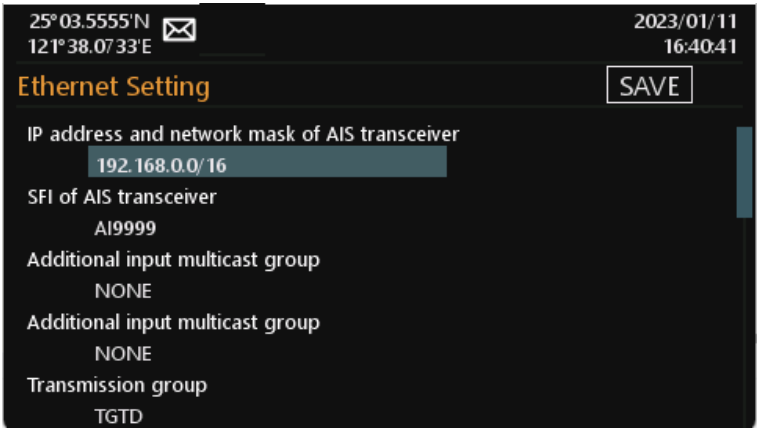
- Additional input multicast group

  This setting is used for additional input groups.

- Transmission group
- SFI for Primary position sensor
- SFI for Secondary position sensor
- SFI for Primary SOG/COG sensor
- SFI for Secondary SOG/COG sensor
- SFI for Primary heading sensor
- SFI for Secondary heading sensor
- SFI for Primary ROT sensor
- SFI for Secondary ROT sensor
- SFI for Primary AIS Control
- SFI for Secondary AIS Control
- SFI for Primary alert command source
- SFI for Secondary alert command source

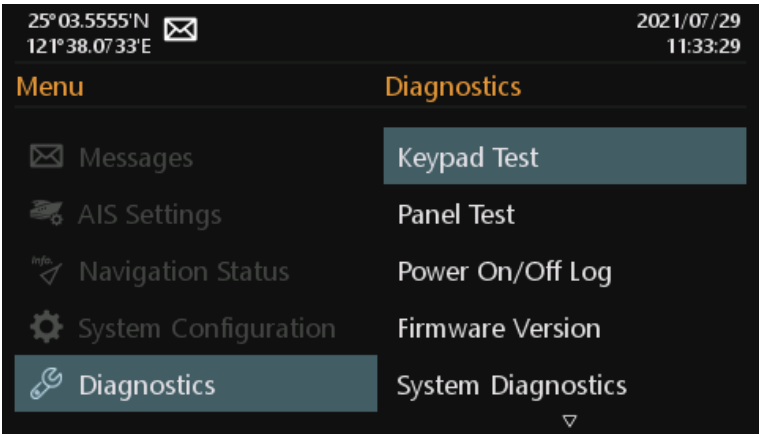
Table – Input transmission groups with applicable sentences

Tx group	Multicast address	Port	Typical talker ID	Typical sentences	Message type
NAVD	239.192.0.4	60004	GA, GP, GN, LC, IN, HE, TI	DTM, GBS, GNS, RMC, VBW, VTG, GGA, GLL HDT, THS, ROT	SBM
NAVD	239.192.0.4	60004	EC, EI, IN	ABM, ACA, AIR, BBM, SSD, VSD	CRP
TGTD	239.192.0.2	60002	RA	ABM, ACA, AIR, BBM, SSD, VSD	CRP
SATD	239.192.0.3	60003	HE	HDT, THS	SBM
PROP	239.192.0.8	60008	Proprietary	PAMC	SBM



4.9 Diagnostics

This submenu provides users to check system statuses. There are a total of 7 check options.



4.9.1 Keypad Test

This option provides keyboard testing. Pressing button during testing, a corresponding button on the screen will response. After all buttons are tested, a message will indicate. Press OK to exit. To quit test without completing, wait for 30 seconds and the system will return to the Diagnostics submenu.

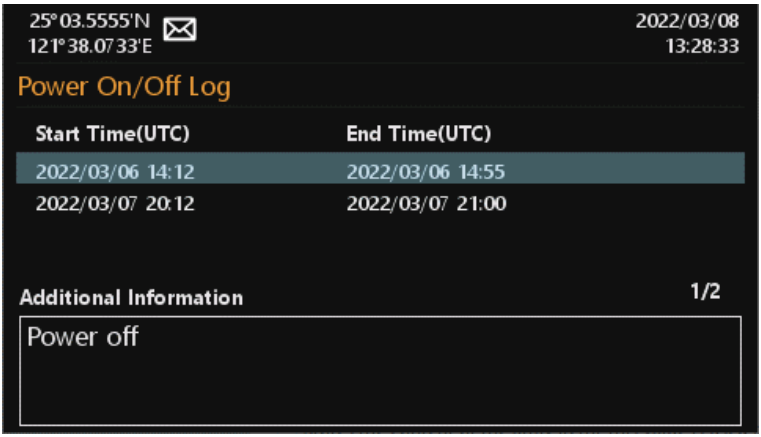
4.9.2 Panel Test

In the submenu users can test the brightness of the screen.

Use ▲ ▼ to switch the white cube between different sizes. Use ◀ ▶ to test different stages of brightness. To exit the function, press Esc.

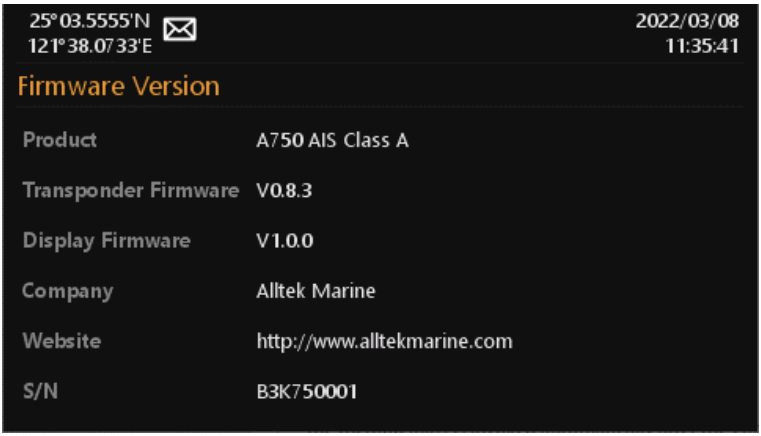
4.9.3 Power On/Off Log

This option provides activation and silent mode history. (any event less than 15 minutes would not be registered in the history)



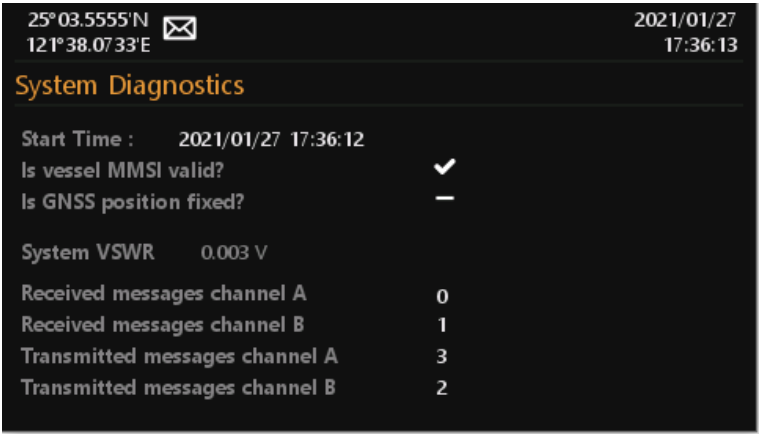
4.9.4 Firmware Version

Provide model name, transponder firmware, display firmware, etc.

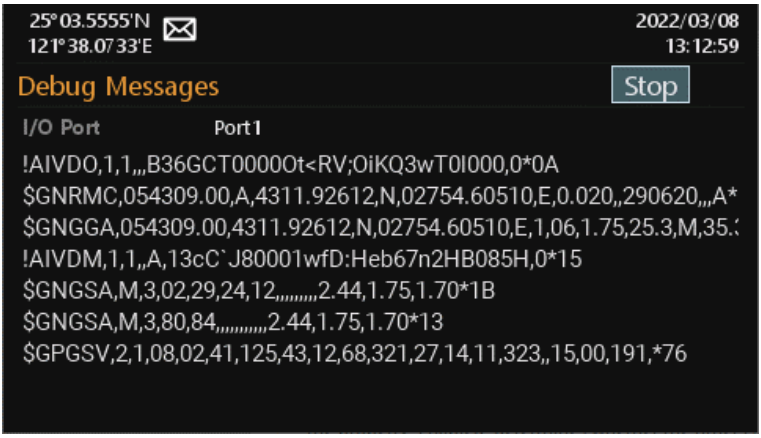


4.9.5 System Diagnostics

This option provides users to simply check the transponder condition. Press Fn the system will reset the time and count value.

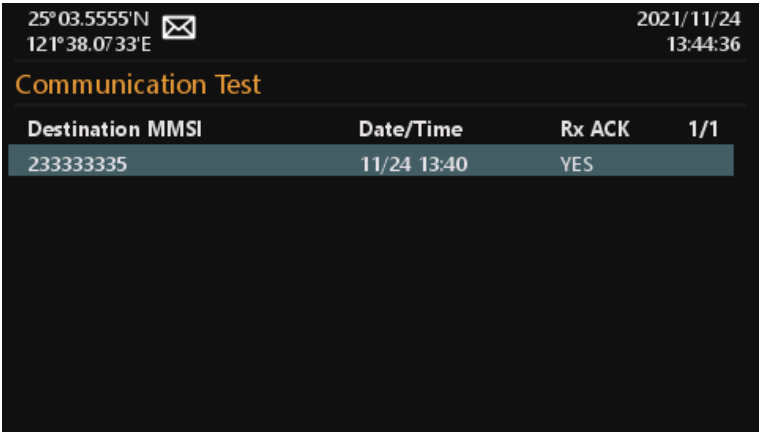


4.9.6 Debug Messages

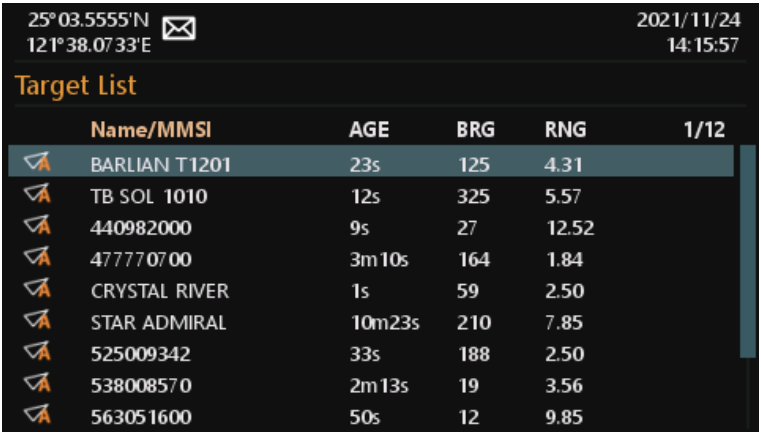


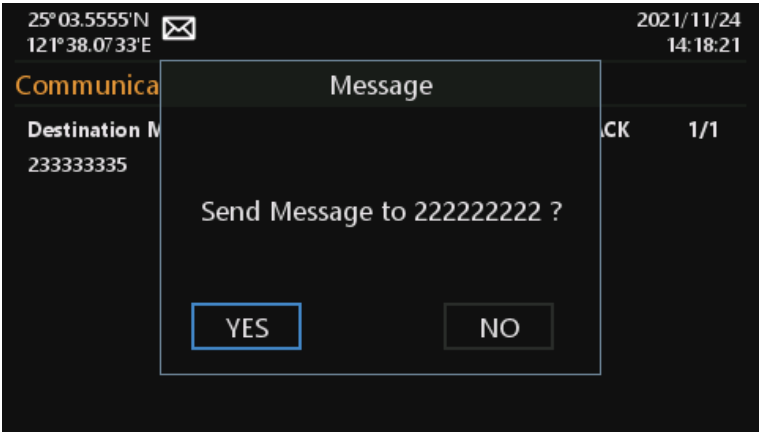
4.9.7 Communication Test

Communication between A750 and other Class A device can be tested. The procedure starts by transmitting Message 10 to an addressed Class A MMSI. The addressed MMSI, once received Message 10, will return Message 11. The test is then complete when the transponder successfully receives the Message 11.



Press Fn to start the communication test. The system will show Target List that only has targets with Class A type. Use direction keys to select a target and then press ↵ to start the transmission of Message 10.

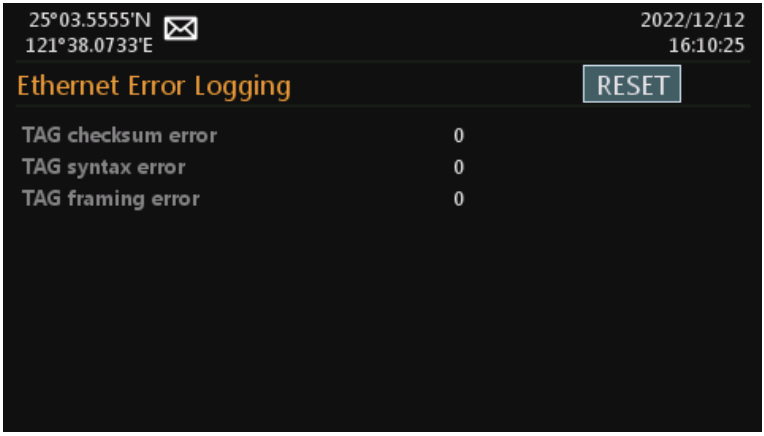

25°03.5555'N
121°38.0733'E
2021/11/24
14:15:57
Target List
Name/MMSI AGE BRG RNG 1/12
BARLIAN T1201 23s 125 4.31
TB SOL 1010 12s 325 5.57
440982000 9s 27 12.52
477770700 3m10s 164 1.84
CRYSTAL RIVER 1s 59 2.50
STAR ADMIRAL 10m23s 210 7.85
525009342 33s 188 2.50
538008570 2m13s 19 3.56
563051600 50s 12 9.85


25°03.5555'N
121°38.0733'E
2021/11/24
14:18:21
Communica
Destination M
ACK
1/1
233333335
Message
Send Message to 222222222 ?
YES
NO

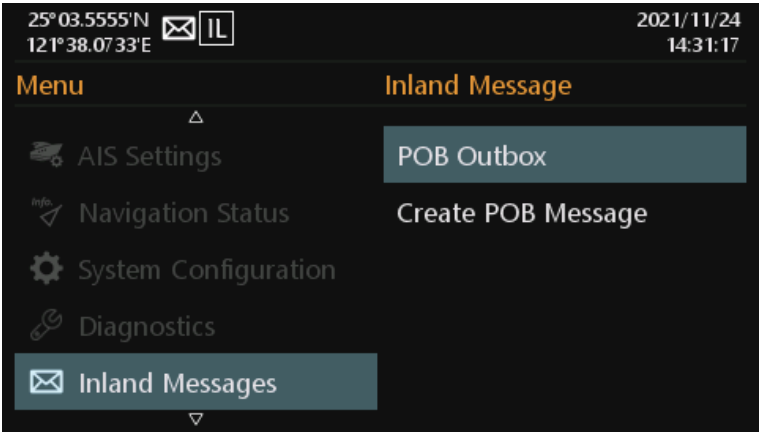
4.9.8 Ethernet Error Logging

This option provides users to check the counts of errors detected in processing datagrams containing IEC 61162-1 sentences from Ethernet..

- TAG checksum error;
- TAG syntax error (line length, use of delimiters, invalid characters);
- TAG framing error (incorrect start or termination of TAG block);



4.10 Inland Messages

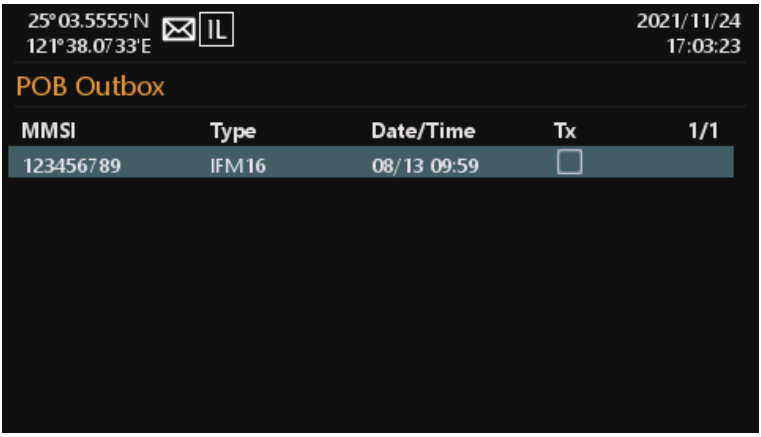


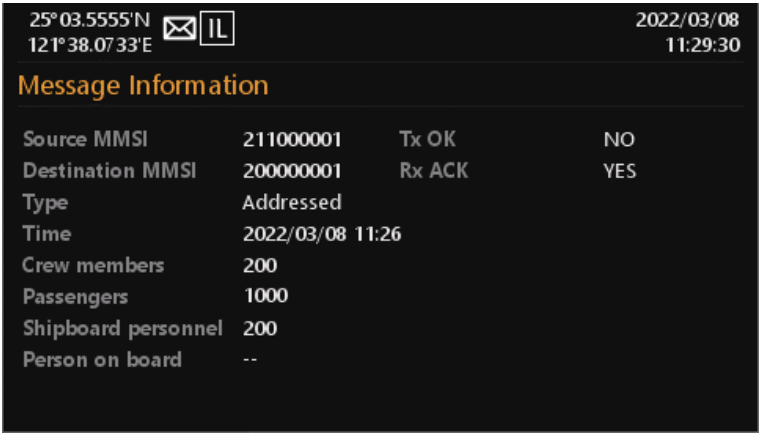
4.10.1 POB Outbox

The submenu displays log of sent Number of person on board (RFM55/IFM16) messages. The IMO version sends the total number of persons on board as a binary message with international IFM16.

The Inland (IWW) version sends a message with number of crew, personnel and passengers as a binary message with inland branch RFM55.

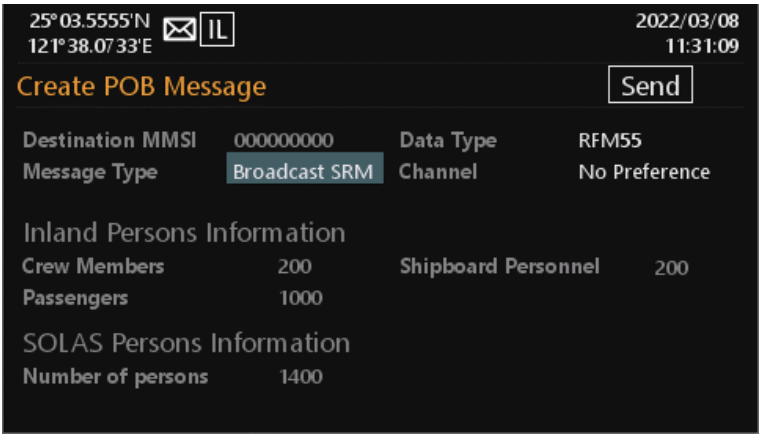
Use direction keys to select a message and press ↵ to display message content.



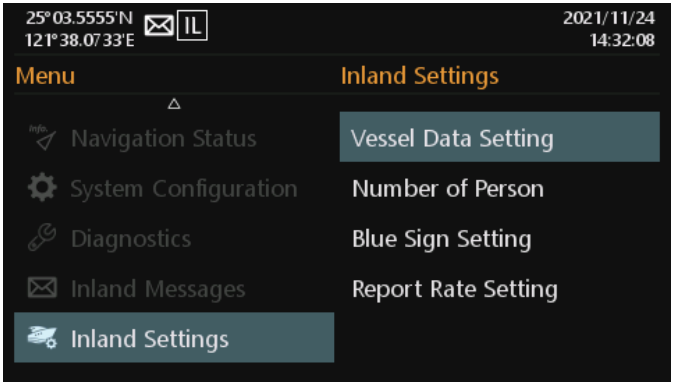


4.10.2 Create POB Message

In this submenu users can compose number of person on board (RFM55/IFM16) messages. Number of person onboard can be configured in Inland Setting 0. When “Broadcast SRM” is selected, just omit the Destination MMSI. The **Data Type** provides the option either to send the data in RFM55 or IFM16. Channel gives you the option to send the message through channel A, B, A&B, or No Preference. By No Preference, which is the default option, the system will select the channel automatically.



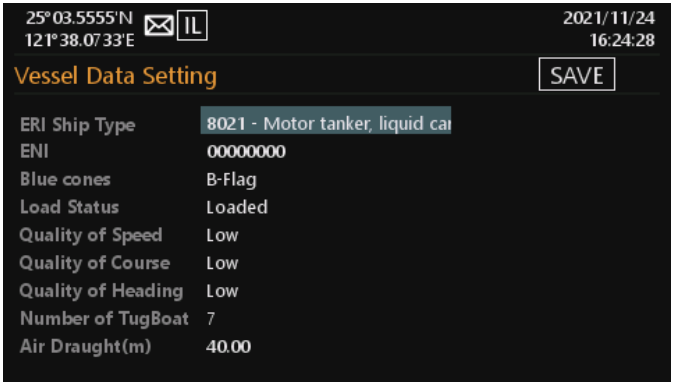
4.11 Inland Settings



4.11.1 Vessel Data Setting

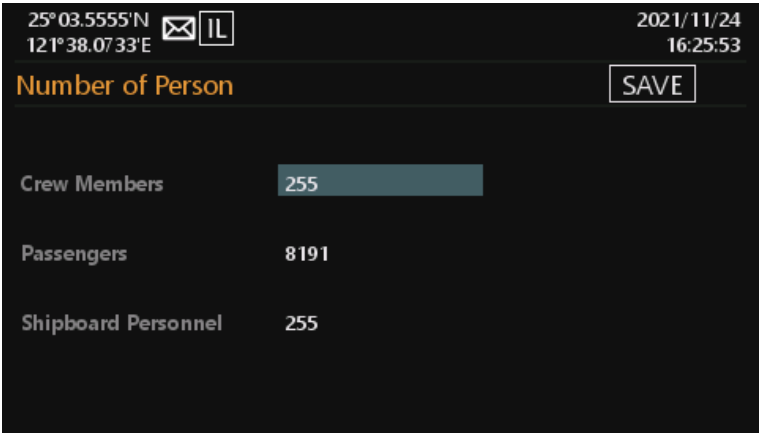
Inland related vessel data can be set in this submenu:

- ERI Ship Type - ERI classification code.
- ENI - European Number of Identification or European Vessel Identification Number
- Blue cones - The number of blue cones or blue flag status for the cargo (1, 2 or 3 blue cones, or blue flag).
- Load Status - “Loaded”, “Unloaded”, “Unknown”
- Quality of Speed, Course, Heading - will be shown as “High” when the target vessel is using an approved sensor to generate this data, or Low if the data is derived from internal GNSS only.
- Number of Tugboats - The number of assisting tugboats (from 0 to 6 or unknown)
- Air Draught - The air draught of the vessel to the nearest centimeter.



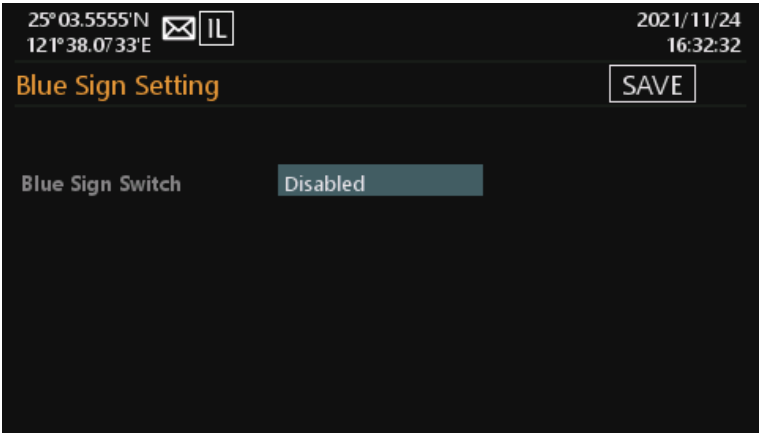
4.11.2 Number of Person

This submenu provides Number of Person (RFM55) setting:
The number of crew (0 to 254 or unknown), passengers (0 to 8190 or unknown) and other shipboard personnel (0 to 254 or unknown).



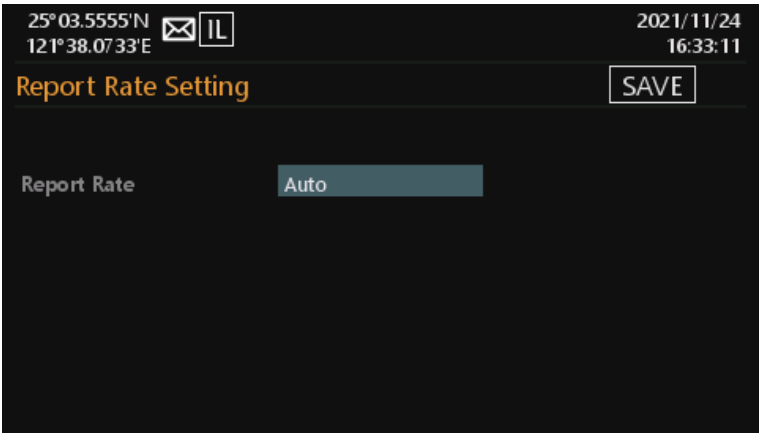
4.11.3 Blue Sign Setting

Blue Sign information helps you recognize the approaching vessels in your inland waterway area. A “blue sign” switch may optionally be connected to the AIS transceiver during installation. This setting enables or disables the blue sign switch on the Junction Box.



4.11.4 Report Rate Setting

Set A750's report rate. Selectable report rates are Auto/ 30 SEC./ 15 SEC./ 10 SEC. etc.



4.11.5 Inland Own Ship

5 PRODUCT SPECIFICATIONS

5.1 Applicable Standards

IEC 61993-2 Ed.3.0, 2018	IMO Resolution A.694(17)
IEC 61108-1 Ed.2.0, 2003	IMO Resolution MSC.74(69) Annex 3
IEC 60945 Ed.4.0, 2002 incl. Corr. 1, 2008	IMO Resolution MSC.191(79)
IEC 61162-1 Ed.5.0, 2016	IMO Resolution MSC.302(87)
IEC 61162-2 Ed.1.0, 1998	ITU-R M.1371-5 (Class A), 2014
IEC 61162-450 Ed.2.0, 2018	IEC 62288 Ed.3.0, 2021
IEC 62923-1 Ed. 1.0, 2018	IEC 62923-2 Ed. 1.0, 2018

5.2 VHF Transceiver

Frequency Range	156.025 MHz ~ 162.025 MHz
Channel Bandwidth	25 KHz
Modulation	GMSK / FM
Data Rate	9,600 bps
Number of AIS Transmitter	1
Number of AIS Receiver	2
Number of DSC Receiver	1
AIS Channel 1	CH 87B (161.975 MHz)
AIS Channel 2	CH 88B (162.025 MHz)
Tx Power Output	1/12.5 Watt (30/41 dBm ± 1.5 dB)
Rx Sensitivity	< -107 dBm @ 20% PER

5.3 DSC Receiver

Frequency	156.525 MHz
Modulation	FSK
Channel Bandwidth	25K

Sensitivity	< -107 dBm @ BER < 10^{-2}
Spurious Response Rejection	≧ 70 dB for signal @ -104 dBm; BER ≦ 1 %
Blocking	≧ 84 dB for signal @ -104 dBm; BER ≦ 1 %

5.4 GNSS Receiver (Internal)

Receiver type	72-channel; GPS, GLONASS, BeiDou, Galileo, SBAS: WASS, EGNOS, MSAS, GAGAN
Accuracy	Position: 2.5m CEP SBAS: 2.0m CEP
Sensitivity	Default mode: GPS & GLONASS Tracking & Navigation: -164 dBm Reacquisition: -160 dBm

5.5 Power Supply

Supply Voltage	12V / 24V DC
Supply Voltage Range	9.6V DC ~ 31.2V DC
Peak Current Draw	3.50A @ 12V DC; 1.72A @ 24V DC

5.6 LCD Display

Screen Size	4.3” color TFT
Pixel Number (Resolution)	480x272
Dimmer Control	Change brightness automatically when lighting changes
Nominal viewing distance	52cm

5.7 Keypad

11 Keypads with Back-light	Function, ESC, Voyage/SRM, MENU, Screen Brightness, DISP, Enter, Arrow Keys

5.8 Connection Interface

A750 Main Unit Front Panel:	
USB	Mini type B USB interface
SD Card Slot	MicroSD type
Pilot Plug	Std. Sex 206486-2
A750 Main Unit Rear Panel:	
Power Connector	Round type, 3 pins
GPS Antenna Connector	TNC (Female)
VHF Antenna Connector	SO-239 (Female)
Ethernet	Compliance with IEEE 802.3u, 10Base-T/100Base-TX
DATA	37-pins, connect to Junction Box via extension cable
Junction Box Connectors: [* Baud rate support: **38400** (**default**), 9600, 4800.]	
Sensor Interfaces 1 to 3 *	IEC 61162-1 or -2
Pilot / Auxiliary *	IEC 61162-2
External Display *	IEC 61162-2
Long Range *	IEC 61162-2
DGNSS correction input *	RTCM-SC-104
Alarm Relay	Normally open
NMEA2000	IEC61162-3
Alarm Output	Relay contact
Blue sign switch	Connect to external Blue sign switch
Silent mode	Connect to external silent switch

5.9 Environmental

Operating Conditions	IEC 60945 “protected” category
Operating Temperature	-25°C ~ 55°C
Operating Humidity	95% RH at 40°C
Waterproof	IP54

5.10 Physical

Width	262 mm (10.32 inch)
Height	135 mm (5.32 inch)
Depth (include connectors)	197 mm (7.76 inch)
Weight (main unit)	1.25 kg

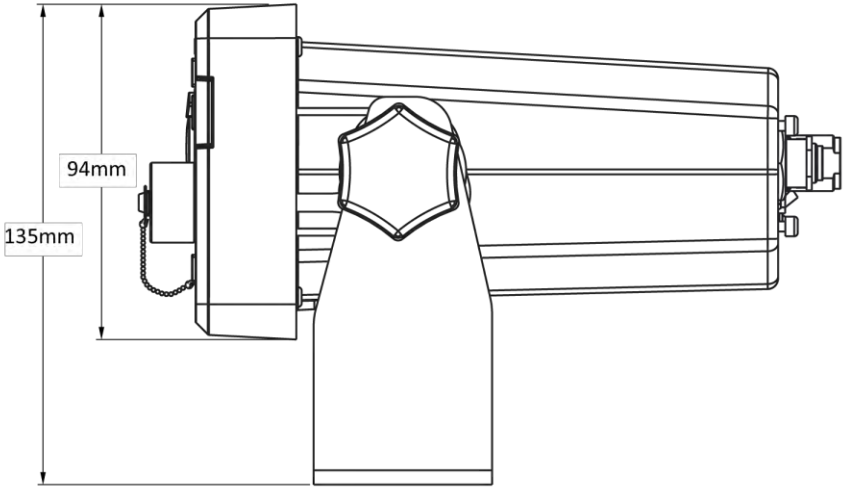
5.11 Pilot Plug (optional)

Cable length	2 m
Connector type	Std. Sex 206486-2

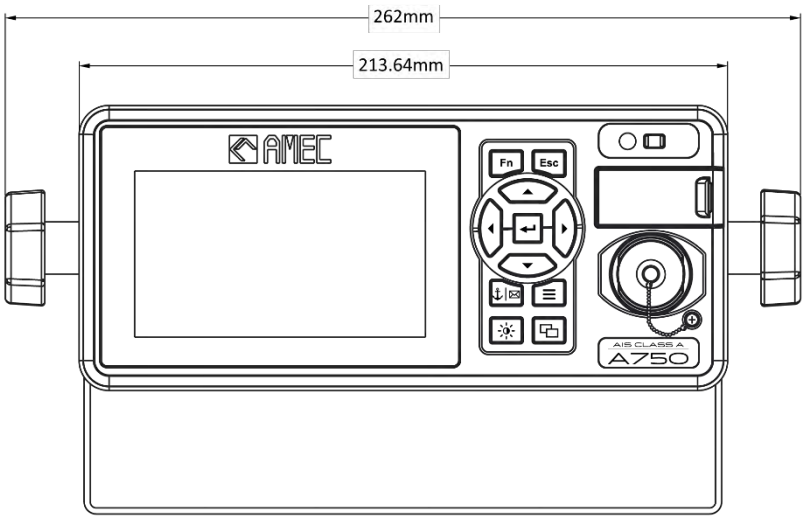
6 MECHANICAL DIMENSIONS

6.1 A750 Transponder Main Unit

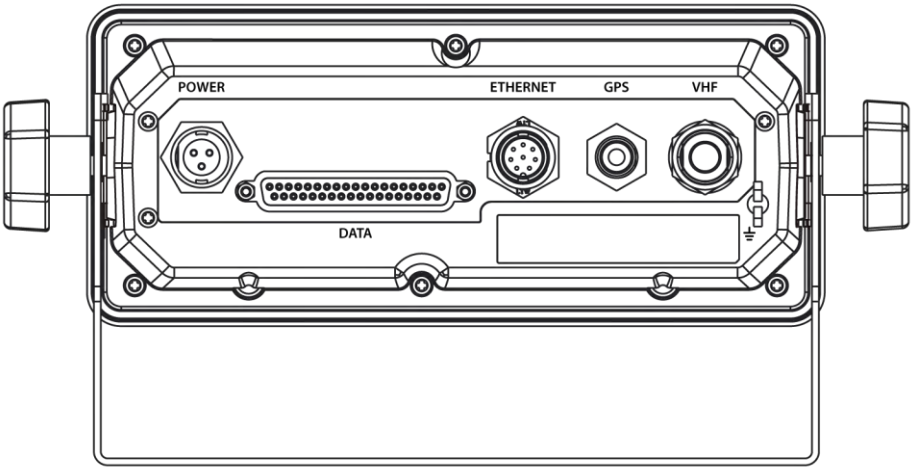
Front (size: mm)



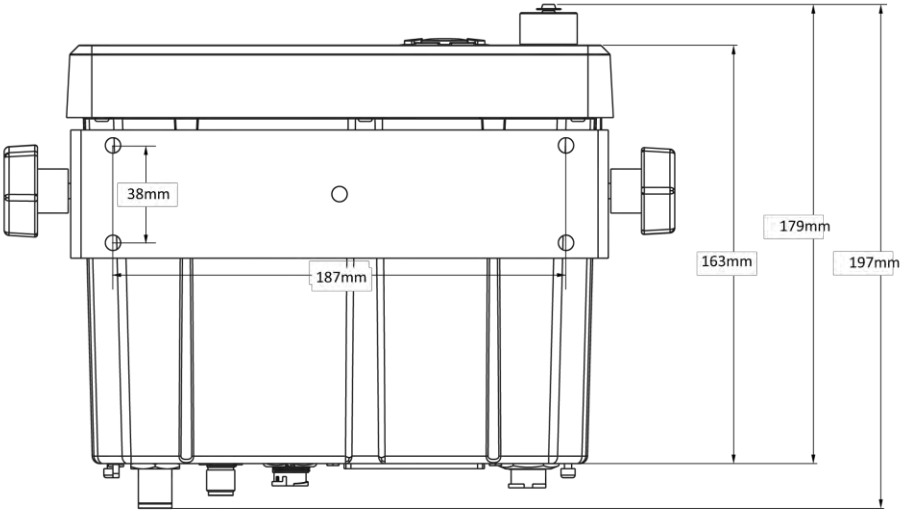
Side (size: mm)



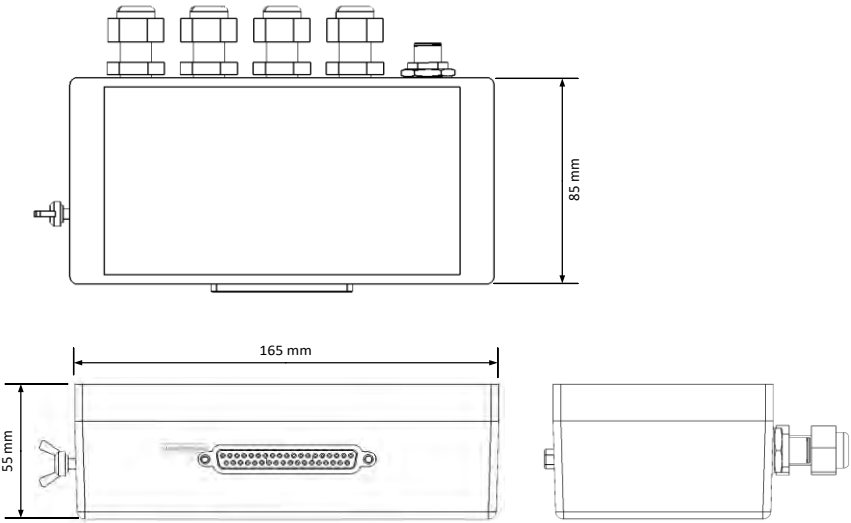
Back (size: mm)



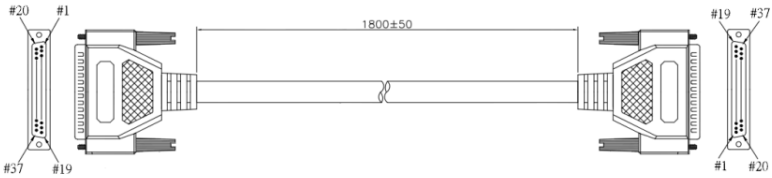
Bottom (size: mm)



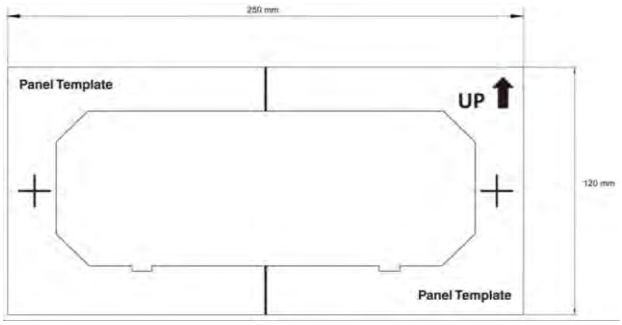
6.2 Junction Box



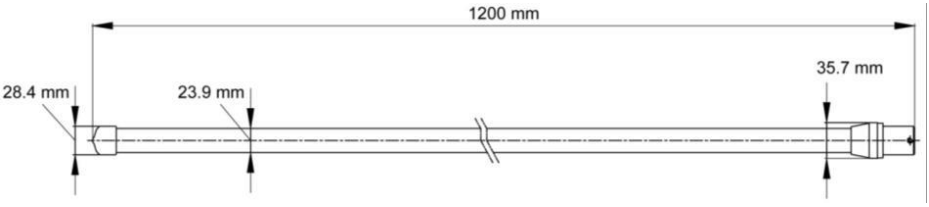
6.3 Extension Cable



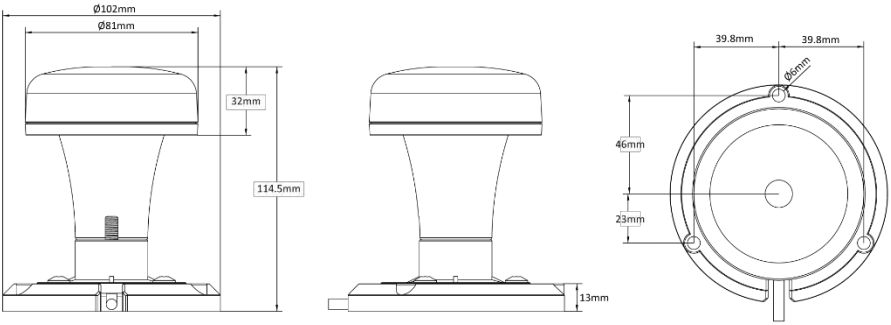
6.4 Mounting Template (not to scale)



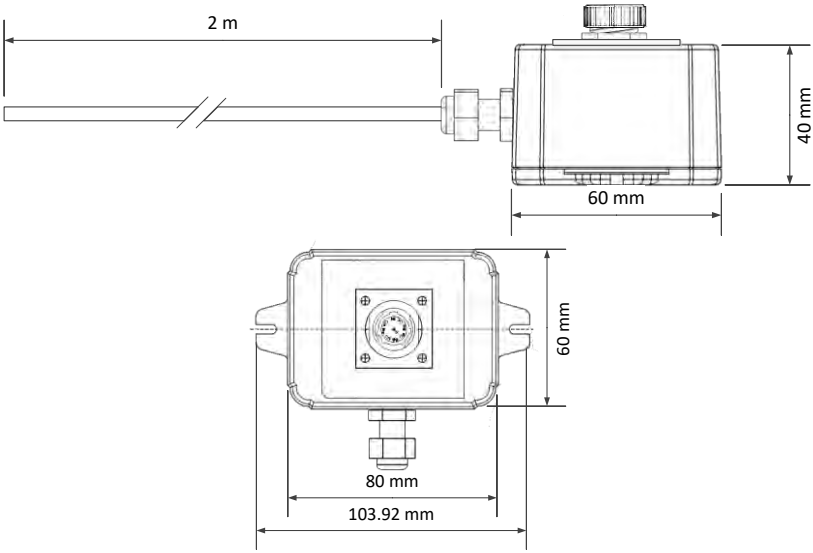
6.5 VHF Antenna



6.6 GNSS (GPS) Antenna GA-25



6.7 Pilot Plug (optional)



7 TROUBLESHOOTING

Use the following guide to perform simple troubleshooting in case the transponder does not function as it is expected. Due to the complexity of the operation environment of marine electronics, it is recommended to minimize all possible interference sources before proceeding with the troubleshooting by

- Disconnecting other NMEA equipment from the AIS transponder such as ECDIS, heading or gyro etc.
- Switching off other emission sources such as radar or VHF radio.

Symptom	Possible cause and remedy
The transponder will not power on	• Check that the voltage of the power supply has 12V or 24V. • Check that the polarity is not switched. • Check that the available current is sufficient for start-up. • Check that the power connector is correctly connected and secured. • Increase Dimmer level of the display.
No GPS position fix	• Check for failed GPS antenna, damaged antenna cable and connectors • When the transponder's internal GPS does not have a position fix, the time and date appearing in the upper right corner of the display will not be correct. • Check the GNSS status to see the received satellites and their noise ratio.
No AIS transmission	• Make sure that MMSI number is correctly configured. • Make sure that silent mode is switched off. • Check that the available current is sufficient for transmission. • Check if the transponder might be operating in a regional area set with different operating mode.
AIS range seems too low	• Check VHF antenna and cable installation • Make sure the transponder is not operating in low power (1W) mode.
No AIS targets on radar view and target list	• Check if VHF antenna, cabling and connector installations are damaged.
Sensor or Data ports not response	• Check that wiring polarity is not switched • Check that the transponder and the connected sensor have the same baud rate

7.1 Troubleshooting with alarm messages

The A750 is monitoring itself constantly for failures or other important parameters with the built-in integrity test (BIIT). In case an abnormal operation is detected in one or more of the following conditions, an alert will be triggered and displayed on the screen, and the transponder will react as described in the following table.

Description text	BIIT ID	Reaction of the system (transponder)
AIS: Tx malfunction The A750 has a built-in lock detector (high active) to monitor the local oscillator (PLL circuit) of the transmitter. If the operation of PLL circuit becomes abnormal, a logic low (Tx malfunction) will be sent from the lock detector to notify the system. At the same time, system will output an BIIT ID 001 alert at the related PI port.	001	Stop transmission
AIS: Antenna VSWR exceeds limit The A750 has a built-in RF output power detector to monitor the VSWR (Voltage Standing Wave Ratio) of the VHF antenna port. If the antenna VSWR exceeds a given limit, an alarm will be generated. If the VSWR goes below the defined threshold, the alarm is cleared.	002	Continue operation
AIS: Rx channel 1 malfunction The A750 has 3 built-in lock detectors (high active) to monitor each local oscillator (PLL circuit) of receiver channel 1, channel 2, and channel 70 respectively. If the operation of PLL circuit becomes abnormal, a logic low level will be sent from the lock detector to notify the system. At the same time, the system will output BIIT ID 003, BIIT ID 004 or BIIT ID 005 alert to indicate the CH1 or CH2 or CH70 RX malfunction respectively.	003	Stop transmission on affected channel
AIS: Rx channel 2 malfunction	004	Stop transmission on affected channel
AIS: Rx channel 70 malfunction	005	Continue operation
AIS: general failure	006	Stop transmission
AIS: UTC sync invalid	007	Continue

This alarm is triggered when the transponder lost UTC direct synchronization or cannot synchronize from the internal GPS receiver.		operation using indirect or semaphore synchronization
AIS: MKD connection lost This alarm is active if the communication between the control unit and the display in the transponder does not work.	008	Continue operation
AIS: internal / external GNSS position mismatch This alarm is active if the difference between the internal and external GNSS position is more than 100m for more than 1 hour.	009	Continue operation
AIS: NavStatus incorrect For example, if the navigational status is set to “At Anchor” but the ship is moving faster than 3 knots, this alarm will become active.	010	Continue operation
Heading sensor offset This alarm is active when SOG is greater than 5kn and the difference between COG and HDT is greater than 45° for 5 min.	011	Continue operation
AIS: active AIS SART This alarm is active when the transponder receives an AIS SART position report.	014	Continue operation
AIS: external EPFS lost This alarm is active if the position from the external Electronic Position Fixing System is invalid.	025	Continue operation
AIS: no sensor position in use This alarm is active if there is no valid position from any sensor is available.	026	Continue operation
AIS: no valid SOG information This alarm is active if the transponder does not have a valid SOG from any sensor	029	Continue operation using default data
AIS: no valid COG information This alarm is active if the transponder does not have a valid COG from any sensor	030	Continue operation using default data
AIS: Heading lost/invalid This alarm is active if either the heading info from external sensor is lost or if the heading is undefined.	032	Continue operation using default data
AIS: no valid ROT information This alarm is active if ROT is undefined or if no valid ROT info is available.	035	Continue operation using default data

Appendix A: Technical Information - Data Interface

A.1 AIS Interface Overview

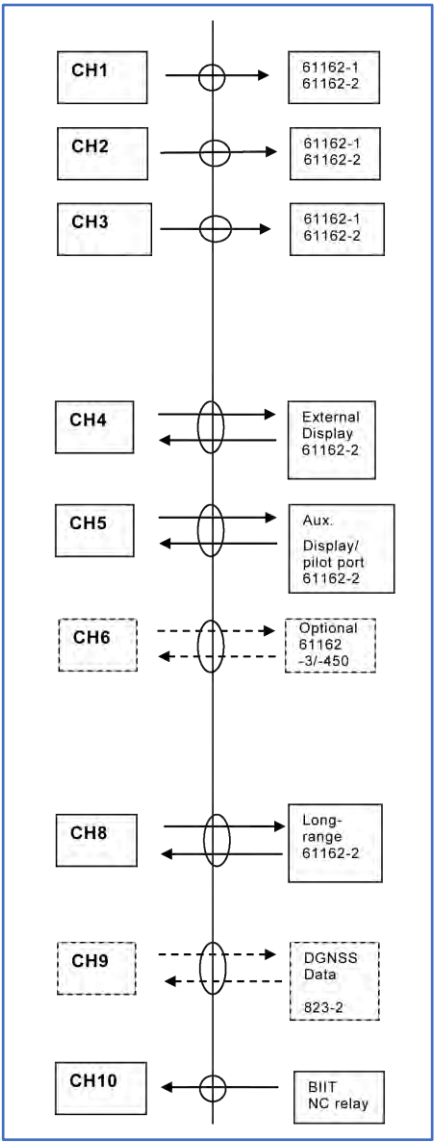


Figure A1 AIS Interface Overview

A.2 A750 Data Interface (IEC 61162-2)

The A750 Class A AIS Transponder provides 2 types of IEC 61162-2 data interfaces for user applications. The first interface type includes 3 input-only sensor data ports and the second interface type includes 4 bidirectional input/output ports. Data port for each interface type will be described in the following section.

A.2.1 Sensor Data Input Ports

The schematic of input-only sensor data port is shown in Figure A1. The schematic includes an isolated half duplex RS-485 transceiver IC which is used as the main component to receive external data. The transceiver IC is isolated from external input. To avoid signal reflection, the transceiver IC has an optional built-in 120Ω loop termination, which is selectable by the dip-switch on the junction box and the switch should be set to on position when connecting external data source with long cable. All sensor data-input ports are isolated from one another and are also isolated from internal power supply. The input impedance on A/B wires is greater than 12 KΩ and the levels on the A/B wires are defined in the following:

- Logic low input: A-B < -0.2V
- Logic high input: A-B > -0.02V

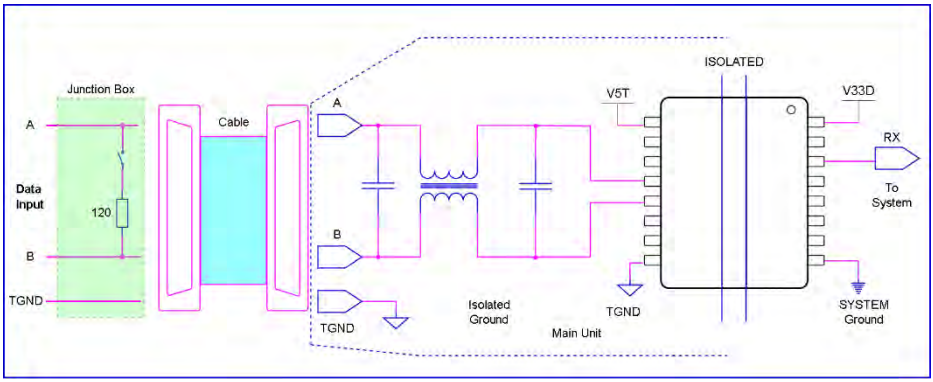


Figure A2 Schematic of sensor data input port.

A.2.2 Bidirectional Data Ports

The schematic of bidirectional data port is shown in Figure A2. The schematics includes an isolated full duplex RS-485 transceiver IC which is used as the main component to handle both data input and output from external data source. The transceiver IC is isolated from external input. To avoid signal reflection, the transceiver IC has an optional built-in 120Ω loop termination, which is selectable by the dip-switch on the junction box and the switch should be set to on position when connecting external data source with long cable. All bidirectional data ports are isolated from one another and are also isolated from internal power supply. The transceiver internal power supply is fully isolated from the external power supply.

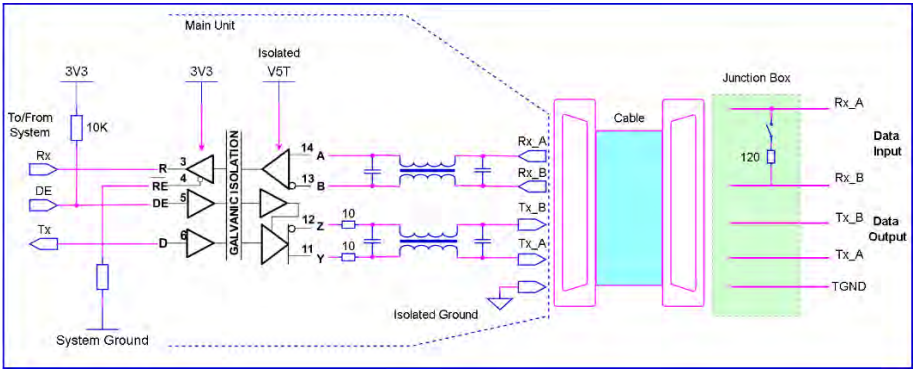


Figure A3 Schematic of bidirectional data port.

The output driver capability of bidirectional data port can provide a maximum of 60mA, and the minimum differential output swing under 100 Ω load can be 2.3V.

A.2.3 A and B Signal Lines

Refer to sections A.1.1 and A.1.2.

A.2.4 Output Driver

The output driver capability of bi-direction data port can provide maximum 60mA, and the minimum differential output swing under 100 Ω load can be 2.3V.

A.2.5 Input Load

Refer to sections A.1.1 and A.1.2.

A.2.6 Hardware Input/Output Circuit

Refer to sections A.1.1 and A.1.2.

A.3 Supported IEC 61162 Data Sentences

Data Port	*Input Sentences*	*Output Sentences*
Sensor 1 **Sensor 2** **Sensor 3** **DGPS**	DTM, GBS, GGA, GLL, GNS, GSA, GSV, HDT, RMC, ROT, THS, VBW, VHW, VTG	N/A
External Display Pilot	ABM, ACA, ACN, ACK, AIQ, AIR, BBM, EPV, LRF, LRI, SSA, SSD, VSD	ABK, ACA, ACS, ALC, ALF, ALR, ARC, LR1, LR2, LR3, LRF, NAK, TXT, VDM, VDO,VER For query(AIQ): ACA, EPV, SSD, TRL, TXT, VER, VSD
Long Range	LRF, LRI	LR1, LR2, LR3, LRF

Sentence Output Interval:

Sentence	Interval
VDO	Once a second
ALR, ALC, ALF (active)	Once every thirty seconds
ALR (inactive)	Once every sixty seconds

A.4 Interpretation of Input Sentences

A.4.1 ABM – AIS Addressed Binary and Safety Related Message

This sentence supports ITU-R M.1371 Messages 6, 12, 25, 26 and provides an external application with a means to exchange data via an AIS transponder.

!--ABM,x,x,x,xxxxxxxxx,x,xx,s—s,x*hh<CR><LF>			
Field No.	**Format**	**Description**	**Remark**
1	x	Total number of sentences needed to transfer the message	
2	x	Sentence number	
3	x	Sequential message identifier	
4	xxxxxxx xx	The MMSI of the destination AIS unit for the ITU-R M.1371 message	
5	x	AIS channel for broadcast of the radio	

		message	
6	xx	ITU-R M.1371 message ID	
7	s—s	Encapsulated data	
8	x	Number of fill-bits	

A.4.2 ACA – AIS Channel Assignment Message

An AIS device can receive regional channel management information.

$--ACA,x,llll.ll,a,yyyyy.yy,a,llll.ll,a,yyyyy.yy,a,x,xxxx,x,xxxx,x,x,x,a,x,hhmmss.ss*hh<CR><LF>			
Field No.	**Format**	**Description**	**Remark**
1	x	Sequence Number	
2	llll.ll,a	Region northeast corner latitude – N/S	
3	yyyyy.yy,a	Region northeast corner longitude – E/W	
4	llll.ll,a	Region southwest corner latitude – N/S	
5	yyyyy.yy,a	Region southwest corner longitude – E/W	
6	x	Transition zone size	
7	xxxx	Channel A	
8	x	Channel A bandwidth	
9	xxxx	Channel B	
10	x	Channel B bandwidth	
11	x	Tx/Rx mode control	
12	x	Power level control	
13	a	Information source	
14	x	In-use flag	
15	hhmmss.ss	Time of “in use” change	

A.4.3 ACK – Acknowledge Alarm

This sentence is used to acknowledge an alarm condition reported by a device.

$--ACK,xxx*hh<CR><LF>			
Field No.	**Format**	**Description**	**Remark**
1	xxx	Unique alarm number (identifier) at alarm source	

A.4.4 AIQ - Query Sentence

This sentence is used to inquire AIS sentence information.

$--AIQ,c—c*hh<CR><LF>			
Field No.	**Format**	**Description**	**Remark**
1	c—c	Support query sentence of ACA, EPV, SSD, TRL, TXT, VER, VSD	

A.4.5 AIR – AIS Interrogation Request

This sentence supports ITU-R M.1371 messages 15 and 10. It provides an external application with the means to initiate requests for specific ITU-R M.1371 messages from AIS unit.

$--AIR,xxxxxxxxx,x.x,x,x.x,x,xxxxxxxxx,x.x,x*hh<CR><LF>			
Field No.	**Format**	**Description**	**Remark**
1	xxxxxxxx x	MMSI of interrogated station 1	
2	x.x	ITU-R M.1371 message requested from station-1	
3	x	Message sub-section	ignored
4	x.x	Number of second message requested from station-1	
5	x	Message sub-section	ignored
6	xxxxxxxx x	MMSI of interrogated station-2	
7	x.x	Number of messages requested from station-2	
8	x	Message sub-section	ignored

A.4.6 BBM – AIS Broadcast Binary Message

This sentence supports generation of ITU-R M.1371 binary messages 8, 14, 25, and 26. This provides the application with a means to broadcast data, as defined by the application only.

!--BBM,x,x,x,x,x.x,s—s,x*hh<CR><LF>			
Field No.	**Format**	**Description**	**Remark**
1	x	Total number of sentences needed to transfer the message	
2	x	Sentence number	
3	x	Sequential message identifier	
4	x	AIS channel for broadcast of the radio message	
5	x.x	ITU-R M.1371 Message ID	
6	s—s	Encapsulated data	
7	x	Number of fill-bits	

A.4.7 DTM – Datum Reference

Local geodetic datum and datum offsets from a reference datum.

$--DTM,ccc,a,x.x,a,x.x,a, x.x,ccc*hh<CR><LF>			
Field No.	**Format**	**Description**	**Remark**
1	ccc	Local datum	
2	a	Local datum subdivision code	ignored
3	x.x, a	Lat offset, min, N/S	ignored
4	x.x, a	Lon offset, min, E/W	ignored
5	x.x	Altitude offset, m	ignored
6	ccc	Reference datum	

A.4.8 EPV – Command or Report Equipment Property Value

$--EPV,a,cc,c--c,x.x,c--c*hh<CR><LF>			
Field No.	**Format**	**Description**	**Remark**
1	a	Sentence status flag	
2	cc	Destination equipment type	
3	c--c	Unique identifier	
4	x.x	Property identifier	
5	c--c	Value of property to be set	

A.4.9 GBS – GNSS Satellite Fault Detection

This sentence is used to support receiver autonomous integrity monitoring (RAIM).

$--GBS, hhmmss.ss, x.x, x.x, x.x, xx, x.x, x.x, x.x *hh <CR><LF>			
Field No.	**Format**	**Description**	**Remark**
1	hhmmss.ss	UTC time of the GGA or GNS fix associated with this sentence	
2	x.x	Expected error in latitude	
3	x.x	Expected error in longitude	
4	x.x	Expected error in altitude	ignored
5	xx	ID number of most likely failed satellite	ignored
6	x.x	Probability of missed detection for most likely failed satellite	ignored
7	x.x	Estimate of bias on most likely failed satellite	ignored
8	x.x	Standard deviation of bias estimate	ignored

A.4.10 GGA – Global positioning system (GPS) fix data

Time, position and fix-related data for a GPS receiver.

$--GGA, hhmmss.ss, llll.ll, a, yyyyy.yy, a, x, xx, x.x, x.x, M, x.x, M, x.x, xxxx*hh<CR><LF>			
Field No.	**Format**	**Description**	**Remark**
1	hhmmss.ss	UTC of position	
2	llll.ll,a	Latitude N/S	
3	yyyyy.yy,a	Longitude E/W	
4	x	GPS quality indicator	ignored
5	xx	Number of satellites in use, 00-12, may be different from the number in view	ignored
6	x.x	Horizontal dilution of precision	ignored
7	x.x	Antenna altitude above/below mean sea level (geoid)	ignored
8	M	Units of antenna altitude, m	ignored
9	x.x	Geoidal separation	ignored
10	M	Units of geoidal separation,m	ignored
11	x.x	Age of differential GPS data	ignored
12	xxxx	Differential reference station ID, 0000-1023	ignored

A.4.11 GLL – Geographic Position – Latitude/Longitude

Latitude and longitude of vessel position, time of position fix and status.

$--GLL, llll.ll, a, yyyyy.yy, a, hhmmss.ss, A, a *hh<CR><LF>			
Field No.	**Format**	**Description**	**Remark**
1	llll.ll, a	Latitude, N/S	
2	yyyyy.yy, a	Longitude, E/W	
3	hhmmss.ss	UTC of position	
4	A	Status, A=data valid V=data invalid	
5	a	Mode indicator	

A.4.12 GNS – GNSS Fix Data

Fix data for single or combined satellite navigation systems (GNSS). This sentence provides fix data for GPS, GLONASS, possible future satellite systems and systems combining these.

$-- GNS, hhmmss.ss, llll.ll, a, yyyyy.yy, a, c--c,xx,x.x,x.x,x.x,x.x,x.x,a *hh<CR><LF>			
Field No.	**Format**	**Description**	**Remark**
1	hhmmss.ss	UTC of position	
2	llll.ll, a	Latitude, N/S	
3	yyyyy.yy, a	Longitude, E/W	
4	c--c	Mode indicator	
5	xx	Total number of satellites in use	ignored
6	x.x	HDOP	ignored
7	x.x	Antenna altitude, m, re:mean-sea-level (geoid)	ignored
8	x.x	Geoidal separation, m	ignored
9	x.x	Age of differential data	ignored
10	x.x	Differential reference station ID	ignored
11	a	Nacigational status indicator	

A.4.13 GSA – GNSS DOP and Active Satellites

GNSS receiver operating mode, satellites used in the navigation solution reported by the GGA or GNS sentences, and DOP values. If only GPS, GLONASS, etc. are used for the reported position solution, the talker ID is GP, GL, etc. and the DOP values pertain to the individual system.

$--GSA, a, x, xx,xx,xx,xx,xx,xx,xx,xx,xx,xx,xx,xx,x.x,x.x,x.x*hh<CR><LF>			
Field No.	**Format**	**Description**	**Remark**
1	a	Mode: M = manual, forced to operate in 2D or 3D mode A = automatic, allowed to automatically switch 2D/3D	
2	x	Mode: 1 = fix not available, 2 = 2D, 3 =	

		3D	
3	xx,xx,xx,xx, xx,xx,xx,xx, xx,xx,xx,xx	ID numbers of satellites used in solution	
4	x.x	PDOP	
5	x.x	HDOP	
6	x.x	VDOP	

A.4.14 HDT – Heading True

Actual vessel heading in degrees true produced by any device or system producing true heading.

$--HDT, x.x, T*hh<CR><LF>			
Field No.	**Format**	**Description**	**Remark**
1	x.x, T	Heading, degrees true	

A.4.15 LRF – AIS Long-Range Function

This sentence is used in both long-range interrogation requests and long-range interrogation replies. The LRF-sentence is the second sentence of the long-range interrogation request pair, LRI and LRF (see the LRI-sentence).

$--LRF,x,xxxxxxxxx,c—c,c—c,c—c*hh<CR><LF>			
Field No.	**Format**	**Description**	**Remark**
1	x	Sequence number	
2	xxxxxxxxx	MMSI of requestor	
3	c—c	Name of requestor	
4	c—c	Function request	
5	c—c	Function reply status	

A.4.16 LRI – AIS Long-Range Interrogation

The long-range interrogation of the AIS unit is accomplished through the use of two sentences. The pair of interrogation sentence formatters, a LRI sentence followed by a LRF sentence, provides the information needed by a universal AIS unit to determine if it should construct and provide the reply sentences (LRF, LR1, LR2, and LR3).

$--LRI,x,a,xxxxxxxxx,xxxxxxxxx,llll.ll,a,yyyyy.yy,a,llll.ll,a,yyyyy.yy,a*hh<CR><LF>			
Field No.	**Format**	**Description**	**Remark**
1	x	Sequence number	
2	a	Control flag	
3	xxxxxxxxx	MMSI of requestor	
4	xxxxxxxxx	MMSI of destination	
5	llll.ll,a	Latitude – N/S	
6	yyyyy.yy,a	Longitude – E/W	
7	llll.ll,a	Latitude – N/S	
8	yyyyy.yy,a	Longitude – E/W	

A.4.17 RMC – Recommended Minimum Specific GNSS Data

Time, date, position, course and speed data provided by a GNSS navigation receiver.

$--RMC, hhmmss.ss, A, llll.ll,a, yyyyy.yy, a, x.x, x.x, xxxxxx, x.x,a, a, a*hh<CR><LF>			
Field No.	**Format**	**Description**	**Remark**
1	hhmmss.ss	UTC of position fix	
2	A	Status	
3	llll.ll,a	Latitude, N/S	
4	yyyyy.yy, a	Longitude, E/W	
5	x.x	Speed over ground, knots	
6	x.x	Course over ground, degrees true	
7	xxxxxx	Date: dd/mm/yy	
8	x.x,a	Magnetic variation, degrees, E/W	
9	a	Mode indicator	
10	a	Navigational status	

A.4.18 ROT – Rate of Turn

Rate of turn and direction of turn.

$--ROT, x.x, A*hh<CR><LF>			
Field No.	**Format**	**Description**	**Remark**
1	x.x	Rate of turn, °/min	
2	A	Status: A = data valid, V = data invalid	

A.4.19 SSA –Sender Signature Authentication

This sentence can be used both for authentication of sender and for authentication of untampered
content. For this purpose, the sentence has to be applied before the protected sentence (for example EPV, SSD).
Other sentences shall not be interleaved between the sender signature authentication sentence and protected sentence, and the time between the SSA and the protected sentence should be limited. The sender signature authentication protected sentence pair shall be sent without unnecessary delay between sentences, and the time interval between the sentences shall not exceed 2 s. Note that any of the sentences may be lost and timed out.

$--SSA,ccc,c,h—h,aa*hh<CR><LF>			
Field No.	**Format**	**Description**	**Remark**
1	ccc	The following sentence formatter that should be protected (for example EPV or SSD).	
2	c	Type of method to calculate signature: 1: MD5	
3	h--h	Hexadecimal representation of the signature, for example 32 hexacodes for MD5.	

A.4.20 SSD – AIS Ship Static Data

This sentence is used to enter static parameters into a shipboard AIS unit. The parameters in this sentence support a number of the ITU-R M.1371 Messages.

$--SSD,c—c,c—c,xxx,xxx,xx,xx,c,aa*hh<CR><LF>			
Field No.	**Format**	**Description**	**Remark**
1	c—c	Ship's call sign	
2	c—c	Ship's name	
3	xxx	Pos. ref., point dist."A,"	
4	xxx	Pos. ref.,point dist. "B,"	
5	xx	Pos. ref., point dist."C,"	
6	xx	Pos. ref.,point dist. "D,"	
7	c	DTE indicator flag	
8	aa	Source identifier	

A.4.21 THS – True Heading and Status

Actual vessel heading in degrees true produced by any device or system producing true heading. This sentence includes a "mode indicator" field providing critical safety related information about the heading data, and replaces the deprecated HDT sentence.

$--THS,x.x,a*hh<CR><LF>			
Field No.	**Format**	**Description**	**Remark**
1	x.x	Heading, degrees true	
2	a	Mode indicator	

A.4.22 VBW – Dual Ground/Water Speed

Water-referenced and ground-referenced speed data.

$--VBW, x.x, x.x, A, x.x, x.x, A, x.x, A, x.x, A*hh<CR><LF>			
Field No.	**Format**	**Description**	**Remark**
1	x.x	Longitudinal water speed, knots	ignored
2	x.x	Transverse water speed , knots	ignored
3	A	Status : water speed, A = data valid, V = data invalid	ignored
4	x.x	Longitudinal ground speed , knots	
5	x.x	Transverse ground speed , knots	
6	A	Status , ground speed, A = data valid, V = data invalid	
7	x.x	Stern transverse water speed , knots	ignored
8	A	Status : stern water speed,A = data valid, V = data invalid	ignored
9	x.x	Stern transverse ground speed ,knots	ignored
10	A	Status : stern ground speed,A = data valid, V = data invalid	ignored

A.4.23 VHW – Water speed and heading

The compass heading to which the vessel points and the speed of the vessel relative to the water.

$--VHW, x.x, T, x.x, M, x.x, N, x.x, K*hh<CR><LF>			
Field No.	**Format**	**Description**	**Remark**
1	x.x, T	Heading, degrees true	
2	x.x, M	Heading, degrees magnetic	Ignored
3	x.x, N	Speed, knots	Ignored
4	x.x, K	Speed, km/h	Ignored

A.4.24 VSD – AIS Voyage Static Data

This sentence is used to enter information about a ship's transit that remains relatively static during the voyage.

$--VSD,x.x,x.x,x.x,c—c,hhmmss.ss,xx,xx,x.x,x.x*hh<CR><LF>			
Field No.	**Format**	**Description**	**Remark**
1	x.x	Type of ship and cargo category	
2	x.x	Maximum present static draught	
3	x.x	Persons on-board	
4	c—c	Destination	
5	hhmmss.ss	Estimated UTC of arrival at destination	
6	xx	Estimated day of arrival at destination	
7	xx	Estimated month of arrival at destination	
8	x.x	Navigational status	
9	x.x	Regional application flags	

A.4.25 VTG – Course Over Ground and Ground Speed

The actual course and speed relative to the ground.

$--VTG, x.x, T, x.x, M, x.x, N, x.x, K,a*hh<CR><LF>			
Field No.	**Format**	**Description**	**Remark**
1	x.x, T	Course over ground, degrees true	
2	x.x, M	Course over ground, degrees magnetic	ignored
3	x.x, N	Speed over ground, knots	
4	x.x, K	Speed over ground, km/h	ignored
5	a	Mode indicator	

A.4.26 PAMC, DBG – Proprietary Sentences, Debug

The proprietary sentences are additional sentences only applicable to this product. Its main usage is for enabling testing mode and parameter settings.
This sentence is used for configuration. It commands unit with given parameters.

$PAMC,C,c-c,x,x,x,x,x,x,x,x*hh<CR><LF>			
Field No.	**Format**	**Description**	**Remark**
1	C	Command : “C”	
2	c-c	Function type. For example, DBG.	
3	x	Parameter Id 1 , 0-998	
4	x	Parameter value 1 , 0- 1000000000	
5	x	Parameter Id 2 , 0-998	
6	x	Parameter value 2, 0- 1000000000	
7	x	Parameter Id 3 , 0-998	
8	x	Parameter value 3, 0- 1000000000	
9	x	Parameter Id 4 , 0-998	
10	x	Parameter value 4, 0- 1000000000	

This sentence is used for retrieving responses.

$PAMC,R,c-c,x,x,x,x,x,x,x,x*hh<CR><LF>			
Field No.	**Format**	**Description**	**Remark**
1	R	Response : “R”	
2	c-c	Function type. For example, DBG.	
3	x	Parameter Id 1 , 0-998	
4	x	Parameter value 1 , 0- 1000000000	
5	x	Parameter Id 2 , 0-998	
6	x	Parameter value 2, 0- 1000000000	
7	x	Parameter Id 3 , 0-998	
8	x	Parameter value 3, 0- 1000000000	
9	x	Parameter Id 4 , 0-998	
10	x	Parameter value 4, 0- 1000000000	

A.4.27 PAMC, DSC – Proprietary Sentences, Digital selective calling

When AIS transponder receives DCS messages, this sentence is used to output DSC pattern.

$PAMC,R,DSC,c-c*hh<CR><LF>			
Field No.	**Format**	**Description**	**Remark**
1	c-c	DSC pattern	

A.4.28 ACN – Alert command

This sentence is used for acknowledge, silence, responsibility transfer and to request repeat of alert details in case the reception process has detected, based on ALC, that ALF has been missed.

$--ACN,hhmmss.ss,aaa,x.x,x.x,c,a*hh <CR><LF>			
Field No.	**Format**	**Description**	**Remark**
1	hhmmss.ss	Time	
2	aaa	Manufacturer mnemonic code	
3	x.x	Alert Identifier	
4	x.x	Alert Instance, 1 to 999999	
5	c	Alert command, A, Q, O or S	
6	a	Sentence status flag	

A.5 Interpretation of Output Sentences

A.5.1 ABK – AIS Addressed and Binary Broadcast Acknowledgement

The ABK-sentence is generated when a transaction, initiated by reception of an ABM, AIR, or BBM sentence, is completed or terminated.

$--ABK,xxxxxxxxx,x,x.x,x,x*hh<CR><LF>			
Field No.	**Format**	**Description**	**Remark**
1	xxxxxxxxx	MMSI of the addressed AIS unit	
2	x	AIS channel of reception	
3	x.x	ITU-R M.1371Message ID	
4	x	Message sequence number	
5	x	Type of acknowledgement	

A.5.2 ACA – AIS Channel Assignment Message

An AIS device can receive regional channel management information

$-ACA,x,llll.ll,a,yyyyy.yy,a,llll.ll,a,yyyyy.yy,a,x,xxxx,x,xxxx,x,x,x,a,x,hhmmss.ss*hh<CR><LF>			
Field No.	**Format**	**Description**	**Remark**
1	x	Sequence Number	
2	llll.ll,a	Region northeast corner latitude – N/S	
3	yyyyy.yy,a	Region northeast corner longitude – E/W	
4	llll.ll,a	Region southwest corner latitude – N/S	
5	yyyyy.yy,a	Region southwest corner longitude – E/W	
6	x	Transition zone size	
7	xxxx	Channel A	
8	x	Channel A bandwidth	
9	xxxx	Channel B	
10	x	Channel B bandwidth	
11	x	Tx/Rx mode control	
12	x	Power level control	
13	a	Information source	
14	x	In-use flag	
15	hhmmss.ss	Time of “in use” change	

A.5.3 ALR – Set Alarm State

Local alarm condition and status. This sentence is used to report an alarm condition on a device and its current state of acknowledgement.

$--ALR,hhmmss.ss,xxx,A, A,c--c*hh<CR><LF>			
Field No.	**Format**	**Description**	**Remark**
1	hhmmss.ss	Time of alarm condition change, UTC	
2	xxx	Unique alarm number (identifier) at alarm source	
3	A	Alarm condition, A = threshold exceeded, V = not exceeded	
4	A	Alarm's acknowledge state, A = acknowledged, V = unacknowledged	
5	c--c	Alarm's description text	

A.5.4 EPV – Command or Report Equipment Property Value

$--EPV,a,cc,c--c,x.x,c--c*hh<CR><LF>			
Field No.	**Format**	**Description**	**Remark**
1	a	Sentence status flag	
2	cc	Destination equipment type	
3	c--c	Unique identifier	
4	x.x	Property identifier	
5	c--c	Value of property to be set	

A.5.5 LR1 – AIS Long-Range Reply Sentence 1

The LR1 sentence identifies the destination for the reply and contains the information items requested by the "A" function identification character (see the LRF sentence).

$--LR1,x,xxxxxxxxx,xxxxxxxxx,c—c,c—c,xxxxxxxxx*hh<CR><LF>			
Field No.	**Format**	**Description**	**Remark**
1	x	Sequence number	
2	xxxxxxxxx	MMSI of responder	
3	xxxxxxxxx	MMSI of requestor	
4	c—c	Ship's name, 1 to 20 characters	
5	c—c	Call sign, 1 to 7 characters	
6	xxxxxxxxx	IMO number, 9-digit number	

A.5.6 LR2 – AIS Long-Range Reply Sentence 2

The LR2-sentence contains the information items requested by the “B, C, E and F” function identification characters,(see the LRF sentence)

$--LR2,x,xxxxxxxxx,xxxxxxxx,hhmmss.ss,llll.ll,a,yyyyy.yy,a,x.x,T,x.x,N*hh<CR><LF>			
Field No.	**Format**	**Description**	**Remark**
1	x	Sequence number	
2	xxxxxxxxx	MMSI of responder	
3	xxxxxxxx	Date: ddmmyyyy, 8 digits	
4	hhmmss.ss	UTC time of position	
5	llll.ll,a	Latitude – N/S	
6	yyyyy.yy,a	Longitude, E/W	
7	x.x,T	Course over ground, degrees, true	
8	x.x,N	Speed over ground, knots	

A.5.7 LR3 – AIS Long-Range Reply Sentence 3

The LR3 sentence contains the information items requested by the “I, O, P, U and W” function identification character (see the LRF sentence).

$--LR3,x,xxxxxxxxx,c—c,xxxxxx,hhmmss.ss,x.x,x.x,x.x,x.x,x.x,x.x*hh<CR><LF>			
Field No.	**Format**	**Description**	**Remark**
1	x	Sequence number	
2	xxxxxxxxx	MMSI of responder	
3	c—c	Voyage destination, 1 to 20 chars	
4	xxxxxx	ETA date: ddmmyy	
5	hhmmss.ss	ETA time	
6	x.x	Draught	
7	x.x	Ship/cargo	
8	x.x	Ship length	
9	x.x	Ship breadth	
10	x.x	Ship type	
11	x.x	Persons, 0 to 8191	

A.5.8 LRF – AIS Long-Range Function

This sentence is used in both long-range interrogation requests and long-range interrogation replies. The LRF-sentence is the second sentence of the long-range interrogation request pair, LRI and LRF (see the LRI-sentence).

$--LRF,x,xxxxxxxxx,c—c,c—c,c—c*hh<CR><LF>			
Field No.	**Format**	**Description**	**Remark**
1	x	Sequence number	
2	xxxxxxxxx	MMSI of requestor	
3	c—c	Name of requestor	
4	c—c	Function request	
5	c—c	Function reply status	

A.5.9 TRL –AIS transmitter-non-functioning log

This sentence is specific to AIS class A stations. It is intended to support the retrieval of the AIS non-functioning log information.

$--TRL,x.x,x.x,x,xxxxxxxx,hhmmss.ss,xxxxxxxx,hhmmss.ss,x*hh<CR><LF>			
Field No.	**Format**	**Description**	**Remark**
1	x.x	Total number of log entries	
2	x.x	Log entry number	
3	x	Sequential message identifier	
4	xxxxxxxx	Switch off date	
5	hhmmss.ss	Switch off UTC time	
6	xxxxxxxx	Switch on date	
7	hhmmss.ss	Switch on UTC time	
8	x	Reason code 1 = power off; 2 = silent mode; 3 = transmission switched off by channel management command; 4 = equipment malfunction; 5 = invalid configuration;	

A.5.10 TXT – Text Transmission

For the transmission of short text messages. Longer text messages may be transmitted by using multiple sentences.

$--TXT,xx,xx,xx,c--c*hh<CR><LF>			
Field No.	**Format**	**Description**	**Remark**
1	xx	Total number of sentences	
2	xx	Sentence number	
3	xx	Text identifier	
4	c--c	Text message	

A.5.11 VDM – AIS VHF Data-Link Message

This sentence is used to transfer the entire contents of a received AIS message packet, as defined in ITU-R M.1371 and as received on the VHF Data Link (VDL), using the “six-bit” field type.

!--VDM,x,x,x,a,s—s,x*hh<CR><LF>			
Field No.	**Format**	**Description**	**Remark**
1	x	Total number of sentences needed to transfer the message	
2	x	Sentence number	
3	x	Sequential message identifier	
4	a	AIS channel	
5	s—s	Encapsulated ITU-R M.1371 radio message	
6	x	Number of fill-bits	

A.5.12 VDO – AIS VHF Data-Link Own-Vessel Report

This sentence is used to transfer the entire contents of an AIS unit's broadcast message packet, as defined in ITU-R M.1371 and as sent out by the AIS unit over the VHF data link (VDL) using the "six-bit" field type.

!--VDO,x,x,x,a,s—s,x*hh<CR><LF>			
Field No.	**Format**	**Description**	**Remark**
1	x	Total number of sentences needed to transfer the message	
2	x	Sentence number	
3	x	Sequential message identifier	
4	a	AIS channel	
5	s—s	Encapsulated ITU-R M.1371 radio message	
6	x	Number of fill-bits	

A.5.13 ALC – Cyclic alert list

The purpose of this sentence is to satisfy the needs for a safe and consistent data distribution with a minimum of data traffic. Each change on an alert's data leads to an incremented Revision counter. So an alert processing device only needs to check the alert entries in the ALC messages to ensure that no ALF message has been lost.

$--ALC,xx,xx,xx,x.x,aaa,x.x,x.x,x.x,……..,aaa,x.x,x.x,x.x*hh <CR><LF>			
Field No.	**Format**	**Description**	**Remark**
1	xx	Total number of sentences for this message, 01 to 99	
2	xx	Sentence number, 01 to 99 1	
3	xx	Sequential message identifier, 00 to 99	
4	x.x	Number of alert entries	
5	aaa	Manufacturer mnemonic code	
6	x.x	Alert identifier	
7	x.x	Alert instance (BIIT ID)	
8	x.x	Revision counter	
9	…….	Additional Alert entries	
10	aaa,x.x,x.x,x.x	Alert entry n	

A.5.14 ALF – Alert sentence

This sentence is used to report an alert condition and the alert state of a device. An ALF message shall be published for an alert each time the alert information in this sentence changes and on alert request

$--ALF,x,x,x,hhmmss.ss,a,a,a,aaa,x.x,x.x,x.x,x,c---c*hh <CR><LF>			
Field No.	**Format**	**Description**	**Remark**
1	x	Total number of ALF sentences for this message, 1 to 2	
2	x	Sentence number, 1 to 2	
3	x	Sequential message identifier, 0 to 9	
4	hhmmss.ss	Time of last change	
5	a	Alert category, A, B or C	
6	a	Alert priority, E, A, W or C	
7	a	Alert state, A, S, N, O, U or V	
8	aaa	Manufacturer mnemonic code	
9	x.x	Alert identifier	
10	x.x	Alert instance (BIIT ID), 1 to 999999	
11	x.x	Revision counter, 1 to 99	
12	x	Escalation counter, 0 to 9	
13	c---c	Alert text	

A.5.15 ARC – Alert command refused

This sentence is used for which it is illegal to accept acknowledge or responsibility transfer, e.g. not enough information for decision support available or the source of acknowledgement is not acceptable.

$--ARC,hhmmss.ss,aaa,x.x,x.x,c*hh <CR><LF>			
Field No.	**Format**	**Description**	**Remark**
1	hhmmss.ss	Time	
2	aaa	Manufacturer mnemonic code	
3	x.x,	Alert identifier	
4	x.x,	Alert instance (BIIT ID), 1 to 999999	
5	c	Refused alert command, A, Q, O or S	

Appendix B: A750 NMEA 2000 PGN Information

The following table is a list of the NMEA 2000 PGNs supported by the A750 unit.

OUTPUT	
PGN	**Description**
59392	ISO Acknowledgment
59904	ISO Request
60928	ISO Address Claim
126464	PGN List - Transmit PGN's group function
126993	Heartbeat
126996	Product Information
126998	Configuration Information
129025	Position Rapid Update
129026	COG SOG Rapid Update
129029	GNSS Position Data
129038	AIS Class A Position Report
129039	AIS Class B Position Report
129040	AIS Class B Extended Position Report
129041	AIS Aids to Navigation (AtoN) Report
129792	AIS DGNSS Broadcast Binary Message
129793	AIS UTC and Date Report
129794	AIS Class A Static and Voyage Related Data
129795	AIS Addressed Binary Message
129796	AIS Acknowledge
129797	AIS Binary Broadcast Message
129798	AIS SAR Aircraft Position Report
129800	AIS UTC/Date Inquiry
129801	AIS Addressed Safety Related Message
129802	AIS Safety Related Broadcast Message
129803	AIS Interrogation
129804	AIS Assignment Mode Command
129805	AIS Data Link Management Message

129806	AIS Channel Management
129807	AIS Group Assignment
129809	AIS Class B “CS” Static Data Report, Part A
129810	AIS Class B “CS” Static Data Report, Part B
129811	AIS Single Slot Binary Message
129812	AIS Multi Slot Binary Message
129813	AIS Long-Range Broadcast Message

INPUT	
PGN	**Description**
59392	ISO Acknowledgment
59904	ISO Request
60928	ISO Address Claim
127250	Vessel Heading
127258	Magnetic Variation

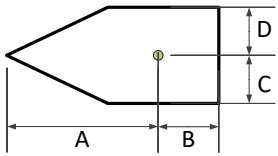
Appendix C: Installation and Maintenance Record

The following installation record should be completed and retained on board the vessel for maintenance records.

Vessel Information			
Vessel Name		**Flag State**	
IMO Number		**MMSI Number**	
Owner/Company		**Radio call sign**	
Type of vessel		**Gross tonnage**	
Length	**m**	**Beam**	**m**

AIS Class A Transponder Information			
Transponder S/N		**Pilot Plug S/N**	
Junction Box S/N		**GPS Ant. S/N**	
Password			
Power supply	**Voltage:** **V**	**Maximum output current:** **A**	
Note			

GPS/GNSS Antenna Location			
A= Distance to Bow	**m**	**C= Dist. To Port-Side**	**m**
B= Distance to Stern	**m**	**D= Dist. To Starboard**	**m**



Connected Sensors and Devices		
Connected Port	**Equipment**	**Model Number**
Sensor 1		
Sensor 2		
Sensor 3		
Ext Display Port		
Pilot Port		
Long Range Port		
DGNSS Data Port		
Other Device		

Installer Information		
Company Name		
Technician's Name		
Telephone/Mobile No.		
Address		
Place	**Date**	**Installer's Signature**

Software Revisions

The transponder is delivered with software version according to the following table which is to be filled in and maintained either by manufacturer, distributor, dealer, or installation company. When software update is done, the new software (firmware) version can be identified through MKD at MENU/DIAGNOSTICS/VERSION (please refer to section 4.10.10 in the manual). Each new software upgrade requires information recorded to reflect the change made.

Software Maintenance Record			
Software Version	**By**	**Date**	**Change**

NOTE:

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