User Manual

AIS Class A System

Marinelite

NANTONG SAIYANG ELECTRONICS CO., LTD

Revision History

Version	Revision History	Relevant sections	Date Modified
M-SAG9000-OM-EN-01A	Initial Release	-	2025.01
M-SAG9000-OM-EN-01B	1. Optimized zoom prompts for AIS radar display	4.2 AIS Radar View	2025.03
	2. Synchronized display of Chinese vessel names in AIS list under Chinese language environment	4.1 AIS List	
	3. Added MKD monitoring window data transmission/reception toggle control	5.3 Port Settings	
	4. Added MKD touchscreen toggle control	5.1 General Settings	
	5. Expanded functionality of the [MUTE] button	3.1 Panel Description	
	6. Added automatic day/night mode switching	5.1 General Settings	
	7. Added one-touch return to AIS list function	4.1 AIS List	
	8. Added speeding alarm for own vessel	6.4 Alarms and Status Detection	
M-SAG9000-OM-EN-01C	1. Added host upgrade method	5.7 Recovery and Upgrades	2025.10
	2. Added MKD port baud rate setting	5.3 Port Settings	
	3. Added control for “ECDIS” and “Pilot” port output statements	5.5 Output Port Statement Settings	
	4. Modified default baud rate for sensor input ports 1-3	5.7 Recovery and Upgrades	
	5. Optimized built-in positioning identifier	3.5 Main Interface Introduction	
	6. Optimized power-on/off log recording method	6.5 Event Log and Power on/off Log	
M-SAG9000-OM-EN-01D	1. Added time zone indicator to title bar	3.5 Main Interface Introduction	2025.11
	2. Added Chinese vessel name input function in static parameters page	3.6 AIS Parameter Setting and Reading	
	3. Added automatic vessel name update function in AIS list page	4.1 AIS List	
	4. Added differential positioning message processing control switch to System Settings > General Settings page	5.1 General Settings	

	5. Added TXT prompt popup control switch and alarm popup control switch to Alarms Settings page	6.4 Alarms and Status Detection	
	6. Added toggle control for TCPA and CPA data columns in AIS list page	6.4 Alarms and Status Detection	
	7. Optimized response speed for vessel overspeed alarms and shortened voice announcement cycle	6.4 Alarms and Status Detection	
M-SAG9000-OM-EN-01E	1.Add the "ship name display" function.	5.1 General Settings	2026.03
	2.Add the "abbreviation description" of the monitor.	7.3 Abbreviation description	
M-SAG9000-OM-EN-01F	The text in the manual has been optimized and standardized	1.3 System Diagram	2026.04

Foreword

Thank you for purchasing the Shipboard Class A Automatic Identification System manufactured by Nantong Saiyang Electronics Co.,Ltd.

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Before attempting to operate this equipment, please read this manual thoroughly to ensure that the equipment operates properly and safely in accordance with the warning instructions and operating procedures. We strongly recommend that you keep this manual carefully for future reference. This manual will provide useful guidance in the event of operational problems or malfunctions.

The symbols in this manual are presented according to the following rules:

Physical buttons on the right side of the MKD are presented with 【】, e.g.【Power】refers to the power button on the right side of the MKD.

The operation items in the display are presented with 〖〗, e.g.〖Type〗, 〖AIS List〗refer to the operation items that can be clicked in the display.

SAFETY INSTRUCTIONS

Warning: Navigation Aid

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

Warning: Products Installation

This product should be installed in accordance with the installation instructions manual, or may reduce product performance, cause personal injury, or even damage to the vessel.

Warning: High Voltage

The main unit of the device interior contains very high voltages. Internal adjustment requires qualified technical service personnel with specialized service procedures and tools, the user can not disassemble and adjust by themselves, for this condition, Manufacturer and Distributor wont be able to offer Warranty service.

Warning: No Electrified Plugging or Unplugging of Parts

Be sure to turn off the power when making any electrical connections.

Notice

	There is no user operable part inside this product, do not disassemble this product as it may cause fire and electric shock. Please contact our company or local dealer for inspection and repair service.
	Do not disassemble the unit. Failure to do so could result in fire, electric shock, or equipment damage.
	Do not connect or disconnect the power cord or operate the switch with wet hands or you may be electrocuted.
	If you notice an unusual odor, smoke or abnormal heat emanating from the unit, turn off the power immediately. Continued use may result in fire, electric shock or equipment damage.
	Do not use voltages outside the specified voltage (18-36V DC) range of the unit, as this may result in fire, electric shock or inoperative or even damage.
	Do not use this product at temperatures above 55°C or below -15°C. It may not work at high temperatures.
	For safety reasons, switch off the power when the unit is not in use for a long period of time.
	Do not switch on this product when the VHF antenna is not connected, the device transmits with high power and using it without the VHF antenna connected will easily damage the product.
	The device needs to be connected to a GNSS positioning antenna and make sure that the device can be positioned properly; when the device is not positioned, the function will have more defects.

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1. Introduction

1.1 Features Overview

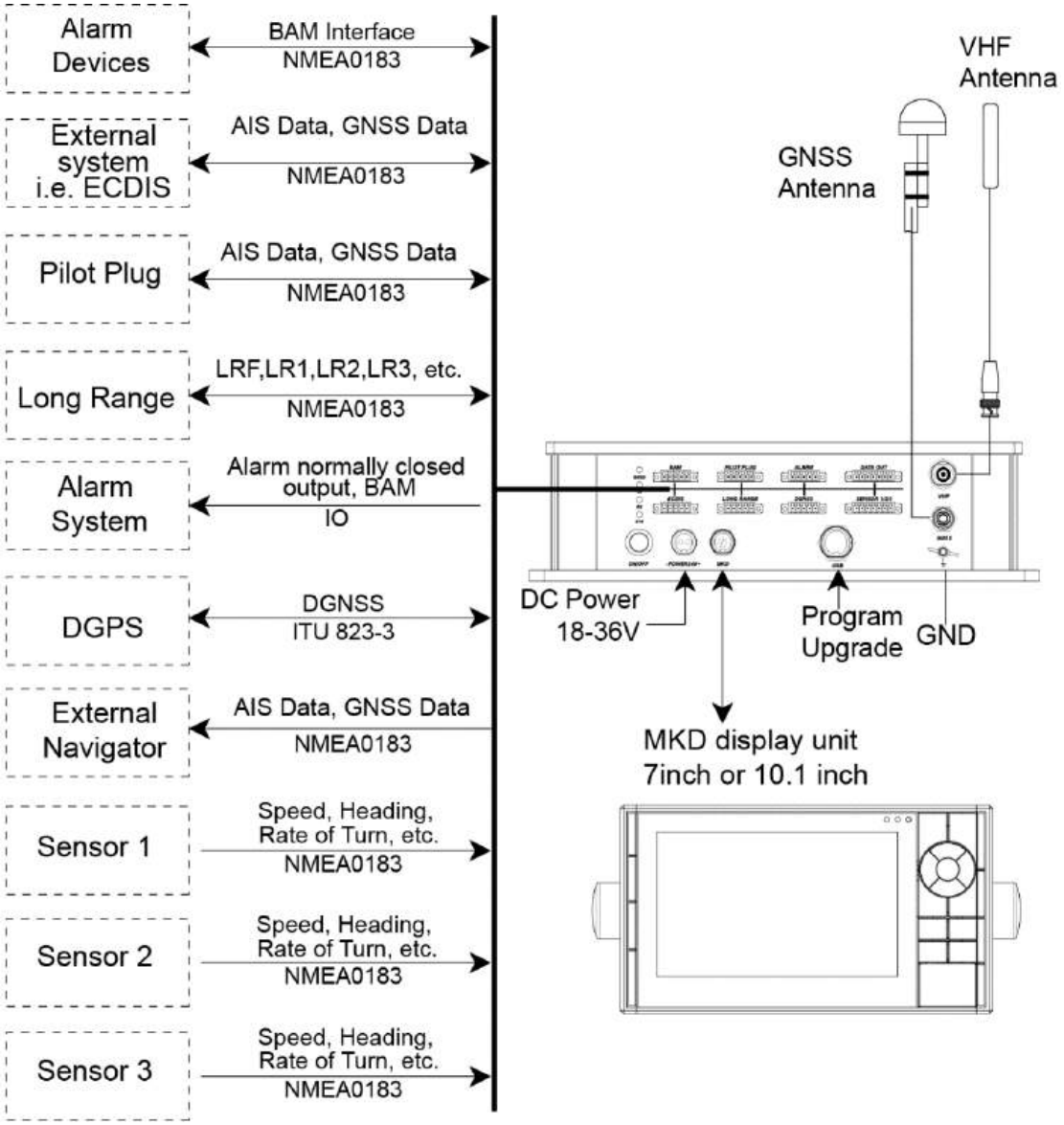
The Class A Marine Automatic Identification System is a position and ship information reporting system. It is designed and manufactured to meet the requirements of the marine environment and is designed to follow and comply with the following standards:
IEC61993-2(2018), R.M.1371-5(2014), IEC62923-1(2018), IEC62923-2(2018), IEC61162-1(2024), IEC61162-2(2024), IEC60945:2002/COR1:2008, IMO MSC.302(87), MSC.466(101).
Vessels equipped with shipboard Class A AIS can automatically share and regularly update their vessel identity information, position, speed, heading and other information. The position, speed heading information can come from the built-in or external GNSS positioning system. The built-in GNSS has a differential capability to provide a reference for the system's UTC at the same time, and when the external GNSS fails, the internal GNSS can provide position, speed heading and other information. Communication between the receiving vessels is via VHF transmission.
Shipborne Class A AIS has 3 launch modes: autonomous (continuous operation in all areas), assigned(data transmission interval remotely controlled by authority in traffic monitoring service) and polled(in response to interrogation from a ship or authority) , and can receive various types of AIS targets. There are 3 sensor access ports, which can access GNSS positioning source, speed log, compass, steering rate indicator and other types of sensors, and there are 5 AIS data outputs which can be accessed to ECDIS, radar and other display devices.

1.2 Packing List

Material Name	Description
Display	7 inch or 10.1 inch optional
Display Mounting Bracket	1
Bracket Fixing Nut	2
M4*20 self-tapping screws for display bracket or flush mounting	7 or 9
AIS TX/RX unit	1
GNSS Antenna	1
M4*20 screws for AIS Transceiver Mounting	4
9 pins data cable	1
2 pins power cable	1
Fuse 5A	5
Certificate of Conformity	1

Installation Dimension Drawing	Optional
Simple Operation Card	1
User Manual	1
Third party marine product certificates	1

1.3 System Diagram



1.4 Technical Parameters

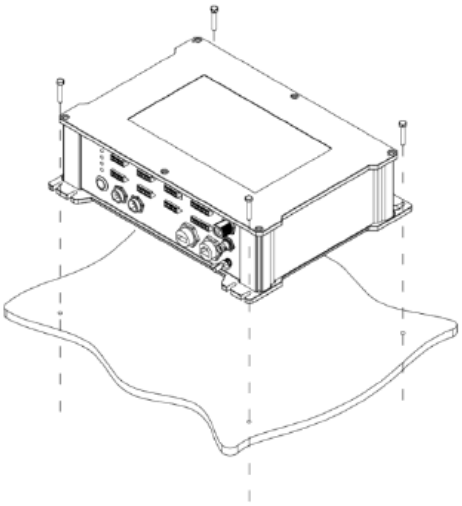
Technical Parameters		
No.	**Parameter Name**	**Parameter Description**
1	Product Name	AIS Class A
2	Product Model	SAG9000-07(Transponder+7” Display) SAG9000-10(Transponder+10” Display)
3	Shell Protection ingress	Transponder & Display Unit: IP20
4	Compass safety distance	Standard compass: 85cm Steering Compass: 95cm
5	Working Temperature	-15℃~55℃
6	Storage Temperature	-30℃~70℃

AIS Transponder Technical Parameters		
No.	**Parameter Name**	**Parameter Description**
1	Model	SAG9000
2	Power	DC 24V (DC18-36V ， 5A or above)
3	Transmit power	1W/12.5W
4	Bandwidth	25kHz
5	Modulation method	GMSK
6	Baud Rate	9600BPS
7	AIS transceiver channel/frequency	156.025~162.025MHz 87/161.975MHz(default) 88/162.025MHz(default)
8	DSC Receive Channel/Frequency	70/156.525MHz
9	Weight	5.3kg
10	Dimension of main unit(mm)	341*221*80（Length*Width*Height）

Display Unit Technical Parameter		
No.	**Parameter Name**	**Parameter Description**
1	Display Model	7 ″ : MKD-07 10.1 ″ : MKD-10
2	Display External Dimensions(mm)	7 ″ : 271*60*132（Length*Width*Height) 10.1 ″ : 341*68*180（Length*Width*Height)
3	Display size and resolution	7 ″ : 800*480 10.1 ″ : 1280*800
4	Display Area Size	7 ″ : 152.4*91.44mm（W*H） 10.1 ″ : 216.96*135.6mm（W*H）
5	Display Viewing Angle	7 ″ 10.1 ″ Left Side：70° Left Side：85° Right Side：70° Right Side：85° Top side：50° Top side：85° Bottom side：70° Bottom side：85°
6	Display Brightness	7 ″ : 300 10.1 ″ : 400
7	Display Contrast	7 ″ : 500 10.1 ″ : 900
8	Operating Method	Touch screen and Keyboard Operation
9	Touch Screen Parameters	Multi-touch, capacitive screen Surface hardness ⩾ 6H Light transmittance ⩾ 85%
10	Vsible distance	Unit indication:0.55m

2. Installation

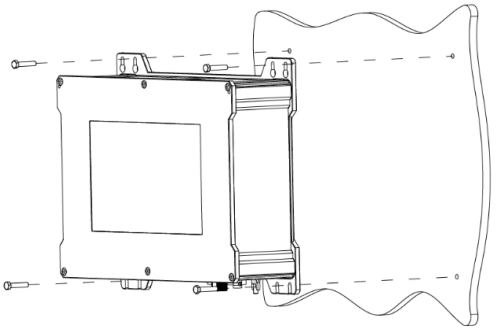
2.1 AIS Transponder Installation



Method 1: Platform installation

Use the AIS transponder installation size chart to mark the 4 punched holes on the mounting platform, drill 4 holes with a 4.2mm diameter twist drill, and then use 4 M5*25 self-tapping screws to pass through the fixing holes in the bottom shell of the AIS transponder and fix it on the mounting plane.

Method 2: Wall mounting Installation



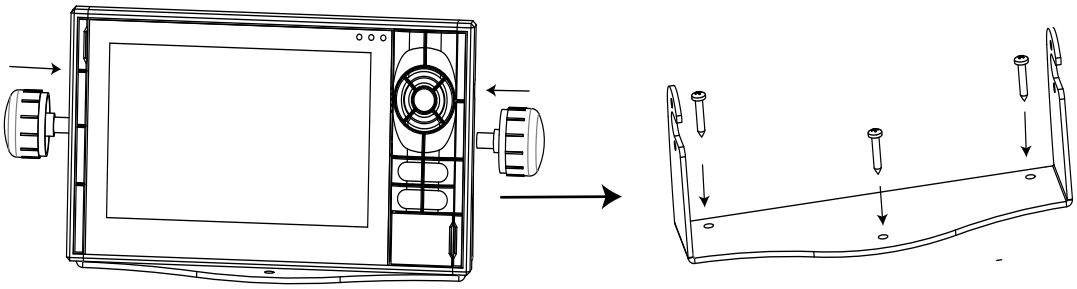
Use the AIS transponder installation size chart in the installation of the vertical surface marked out 4 punching position, with a diameter of 4.2mm twist drill drilling 4 holes in the mounting surface of the 4 holes on the 4 holes on the 4 M5 * 25 self-tapping screws (only screw 3-5 teeth, do not tighten it), will be the AIS transponder hanging screws after the screws will lock the screws, will be the AIS transponder fixed in the vertical installation of the surface.

2.2 MKD Display Installation

Method 1: Hanging or desktop mounting

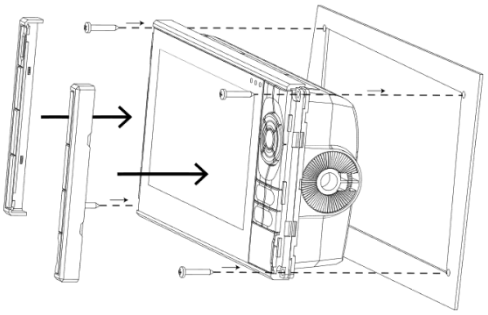
Fix the MKD monitor on the bracket with the knob, and then use the screws (M4*20) through the holes to fix the bracket on the plane to be mounted, and then the installation is completed after fixing it.

After completing the installation, adjust the angle of the monitor through the ear nuts on both sides to the most suitable viewing angle.



Method 2: Flush mounting

Firstly, open holes on the plane to be installed according to the MKD monitor size chart, remove the decorative strips, put the screws through the holes at the corners of the machine to fix the MKD monitor on the holes on the plane, and then press the decorative strips back to the two sides of the MKD monitor, and fix it well that is, the installation is completed.

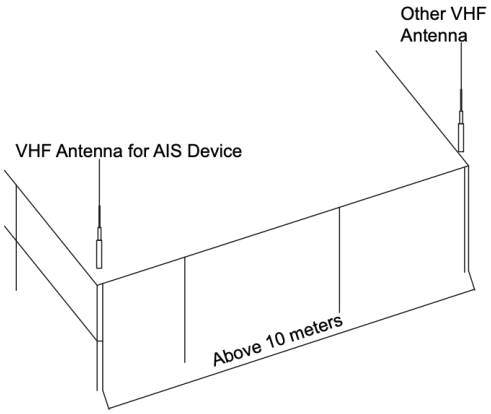


2.3 VHF Antenna Installation

VHF antenna selection and installation should pay attention to the following matters:

1. Omni-directional vertically polarized VHF antenna should be selected.

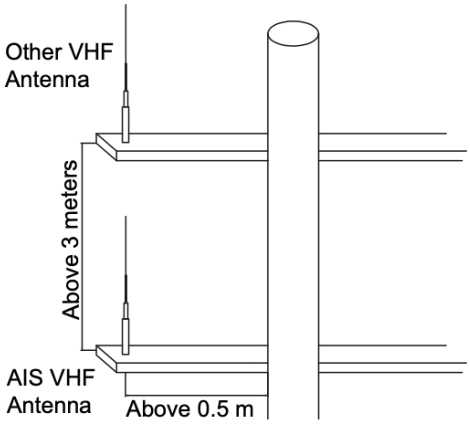
2. AIS VHF antenna should be installed in a vertical position, in the horizontal plane should be as far away as possible from conductive objects, the distance is not less than 0.5m, as shown in the figure on the right. The antenna should not be close to large vertical objects, try to maintain a 360 ° field of view unobstructed, if possible should be placed in the highest possible position, and try to stay away from other antennas.



3. AIS VHF antenna should be installed directly above or below the original VHF radiotelephone antenna, and the vertical distance is at least greater than 3m, as shown in the figure on the right.

4. AIS VHF antenna should be as far away as possible from high-power emission sources, such as radar and other radio transmitting antennas, it is best to leave more than 3m, and avoid the radiation area.

5. If installed in parallel with other VHF antennas, it needs to be at least 10m away from other VHF antennas, as shown in the right figure.

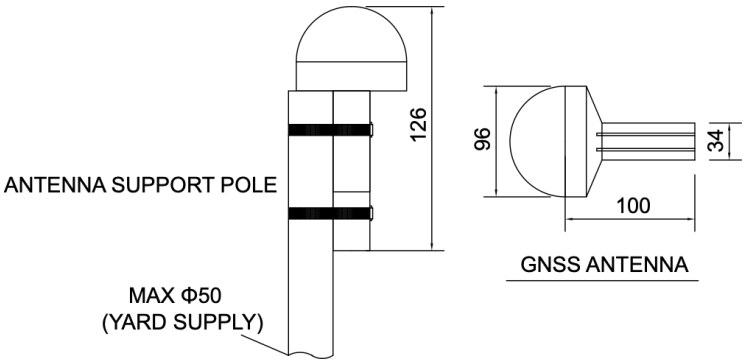


6. VHF antenna cable should be as short as possible to minimize signal loss. A high quality low loss coaxial cable suitable for the installation location should be used. The antenna cable should be installed in a separate signal alignment channel, and not less than 10cm from the power line. cable joints pay attention to waterproof treatment.

2.4 GNSS Antenna Installation

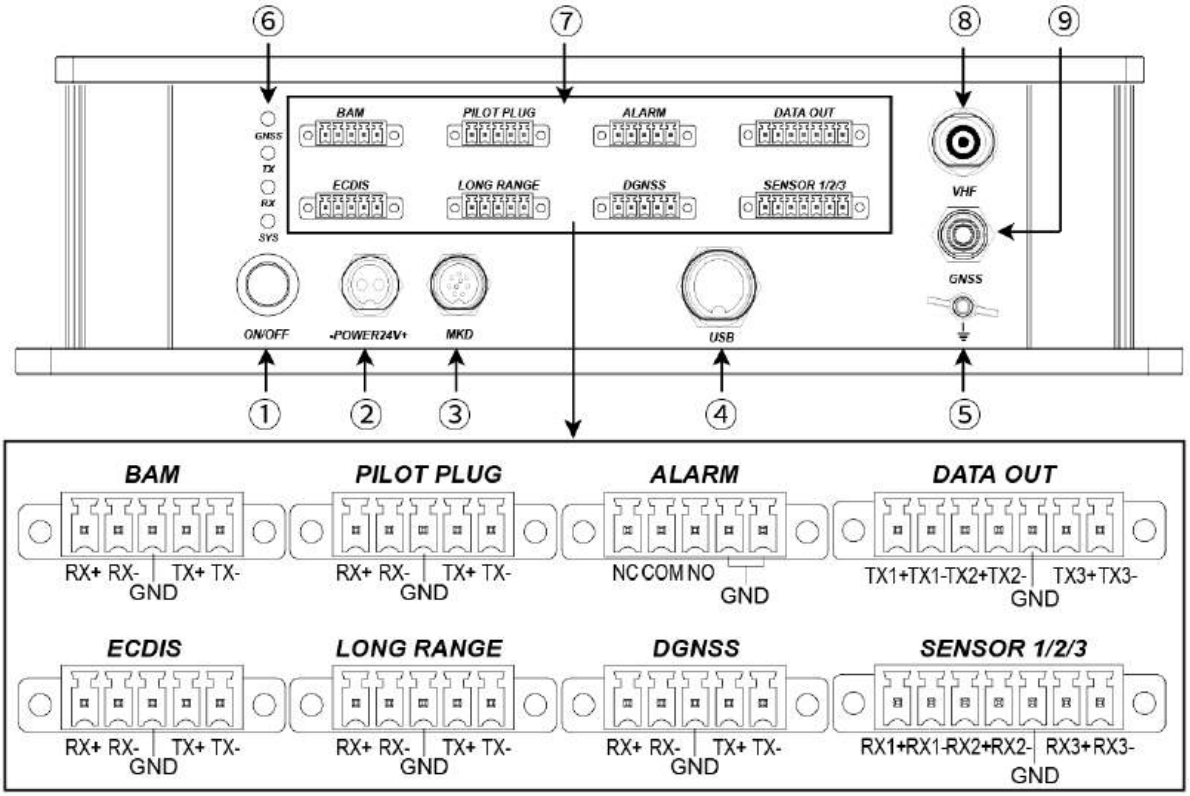
Please pay attention to several points when choosing the location of GNSS antenna installation:

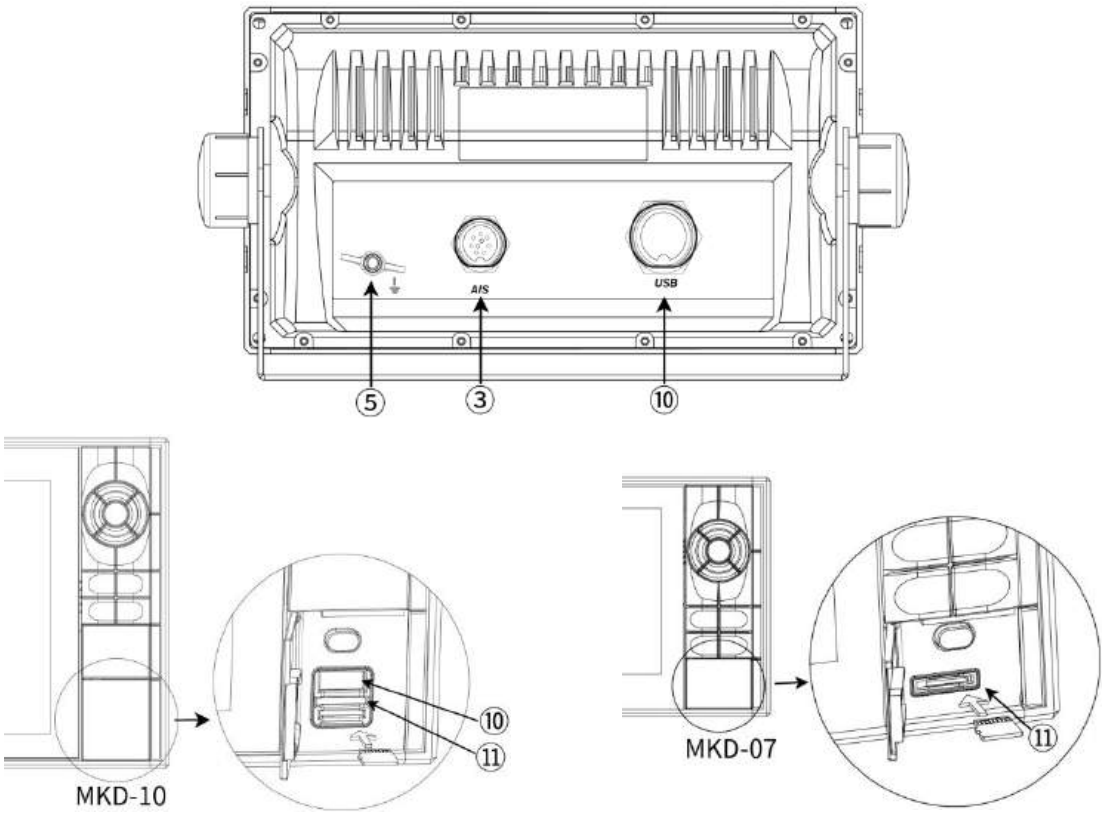
1. the chosen location should avoid radar, because radar wave radiation can damage or affect the reception of satellite signals;
2. There is no obstacle on the line of sight with the satellite. Obstacles on the line of sight (such as masts, etc.) will block signal reception or extend the satellite search time;
3. the higher the installation position, the better, on the one hand, to avoid obstruction, on the other hand, to prevent being splashed by seawater, stained with water to affect reception;
4. cable joints pay attention to waterproof treatment.



2.5 Device Connection

2.5.1 Interface Introduction





NO.	Interface Name	Description
①	Power Switch	When pressed, the AIS Transponder and the MKD are normally powered; the power should be switched off during the wiring process.
②	Power Interface	Access to standard 24VDC, adaptable voltage range: 18~36VDC
③	MKD Interface	Connect the AIS Transponder to the MKD Display with a 9-pole connecting cable and lock it.
④	AIS Transponder USB Interface	Can be inserted into the USB flash drive to upgrade the AIS Transponder, the upgrade process in the MKD display has a corresponding prompt interface
⑤	Ground Connection	Connection to the ship's ground
⑥	Indicator light	**GNSS:** Positioning indicator, always on when not positioning, flashing when positioning. **TX:** flashes when transmitting, does not light up when not transmitting. **RX:** flashes when receiving, does not light up when not receiving. **SYS:** Always on when power is turned on, blinks at 1S interval during normal upgrade process, and blinks rapidly at 0.2S interval in case of failure.
⑦	Data interface	**BAM:** standard BAM interface for connecting to other BAM-compatible devices such as Vessel Data Recorders (VDR) and Central Alarm Management Systems (CAM). **ECDIS:** connects to display devices with optional output of GNSS and AIS data.

		PILOT PLUG: pilot interface. **LONG RANGE:** remote interface. **DGNSS:** can access ITU 823-3 differential data, supports RTCM2.X and RTCM3.X; **DATA OUT:** a total of three data outputs, including built-in GNSS data and AIS data; **SENSOR1/2/3:** The three data channels share identical functionality and can interface with devices such as compasses, GNSS receivers, rudder angle indicators, and log recorders. All data interfaces utilize RS422 communication. For detailed input/output statement types for each data interface, refer to Section 2.5.2. **ALARM:** connect the alarm NO is normally open, NC is normally closed, COM is the common terminal;
⑧	VHF antenna interface	Connect the VHF antenna.
⑨	GNSS antenna interface	Antenna with built-in GNSS module connected to a GNSS positioning antenna.
⑩	MKD USB port	A USB stick can be inserted to update user data or upgrade the MKD, during the upgrade process the MKD display has a corresponding prompt interface.
⑪	MKD TF port	TF card can be inserted to update user data or upgrade MKD, during the upgrade process, MKD display has a corresponding prompt interface.

2.5.2 Data Port Input and Output Sentences

Interface Name	Sentences Types
BAM	Input：ACK, ACN, HBT Output：ALF, ALR, ALC, ARC
ECDIS	Input: AIQ,SSA,SPW,HBT,EPV,LRF,ABM,BBM,ACN,ACK,VSD,AIR,ACA,SSD Output: RMC,GNS,GBS,DTM,VBW,VTG,ROT,THS,HDT,TXT,VDO,VDM,ABK, ACA,ACS,GFA,GGA,GLL,GRS,GSA,GSV,GST,ZDA,GDC,ALF,ALR,ALC,TRL,LRF, LR1,LR2,LR3,LRI,VSD,SSD,EPV,NAK,VER
PILOT PLUG	**Port set to 0-normal access:** Input：AIQ,SSA,SPW,HBT,EPV,LRF,ABM,BBM,ACN,ACK,VSD,AIR,ACA,SSD Output：RMC,GNS,GBS,DTM,VBW,VTG,ROT,THS,HDT,TXT,VDO,VDM,ABK, ACA,ACS,GFA,GGA,GLL,GRS,GSA,GSV,GST,ZDA,GDC,ALF,ALR,ALC,TRL,LRF, LR1,LR2,LR3,LRI,VSD,SSD,EPV,NAK,VER

	Port is set to 1-Access is restricted: Input：EPV(attribute identifier 117), SSA Default output： VDM,VDO,ABK,ACA,ACS,ALF,ALR,ALC,TXT,LR1,LR2,LR3,LRI,LRF,VSD,SSD VER,EPV,NAK,TRL Optional output： RMC,GNS,GBS,DTM,VBW,VTG,ROT,THS,HDT,GFA,GGA,GLL,GRS,GSA,GSV GST,ZDA,GDC
LONG RANGE	Input：LRI,LRF Output：LRF,LR1,LR2,LR3
DGNSS	Input：RTCM2.X/3.X Output：ITU823-3
DATA OUT	Output：RMC,GNS,GBS,DTM,VBW,VTG,ROT,THS,HDT,TXT,VDO,VDM,ABK, ACA,ACS,GFA,GGA,GLL,GRS,GSA,GSV,GST,ZDA,GDC,ALF,ALR,ALC,TRL,LRF, LR1,LR2,LR3,LRI,VSD,SSD,EPV,NAK,VER
SENSOR1/2/3	Input：DTM,RMC,GNS,GBS,VBW,VTG,THS,HDT,ROT,GFA,GGA,GLL,GRS, GSA,GSV,GST,ZDA,GDC

3. Basic Operating Instructions

3.1 Panel Description

NO.	Name	Descriptions
①	【MENU】	Short press to enter the main menu interface; Long press to quickly open the AIS list
②	【MUTE】	When an alarm is active, a short press mutes the alarm. When no alarm is active, a short press mutes the entire system. While muted, a short press switches back to the unmuted state.
③	【∧】【∨】【<】【>】	Move the cursor up, down, left, or right to select menu options
④	【ENT】	Confirmation menu or cursor current option
⑤	【PAGE】	In a menu screen, press the 【PAGE】 key to switch to the next menu screen.
⑥	【BACK】	Return to the upper level of the menu
⑦	【ZOOM+】	Range reduction in the AIS radar interface and enlarge the image
⑧	【ZOOM-】	AIS radar interface for range magnification and resize image
⑨	【BRIGHT】	Adjust the brightness of the display in levels
⑩	【PWR】	Realize the MKD monitor on/off function. Short press 1s to turn on, long press 5s to turn off.

3.2 Description of Touch Gestures

- **Introduction to Touch Gestures**

  Tap: Single finger tap on the screen

  Swipe up/down: hold screen up/down

  Swipe left/right: hold the screen left/right

  Two-finger zoom: two-finger tap on the screen to zoom in or out

- **Touch operating rules**

Single-finger tap: to enter the level menu or perform the operation, equivalent to the function of the 【ENT】 key.

Single finger touch long press: click more than 3 seconds to enter batch operation.

Two-finger zoom: zoom in or out of the screen (only valid in the AIS radar disk).

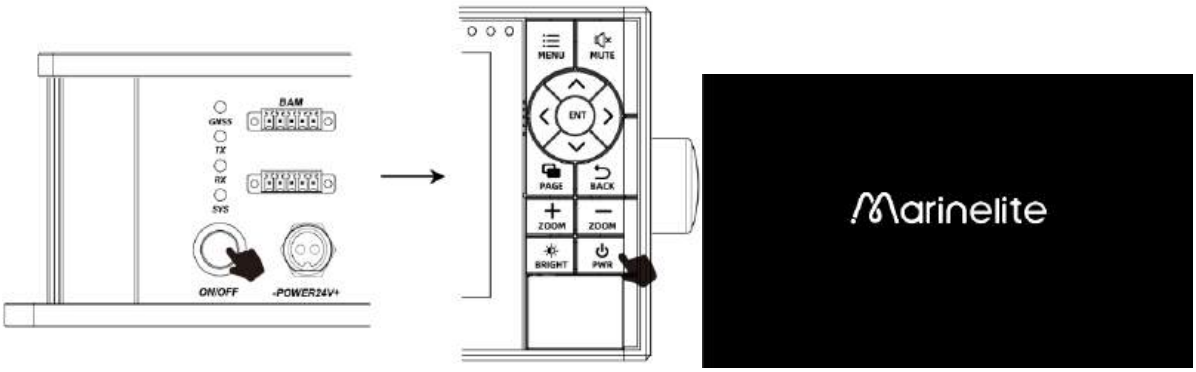
One-finger swipe: "Swipe left" to bring up the delete button, "Swipe up and down" to realize the function of list drop-down or drop-up in the list.

Note: The following parts of the manual, involving the function operation to touch operation to introduce.

3.3 Power On and Off

3.3.1 Turn the Power On

After ensuring that the power supply connected to the AIS transponder is normal, press the power button on the AIS transponder, the AIS transponder works normally, and then press the power button on the MKD monitor, the MKD monitor screen is illuminated and the power-on screen is displayed.



3.3.2 Turn the Power Off

- **Turn off MKD display only**

Press and hold the power button on the right side of the MKD monitor for 2 seconds and a shutdown countdown will appear on the screen, and the screen will rest and shut down when the countdown is over.

- **Turn off MKD Display and AIS Transponder**

Press the power button on AIS Transponder, it will be turned off together with and MKD monitor.

3.4 Adjusting Screen and Button Brightness

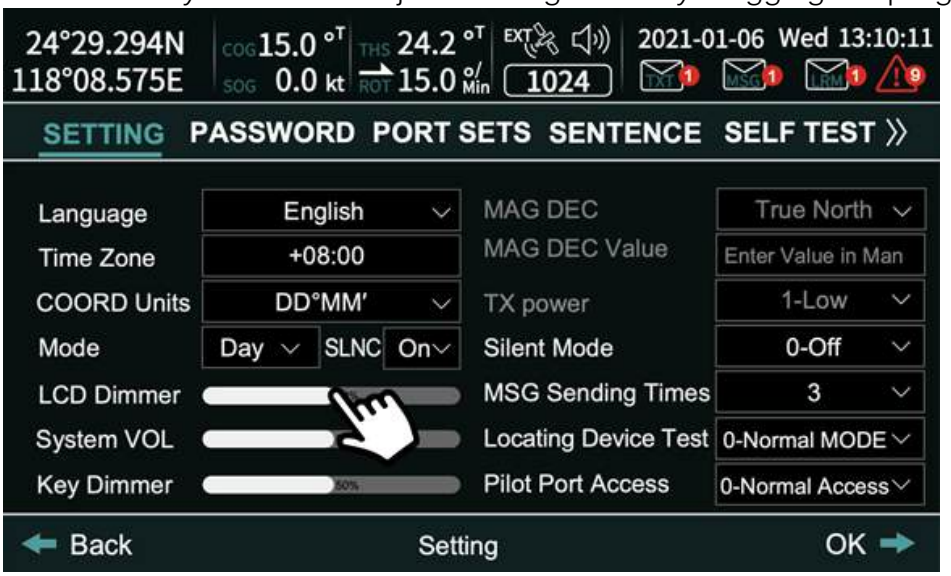
- Quickly adjust the screen brightness:

As shown in the right figure: short press【BRIGHT】key to adjust the backlight brightness of the MKD display, the brightness is divided into 6 levels, every time you press the brightness incremental one level, cyclic adjustment.

The monitor's brightness default is 80%.

- To adjust the brightness of the screen and buttons in the system: enter "Setting" → "Setting"

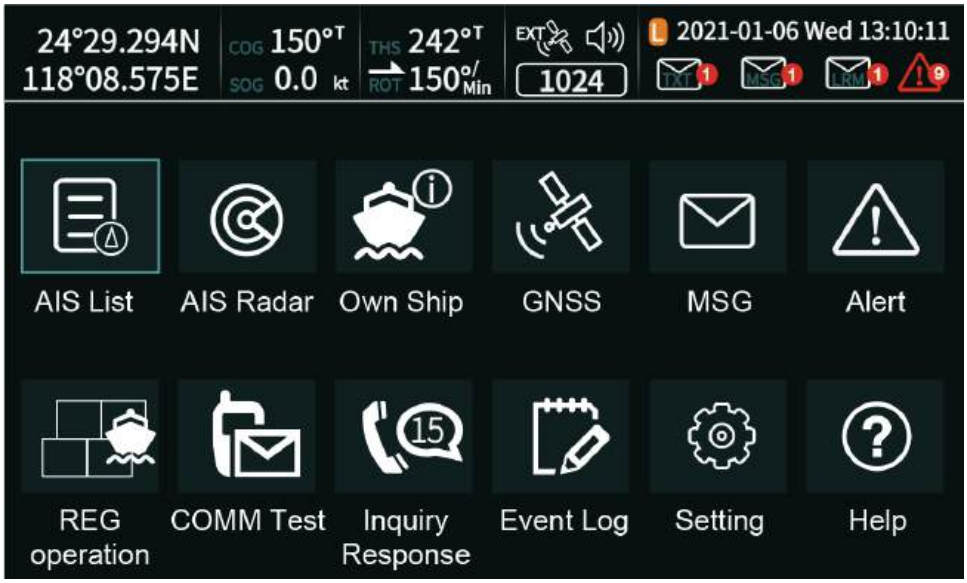
1)Tap Screen LCD/Key Dimmer to adjust the brightness by dragging the progress bar;



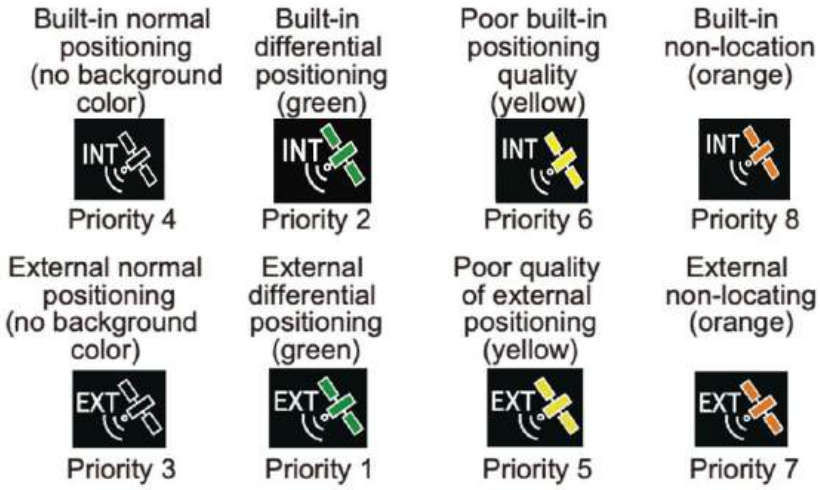
2) Operate by key, use【Direction】key to select screen brightness/key brightness, then press【ENT】to confirm, adjust the brightness by【<】【>】key, short press to adjust 1% each time.

Note: The last adjusted brightness value will be saved, reboot after power off still remain the brightness before the last power off.

3.5 Main Interface Introduction



- Header Data Field

No.	Name	Function Overview
①	Vessel Location	Nantong (32°01.688N 120°54.795E) is displayed for the first time on the power-up, and after that it is acquired through RMC/GNS statements, prioritizing the use of the position data in the RMC statements.
②	Course	Acquired by RMC, VBW, VTG statement, when there is RMC statement, judge RMC statement; when RMC statement is invalid and there is THS/HDT statement, judge VBW statement.
③	Speed	Acquired by RMC, VBW, and VTG statements, when there is RMC statement, judge RMC statement; when RMC statement is invalid, judge VBW statement.
④	Heading	Acquired through THS, HDT statements, with preference given to THS statements.
⑤	ROT	Acquired through ROT statements
⑥	Positioning State	
⑦	Volume	Indicates the current system volume. Tap on the touchscreen to toggle mute or non-mute.

⑧	AIS Info	Includes AIS receive count, transmit status, major and minor power status, and AIS receive channel indication. (1) High power does not transmit: no background color in the rectangular box; (2) 1 high power emission: orange-red flashing in the rectangular box for 0.2s; (3) One low-power emission: bright yellow flashing in the rectangular box for 0.2s; (4) Low power does not transmit: the bottom color in the rectangular box is dark yellow; (5) Silent: the bottom color inside the rectangular box is gray; (6) A/B channel receive at the same time: the left half of the border and the right half of the border flash yellow-orange for 0.2s; (7) Channel A receives once, the left border flashes yellow-orange for 0.2s. Similarly, channel B receives once, the right side border flashes yellow-orange for 0.2s.
⑨	Date and time	The system obtains date and time information via GNSS statements, supporting two display formats: UTC time and local time. When displaying UTC time, the icon is U When displaying local time, the icon is L The time zone can be modified through the system settings menu. After changing the time zone, the displayed date and time will be synchronized and updated.
⑩	TXT List	The red circle displays the number of received TXT messages. Touch and click to access the TXT list under the Alarm menu.
⑪	Message Inbox	The red circle shows the number of unread messages received. Touch and click to access the Inbox screen for the message.
⑫	Long Range Message	The red circle shows the number of remote messages received. Touch and click to access the Remote Messages screen under the Messages menu.
⑬	Alarm Message	The red circle shows the number of current alarms received. Touch and click to enter the alarm list screen.

Main Menu Options

No.	Menu Name	Function Overview
①	AIS List	Displays the targets received by the AIS and related information.
②	AIS Radar	Display on the radar disk the targets received by the AIS and the associated information.
③	Own Ship	Information display and setting of this ship: including voyage information, static information, other information, dynamic information.
④	GNSS	Displays GNSS ephemeris information.
⑤	MSG	Messages sent and received between this ship and the AIS target, and enables message management.
⑥	Alert	Alarm messages, alarm settings and prompt messages are displayed in the system.
⑦	RDSS	(Optional function) For the operation method, please refer to the RDSS instruction manual.
⑧	REG Operation	Displays the currently received region information, and you can add and edit regions.
⑨	COMM Test	Test for proper communication via VDL
⑩	Inquiry Response	Displays the queries initiated by this unit to other AISs and the contents of the responses received to the queries from other AISs.
⑪	Event Log	Divided into event record and switch-off record: event record: mainly records the time when AIS can not be launched normally as well as the reasons, with a maximum of 10 records; switch-off record: the time when the equipment is shut down and powered off, with a maximum of 100 displays.
⑫	Setting	MKD display, data port, and sensor statements can be set, and the system can be self-tested and upgraded.

⑬	Help	Displays the user manual
⑭	Chart	(Optional function) For the operation method, please refer to the nautical chart instruction manual.

3.6 AIS Parameter Setting and Reading

After entering own ship information menu, own ship information is displayed through the voyage information, dynamic information, other information, and static information pages, and the AIS parameters can be reset.

3.6.1 Overview of Write Parameters

- **Touch Operation：**

Text box operation: clicking the touch screen text box, input the corresponding content in the pop-up input method; as shown in the following figure, the 〖DEST〗 text box at “1”;

Drop-down box operation: clicking the touch screen drop-down box, click the pop-up drop-down box to select the required option, as shown in the following figure, the 〖Regional application〗 Drop-down box at “2”;

Write Parameter: After all the parameter settings done, you need to click on the 〖Write〗 (as shown at “3” in the following figure), then you can write the parameter.

- **Keys Operation：**

  In the main menu interface, select 〖Own Ship〗 by【Direction】key, press【ENT】key to enter the page of 〖VOYAGE INFO〗, then select AIS Parameter by【Direction】key, press【ENT】key to modify the parameter. After finishing the parameter setting, press【Direction】key to the 〖Write〗, then press【ENT】key to write the parameter.

- **Encryption instructions:**

  When there is a write button in the lower right corner, all parameters in the voyage

information, NavStatus in the dynamic information, and Ship Type in the static information can be written directly without any password;

MMSI, IMO, Name, Call Sign, ABCD in static information only can be written with password.

3.6.2 AIS Parameters Setting

- **Set parameters under Voyage Info page:**

DEST: only uppercase letters, specified symbols and numbers can be entered, with a maximum of 20 characters;

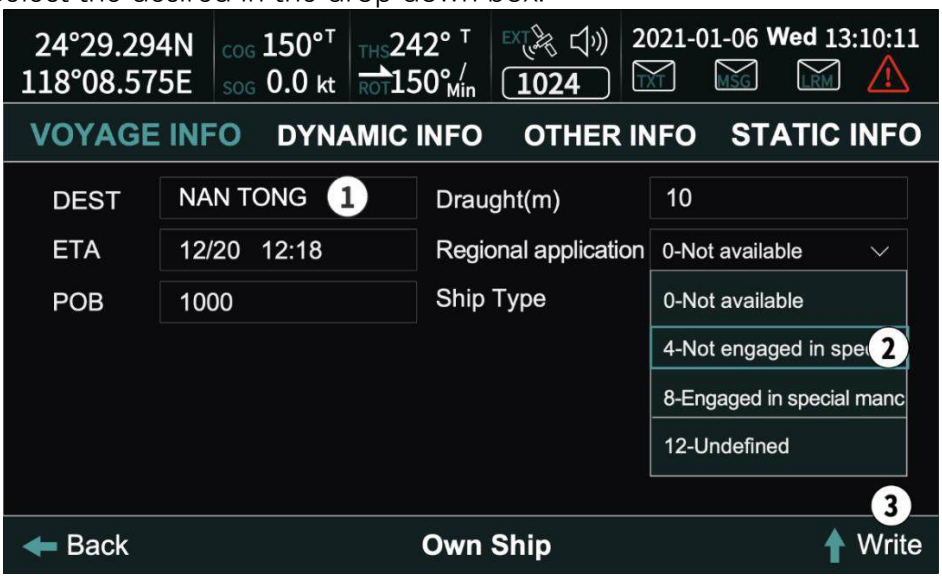
Draught(m): the range of values entered is 0~25.5

ETA: valid range is month (1~12), day (1~31), hour (0~23), minute (0~59)

Regional application: select the desired content in the drop-down box.

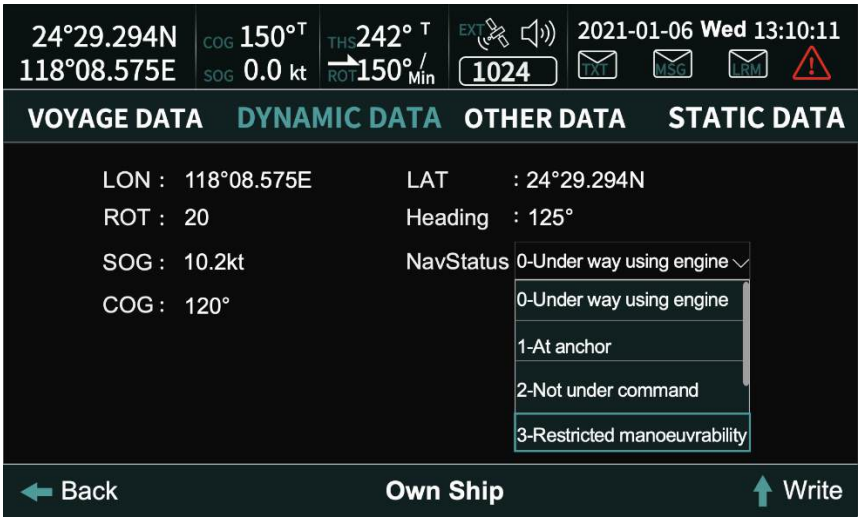
Number of persons on board: enter a value in the range 0~8191.

Ship Type: Select the desired in the drop down box.



- **Set parameters under Dynamic Info page :**

Only NavStatus can be set, selecting the desired content in the drop-down box.



- **Set parameters under Static Info page：**

Chinese Ship Name: Default is empty. The set ship name must contain at least one Chinese character and can be up to 20 characters long (each Chinese character counts as one character)

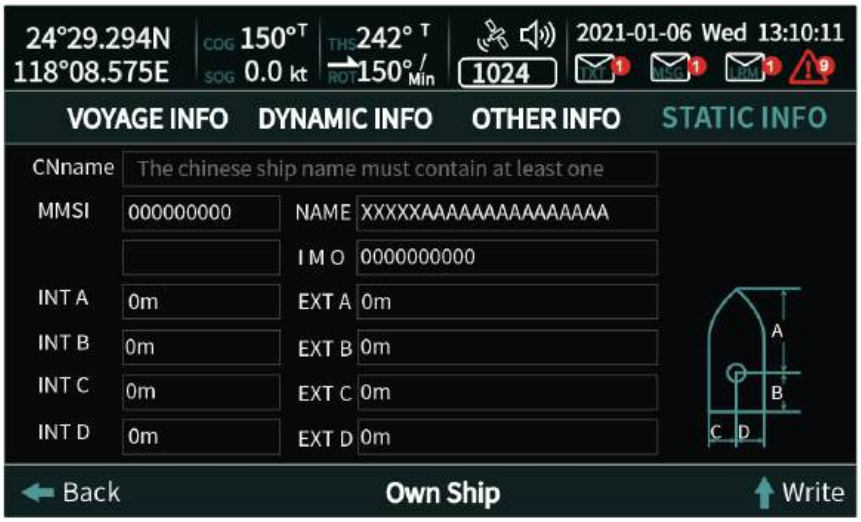
MMSI: The factory default is 000000000, and the input range is 200000000~799999999, 982000000~987999999.

IMO： The factory default is 000000000, and the input range is 0-1073741823.

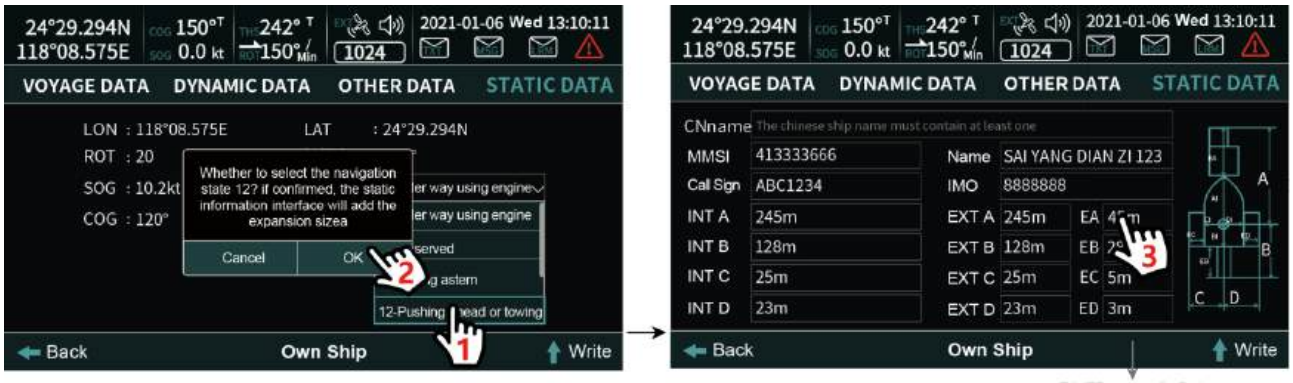
Name: Only uppercase letters, specified symbols and numbers can be entered, with a maximum of 20 characters.

Call Sign: Only uppercase letters, specified symbols and numbers can be entered, with a maximum of 7 characters.

ABCD: According to the installation position of the GNSS antenna on the ship, the sum of the AB values is the length of the ship, and the sum of the CD values is the width of the ship. The default display is 0, the valid range of A/B is 0-511, the valid range of C/D is 0-63.



Set NavStatus to 12, EA, EB, EC, and ED can be entered in the static information.



EA/EB range 0~511m
EC/ED range 0~63m
EA/EB/EC/ED cannot be set to 0m at the same time.

3.7 AIS Autonomous Transmission Interval

AIS adopts SOTDMA technology, dividing 1 minute into 2250 time slots, with each time slot as the smallest unit. Within 1 minute of power-up, it first receives AIS from the surrounding area, and after processing and analyzing the received information, it establishes a time-slot table for the surrounding sea area, which is continuously updated during the subsequent operation.
The vessel's transmissions are planned in accordance with the established time-slot table and the vessel's speed, course and sailing status, and the reservation-then-send method is adopted so that the vessel transmits signals according to the designated time-slot and other time-slots can receive signals of various types of AIS without interfering with each other.
According to the ship's speed, course and sailing status, the autonomous transmission report intervals are as follows:

Ship Type	Reporting Interval
Ship at anchor or moored and not moving faster than 3 knots	3 minutes
Ship at anchor or moored and moving faster than 3 knots	10 seconds
Ship speed 0-14 knots	10 seconds
Ship speed 0-14 knots and changing course	3⅓ seconds
Ship speed 14-23 knots	6 seconds
Ship speed 14-23 knots and changing course	2 seconds
Ship speed faster than 23 knots	2 seconds
Ship speed faster than 23 knots and changing course	2 seconds

3.8 AIS Transmitted and Received Messages

The messages that can be transmitted and received by this device are shown in the table below:

No.	Message Name	Receive	Transmit
1	Position report (scheduled)	√	√
2	Location report (assigned)	√	√
3	Location report (when asked)	√	√

4	Base Station Report	√	-
5	Static and voyage related data	√	√
6	Addressed binary messages	√	√
7	Binary Acknowledgement	√	√
8	Binary broadcast messages	√	√
9	Standard SAR Aircraft Position Report	√	-
10	UTC and Date Queries	√	√
11	UTC/Date Response	√	√
12	Addressed Safety-Related Messages	√	√
13	Safety-Related Acknowledgement	√	√
14	Safety-related broadcast messages	√	√
15	Query	√	√
16	Assignment Mode Commands	√	-
17	DGNSS	√	-
18	Standard class B device position report	√	-
19	Extended class B device location report	√	-
20	Data link management messages	√	-
21	Aids to Navigation Report	√	-
22	Channel Management Messages	√	-
23	Group assignment commands	√	-
24A	Static data reports	√	-
24B	Static data reports	√	√
25	Single time slot binary message	√	√
26	Multi-timeslot binary message with communication status	√	√
27	Remote AIS broadcast messages	-	√

3.9 AIS Transmit Parameters

3.9.1 Static Data

- MMSI（Maritime Mobile Service Identity）
- IMO（International Maritime Organization）
- CALL SIGN
- SHIP NAME
- ABCD（Position of GNSS antenna on the ship, ship length and width）

- Ship Type

3.9.2 Dynamic Data

- Ship's position
- UTC （Co-ordinated Universal Time）
- COG （Course Over Ground）
- SOG （Speed Over Ground）
- Heading
- Rate of Turn
- Position accuracy
- Time stamp
- RAIM flag （Receiver Autonomous Integrity Monitoring Flag）

3.9.3 Navigational Data

- Draught
- Cargo Type
- Navigation status
- Destination and ETA （Estimated Time of Arrival）
- Regional application flags

3.10 AIS Icon Display

Icon	Station	Icon	Station
(Black)	Own Ship	(Green)	Class A stations
(Green)	AIS Class B stations	(Blue)	Effective positioning device
(Blue)	Base Station	(Green)	SAR Aircraft
(Blue)	AIS AtoN (virtual)	(Blue)	AtoN-Real
(Yellow)	AtoN	(Green)	SAR vessel
(Red)	Dangerous Targets	(Green)	Dormancy Target
(Red)	Targets Lost	(Green)	Heading and course Lost

Note: When a station simultaneously meets the conditions of Dormant Target, Direction Lost Target, and Dangerous Target, it is prioritized to display as Dangerous Target status.

3.11 AIS Target State Description

The types that occur in specific situations are described below:

- **Target Lost：**

If no message is received from another station within the specified time period described in the following table, the station is judged to be in a lost state.

Type / Navigation state /speed	Class A station lost	Class B station lost		Effective positioning device lost
		CS device	SO device	
1）Class A station: sailing status 1-anchor or 5-mooring, speed ≤3kt (2) Class B station: speed not exceeding 2kt	4min	4min	4min	6min
Class A station: navigational state 1-anchor or 5-mooring, speed > 3kt	1min	N/A	N/A	
1) Class A station: the navigation state is not 1-anchor or 5-mooring, 0kt≤speed≤14kt 2）Class B station: 2kt < speed≤14kt	1min	3min	3min	
A and B stations: 14kt < speed≤23kt	36s	3min	90s	
Class A and B stations: speed > 23kt	30s	3min	30s	
Note: Class B station do not provide navigational state.				

- **Direction Lost:**

If the heading and course are invalid or missing in the detail information of Class A and Class B stations, it is judged that the AIS target direction is lost.

- **Dangerous Targets:**

If the heading and course are invalid or missing in the detail information of Class A and Class B stations, it is judged that the AIS target direction is lost.

Class A, B stations may trigger CPA alarms or area alarms. When CPA/area alarms are triggered, the station icon becomes a dangerous target. dangerous target can be stacked with Direction Lost and Target Lost states.

- **Dormant targets:**

Class A station will be judged to be dormant if their navigational state is 1-Anchored or 5-Moored and they are not moving at more than 3 knots, and Class B are judged to be dormant if they are not moving at more than 2 knots. Dormant targets have direction lost as well as target lost states.

- **Unknown targets:**

Undefined stations, except those defined in 3.10, are judged to be unknown targets and shown as .

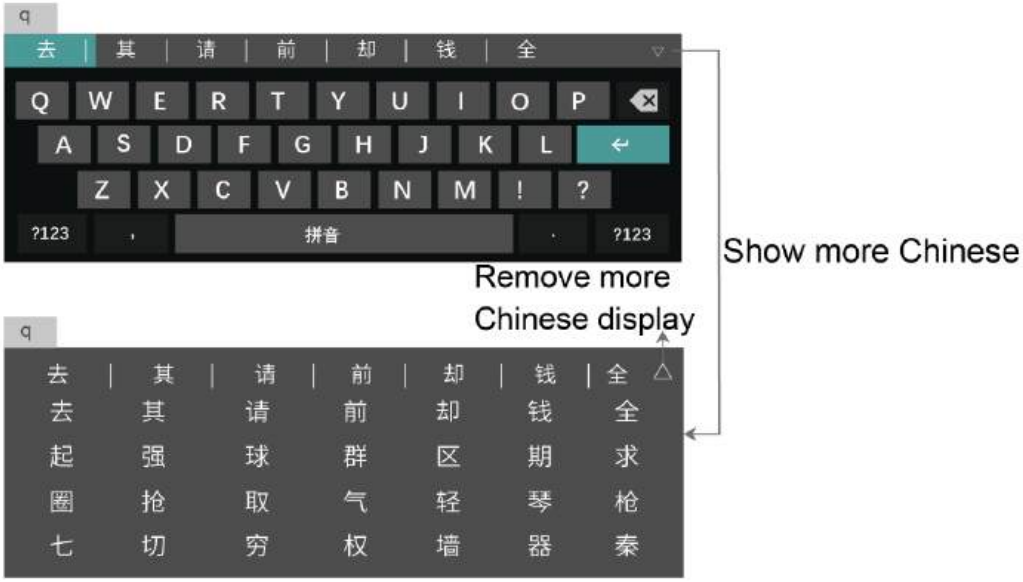
3.12 Input Method Introduction

3.12.1 Chinese Keyboard

- **Page Layout and Function Introduction**

Users enter the Chinese Input page and the Chinese Input Method pops up. The following is the keyboard description of the Chinese Input Method.

Show more Chinese as shown below:

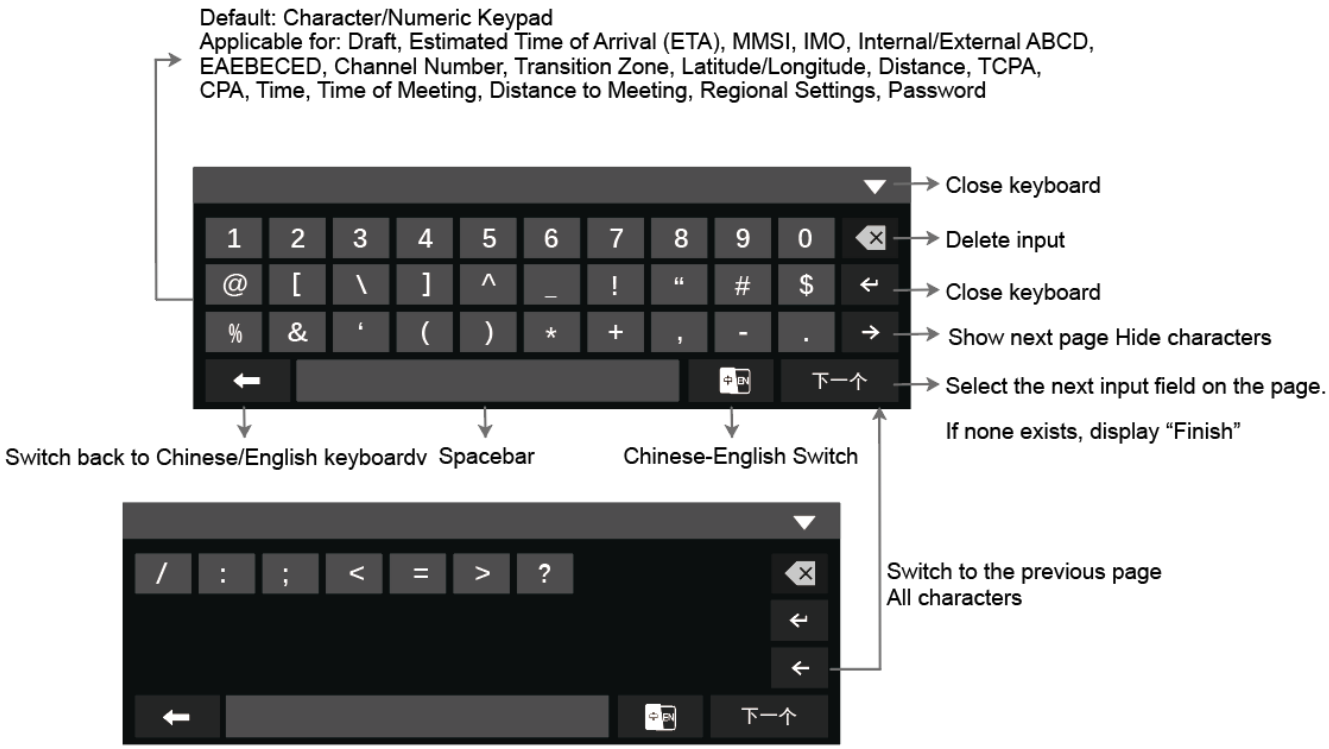


3.12.2 English Keyboard

Users enter the English Input page, the English Input Method pops up. The following is the keyboard description of the English Input Method.

3.12.3 Character/Numeric Keyboard

Users can switch to character/numeric keyboard through 〖character/numeric switch〗 key in English/Chinese input method page, the following is the description of character/numeric keyboard.



3.12.4 Input Method Upgrade

Place the keyboard program in the U disk / TF card, MKD inserted into the U disk / TF card, the keyboard program is automatically upgraded, pop-up prompt "Keyboard upgrading...", after the upgrade is successful pop-up prompt "Keyboard upgrade successful!" When the upgrade fails, a pop-up message "Keyboard upgrade failed!" will appear. When the upgrade fails, a prompt pops up saying "Keyboard upgrade failed!"

4. Function Description and Operation

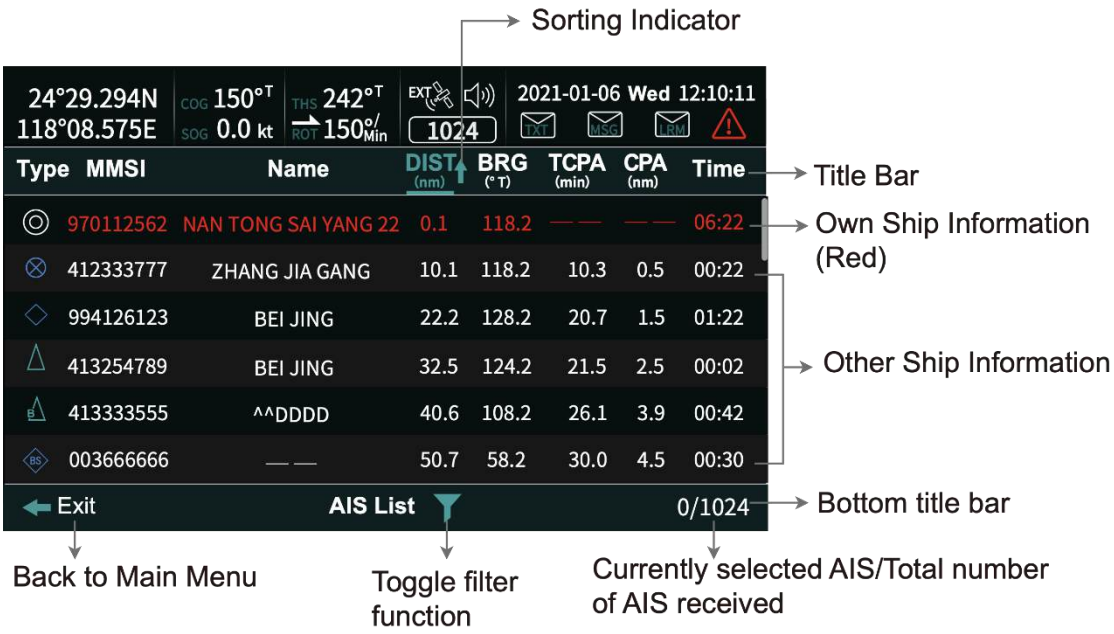
4.1 AIS List

4.1.1 Overview and Page Layout

After power on, you can directly enter the interface of 〖AIS list〗, or click 〖AIS list〗 in the main menu interface , Press and hold the【MENU】button on any screen to jump to the AIS list interface.

AIS list mainly displays received AIS targets and target details, when there are many AIS targets in AIS list, and a single page can not be displayed, you can slide the list to display all the contents, and the number of AIS received is not limited.

The AIS list provides sorting and filtering functions of type, MMSI, ship name, distance, TCPA, CPA, time, which can quickly locate the AIS target.



4.1.2 List Parameters Description

- ① **Type:**

Indicates the station type of the received AIS, only the corresponding icon is displayed in the AIS list, see 3.10 of this document for details of the type indicated by the icon.

- ② **MMSI**

Maritime Mobile Service Identity for own vessel and other AIS received.

- ③ **Ship Name**

For vessels with an AIS name, the name is displayed; for those without, it shows "--". The corresponding AIS details page allows adding/editing vessel names, with a maximum display of 20 characters—excess text is hidden.

When the system language is set to Chinese (including Simplified and Traditional Chinese):

- If a Chinese translation exists for the vessel name, the translated Chinese name is automatically displayed;
- If no Chinese translation exists, the original name remains displayed.
- Upon receiving Chinese vessel name messages from other ships, the "Vessel Name" field

automatically updates to the received Chinese name;

When the system language is set to non-Chinese: The “Vessel Name” field directly displays the original name.

- ④ **Distance**

Distance from the target AIS to own ship: calculated by the latitude and longitude of the target AIS and the ship, with an accuracy of 1 decimal place, if there is no latitude and longitude information for the target station, the distance will be displayed as ---.

- ⑤ **Bearing**

The bearing range from the target AIS to the ship is 0-359.9°, calculated from the latitude and longitude of the target AIS and the ship, with an accuracy of 1 decimal place. If the target station has no latitude and longitude information, the bearing will be displayed as ---.

- ⑥ **TCPA**

Meeting time from the target AIS to the ship, with an accuracy of 1 decimal place, ranging from -999.9 to 999.9min, 999.9 means 999.9 and values greater than 999.9; -999.9 means -999.9 and values less than -999.9. TCPA can only be calculated when latitude, longitude and speed heading are available for Class A and Class B AIS, otherwise it is shown as --.

- ⑦ **CPA**

Encounter distance from the target AIS to the ship, with an accuracy of 1 decimal place and a range of 0 to 999.9nm, only displayed when latitude, longitude and speed heading are available for Class A and Class B AIS, and -- in all other cases.

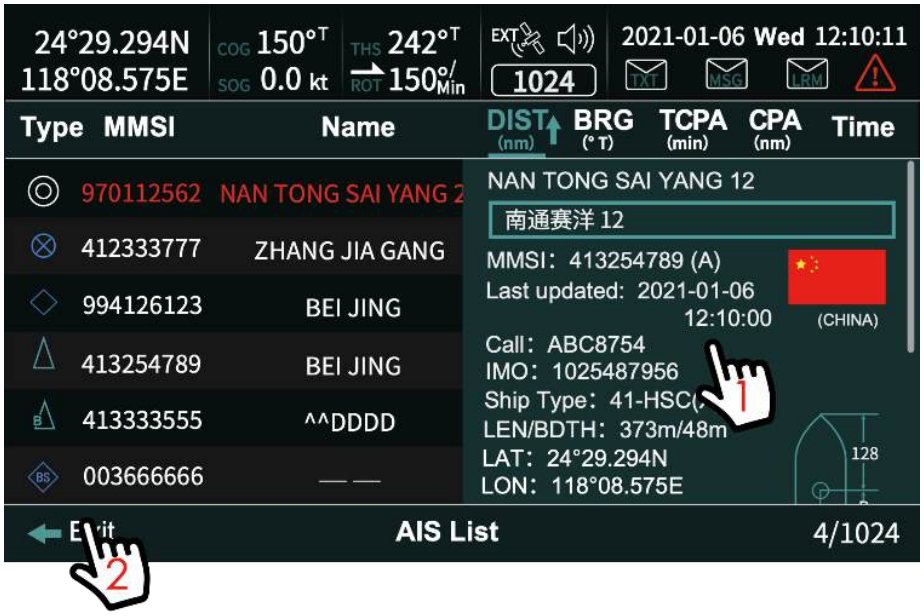
- ⑧ **Time**

The timeout time for effective positioning device is 18 minutes from the time of the last received AIS message; the timeout time for other AIS is 7 minutes, after which the AIS target is not displayed in the list, and the timeout time for static parameters stored in the background is 18 minutes

4.1.3 AIS Details

- **Viewing AIS Details**

Select an AIS in the AIS list, touch and click it to view its detailed information, slide up and down in the detailed information, you can view the complete information content. Tap 〖Back〗 on the touch screen to go back to the main menu page.



- **Input Chinese ship name by page editing:**

Maximum 20 characters can be displayed in the text box of Chinese ship name, and those exceeding the length can be displayed automatically in a cycle.

Click the text box in the page of "AIS Details" as shown in the figure below at "1", you can edit the required Chinese ship name in the pop-up input method as shown in the figure below at "2", then click the non-input method area in the screen to exit the input method and save it.

- **Import Chinese ship name through configuration file:**

- **Description of key operation in AIS details:**

On the AIS list page, press the 【>】【∧】 keys to browse AIS stations in the list.

Press the【ENT】to display the selected AIS's detailed information. Press【ENT】twice more to place the cursor in the 〖Chinese Vessel Name Input Box〗, popping up the keyboard. Press the 【∨】 arrow key to select the first character on the keyboard, enter the Chinese vessel name, then press 【BACK】 to close the keyboard.

When the cursor is on the detail information, press the [Left] key until the cursor moves to the corresponding message in the list. Then press the 【>】【∧】 keys to move the cursor step-

by-step through the list, updating the right-side detail content in real-time. Press the 【>】【ENT】key again to move the cursor from the list to the corresponding detail information's 〖Chinese Ship Name Input Box〗.

Press the [BACK] key to close the detail information, with the cursor positioned on the selected correspondi

4.1.4 AIS List Sort

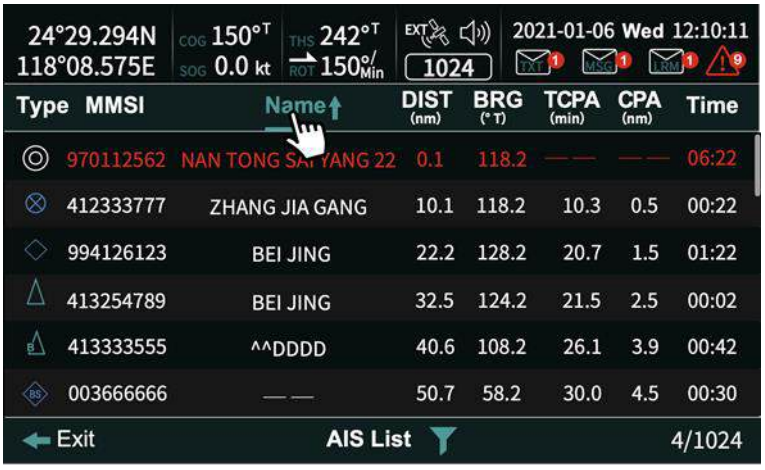
The AIS list is sorted according to incremental 〖Distance〗 by default. "Own ship" is displaying at the top, and "Effective positioning device" is displaying according to the sorting rules below it. "Dangerous target" is prioritized under "Effective positioning device", followed by other AIS targets.

The sorting method when exiting the AIS list screen will be saved and will remain the last selected sorting method when entering the AIS list again.

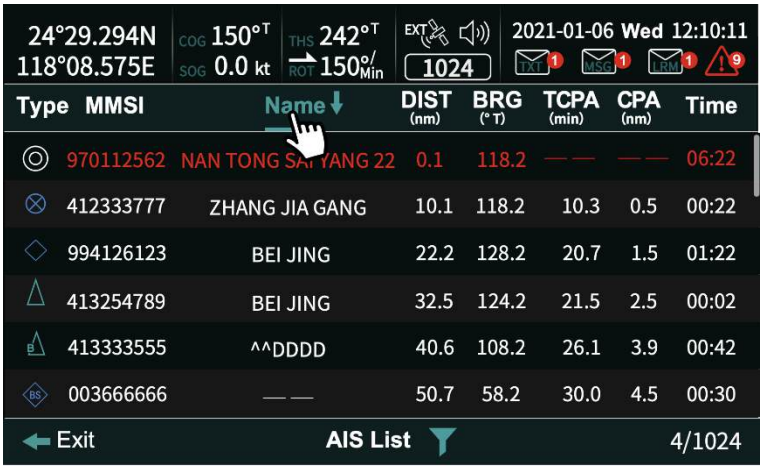
After MKD is shut down and restart, the default 〖Distance〗 incremental sorting is restored.

- **Introduction to sorting operations, using the 'Name' sort as an example.:**

On the 〖AIS List〗 page, click on 〖Name〗, when the up arrow is displayed, then sort by increasing 〖Name〗;



Click on 〖Name〗 once more, arrow down, sort by decreasing 〖Name〗.



- **Parameter Sort priority rule description**

Description of the rules, as follows:

Parameter	Sort Priority
MMSI	Sort by value size
Name	Numbers 0-9 > Letters A-Z > Symbols > No Ship Name（--） ①The name consists of 20 characters, the length is less than 20, add @ at the end to make up the 20 bits for sorting, and the @ at the end is not displayed. ②Characters are incremented by @【 \ 】^ _ Blank ! " # $ % & ' ( ) * + , - . : ; < = > ?
DIST	Data available > No data available（--） Data available：Sort by value size The same distance, then sorted by type, when the type is the same, sorted by MMSI
TCPA	Data available > No data available（--） Data available：Sort by value size With the same TCPA, then sort by distance
CPA	Data available > No data available（--） Data available：Sort by value size With the same CPA, then sort by distance
Time	Sort by time value
Type	ClassA>ClassB>Base stations>AtoN>SAR > Unknown type
Note: All categories are listed in ascending sort by default.	

- **List Sort Key Operation：**

On the AIS List page, press the【>】【∧】key. The cursor defaults to selecting〖Distance〗initially. Then use the【<】【>】keys to select any parameter for sorting. Press the【ENT】key to toggle between ascending and descending order. For example, select〖Vessel Name〗and press【ENT】key. the AIS list displays in ascending order by vessel name. Press【ENT】again to display the list in descending order by vessel name.

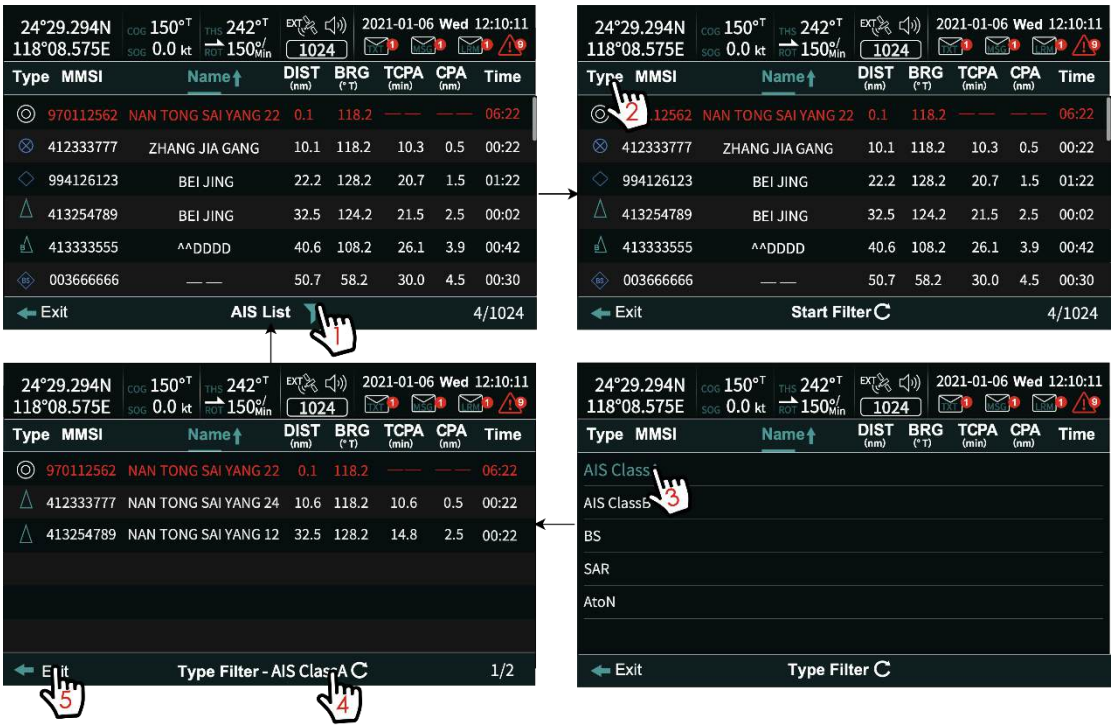
4.1.5 AIS List Filter

- **The following figure describes the operation of filtering using the "Type" filter as an example:**

Click 〖AIS List〗 in the lower title bar of the screen as in Figure "1" to enter the AIS list filtering function, click 〖Type〗 in the screen "2" to show all the types of options that this device can support receiving, click any type in the screen as in Figure "3" to filter out all the AIS of class A currently received. At "3" 〖AIS ClassA〗, it will filter out all the AIS of class A currently received.

Filtering results refresh: filtering results remain in the page can not be refreshed in real time, the user clicks on the screen under the title bar on the refresh will be refreshed as shown in the figure below in the "4" place.

Exit: Click 〖Exit〗 on the title bar in the middle and lower part of the screen as shown in the figure "5", the page will be back to the previous page.

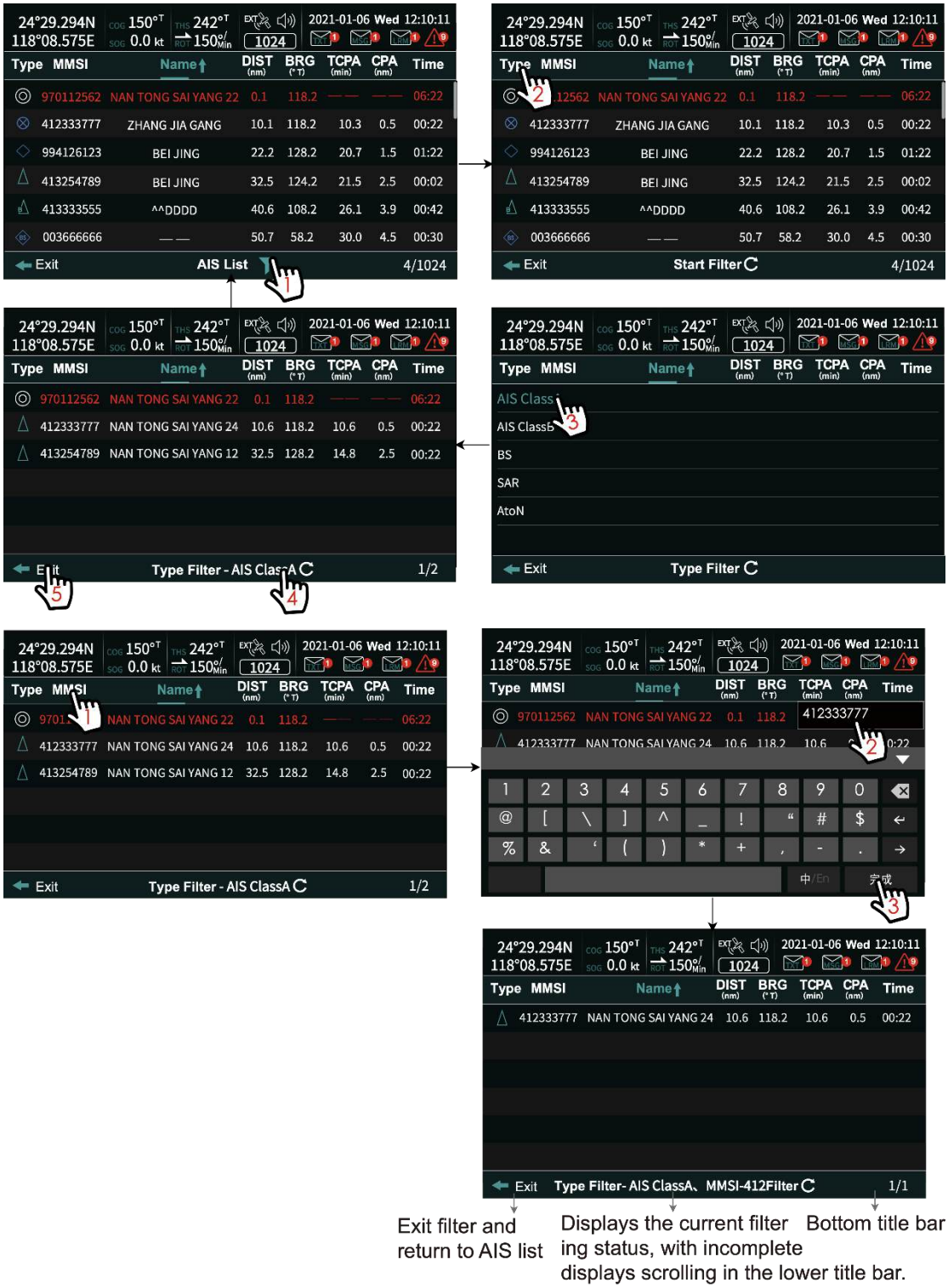


- **Keyboard Operation：**

Movethe cursor to 〖AIS list〗 on the lower title bar by moving the 【∨】【>】 key, press 【ENT】 key to enter the filtering function. When the cursor is displayed on 〖Type〗, you can move the 【<】【>】 keys to select 〖Type〗 / 〖MMSI〗 / 〖Name〗 / 〖DIST〗 / 〖TCPA〗 / 〖CPA〗 / 〖Time〗 for filtering, press 【ENT】 to enter into the filtering under the corresponding parameter, and then press 【BACK】 to return to the previous page.

- **Continuous filtering**

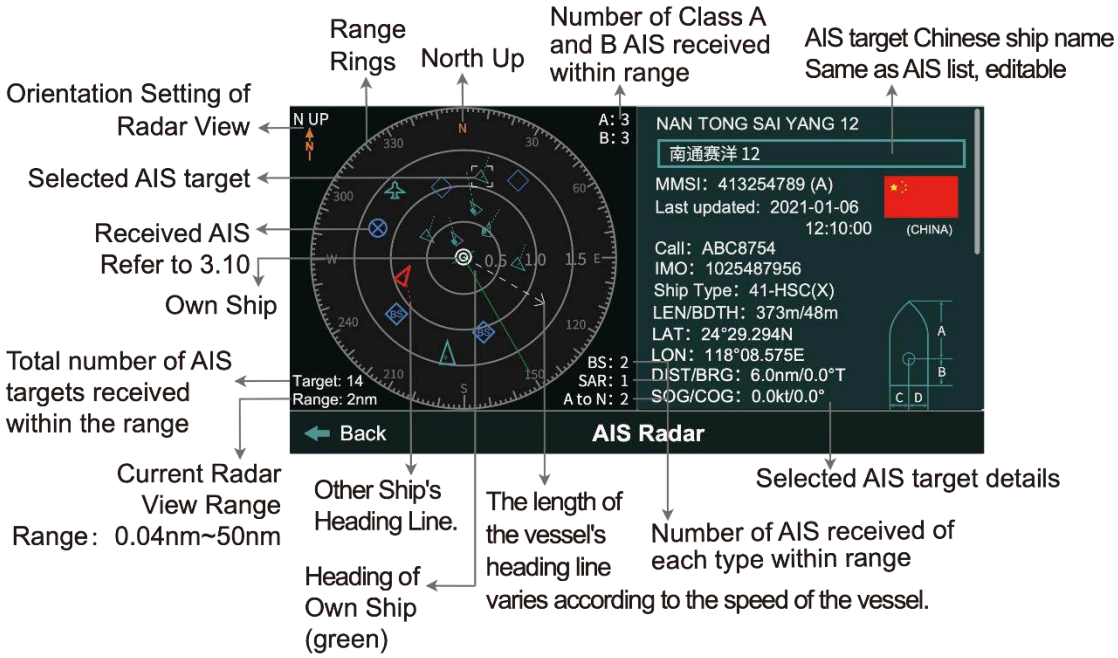
The device supports continuous filtering in the AIS list. The following is an example of filtering MMSI after filtering AIS ClassA:



4.2 AIS Radar View

4.2.1 Overview & Page Layout

Display the ship and received AIS targets through the AIS radar disk with the interface layout shown below:



4.2.2 Key to Select the Sequence of AIS Targets

By default, you enter the radar disk to select an AIS, the cursor is displayed on that AIS, and you can use the arrow keys to select the AIS targets sequentially according to their position in the radar view.

4.2.3 Radar Disk Zoom

- **Range & Rating**

Range from 0.04nm to 50nm, divided into 10 levels, from the standard circle display 4 circles, the middle 3 circles in accordance with the range of the average division of the range, as follows

Level	Range（nm）	Standard circle（nm）
1	0.04	0.01，0.02，0.03
2	1	0.25，0.5，0.75
3	2	0.5，1，1.5
4	5	1.25，2.5，3.75

5	10	2.5，5，7.5
6	15	3.75，7.5，11.25
7	20	5，10，15
8	30	7.5，15，22.5
9	40	10，20，30
10	50	12.5，25，37.5

- **Operation of Zoom**

Touch operation：

On the radar disk two fingers pointing at the screen “slide inward” range enlargement, to reach the maximum pop-up prompt box “The image has been minimized!”; two fingers pointing at the screen “slide outward” range Two fingers tap and hold the screen “sliding outward” the range to narrow, to reach the minimum pop-up prompt box “The image has been maximized!”.

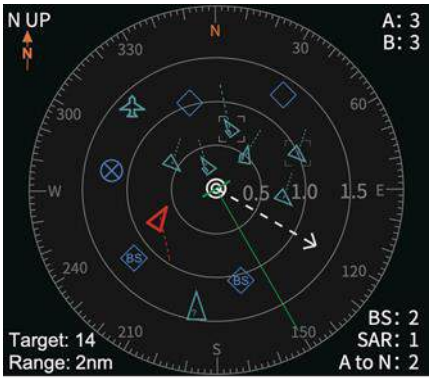
Keyboard operation：

Press briefly【ZOOM+】to zoom in one level at a time (range decreases). Upon reaching maximum zoom, a prompt will appear: “The image has been maximized!” Press briefly【ZOOM-】to zoom out one level at a time (range increases). Upon reaching minimum zoom, a prompt will appear: ““The image has been minimized!.

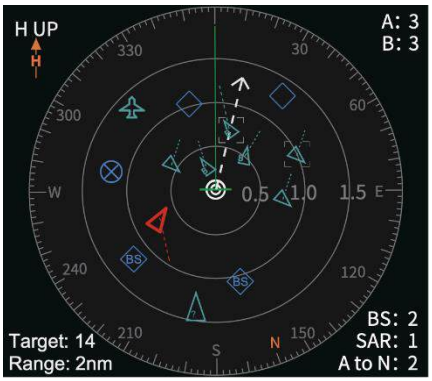
4.2.4 Radar Disk View Direction Setting

The radar disk view direction can be set to 3 types, and the settings are cycled sequentially.：

- **North Up：** N UP， The radar dish is always true north up.



- **Heading Up：**H UP, The radar disk rotates according to the ship's heading, and the heading direction is always upward.



- **Course UP：** C UP, The radar disk rotates according to the ship's course, and the course direction is always upward.

- **Touchscreen operation:**

  Tap the “View Orientation” option on the touchscreen to cycle through three modes.

- **Keyboard operation:**

  Press the【∨】key to highlight “Return”. Press the【>】key to highlight “View Orientation”. Each press of the【ENT】key switches the view orientation.

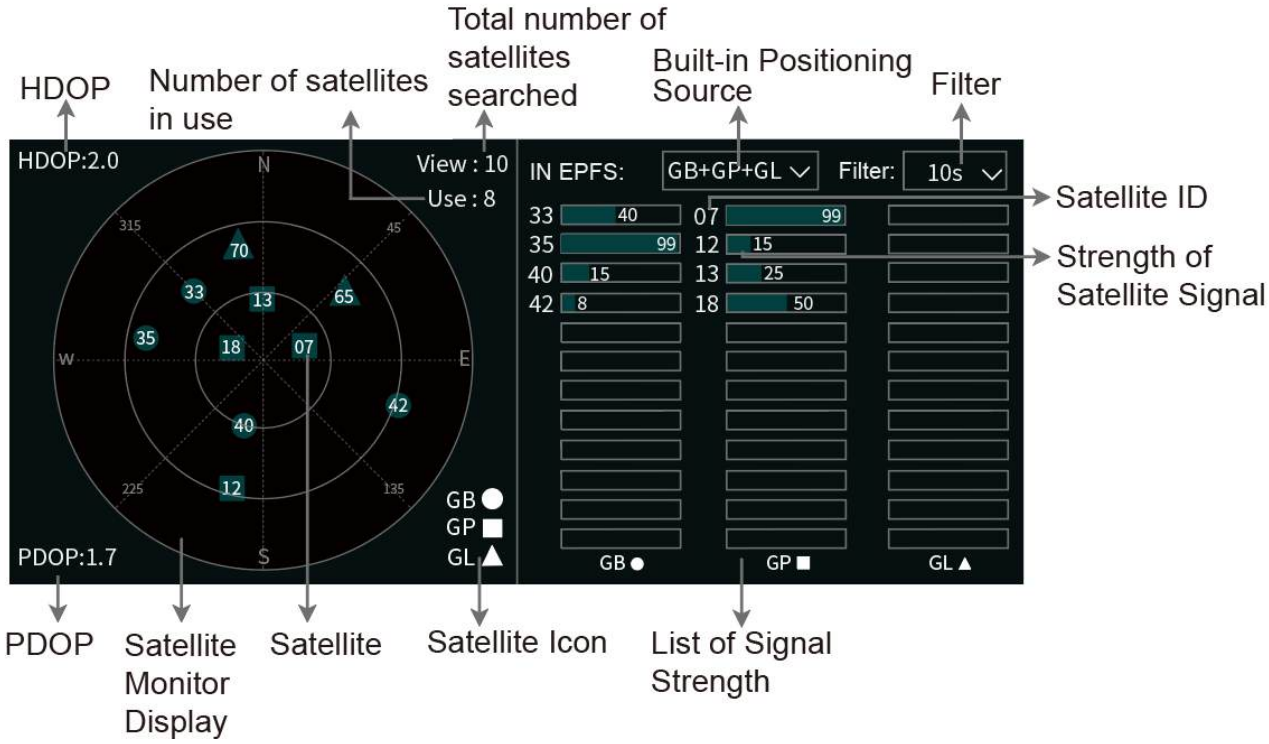
4.2.5 Radar Disk Speed Display

Speed is displayed according to the length of the heading line

Speed(Unit：kn)	Heading line length（Unit：cm）
0≤Speed < 5	1
5≤Speed < 10	1.5
10≤Speed < 15	2
Speed≥15	2.5

4.3 GNSS

4.3.1 Overview & Page Layout



4.3.2 Setting the Built-in Positioning Source

The built-in positioning source can be factory-cured to single BeiDou or customized for multi-system positioning.

For multi-system (GB+GP) positioning, users can set the built-in positioning source to GB/GP/GB+GP, and switch the built-in positioning system as follows:

Touch operation: click the touch screen〖built-in positioning source〗drop-down box to select, click the touch screen 〖OK〗, prompt "Built-in positioning source" set successfully.

Keyboard operation: On the GNSS page, the cursor defaults to selecting 〖Return〗. Press the 【∧】key twice to move the cursor to the〖Built-in Positioning Source〗dropdown menu. Press the【ENT】key to open the dropdown list. The dropdown menu will appear. Use the【∧】【∨】keys to select an option from the list, then press【ENT】to choose the built-in positioning source. Press the【∨】key twice to move the cursor to〖Confirm〗, then press【ENT】. A prompt will appear indicating "Built-in positioning source" has been successfully set.

After shutdown and restart, keep the last selected settings.

4.3.3 Setting Filtering for Built-in Positioning Sources

Filtering defaults to 10s, supported options are 0-Off, 1-Auto, 2s-59s.
After shutdown and restart, keep the last selected settings.

Touch operation：

Click on the touch screen 〖Filter〗, a drop-down box will pop up, click on the touch screen to select a filter value, click on the touch screen 〖OK〗, the prompt will be “Filter setting is successful!”。

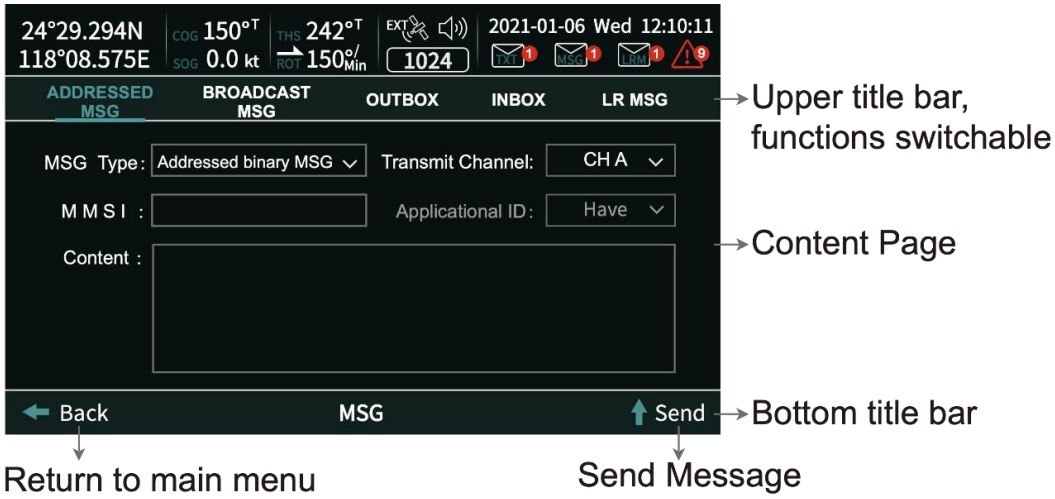
Keyboard operation：

Cursor move to 〖Filter〗, press【ENT】key, pop-up drop-down box to select a filter value, press【Direction】keys, cursor move to【OK】key, press【ENT】key, prompt “Filter Setting Successful!”.

4.4 Message

4.4.1 Message Overview

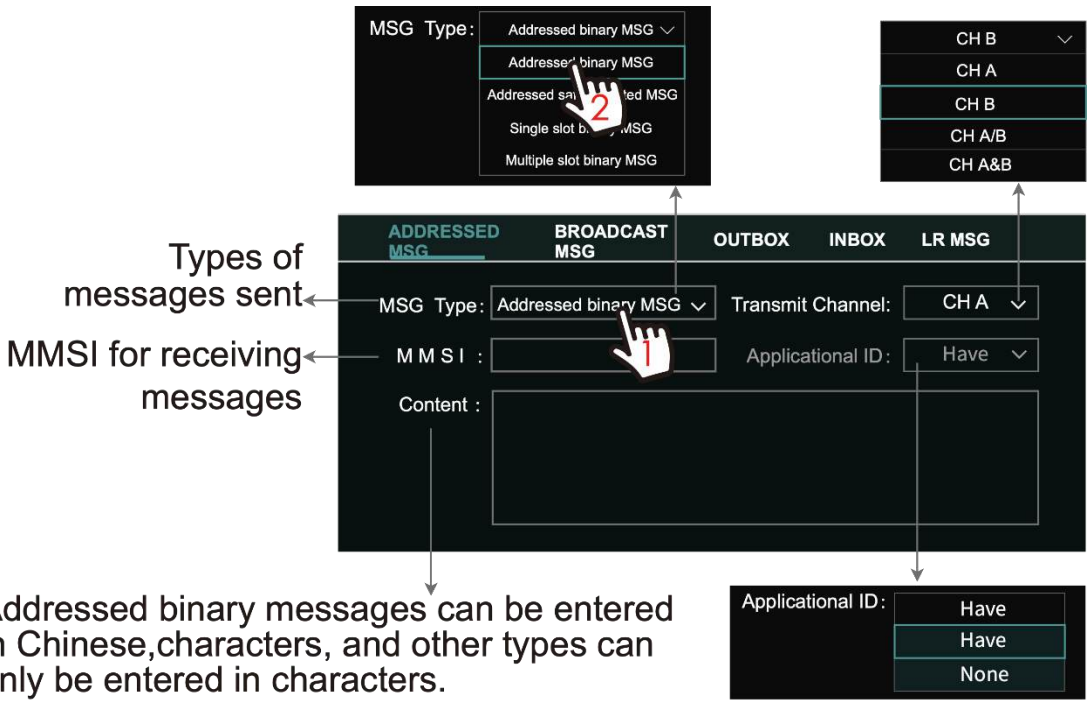
The message module supports the sending and receiving of addressed messages and broadcast messages, and displays them in the outbox and inbox. The module also displays the contents of messages that are remotely interrogated.
All list messages can be viewed, deleted and other operations.



4.4.2 Addressed Message

- **Overview & Page Layout**

Addressed messages are directed to the ship of the specified MMSI.



- **Select Message Type**

Touch operation:

Enter 〖addressed message〗 function, click the touch screen 〖MSG TYPE〗, the drop-down box will pop up, select a message type, such as the above figure "1", "2".

Keyboard operation:

Cursor select 〖MSG TYPE〗, press【ENT】key, the drop-down box will pop up, press【direction】key to select a message type, press 【ENT】 key to confirm.

- **Selecting the transmission channel**

Touch operation:

Click the touch screen 〖Transmit Channel〗, the drop-down box will pop up, select the sending channel, as the above figure, A channel or B channel or A/B channel randomly or A&B channel are sent.

Keyboard operation:

Cursor select 〖Transmit Channel〗, press 【ENT】 key, the drop-down box will be popped up, press 【Direction】 key to select a transmission channel, press 【ENT】 key to confirm.

- **Select Application Identifier**

The function is only selectable when the message type is single time slot binary and multi time

slot binary, other types of messages are not supported.

Touch operation：

Click the touch screen〖Application Identifier〗, a drop-down box will pop up, select〖Yes〗or〖No〗.

Keyboard operation：

Cursor select〖Application Identifier〗, press【ENT】key, the drop-down box will be popped up, press【Direction】keys to select〖Yes〗or〖No〗, press【ENT】key to confirm.

- **Enter MMSI**

The MMSI input box displays all the MMSIs corresponding to the received AIS when clicked, and the user can scroll up and down to find the desired MMSI.

The MMSI can also be entered by using the keyboard. The MMSI contains 9 characters and ranges from 000000000 to 999999999. Otherwise, the MMSI Input Range: 000000000 to 999999999! Input box input numbers while the drop-down box displays fuzzy search results for users to quickly input.

Touch Operation：

Click the〖MMSI〗text box on the touch screen, and the drop-down text box and keyboard pop up on the page. You can click the drop-down text box to select an MMSI or click the numeric keyboard to select a number

Keyboard Operation：

The cursor selects the〖MMSI〗text box, and the drop-down list pops up on the page. Select MMSI in the drop-down list by pressing the【∧】key. Or press the【ENT】key to pop up the keyboard, press the【∨】key to enter the numeric keyboard to select a number, press the【direction】to select a number, and press【ENT】to enter the content.

- **Enter message content**

For addressed binary messages, Chinese and characters can be entered, and only characters can be entered for other types of messages. Text limits the length of the input to the following table：

Message Type	Maximum Input Bytes	Mark
Addressed binary MSG	64	One Chinese character: 2 bytes One English character or symbol: 1 byte
Addressed Safety Related MSG	85	
Single slot binary MSG With application identifier	6	
Single slot binary MSG No application identifier	12	

Multiple slot binary MSG With application identifier	77	
Multiple slot binary MSG No application identifier	65	

Touch Operation：

Click on the touch screen 〖Content〗 text box, the input method pops up, by clicking on the 〖input method〗 input content

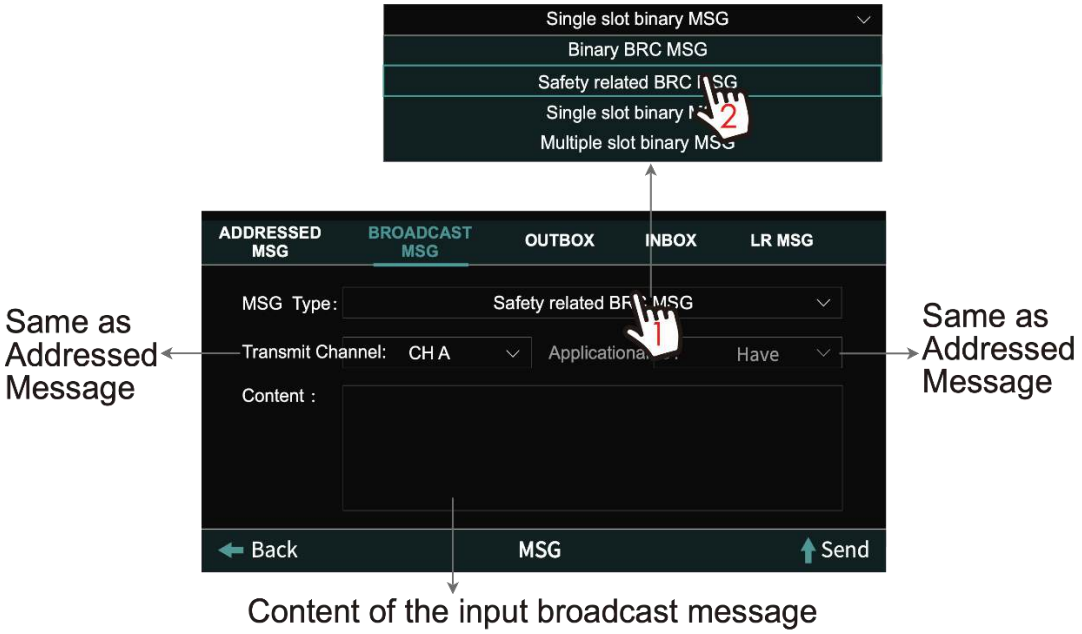
Keyboard Operation：

Cursor selects 〖Content〗 text box, press【ENT】 to bring up the input method, press【∨】 key to enter the interface of 〖Input Method〗 , The focus is currently on the first character in the input method,select the character by【Direction】,press【ENT】 to input the content.

4.4.3 Broadcast Message

- **Overview&Page Layout**

Broadcast message selects the message type and then sends the message to all AIS through the selected transport channel, with the same page operation as addressed binary message.

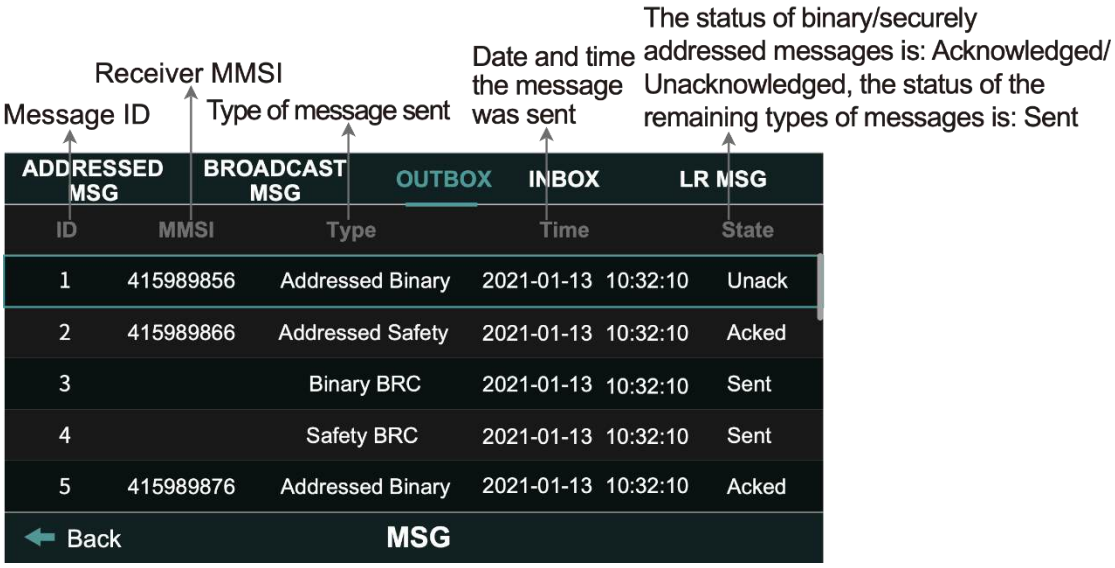


- **Message Content**

For binary broadcast messages, Chinese and characters can be entered, while other types of messages can only be entered as characters. Text limits the length of the input to the following table：

Message Type	Maximum Input Bytes	Mark
Addressed binary MSG	68	One Chinese character: 2 bytes One English character or symbol: 1 byte
Addressed Safety Related MSG	90	
Single slot binary MSG With application identifier	11	
Single slot binary MSG No application identifier	16	
Multiple slot binary MSG With application identifier	82	
Multiple slot binary MSG No application identifier	69	

4.4.4 OUTBOX



Overview&Page Layout

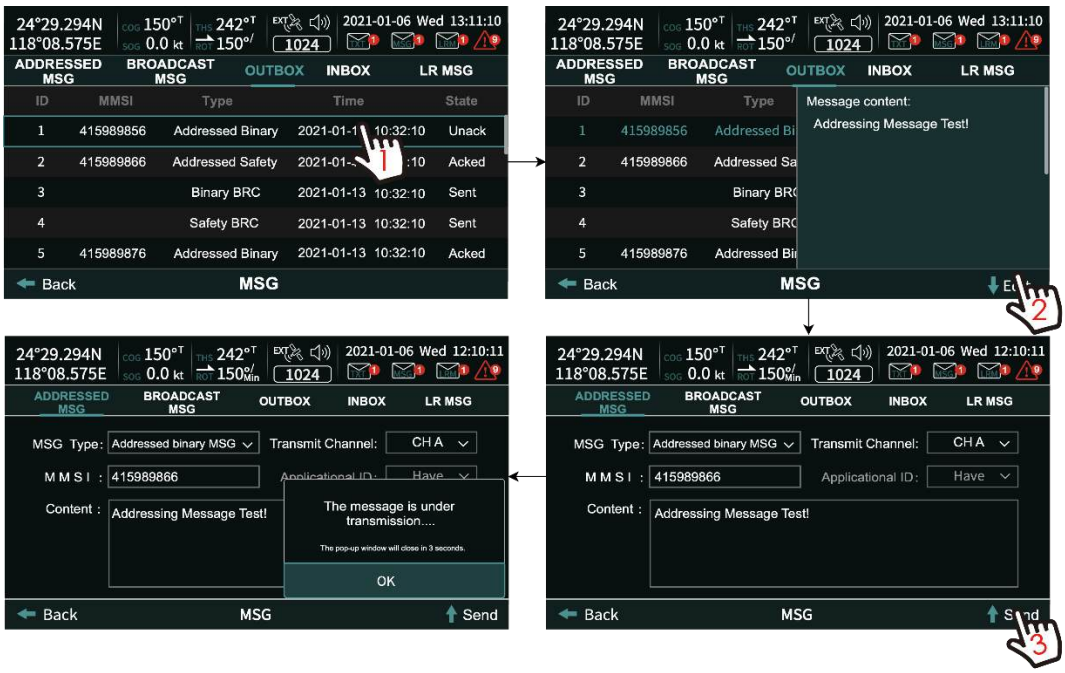
- **View message and edit message before sending**

Click on a message in the Outbox to view the message content, and go to the Edit Message page to send the message again to that recipient.

Touch operation：

Click the touch screen to select a message, click 〖Edit〗, enter the editing page, the content of the message will be displayed on the editing page, click 〖Send〗, you can send the message

again, click 〖Back〗, return to the previous page.

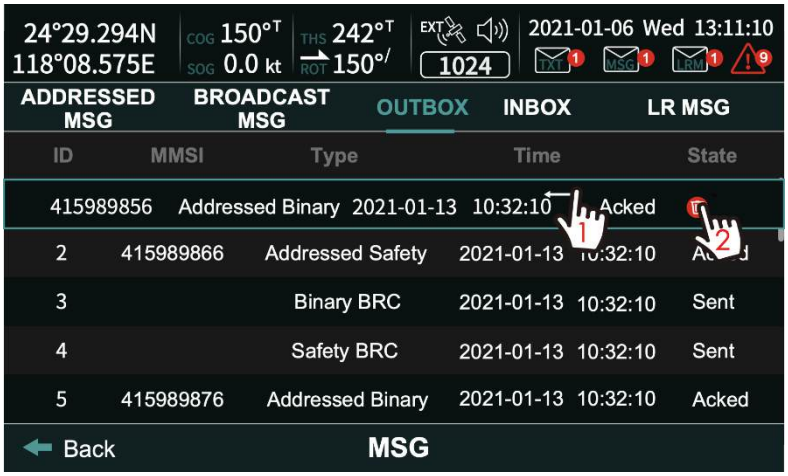


- **Keyboard operation:**

Press the 【∨】 key to highlight a message. Press 【ENT】 to display the message content. Press the 【>】 key until the cursor highlights [Edit], then press 【ENT】 to enter the editing page.

Press the 【Directional】 keys to move the cursor to 〖Send〗, then press the 【ENT】 key to resend the message;

Press the 【Directional】 keys to move the cursor to 〖Back〗, then press the 【ENT】 key to return to the previous page.



- **Delete single message**

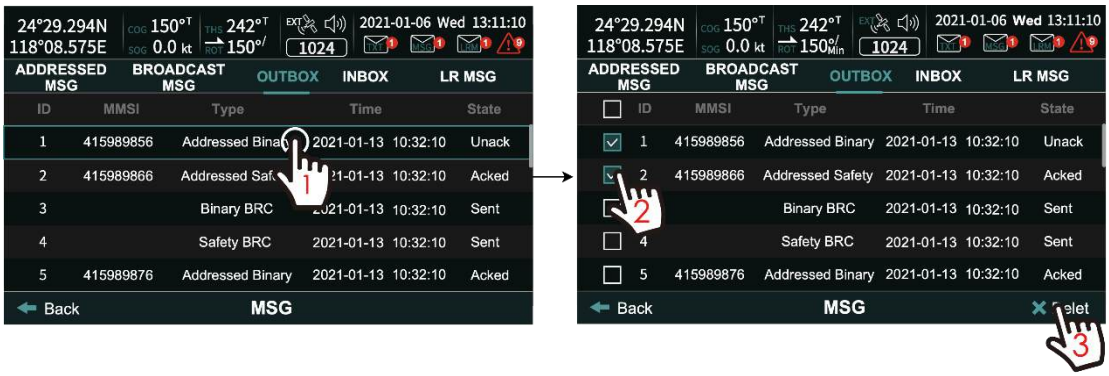
Select a message in the Outbox and hold down the touch screen and swipe left to delete a single message.

- **Batch Delete Messages**

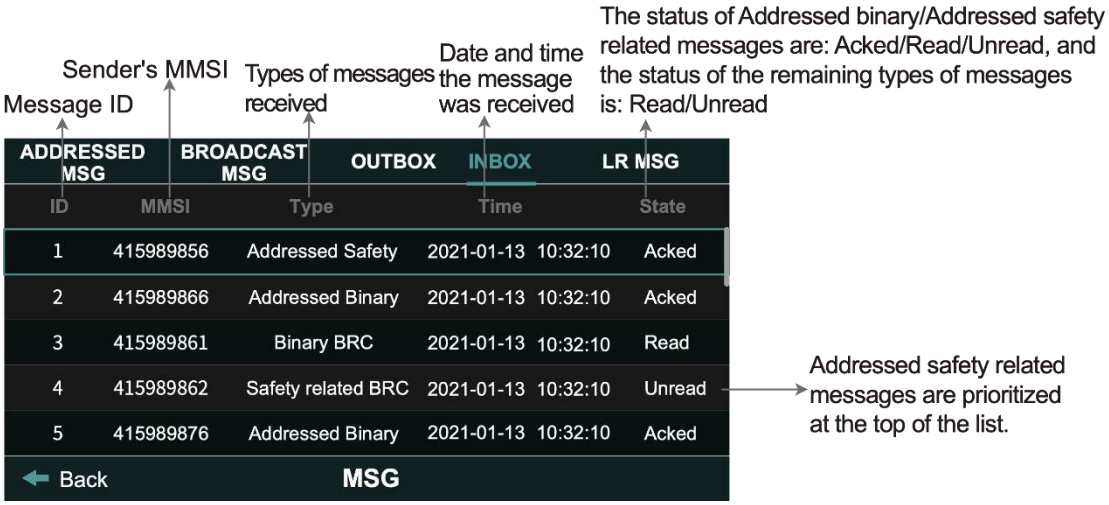
Touch operation:

Select one of the messages in the outbox and long press the touch screen to bring up 〖Multi-

Checkbox〗, click one or more 〖Multi-Checkbox〗, click 〖Delete〗 to delete the selected message, or click 〖Back〗 to go back to the previous page.



4.4.5 INBOX



- **Overview&Page Layout**

Messages in the inbox can be saved to prevent them from being deleted by the user, and all messages are cleared after restarting after switching off the computer.

The security address and security broadcast can display 100 messages, and other messages can display 100 messages. If a new message is received after the limit is exceeded, the first message received will be replaced.

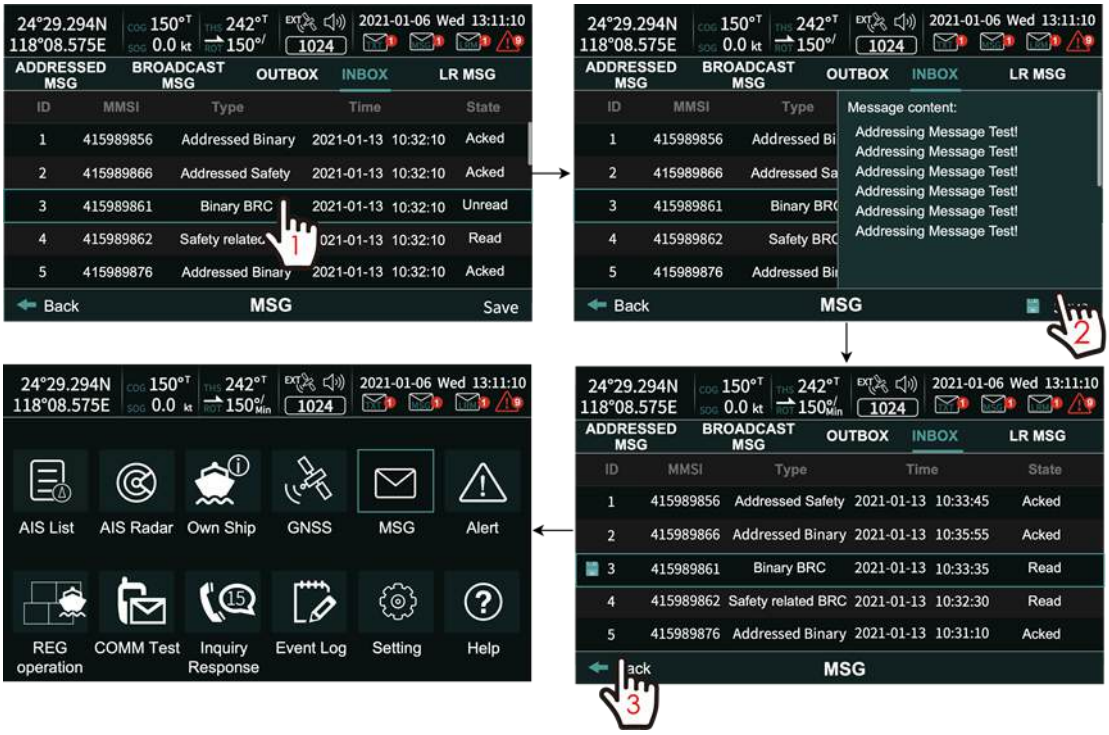
The principle of replacing messages of the same type is adopted, that is, security-related messages are replaced by security-related messages, and other types of messages are replaced by other types of messages. Security-related messages have priority over security broadcast messages. Saved messages cannot be replaced.

Messages with the same source (sender) and content should be replaced with existing messages, with the status restored to 'unread' and the date/time updated to the latest received date/time.

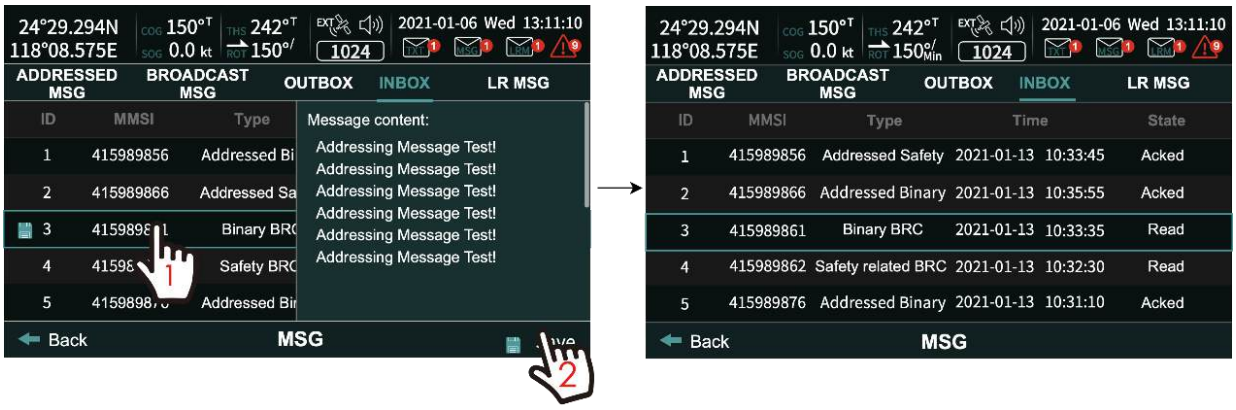
- **Save/Cancel Save Message**

Touch Operation:

Save Message: Click touch screen to select a message, as the following figure '1', it will show the message content, then click touch screen 〖Save〗 as the following figure '2', it will show the message list after saving, and the saved icon will be shown in front of the ID number of the message. Click 〖Back〗 to return to the main menu.



Cancel save message: Click touch screen to select a saved message, as in Figure 1 below, it will show the message content, then click 〖Cancel〗, it will return to the Inbox list, and the storage icon in front of the ID number of the message will disappear. You can also click save icon in the list to cancel saving.



Keyboard Operation：

Cursor selects a message, press 【ENT】 key to display the message content, press 【direction】 key, cursor selects 〖Save〗, press 【ENT】 key to display the message list, and the saved icon will be displayed in front of the ID number of the message.

Cursor selects a saved message, press 【ENT】 key to display the message content, press 【Direction】 keys, cursor selects 〖Cancel〗, press 【ENT】 key to display the message list, and

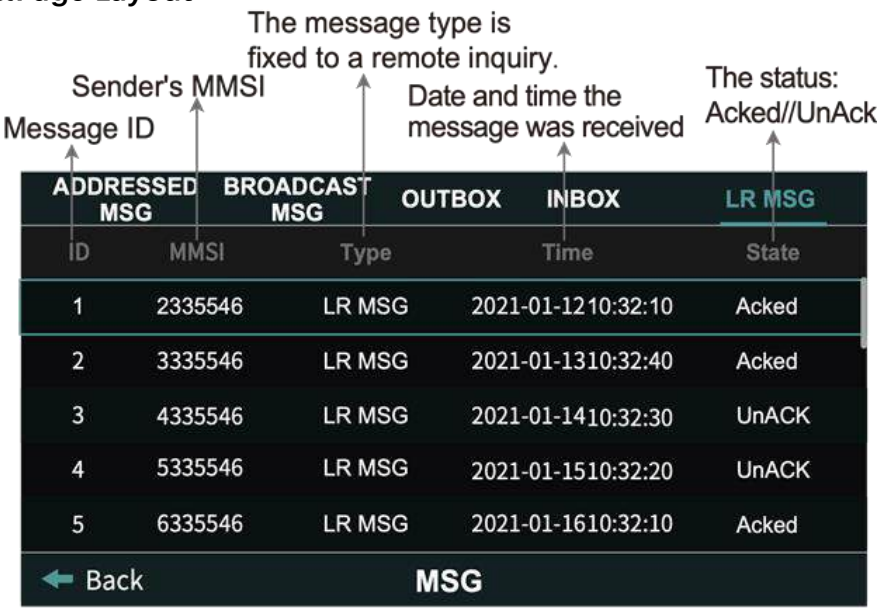
the saved icon disappears in front of the ID number of the message.

- **Delete Message**

Deleting a message is the same as in 'Delete single message 'and 'Batch Delete messages 'in the Outbox.

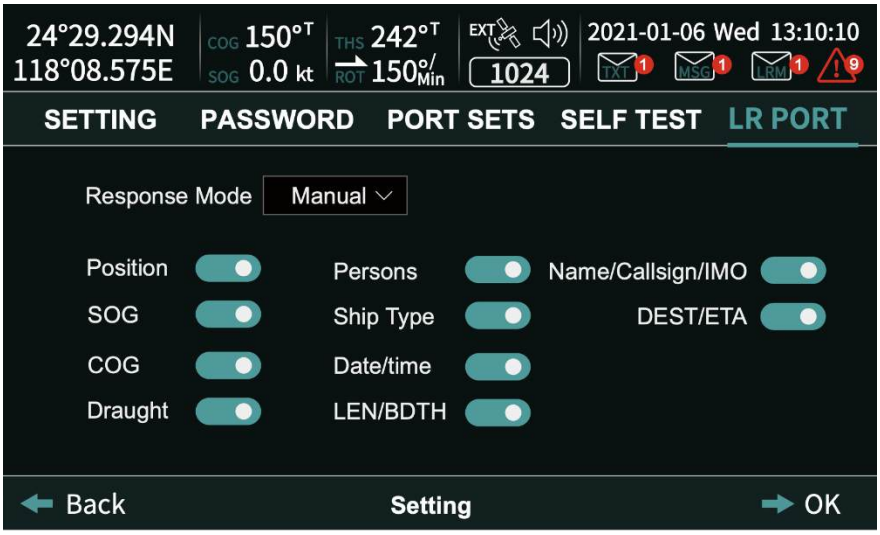
4.4.6 Long Range Message

- **Overview&Page Layout**



- **Long Range interface configuration**

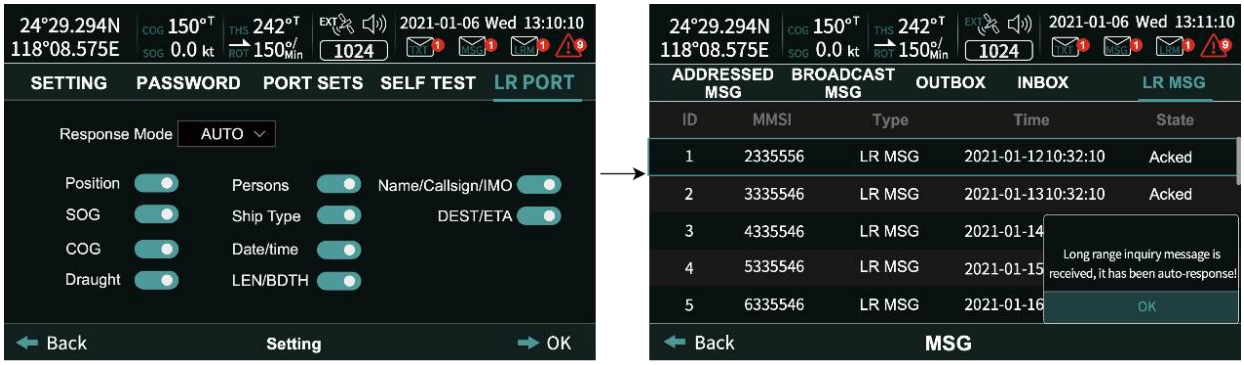
Enter 〖LR Port〗in 〖Settings〗, you can set 〖Response Mode〗to 'Auto' or 'Manual'. Parameter option under 'Response Mode', turn it on to allow replying and outputting from remote interface; turn it off to disallow replying and outputting from remote interface.



- **Long Range Message Auto-Response**

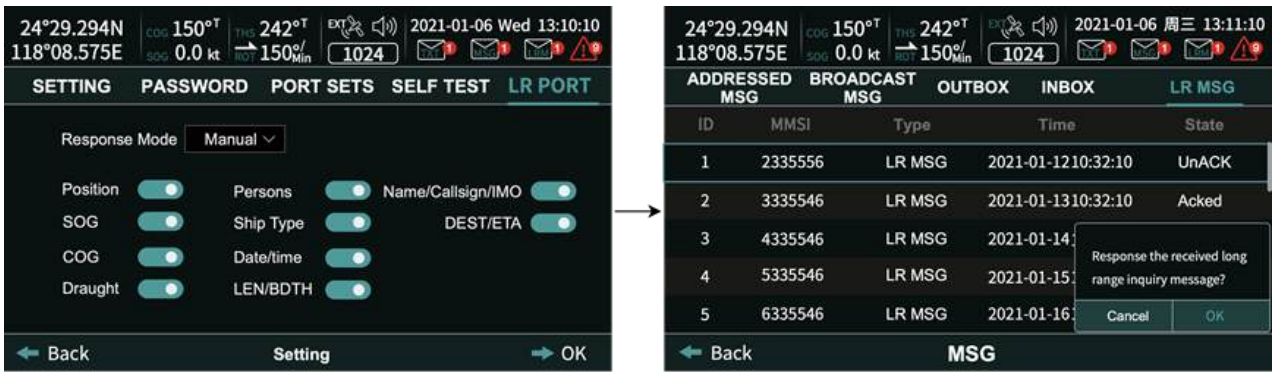
The following figure is set as auto-response, after the response parameter are turned on, a pop-up box will be displayed when long range message is received, "Long range inquiry

message is received, it has been auto-response!" Click〖OK〗 to close the popup box. The status of the received long range message is "Response".



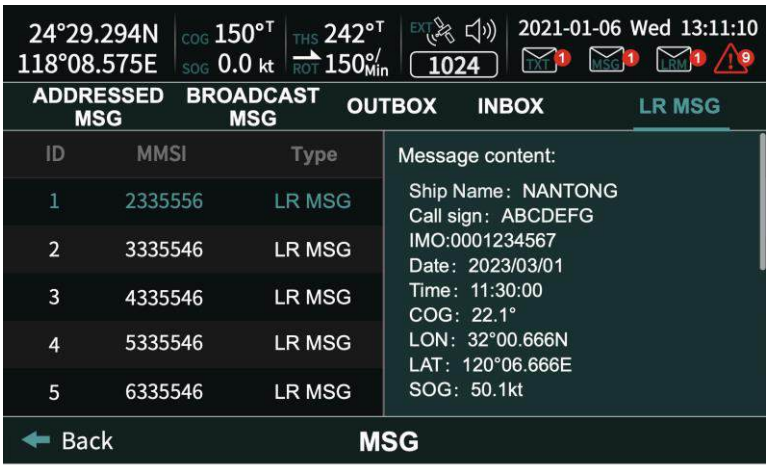
- **Long Range Message Manual-Response**

The following figure is set as manual response, after the response parameters are turned on, the long range message received pops up a prompt box "Response the received long range inquiry message?" Click〖OK〗 to response,, the status of the received long range message will be "Response". If you click〖Cancel〗, the answer will be empty.



- **View Long Range Message Content**

Touch and click a message in the long range message list, or select a message with the cursor, press【ENT】key, the message content will be popped up on the right side, as shown in the following figure.



- **Delete Long Range Message Content**

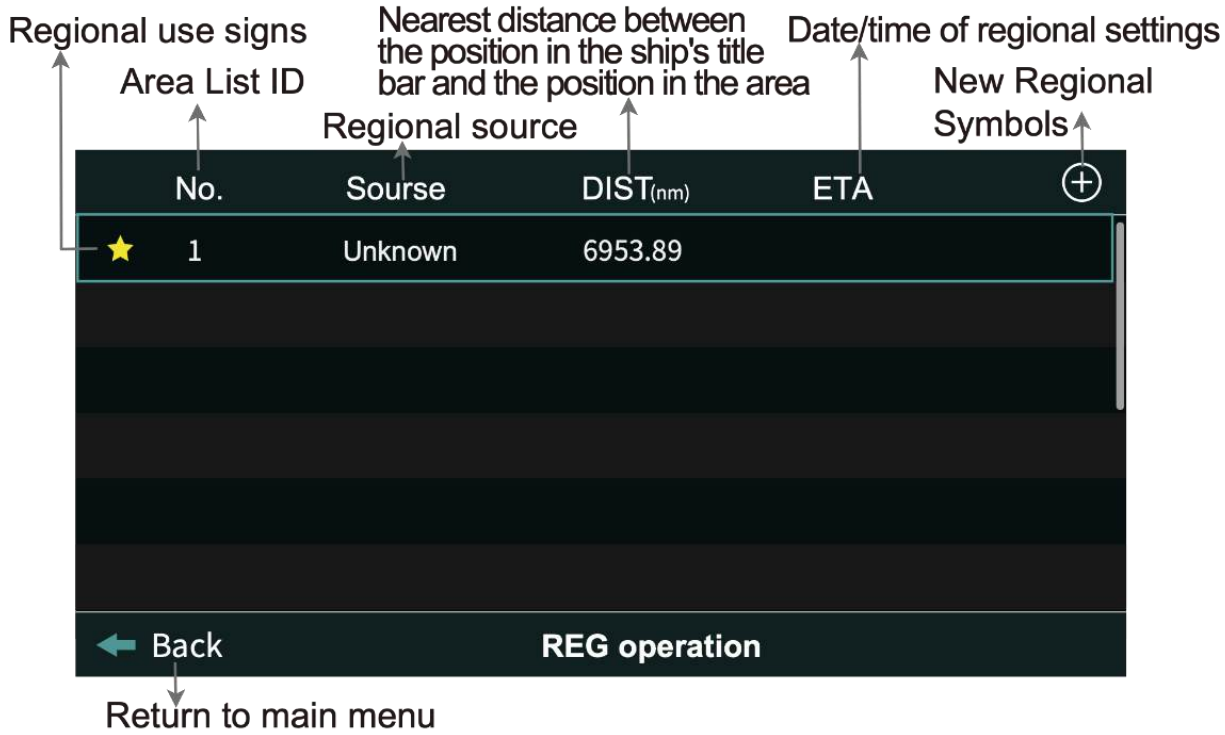
Deleting long range messages is the same as “Delete single message” and “Batch Delete messages” in Outbox.

4.5 Area Settings

4.5.1 Area List

- **Page Layout and Function Overview**

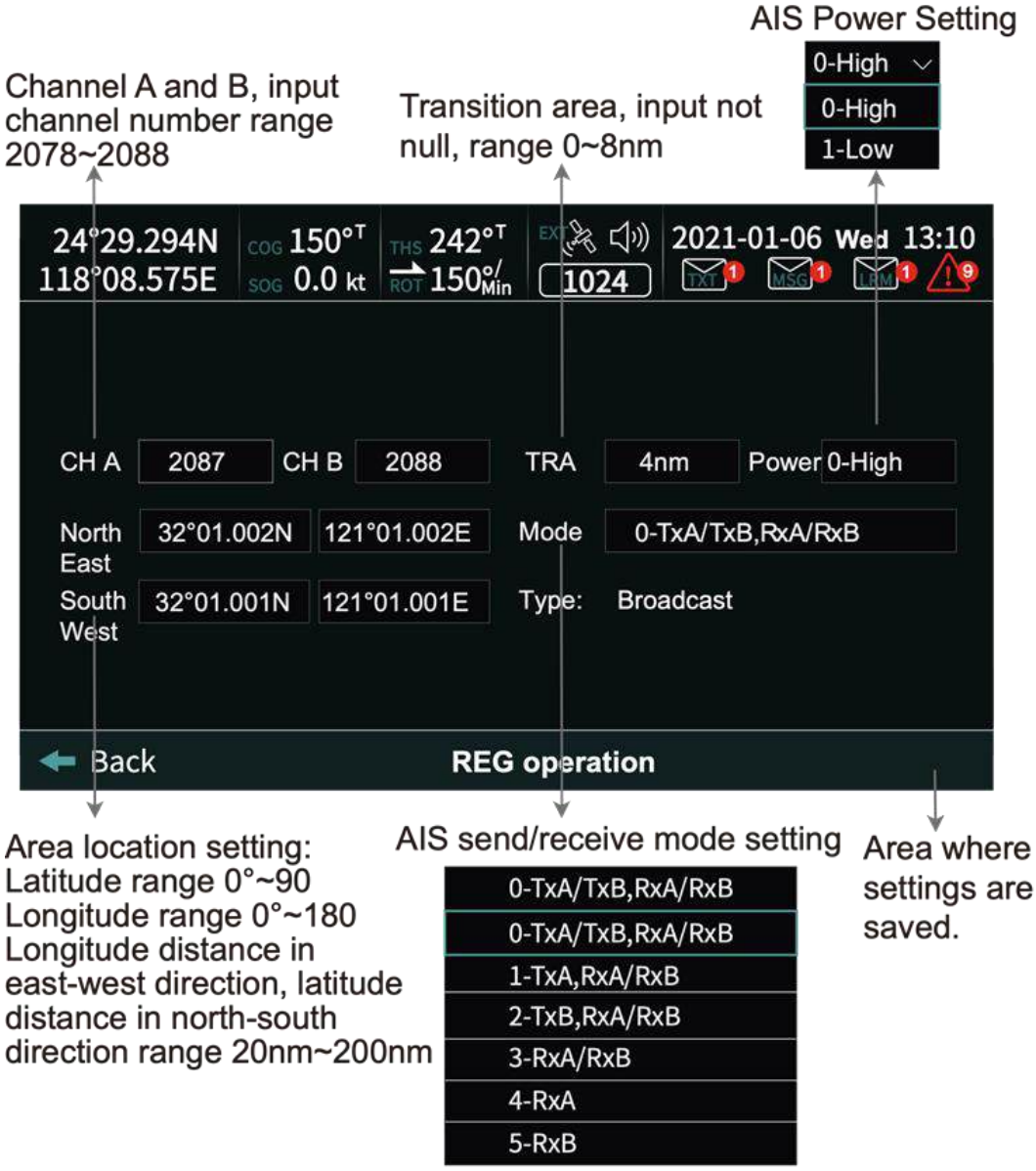
Area setting is done by setting up an area in which the AIS equipment transmits and receives according to the parameters set in the area. New zones can be added by MKD manual setting, message 22, DSC command, shipboard system, and the successfully set zone is stored for 24h.



4.5.2 Creating New Areas

- **Page Layout and Function Overview**

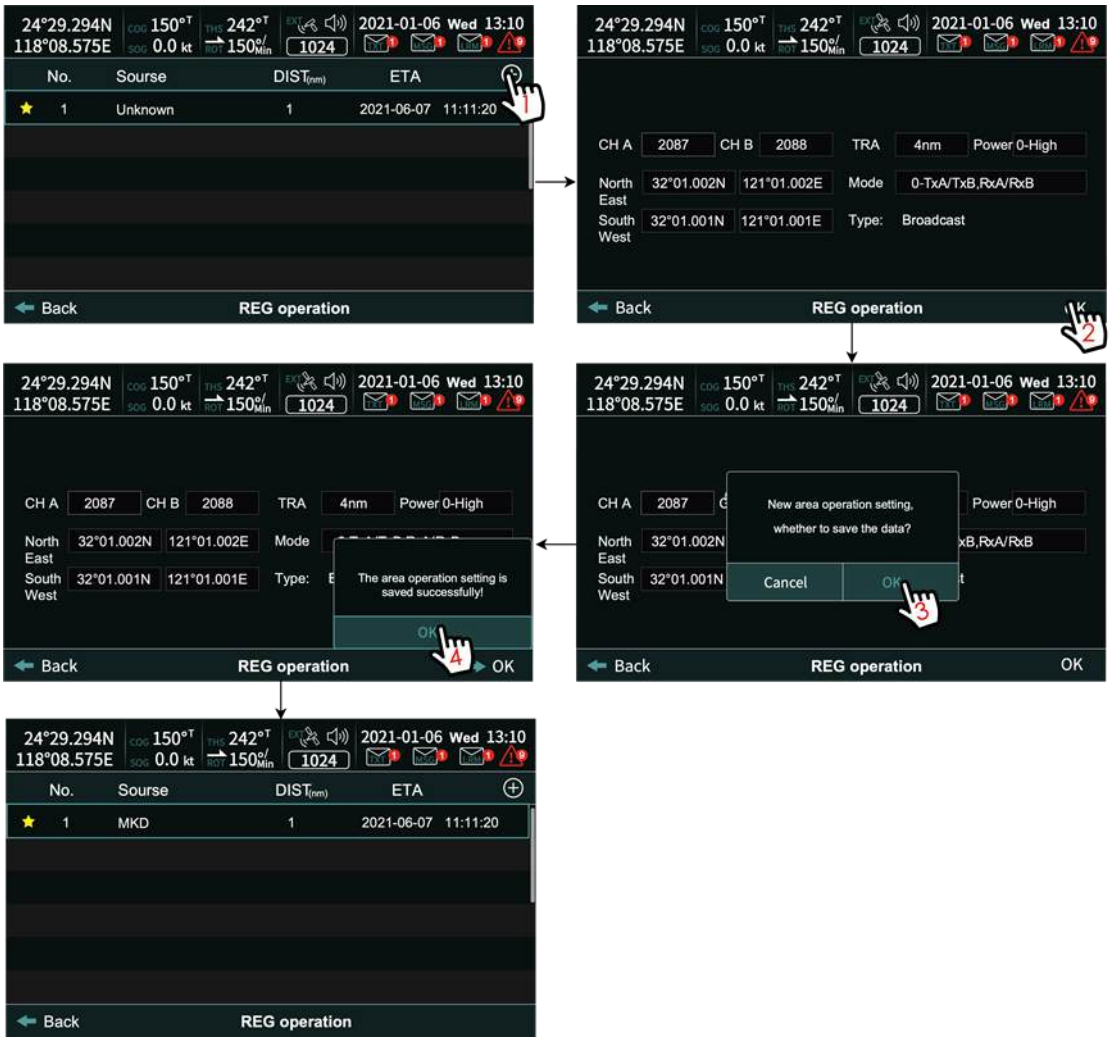
Users can manually add new areas according to MKD, and the parameter settings are as follows:



- **Instructions for creating a new area**

Touch Operation:

Click the symbol of 〖New Area〗 to enter the page of new area, click to edit the parameter value of area setting, and then click 〖OK〗 , it will pop up the prompt message "New area operation setting, whether to save the data", then click the prompt box of 〖OK〗 to pop up the prompt message "The area operation setting is saved successfully! ", click 〖OK〗 in the prompt box again to enter the region list. The operation is shown in the following figure:



Keyboard Operation:

Press the 【∧】 key to select the 〖Add Region〗 symbol. Press 【ENT】 to enter the Add Region page. Select the [Channel A] input field. Press 【ENT】 to bring up the keyboard. Click the 【<】【>】 keys to move the cursor within the input field.

Press the 【∨】 key to position the cursor on the first character in the keyboard. Use the 【Arrow】 keys to select a keyboard value, then press 【ENT】 to enter the parameter value into the input field.

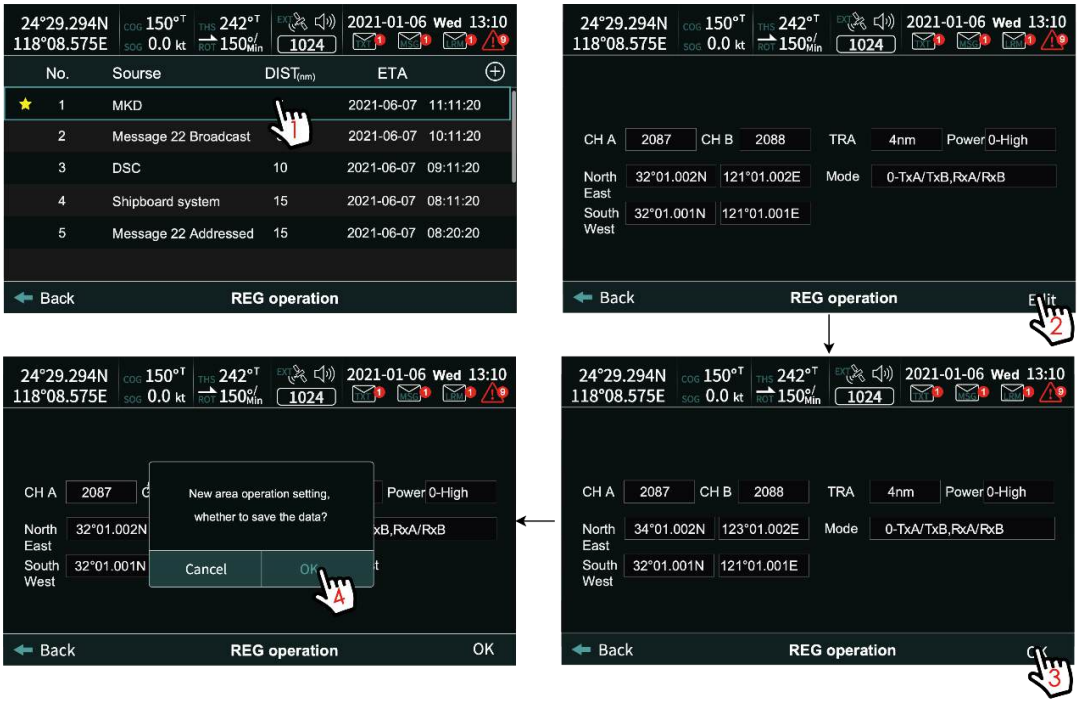
Press the 【BACK】 key to close the input method and exit parameter editing mode.

Briefly press the 【∧】【∨】 keys until the cursor selects 〖Confirm〗 . Press the 【ENT】 key to display the prompt “New region operation settings added. Save data?” Press the 【>】【∧】

keys to move the cursor to 〖Confirm〗 in the prompt box. Press the 【ENT】 key to successfully add the region to the list. Keyboard operations are illustrated below:

4.5.3 Viewing Area Details and Editing

The areas in the area list can be viewed with detailed area information, and you can re-edit the area, the operation steps are shown in the following figure, the operation of editing the area is the same as the operation of adding a new area, refer to 4.5.2.



4.6 Inquiry Response

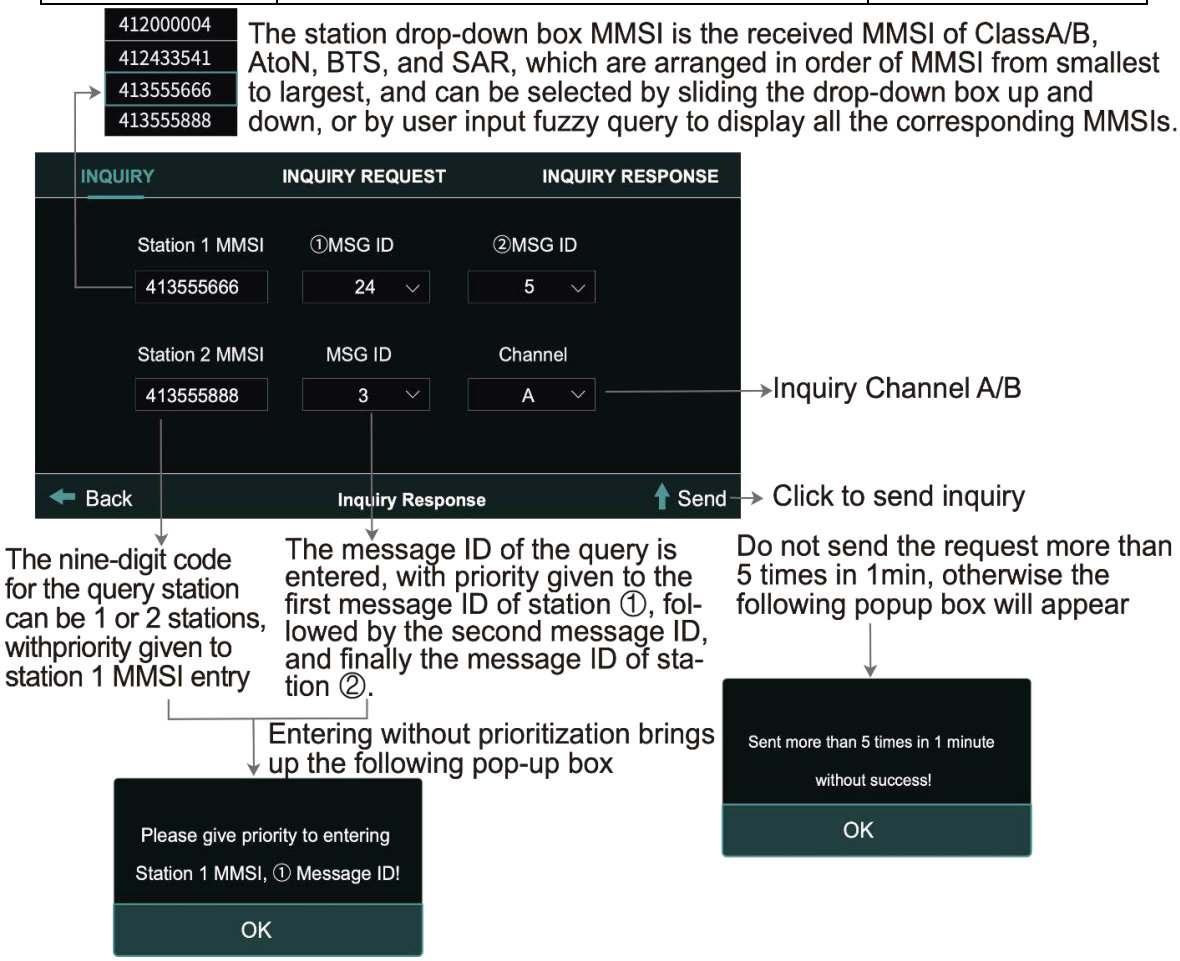
4.6.1 Initiating Inquiries

- **Page Layout and Function Overview**

The user can ask for single/two messages from one AIS device and one message from another AIS device, or three messages from one AIS device. This station can also answer automatically when it receives a message query from another station.

The message IDs corresponding to each type of station that can be interrogated are shown below:

Station Type	Message ID of the message being interrogated	Note
ClassA	Message 3, Message 5, Message 24	Query Class B message 18 must be accompanied by Query message 24.
ClassB	Message 18, Message 19, Message 24	
base stations	Message 4, Message 24	
AtoN	Message 21	
SAR aircraft	Message 9, Message 24	



- **Operating Instructions**

Touch operation:

Click the touch screen 〖Station 1 MMSI〗 to select an MMSI through the drop-down box, click the touch screen ①Message ID〗 to select the message ID you want to inquire, click ②Message ID〗 to inquire the message ID, click the touch screen 〖Send〗 to send an inquiry message.

Keyboard Operation:

Use the cursor to select 〖Station 1 MMSI〗, press the【ENT】key to display a dropdown menu showing received MMSI numbers while simultaneously bringing up the keyboard. Press the【∧】key to select a previously received station MMSI;

Alternatively, highlight 〖Station 1 MMSI〗, press【∨】to select the first entry in the keyboard list. Use the arrow keys to navigate the list, then press【ENT】to input the selected entry into the field;

Press【BACK】to exit editing mode;

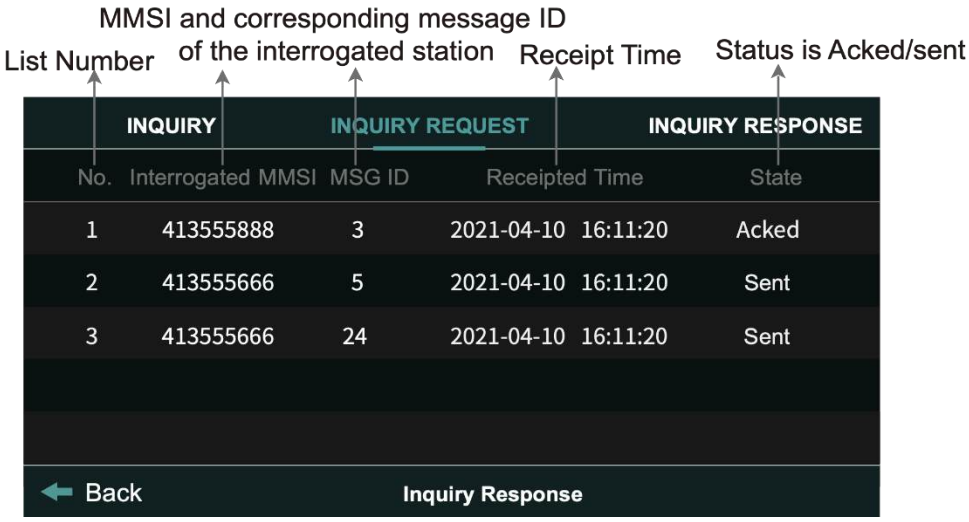
Press the【>】key to highlight ① Message ID. Press【ENT】to open the Message ID dropdown menu. Use the [Arrow] keys to select the desired Message ID, then press【ENT】to input it.

Press the【∨】【>】keys to highlight 〖Send〗, then press the【ENT】key to send an inquiry message;

Or press the【∨】key to highlight 〖Return〗, then press the【ENT】key to return to the main menu.

4.6.2 Inquiry Request List

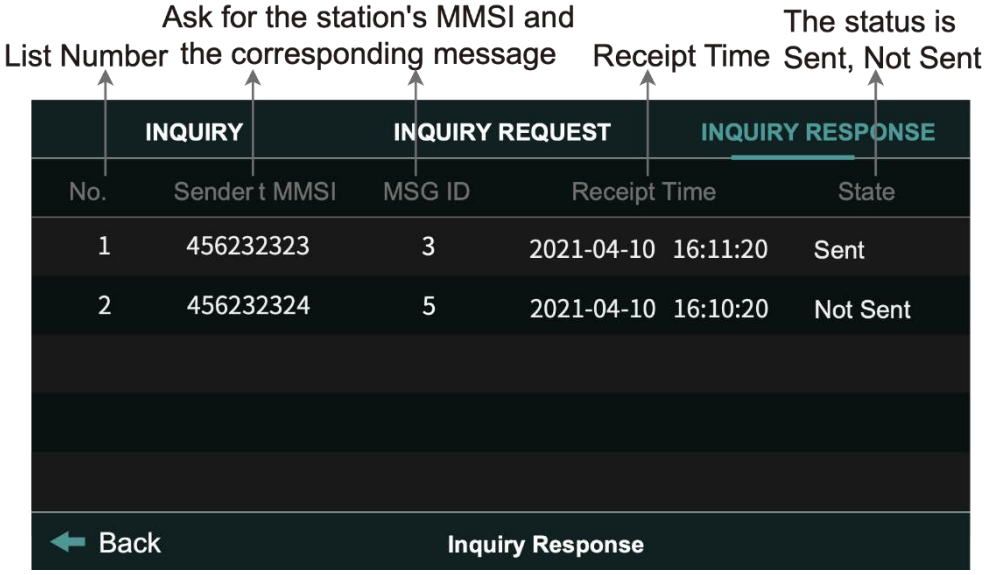
The inquiry request information is displayed in the 〖Inquiry Request〗 list, sorted by the inquiry time, and the latest request is displayed at the top.



4.6.3 Inquiry Response List

The list of responses to inquiries received by this unit is sorted by the time of receipt, and the

latest response is displayed at the top



4.7 Help

- **Check the Manual**

The electronic instruction manual is displayed after entering, and the details of the manual can be viewed by tapping the touch screen and swiping up and down or pressing the up and down 【∧】【∨】 keys.

- **Instruction Manual Update**

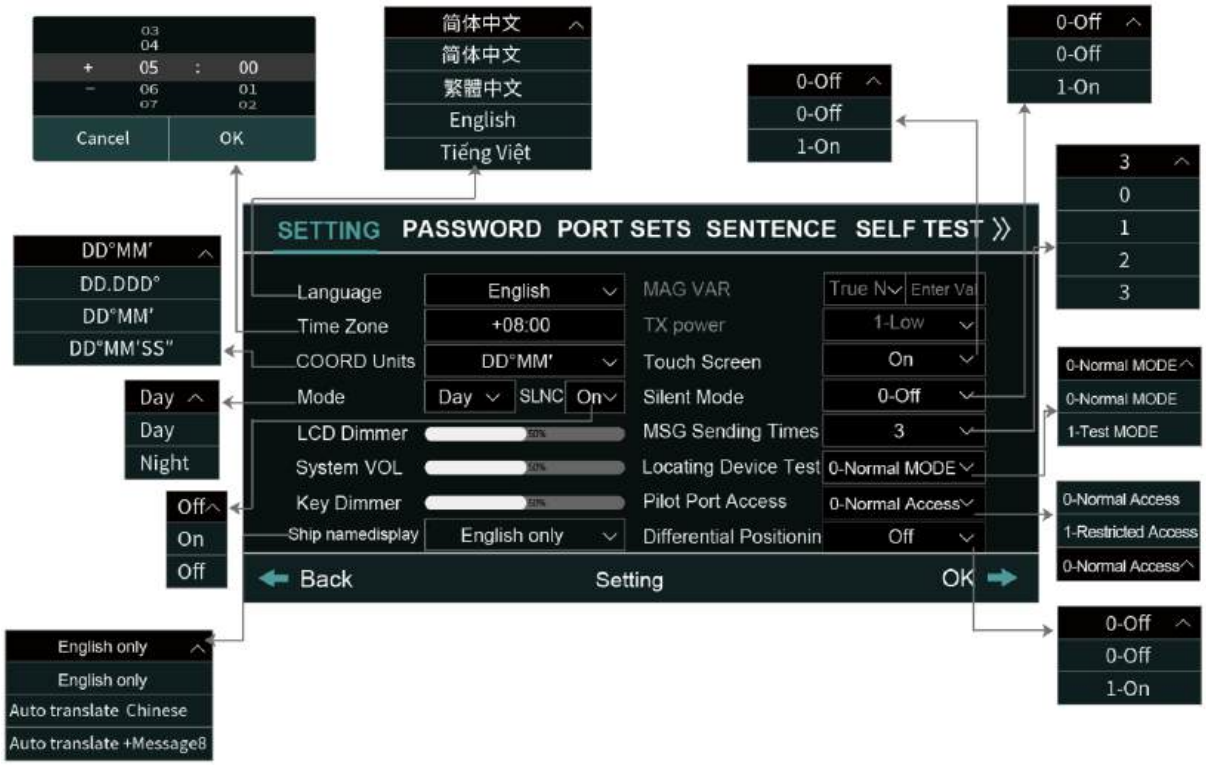
Place the PDF files of English manual, Chinese manual, and traditional manual into the config folder with the file names guide_en, guide_zh, and guide_zh_hant respectively, and compress the zip file with ZIP suffix, place it into the root directory of the USB flash disk or TF card, and then update it automatically after inserting the USB flash disk or TF card.

5 System Setup

5.1 General Settings

5.1.1 General Settings

General settings primarily include system language, time zone, coordinate units, mode switching, volume, brightness, and message transmission-related configurations. Mode switching supports automatic adjustment between day and night modes based on time. For example, in the UTC+8H (Beijing Time) time zone, 6:00 AM to 6:00 PM is daytime mode, while 6:00 PM to 6:00 AM is nighttime mode. Specific settings are shown below:



5.1.2 Operating Instructions

- **Drop-down Box Related Settings**

Touch operation:

The settings that will take effect directly after setting are: 〖Language〗, 〖Coordinate Unit〗, 〖Mode Switching〗and 〖Mute〗. These settings can be modified according to your needs by selecting the corresponding choices in the drop-down box.

The operations that need to be confirmed to take effect after setting are: 〖Silent Mode〗, 〖Message Retransmission Count〗and 〖Location Device Test〗, these settings can be

modified according to your needs by selecting the corresponding choices in the drop-down box and clicking〖OK〗in the lower right corner.

After configuration, one item requires confirmation via the dialog box:〖Touchscreen〗.

To disable touchscreen: Click the dropdown menu, select〖Off〗. A dialog box will appear: "Are you sure you want to disable the touchscreen? Touchscreen functionality will be unavailable after disabling!" Click〖OK〗to disable the touchscreen feature.

Enable Touchscreen:

Method 1: Press the【Direction】keys to move the cursor to the〖Touchscreen〗dropdown menu. Press【ENT】, then use the【Direction】keys to select〖On〗. Press【ENT】again to enable the touchscreen function.

Method 2: Tap any location on the screen five times consecutively. A prompt will appear: "Touchscreen function is disabled. Re-enable?" Press【ENT】to enable the touchscreen function.

Key Operations:

Operations not requiring a password: Use the【Direction】keys to select the display box, then press【ENT】to open the dropdown menu. Use the【∧】【∨】keys to select the desired setting, press【ENT】to confirm. For settings requiring "Confirm," use the【Direction】keys to select the bottom-right〖Confirm〗, then press【ENT】to complete the setting.

Operations Requiring Password Input: Use the [Direction] keys to select "Navigation Interface Access," press【ENT】to display the dropdown menu. Use the【∧】【∨】keys to select the desired mode, then press【ENT】. Use the [Direction] keys to select〖Confirm〗, press【ENT】to display the keyboard. Enter the password using the [Direction] and【ENT】keys. Press【BACK】to exit the keyboard, move the cursor to〖Confirm〗, and press【ENT】to complete the setting. One setting requires confirmation via dialog box:〖Touchscreen〗.

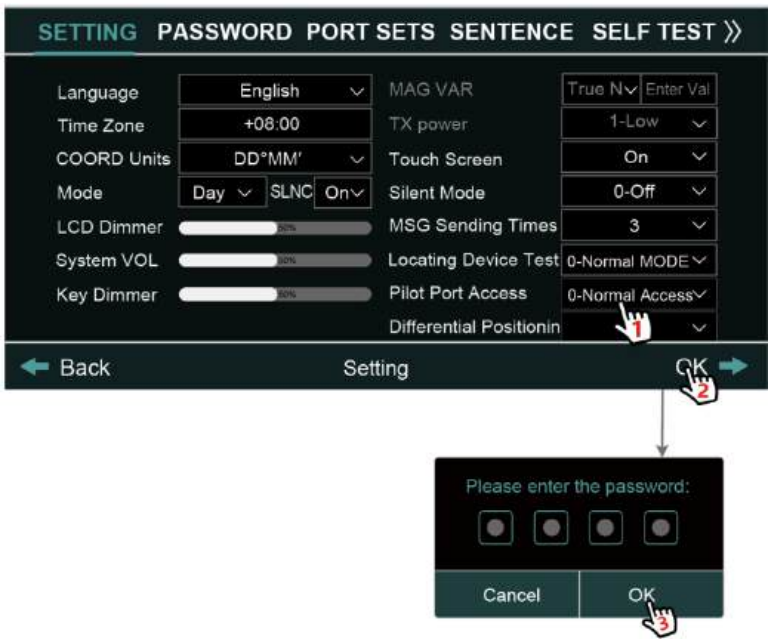
Disable Touchscreen:

Use the【Direction】keys to select the〖Touchscreen〗dropdown menu. Press【ENT】and use the【Direction】keys to select〖Off〗. A dialog box will appear: "Are you sure you want to disable the touchscreen? The touchscreen will be inoperable after disabling!" Use the cursor to select〖OK〗, then press【ENT】to disable the touchscreen.

Enable Touchscreen:

Method 1: Use the [Direction] keys to select the 〖Touchscreen〗 dropdown menu. Press【ENT】 and use the 【Direction】 keys to choose 〖On〗 . Press【ENT】 to enable the touchscreen.

Method 2: Tap any location on the screen five times consecutively. A dialog box will appear: "Touchscreen function is disabled. Re-enable?" Press【ENT】 to enable the touchscreen.



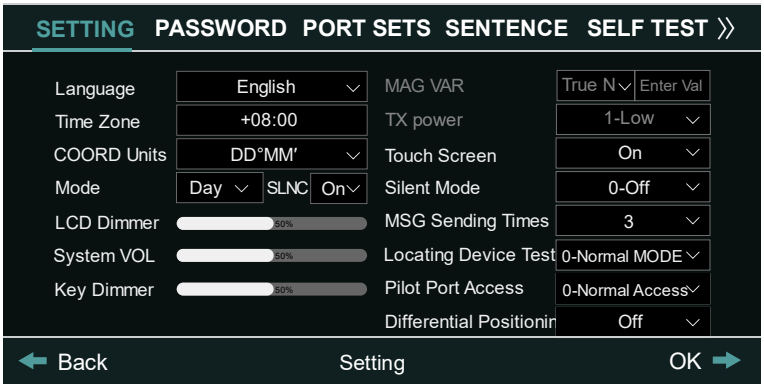
- **Progress Bar Related Settings**

Touch operation:

The settings of 〖System Volume〗 and 〖Key Brightness〗 can be modified in real time by holding the progress bar and sliding left and right with your finger.

Keyboard Operation:

Setting of 〖System Volume〗 and 〖Key Brightness〗 , select the progress bar by【Direction】 key, press【ENT】 key to edit the progress bar, and adjust the setting by【<】【>】 key, short press to adjust 1% each time.

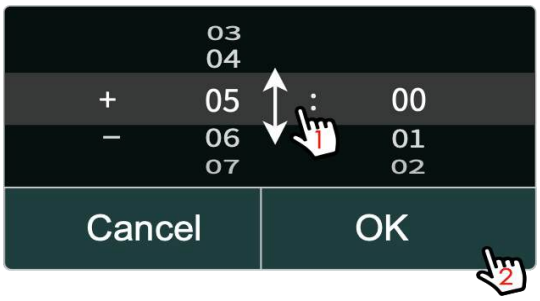


- **Time Zone Settings**

Touch operation:

After clicking the time zone display box, the setting box will pop up, slide up and down to select

the value of time zone, click 〖Confirm〗 in the pop-up box to return to the 〖General Settings 〗 interface, as shown below:



Keyboard Operation:

After selecting "Time Zone" by 【Direction】 keys, press 【ENT】 key to pop up the setting box, select "+ , -" by 【∧】【∨】 keys, press 【>】 key to select "Time", 【∧】【∨】 keys to adjust "Time"; press 【>】 key to select "Minute", 【∧】【∨】 to adjust "Minute", and press 【ENT】 to complete the setting.

5.1.3 Description of Settings

- **Silent Mode**

0-Off: The AIS transponder can send messages normally and transmit sailing information at regular intervals;

1-On: The AIS transponder is in a non-transmitting state and can only receive information transmitted by other AIS.

- **Positioning Device Testing**

0 - Normal Mode: the MKD displays only valid positioning devices, not those under test;

1 - Test Mode: MKD displays the active positioning device and the positioning device under test.

- **Pilot Interface Access**

0 - Normal Access: same function as MKD ports and ECDIS ports.

1-Access Restricted: Supports only the output of ROT, HDT, and THS statements poured in at the sensor port, the input of EPV statements with attribute value 117, and statements beginning with SSA.

- **Number of Information Retransmissions**

The number of times the addressing message will be re-sent if no answer is received. For example, if you set the number of retransmissions to 3, if you send an addressing message to other AIS, the addressing message will be automatically sent 3 times to each of the current transmitting channels when no answer is received, and the interval between each transmission is within 4s.

- **Differential Positioning Mode**

Off: If the device receives a differential positioning message, it will not process it and will only use standard positioning methods.

On: After receiving a differential positioning message, the device will utilize this differential message for positioning.

- **Ship Name Display**

English Only: The ship name column in the "AIS List" is displayed according to the received English ship name.

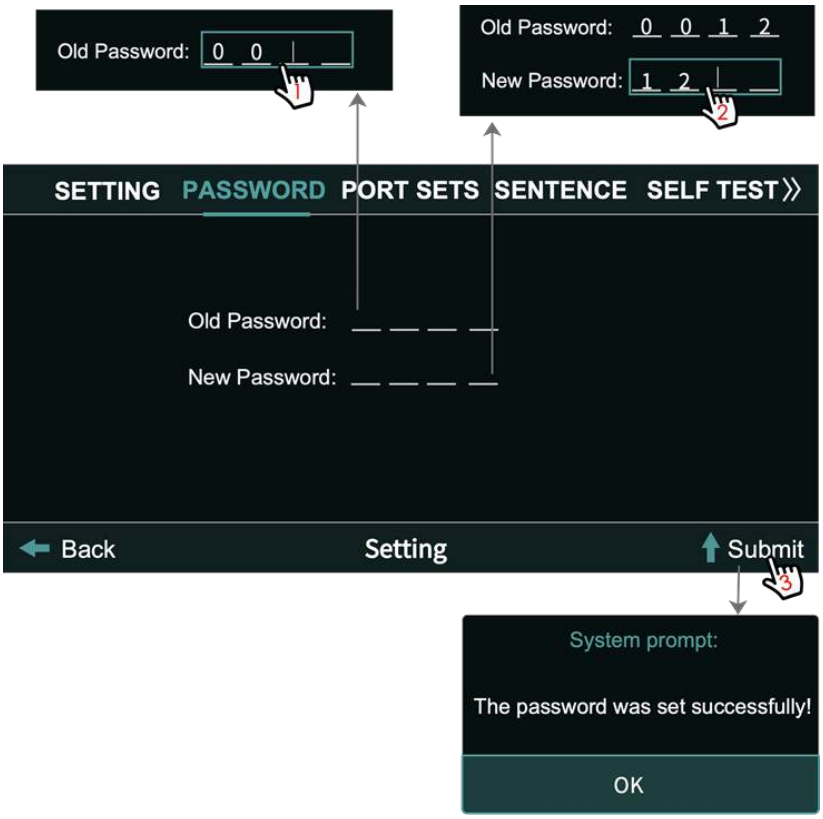
Auto translate Chinese: The ship name column in the "AIS List" is displayed according to the Chinese ship name automatically translated by MKD.

Auto translate + Message 8: The ship name column in the "AIS List" is updated to the corresponding ship name according to the Chinese ship name automatically translated and after receiving Message 8.

5.2 Password Settings

5.2.1 Page Layout and Function Overview

In the password setting interface, users can modify the password according to the demand, the factory default password please contact the manufacturer to get it.



5.2.2 Operating Instructions

Touch operation: The procedure is shown in the figure above;

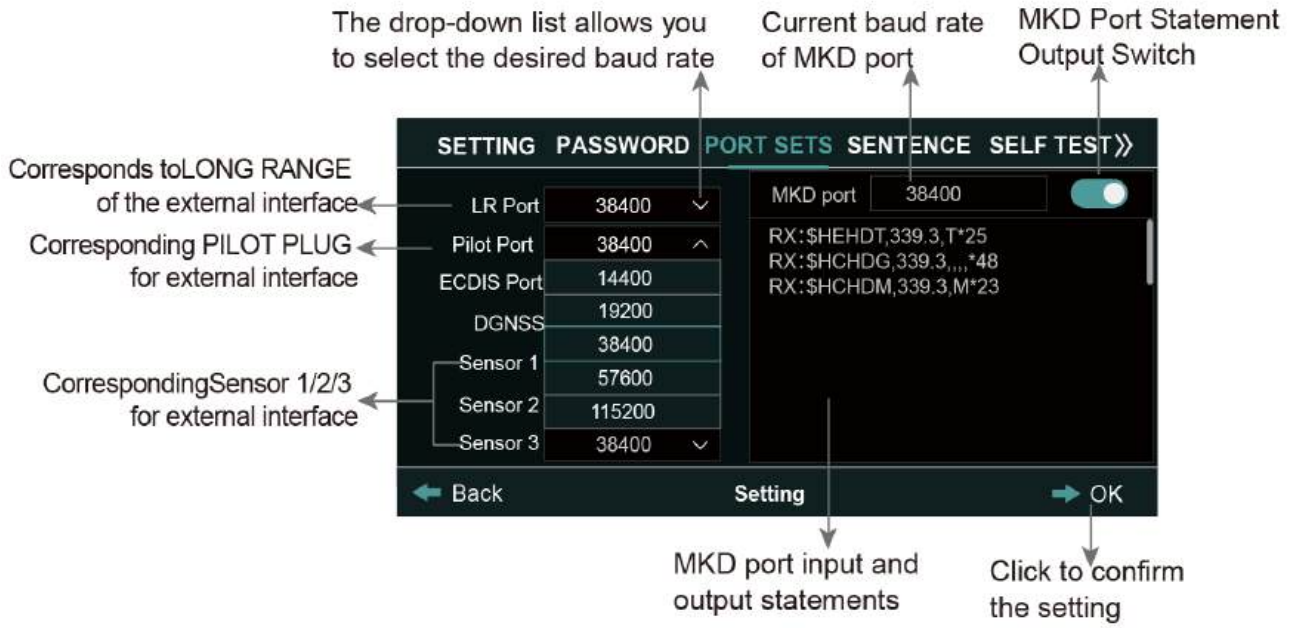
Keyboard Operation:

By the【direction】keys, move the cursor from the title bar to the "old password" input box, press the【ENT】key to input the original 4-digit password through the input method; press the【BACK】key to put away the keyboard, through the【direction】keys to select the "new password" input box, the new password setup is complete, then press the【ENT】key to select〖Submit〗, the password change success prompt box. After the new password is set, select〖Submit〗by【Direction】keys, press【ENT】key, the password modification success prompt box.

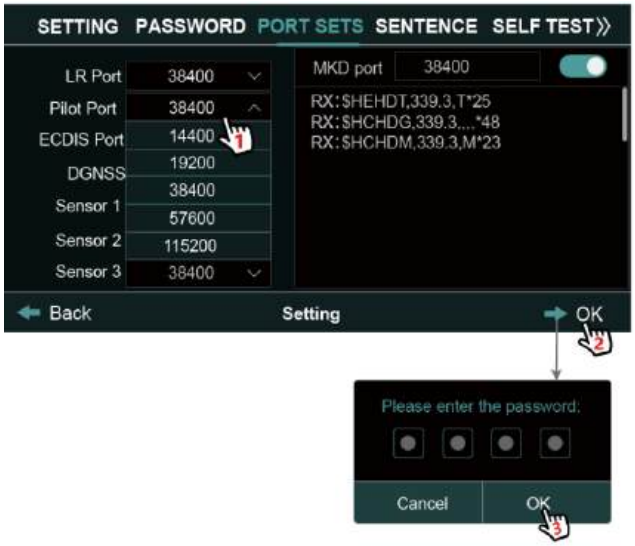
5.3 Port Settings

5.3.1 Page Layout and Function Overview

This interface allows configuration of the remote port, pilot port, ECDIS port, DGNSS port, Sensor 1/2/3, and the baud rate for communication between the MKD and host ports. It also enables monitoring of statements transmitted and received via the MKD port. Note: The baud rate for the three DATA OUT ports in the host's external interfaces matches that of the ECDIS por.



5.3.2 Operating Instructions



- **Setting the Port Baud Rate**

Touch operation:

As shown in the figure below, select the corresponding option in the drop-down box, click〖OK〗, enter the password and then click〖OK〗to complete the modification.

Keyboard Operation:

Select the port you need to modify the baud rate by【Direction】key, press【ENT】key to pop up the drop-down box, select the baud rate you want to set by【∨】【∧】key and press【ENT】key,【Direction】keys to select〖OK〗in the lower right corner, press【ENT】key to input the password and then press【ENT】key to complete the setup again.

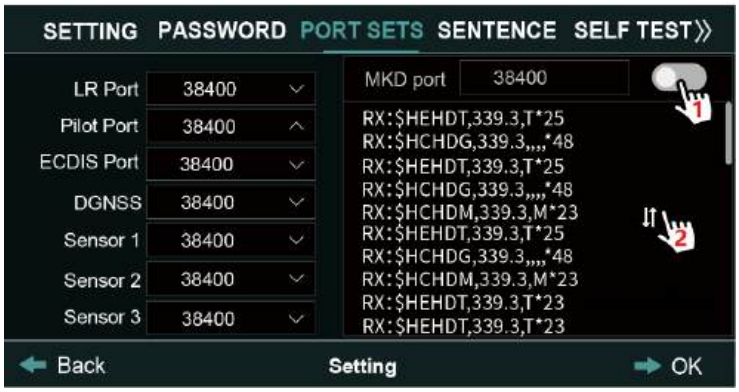
Please note the following operating instructions:

1. Multiple serial port baud rates can be set simultaneously. Once confirmed, save them collectively. After successful saving, The host program will restart automatically. The startup time is approximately 20 seconds, during which no data input will be received.
2. The current baud rate for the MKD port is verified as the optimal setting to ensure communication stability and typically requires no adjustment. If modification is necessary, ensure the MKD and host are connected before synchronizing the baud rate settings on both devices. Failure to synchronize may cause communication interruptions or data transmission failures due to parameter mismatches.

- **Viewing MKD Port Data**

Touch operation:

The MKD port data reception switch defaults to the〖ON〗state. The window refreshes data in real time. Swipe the content panel up or down to view statements transmitted and received by the MKD port. Click the switch to〖OFF〗. The window stops refreshing and retains all currently received statements, preserving the latest 200 statements.



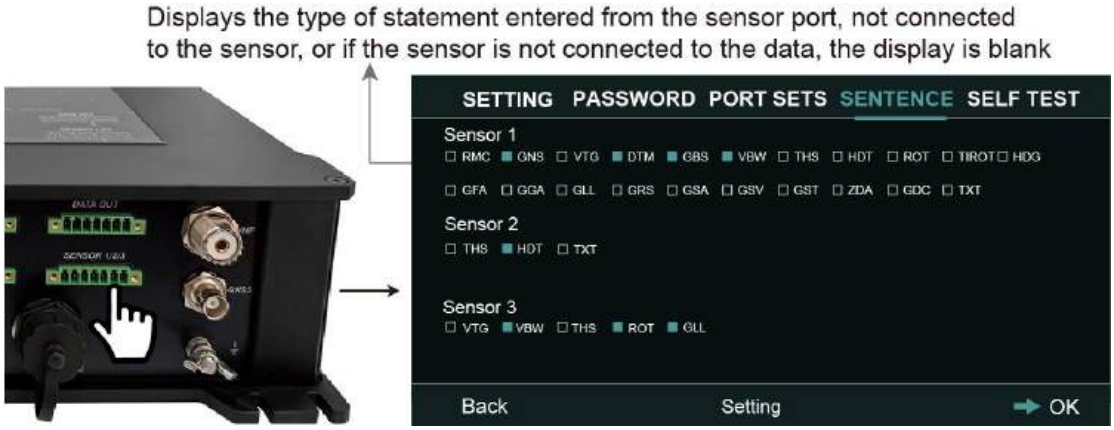
Keyboard Operation:

Use the【Direction】keys to move the cursor to the MKD monitoring port switch. Press the【ENT】key to toggle the switch state. When in the〖OFF〗state, the window stops refreshing. Press the【∨】key again to move the cursor to the data window. Press【ENT】to enter the MKD port monitoring window. Press【∨】【∧】to view transmitted and received statements. Press the【BACK】key to exit the data window.

5.4 Sensor Input Statement Configuration

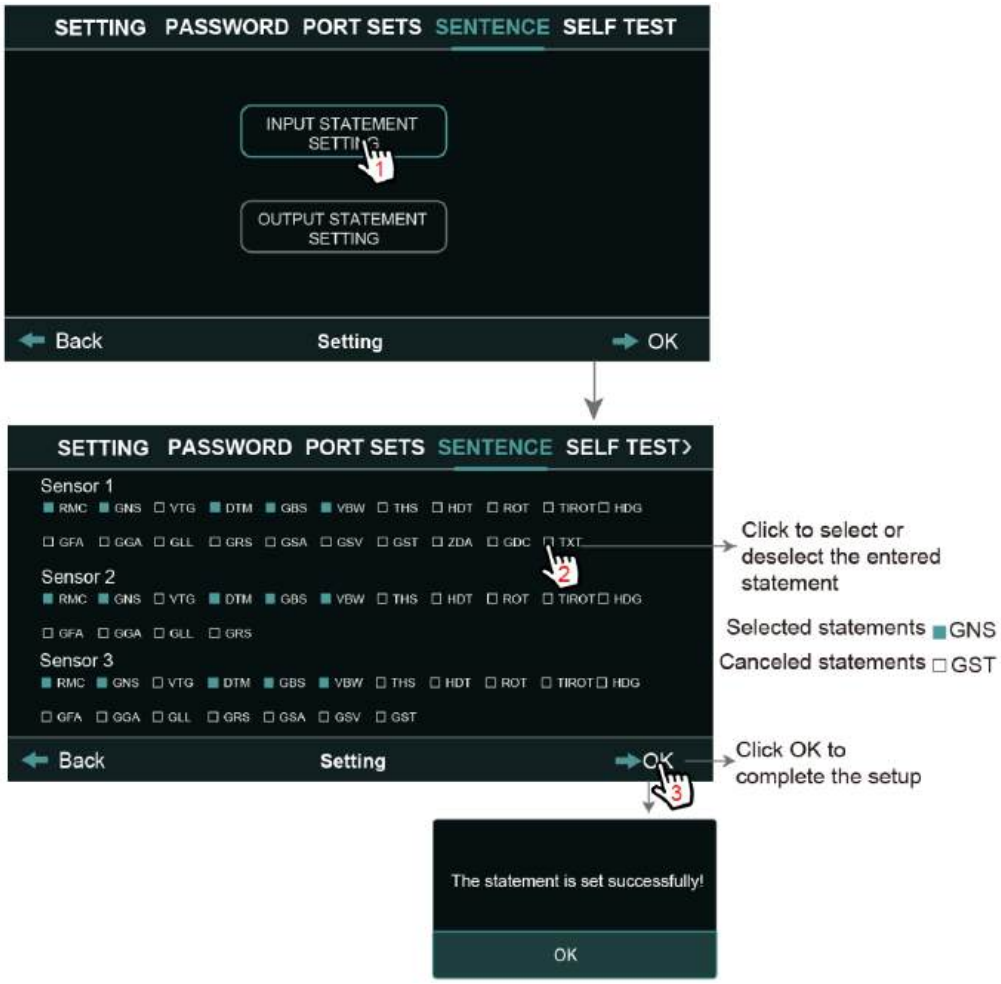
5.4.1 Page Layout and Function Overview

The Sentence Setup screen mainly displays the statements that are accessed to the Sensor 1/2/3 interface and selects the statement you want to use according to your needs.



5.4.2 Operating Instructions

Touch operation:



Keyboard Operation:

Enter the〖Input Statement Settings〗page. Use the【Direction】keys to select the statement you wish to configure. Press the【ENT】key to confirm or cancel the selected statement. Then use the【Direction】keys to highlight〖Confirm〗and【ENT】to complete the statement configuration.

Note: When 3 sensors have the same sentence input, only 1 sensor input can be selected for successful setup

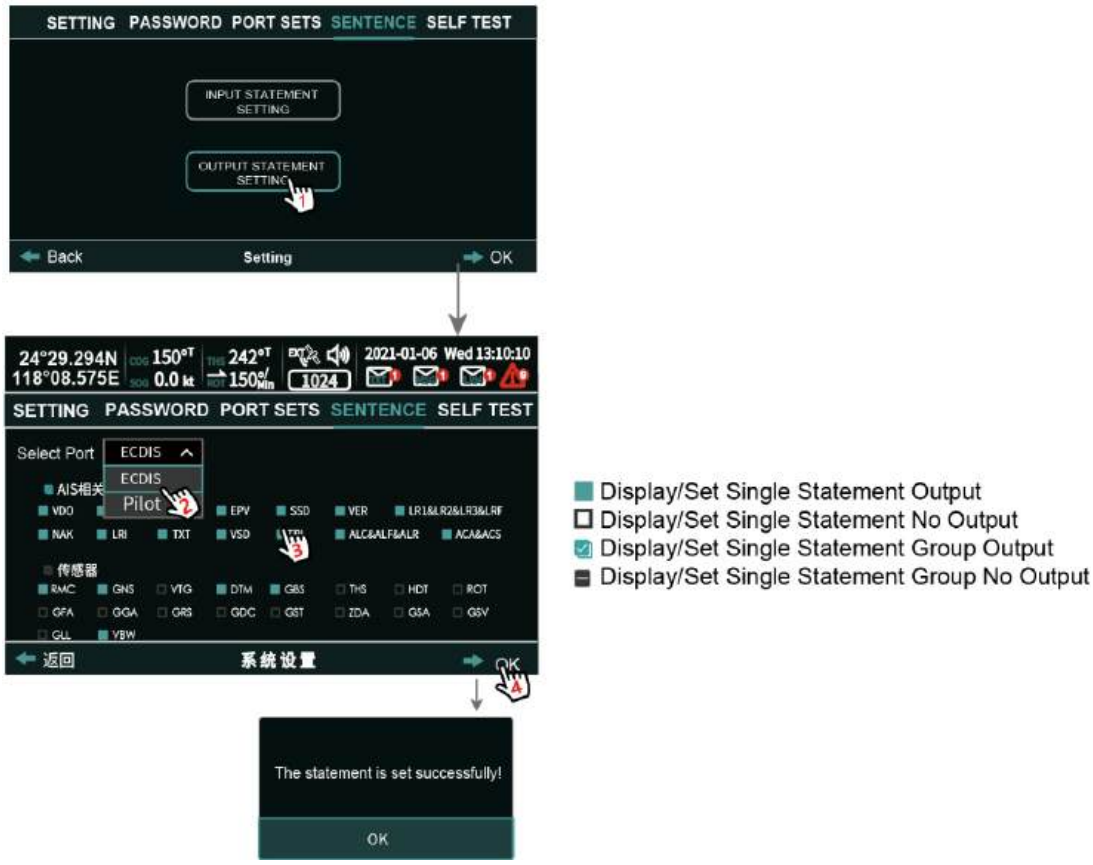
5.5 Output Port Statement Configuration

5.5.1 Page Layout and Function Overview

This page enables custom configuration of output statements for the device's “ECDIS Port” and “Pilot Port.” This facilitates tailored device data interaction and information transmission across diverse scenarios, ensuring port output precisely aligns with practical application requirements.

5.5.2 Operating Instructions

Touch Operation: As shown in the figure below



Key Operation:

Enter the 〖Output Statement Settings〗 page. Use the 【Direction】 keys to select the port to set, then press 【ENT】 to display the dropdown menu. Use the 【∧】【∨】 keys to select the desired port and press 【ENT】 to confirm. Use the 【Direction】 keys to select the desired statement (group). Press 【ENT】 to confirm or cancel the selected output statement. After selection, use the 【Direction】 keys to highlight 〖Confirm〗, then press 【ENT】 to complete the output statement type configuration for that port.

5.6 Long Range Broadcast Settings

5.6.1 Page Layout and Function Overview

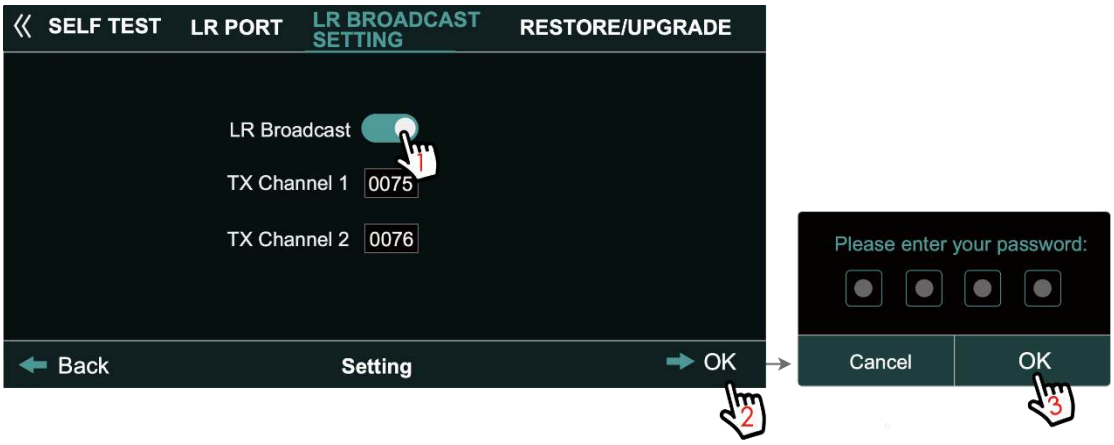
The AIS transponder will transmit message 27 every 3min on the set channel, default is channel 75(156.775MHz), 76(156.825MHz), this interface can set the transmit switch to display the channel number where remote message 27 is transmitted.

Note: When the AIS transponder is set to silent, remote broadcast messages are also turned off.

5.6.2 Operating Instructions

Long Range Broadcast Switch Touch Operation:

As shown in the figure below, click to turn on/off remote broadcast transmissions.



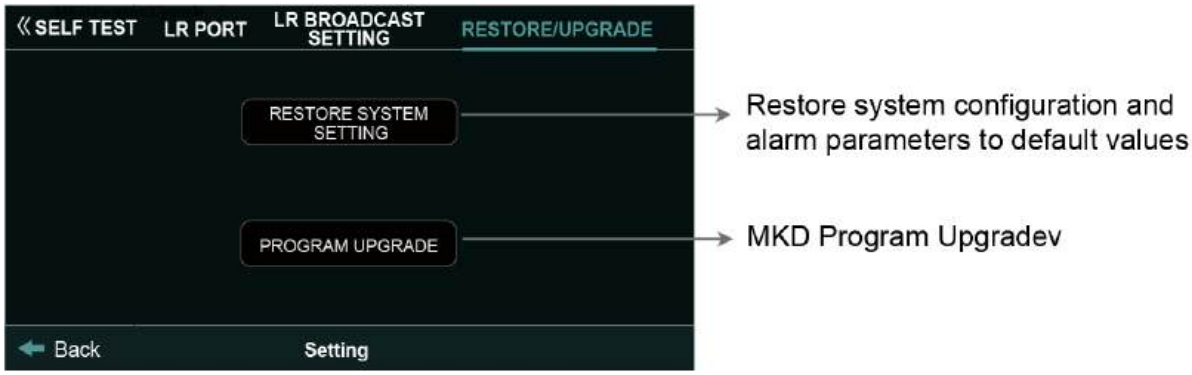
Long Range Broadcast Switch key operation:

By【direction】key to select the cursor of "Remote Broadcast"〖Switch〗, press【ENT】key to set open remote broadcast or close remote broadcast, then【direction】key to select【OK】, enter the password after the password box pops up, click【OK】again to complete the setup.

5.7 Recovery and Upgrades

5.7.1 Page Layout and Function Overview

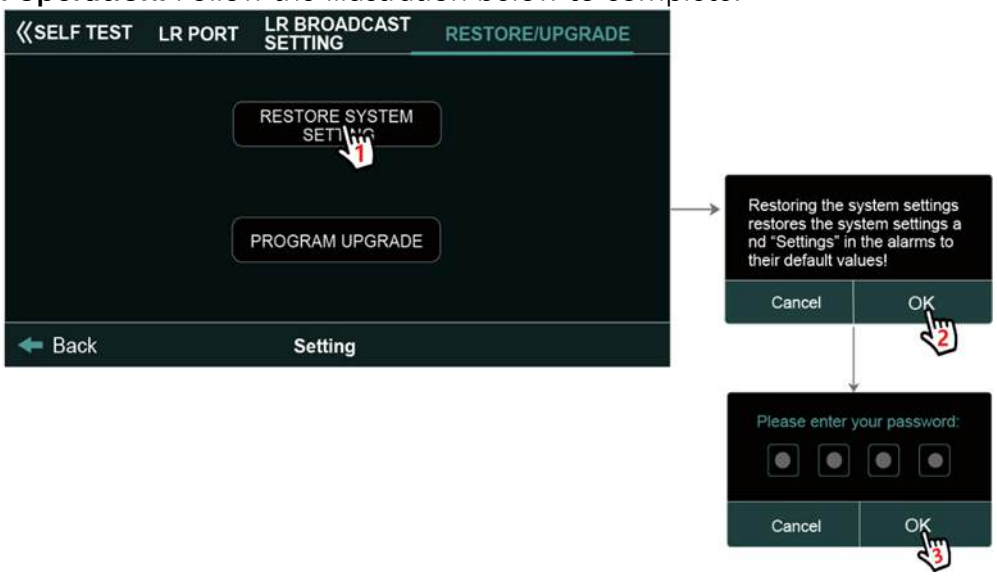
When users need to restore system settings and alarm settings to default values, they can use〖Restore System Settings〗, and they can also upgrade the program of MKD to export.



5.7.2 Operating Instructions

- **Restore System Settings**

  Touch operation: Follow the illustration below to complete.



Keyboard Operation:

Use【Direction】key to select〖Restore System Settings〗, press【ENT】key to confirm, after the prompt box pops up,【Direction】key to select〖OK〗, enter the password in the password box, then【Direction】key to select〖OK〗to finish the restoration of system settings.

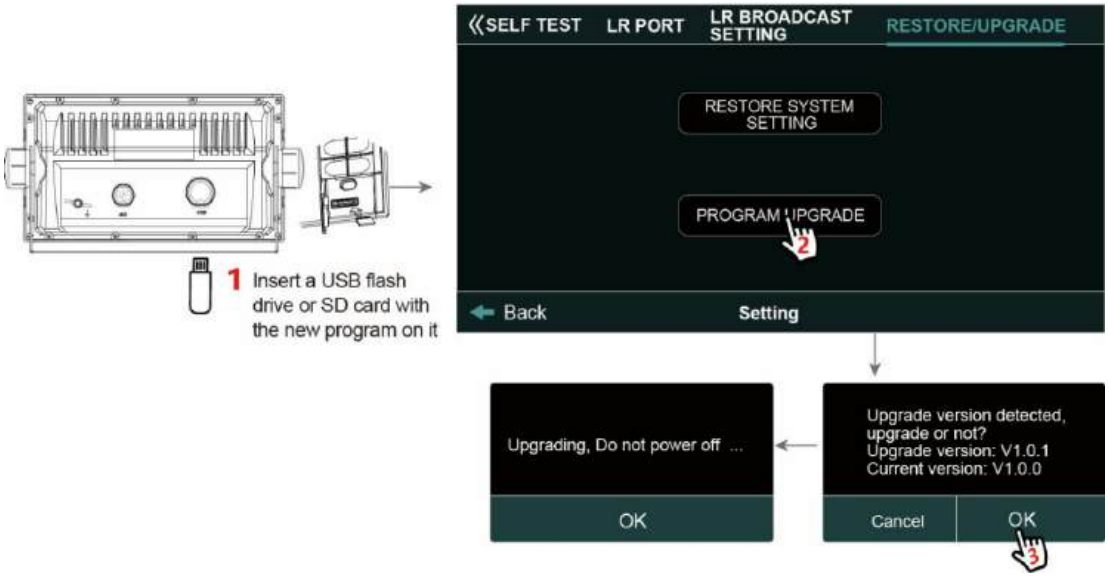
- **The restored settings and default values are as follows:**

Restored Settings	Default Value	Restored Settings	Default Value
Password Settings	Factory Value	Bow Lost Alarm	On
Time Zones	+00:00	RPM (ROT) Lost Alarm	On
Coordinate Unit	DD° MM'	EPFS Lost Alarm	On
Mode Switching	daytime	Vessel Overspeed Alarm	0.0kt (Off)
Mute	off	Encounter Alarm	Status Off Time 10.0min Distance 0.5nm
Screen Brightness	80%	Area Alarm	Status Off Distance 0.5nm
System Volume	50%	Remote Port Baud Rate	38400
Key Volume	50%	Pilot Port Baud Rate	38400
Silent Mode	0-Off	ECDIS Port Baud Rate	38400
Message Retry Count	3	DGNSS Port Baud Rate	38400
Location Device Test	0 - Normal test	Input Sensor 1~3 Baud Rate	4800
Navigation Interface Access	0 - Normal access	Sensor Statemen	Select All
Remote Message Response Mode	Manual Other parameter switches are "On"	ECDIS Port Output Statement	AIS-related Statement Group Sensor Statement Group Other Custom Statement Group
Remote Broadcast	On	Pilot Port Output Statement	AIS-related Statement Group

- **Program Upgrade**

Touch operation:

Follow the procedure below to complete the program upgrade.



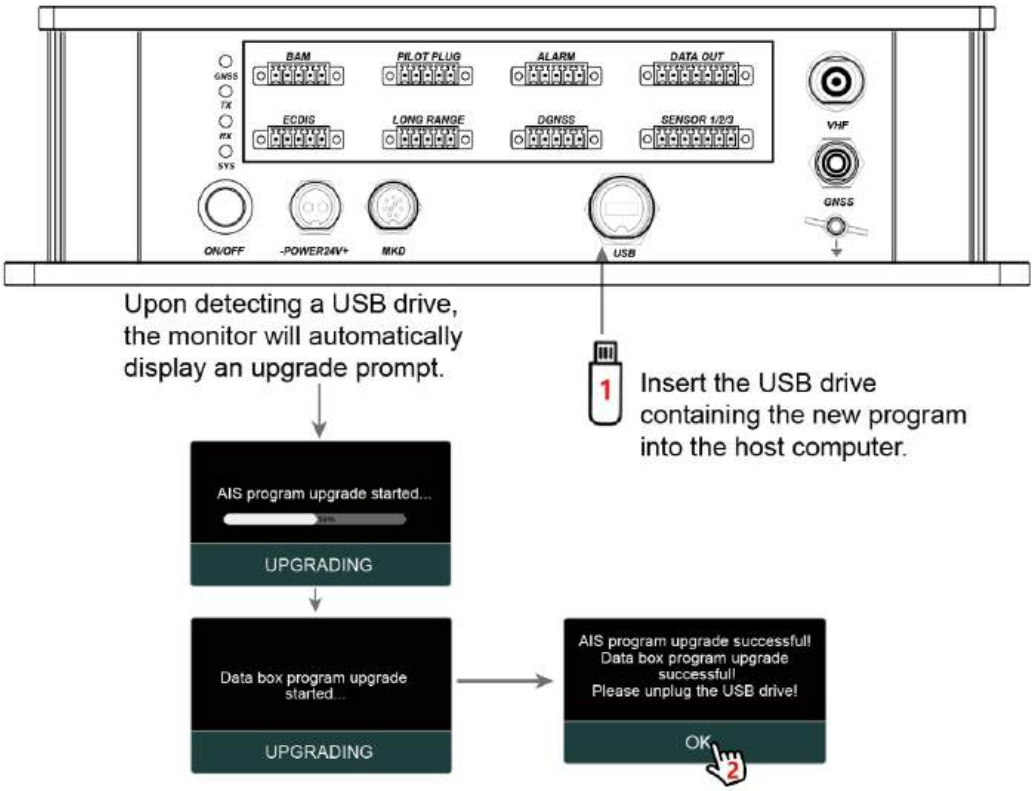
Keyboard Operation:

Select〖Program Upgrade〗by【Direction】key, press【ENT】key to confirm, press【ENT】key again,【Direction】key to select〖OK〗to start detecting upgrade.

Note: The location of the USB port will vary for different display sizes.

- **Host Upgrade**

Host upgrades include Data Box upgrades and AIS upgrades. Follow these steps to perform the upgrade. No manual operation is required on the MKD during the upgrade process. Regardless of the current operating page, the system will automatically display upgrade-related prompts (actual prompt content may vary). Do not remove the USB drive or disconnect power during the upgrade.



6. Maintenance and Inspection

6.1 Common Troubleshooting

Fault Phenomenon	Corresponding Inspection Measures
MKD display cannot be turned on	1) Check cables and connectors for damage 2) Check that the power cord is connected, that the fuse for the power cord is intact, and that the power is turned on 3) Check that the power cord output voltage is within the allowable range; 4) Check that the power switch of the AIS main unit is pressed (turned on); 5) Check for broken/loose data cables between the MKD and the AIS transponder; 6) Press the MKD display for 1S and try to reboot;
Unable Locate	1) Check that the environment around the GNSS antenna is not obscured; 2) Check if the GNSS antenna is damaged; 3) Check if the GNSS antenna and host connecting wire is broken or loose; 4) View the number of received ephemeris in the GNSS interface; 5) Check to see if the Port Setup screen in System Setup is receiving the RX:$xxRMC statement.
Non-transmitting	1) Check that the VHF antenna cable is connected and not broken or loose; 2) Check that the transmit indicator of the AIS transponder is normal; 3) Initiate a communication test to see if an answer can be received; 4) Check that the MMSI is within the valid range; (5) Whether there is a fault alarm with ID "3008" or “3062” in 〖Alert List〗 in MKD. 6) Check if the area mode of ★ in the area setting screen is 3/4/5;
The MKD doesn't show the received AIS target.	1) Check that the VHF antenna cable is connected and not damaged; 2) Check if the receive indicator of the AIS transponder is normal; 3) Check for broken/loose data cables between the MKD and the AIS transponder; (4) Whether there is a fault alarm with ID “3008” or “3116” in the “Alarm List” in MKD.

Change the transmission power to low power	Manual modification is not supported; AIS automatically switches based on current settings/received parameters. Default transmission power is high. It switches to low power transmission when all three conditions are met simultaneously: ① Vessel type: Oil tanker; ② Navigation status: At anchor; ③ Speed ≤ 3 knots.

6.2 Equipment Self-test

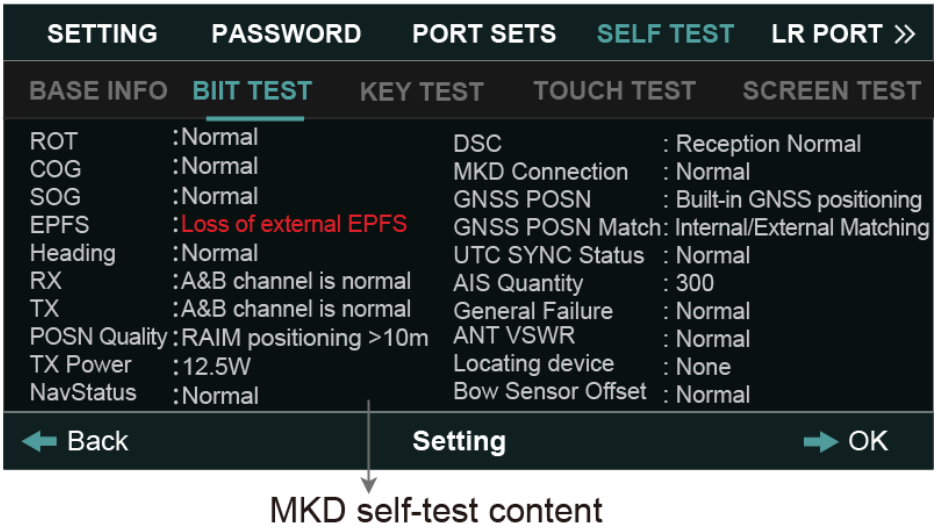
Enter the self-test function by the system settings, providing information such as version number view, current device data and alarm status view, key test, touch screen test, screen test.

6.2.1 Display of Basic Information

- Introduction to page layout and content items

6.2.2 BIIT Testing

- Introduction to page layout and content items



MKD self-test content

The MKD self-test results are described in the table below:

Test Item	Description of test results
ROT/COG/SOG	Received data display: Normal No data received display: invalid
EPFS	External positioning data received: normal External positioning data not received: external EPFS lost
Heading	Data received: Normal No data received: heading lost or invalid
Receiving	A/B receiving channels are receiving normally: A&B channels are normal A-channel reception abnormality: A-channel invalid B-channel reception abnormality: B-channel invalid A/B channel reception abnormality: A&B channel invalid
Transmitting	A/B receiving channels are transmitting normally: A&B channels are normal A-channel transmit abnormality: A-channel invalid B-channel emission abnormality: B-channel invalid A/B channel transmit abnormality: A&B channel invalidated
Positional Quality	Derived from the quality of positioning in the ship's information
Transmitting Power	Display low power/high power: 1W/12.5W
Navigation State	Data received: Normal No data received: invalid

DSC	Normal: reception is normal Reception failure: invalid
MKD connection	Connection normal: normal Connection disconnected: invalid
GNSS Positioning	Built-in positioning: Built-in GNSS positioning External positioning: external GNSS positioning Not located: not located
GNSS Position Matching	Internal/external antenna position shifted by more than 100m for up to 15min: internal/external mismatch Internal and external antenna positions in range: internal/external match
UTC synchronization status	Positioning: Normal Non-localization: invalid
Number of AIS receiving	Displays the current number of AIS received
Common failures	No equipment failure: normal Equipment failure stops transmission: invalid
VSWR of the antenna	VHF antenna VSWR not exceeded: normal VHF antenna VSWR exceedance: invalid
Effective positioning device	No valid locator device received: none Effective positioning device received: Yes
Heading Sensor Offset	SOG>5 knots, normal error in course and heading: normal SOG > 5 knots, error in course and heading > 45° for 5 minutes: invalid

- **Go to the BIIT test page**

Touch operation:

Click BIIT test on the screen of "Self-test" to see the result of MKD self-test.

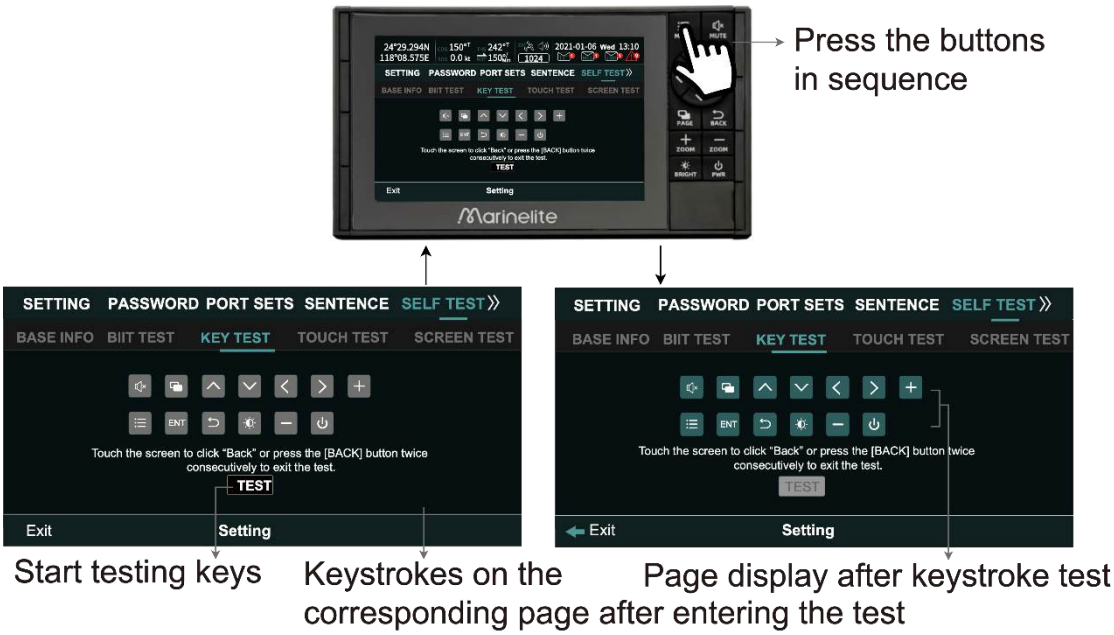
Keyboard Operation:

Cursor selects 〖Basic Information〗, press 【>】 key, cursor selects 〖BIIT test〗, view MKD self-test test result.

6.2.3 Key Testing

Touch operation:

Click "Self-test" page on the touch screen to enter the key test page, click "Test" on the touch screen to enter the key test function, click "Exit" on the touch screen to exit the key test function and return to the main menu.



Keyboard Operation:

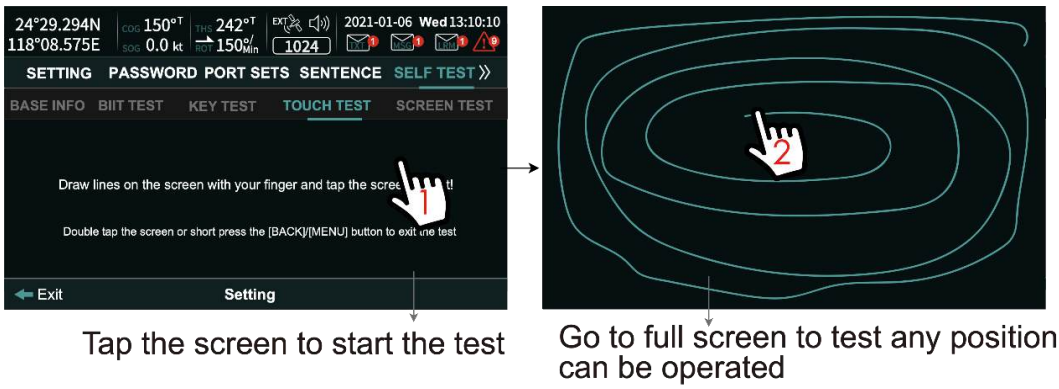
Cursor selects 〖Basic Information〗, press 【>】 key, cursor selects 〖Key Test〗, enter the key test page, press 【Direction】 keys, cursor selects 〖Test〗, press 【ENT】 key to enter the key test function, press 【BACK】 key twice to exit the key test function.

Press the 【<】 key to move the cursor to 〖Return〗, then press the 【ENT】 key to exit the key test function.

6.2.4 Touch Screen Testing

Touch operation:

Click touch screen test on the touch screen to enter the touch screen test page, click touch screen to enter the touch screen test function, click touch screen twice to return to the touch screen test page, click return to return to the main menu.



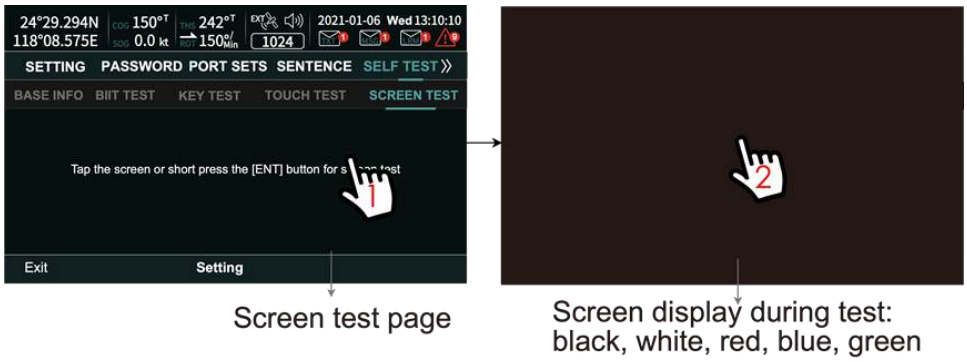
Keyboard Operation:

With the cursor on 〖Basic Information〗, press the 【<】 key. With the cursor on 〖Touchscreen Test〗, conduct the test by tapping the screen. After clicking the screen test, press the 【BACK】 key to return to the previous page. Press the 【MENU】 key to return to the main menu.

6.2.5 Screen Test

Touch operation:

Click on the screen test on the touch screen to enter the screen test page, click on the touch screen to enter the screen test function, the screen of the touch screen shows "black", click on the touch screen once the screen switches to "color", it shows in turn "Black, white, red, blue, green", and then click the touch screen once to return to the screen test page, click 〖Back〗 back to the main menu.



Keyboard Operation:

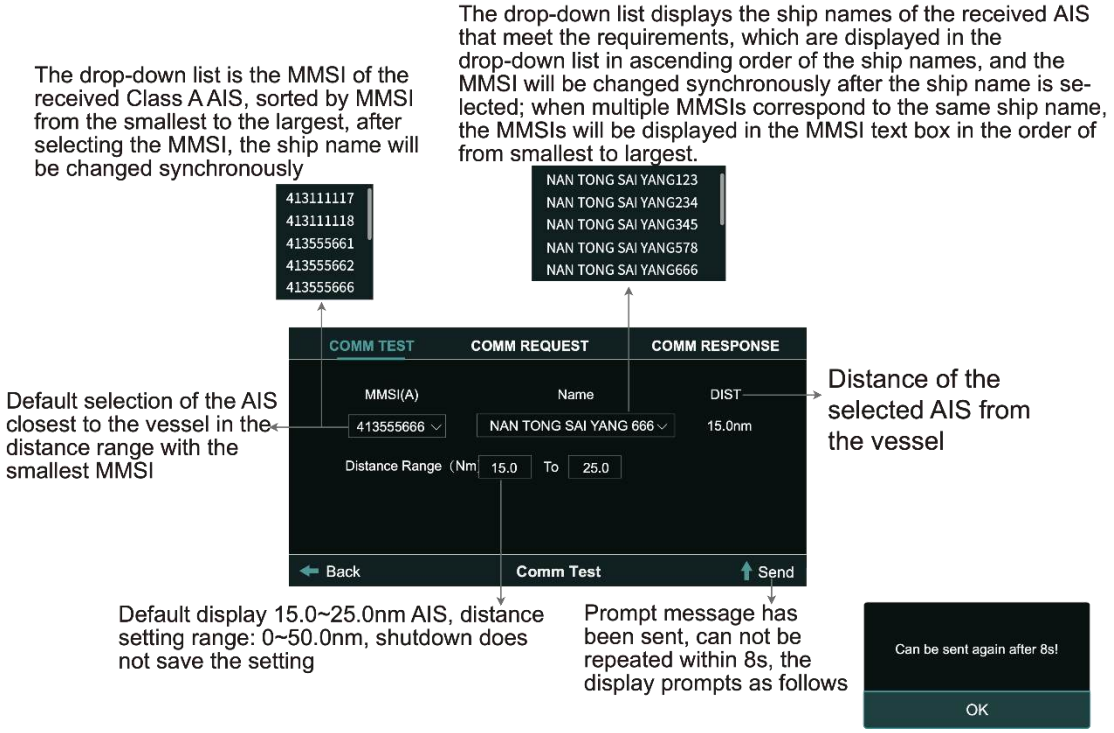
Cursor select 〖Basic Information〗, press 【>】 key, cursor select 〖Screen Test〗, enter the screen test page, press 【ENT】 key to start the screen test, the screen displays "black", every time you press 【ENT】 key, the screen switches the color once, and the screen displays "black, white, red, blue, green", then press 【ENT】 key to return to the screen test page, during the test, press 【BACK】 key to return to the previous page, and press 【MENU】 key to return to the main menu, Red, blue, green", and then press the 【ENT】 key to return to the screen test page, press the 【BACK】 key during the test, return to the previous page, press the 【MENU】 key to return to the main menu.

6.3 Communication Test

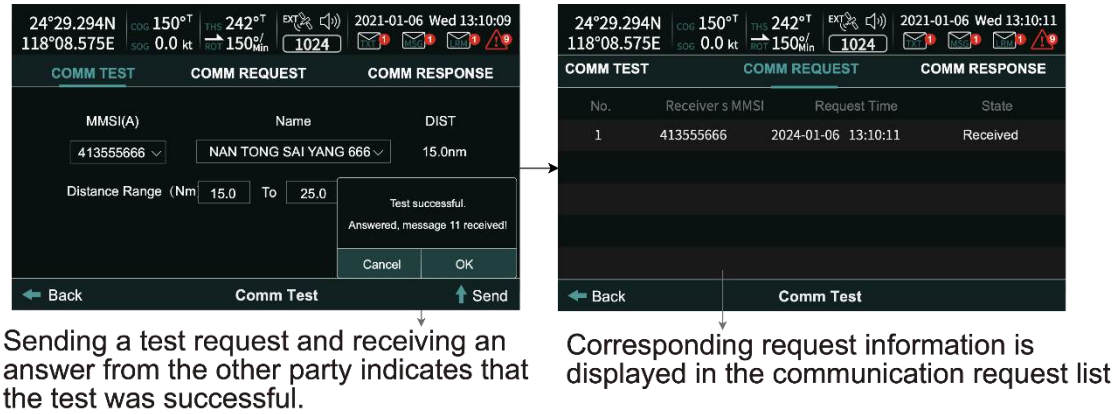
The communication test is a test of proper communication between this AIS device and other Class A AIS devices via VDL, i.e., the AIS sends an addressing message 10 and verifies that the addressing station sends a message 11 in response. Other AIS devices may also send communication test messages to this device, and when a communication test message is sent, this device receives it and automatically sends a message 11 response.

6.3.1 Initiate Communication Test

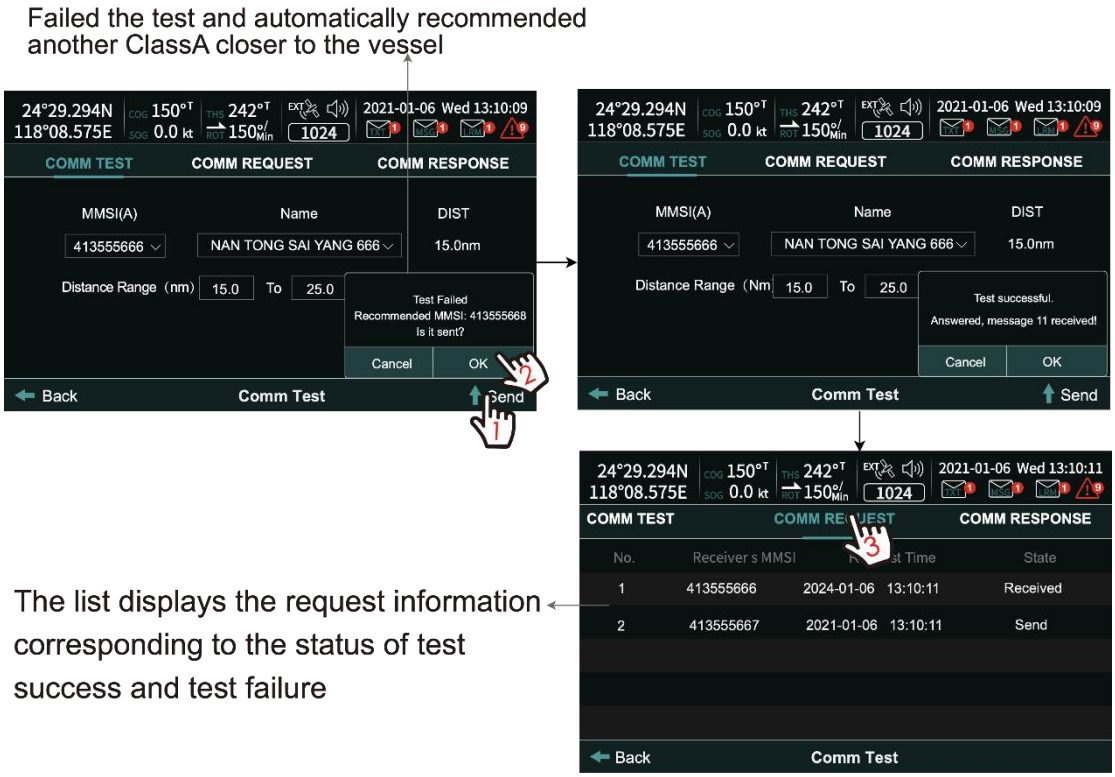
- **Overview and Page Layout**



The following is displayed when the communication request test is successful:



When the communication request test fails, the system automatically recommends a Class A AIS until the test is successful.



- **Operation Instructions**

Touch Operation:

Click the touch screen〖Screening Distance Range〗to show the numeric keyboard, click the keyboard to input the numbers, then click the touch screen〖MMSI(A)〗drop-down box, select an AIS MMSI, and the corresponding ship name of the AIS will be shown, or click the〖Vessel Name〗drop-down box, select a ship name, and the corresponding MMSI information will be shown in the MMSI, then click〖Send〗to send the communication test request, and then click〖Return〗to return to the main menu. Return〗to the main menu.

Button Operation:

Cursor selects〖MMSI(A)〗and presses【ENT】key, the drop-down box will be popped up, press【∧】【∨】keys to select the MMSI of an AIS, and the ship name of the AIS will be displayed accordingly;

Or press【direction】keys, the cursor selects〖vessel name〗, press【ENT】key, the drop-down box will be popped up, press【∧】【∨】keys to select a vessel name, the MMSI information corresponding to the vessel name will be displayed in the MMSI;

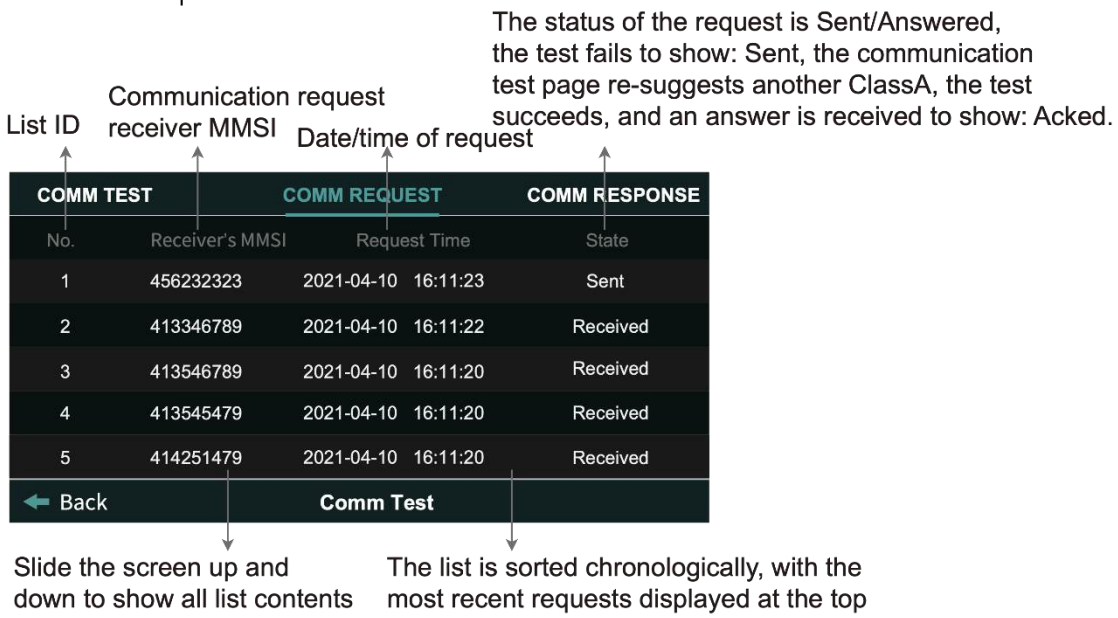
Press【direction】key, cursor selects the text box of screening distance range, press【ENT】key to pop up the input method, press【direction】key to enter the input method to select the value, press【ENT】key to confirm the input.

Press【Direction】keys, the cursor selects〖Send〗, press【ENT】key to send communication test request.

Press【Direction】keys, the cursor selects〖Return〗, press【ENT】key, return to main menu.

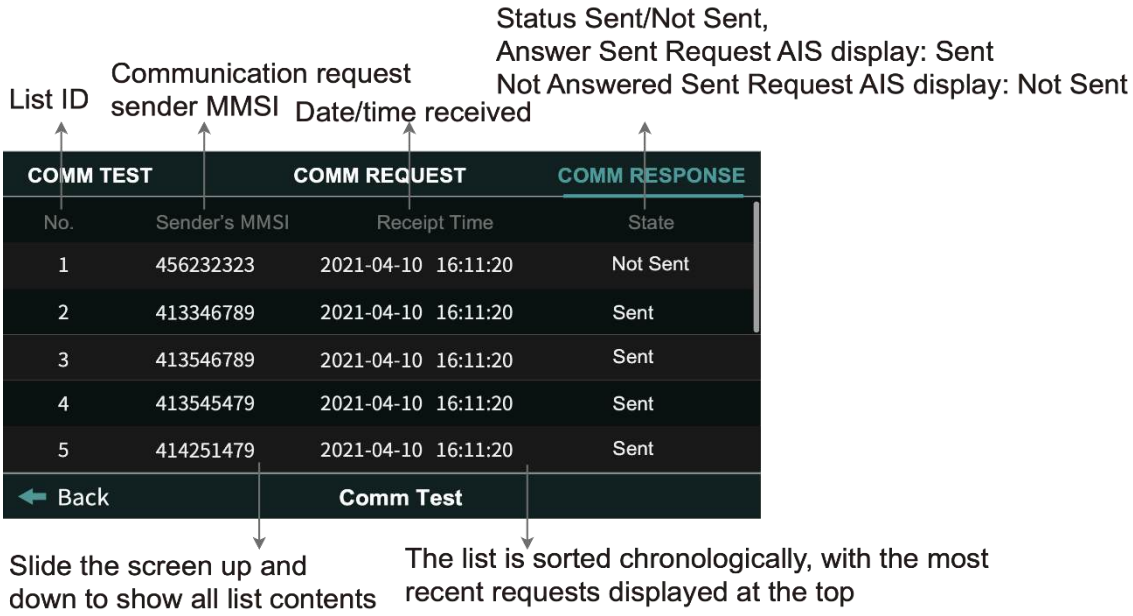
6.3.2 Communication Request List

Information on communication requests to other AIS devices is displayed in the communication request list as shown below.



6.3.3 Communication Response List

The responses to communication requests received from other AIS devices are displayed in the communication response list as shown below.



6.4 Alarms and Status Detection

6.4.1 Type of Alert

The types of alerts detected in the device and the response of the AIS system when an alarm

is triggered are shown in the table below:

ID	Alert Identifier	Type	Priority	Alarm Example	Alarm's description text	Reaction of the system	Upgrade attributes
1	3108	B	W	1	Received valid positioning device	Continue operation	Alarms with priority W will reappear as warnings after exceeding the 5-minute limit.
2	3062	B	W	1	General failure	Stop transmission	
3	3008	B	W	1	TX Malfunction	Stop transmission	
4		B	W	2	Rx Malfunction	Stop transmission on affected channel	
5	3015	B	W	1	Lost position	Continue operation	
6	3116	B	C	1	VHF Antenna VSWR exceeds limit	Continue operation	-
7		B	C	2	Rx channel 1 malfunction	Stop transmission on affected channel	-
8		B	C	3	Rx channel 2 malfunction	Stop transmission on affected channel	-
9		B	C	4	Rxchannel70 malfunction	Continue operation	-
10	3113	B	C	1	UTC Sync Invalid	Continue operation using indirect or semaphore synchronisation	-
11	3003	B	C	1	External EPFS lost	Continue operation	-
12	3119	B	C	1	No valid COG information	Continue operation using default data	-
13		B	C	2	No valid SOG information	Continue operation using default data	-
14		B	C	3	Heading lost or invalid	Continue operation using default data	-
15		B	C	4	No valid ROT information	Continue operation using default data	-
16	3013	B	C	1	Internal / External GNSS mismatch	Continue operation	-
17		B	C	2	Mismatch between HDG and COG	Continue operation	-

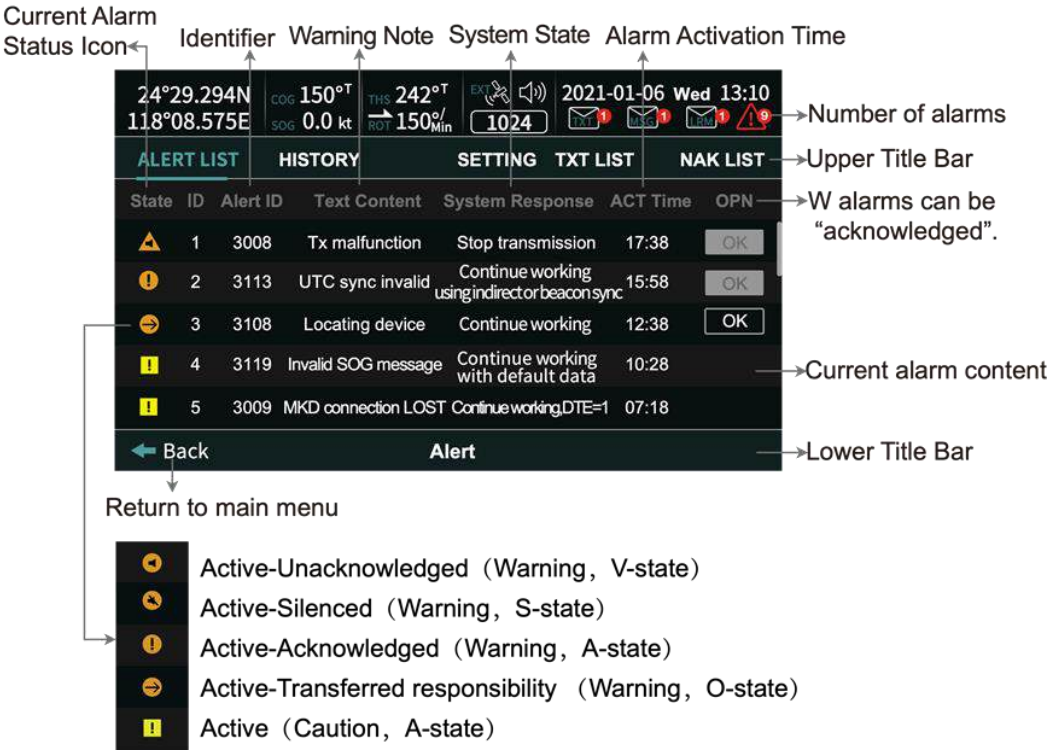
18	3019	B	C	1	Nav Status Incorrect	Continue operation	-
19	3009	B	C	1	MKD connection lost	Continue operation	-

Note: All warning can be responsibility transferred.

6.4.2 Current Alert List

- **Page Layout and Function Overview**

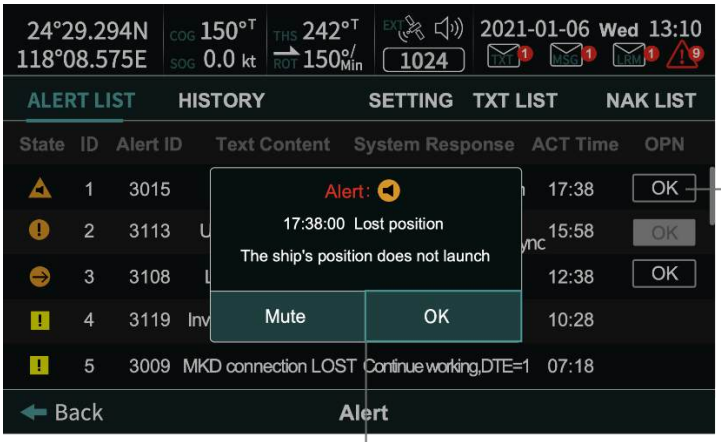
Alert list displays the contents that are currently in alarm status, the Alert list is updated and stored in real time after power on, and is not saved after power off. The specific alarm contents are



View details of the current alert:

- **Operation Instructions**

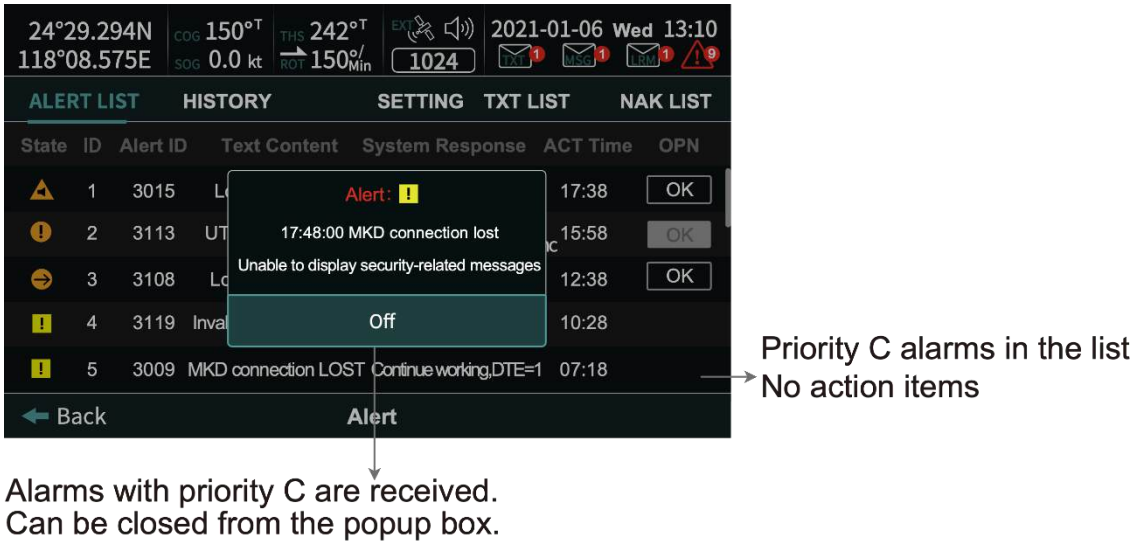
The page pops up the Class W Alarm pop-up box, and the interface and operation are shown in the following figure:



Alarms with priority W in the list can be acknowledged and grayed out after operation.

Receiving the alarm with priority W, you can operate 〖Ack〗/〖Mute〗from the pop-up box.

The page pops up the Class C Alarm pop-up box, and the interface and operation are shown in the following figure:



Touch Operation:

Tap the 〖Alarm〗 icon on the touchscreen. The home screen defaults to the 〖Alarm List〗 page. Swipe up or down on the touchscreen to view all current alarm information. Tap an alarm to display its detailed information. Press and hold the screen while swiping up or down to view all hidden details. Tap the 〖Back〗 icon on the touchscreen to return to the main menu.

On the 〖Alarm List〗 page, you can directly tap 〖Confirm〗 to acknowledge the alarm.

If a dialog box appears on the current page with the cursor positioned on 〖Cancel〗, tap 〖Cancel〗 / 〖Confirm〗 / 〖Mute〗 / 〖Close〗 to exit the dialog and return to the alarm list page.

Button Operation:

Highlight 〖Alarms〗 with the cursor, press the 【ENT】 key to enter the 〖Alarm List〗 page.

Press the 【∧】【∨】 keys to view all current alarm information. Highlight an alarm entry with the cursor, press 【ENT】 to open its detailed information interface. With the cursor in the alarm details area, press the 【∧】【∨】 keys to view all hidden details.

Briefly press the 【>】 key to highlight 〖Return〗, then press 【ENT】 to return to the main menu.

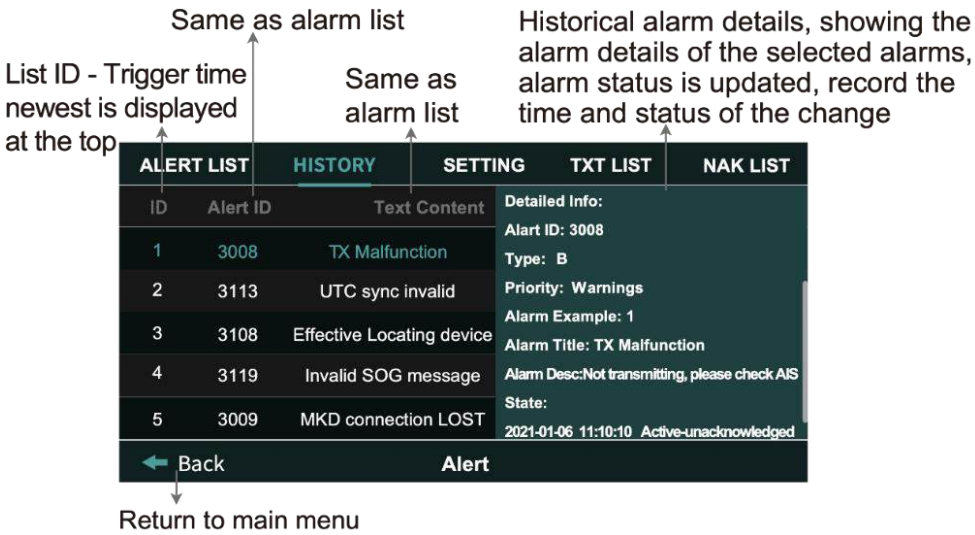
In the 〖Alarm List〗, use the 【∧】【∨】 keys to position the cursor over an 〖Unacknowledged〗 alarm. Press the 【<】 key to jump the cursor to the 〖Acknowledge〗 button on the right. Press 【ENT】 to acknowledge the alarm.

A dialog box appears on the current page with the cursor on 〖Mute〗. Press 【ENT】 or use the 【Directional】 keys to operate 〖Cancel〗 / 〖Confirm〗 / 〖Mute〗 / 〖Close〗. Exit the dialog box to return to the alarm list page.

6.4.3 History Alert List

- **Page Layout and Function Overview**

The contents of the History Alert List are persistently saved in the device after a power failure and reboot.



- **Operation Instructions**

Touch Operation:

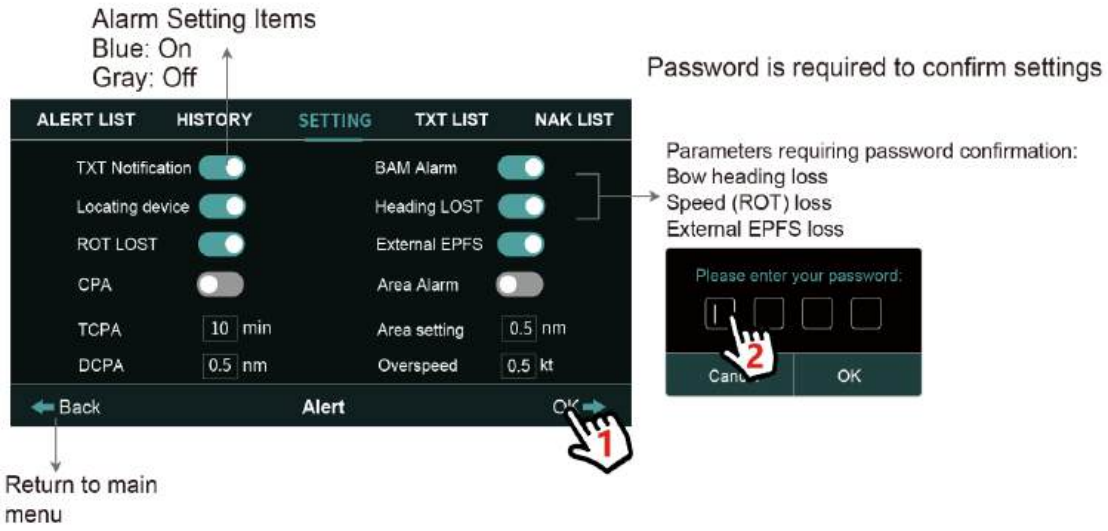
Cursor selects 〖History〗, the first alarm details will be shown on the right side by default, click the touch screen to select the following alarm, the right side will be updated to the alarm details, hold down the screen and slide up and down to see all the hidden details.

Button Operation:

Press 【>】 key, the cursor selects 〖History〗, the first alarm details will be displayed on the right side by default, press 【∧】【∨】 keys, the cursor selects other alarm IDs, press 【ENT】 key, the corresponding details will be displayed on the right side, press 【>】 key, the cursor locks 〖Detailed Information〗, press 【∧】【∨】 keys, all hidden details will be viewed.

6.4.4 Alert Settings

- **Page**



- **Description of Alert Settings**

①**TXT Alert Popup:** Disabled by default. When enabled, a notification box will appear in the bottom-right corner of the screen upon receiving a TXT message.

② **BAM Alarm Popup:** Disabled by default. When enabled, an alarm notification will appear in the center of the screen upon receiving a BAM alarm.

③ **Valid Positioning Device:** Enabled by default. When enabled, an alarm notification will be triggered when a valid positioning device triggers an alarm.

④ **Bow Direction Loss:** Default enabled. When enabled, an alarm notification will be triggered upon loss of bow direction.

⑤ **Rotation Speed (ROT) Loss:** Default enabled. When enabled, an alarm notification will be triggered upon loss of rotation speed (ROT).

⑥ **External EPFS Loss:** Enabled by default. When enabled, an alarm notification will be triggered upon loss of external EPFS.

⑦ **Encounter Alarm:**

Function Switch: Default off; Default Encounter Time: 10.0 minutes; Default Encounter Distance: 0.5 nautical miles (nm)

Page Display: When the function switch is off, the AIS list page does not display the TCPA (Time to Closest Approach) and CPA (Closest Approach Point) columns.

Setting Range:

Encounter Time: 0~60.0 minutes (customizable)

Encounter Distance: 0~100.0 nautical miles (customizable)

The encounter alarm triggers when all conditions are met:

Encounter alarm function is enabled;

TCPA of another vessel in the AIS list ≤ set encounter time (Note: No evaluation when TCPA is negative);

CPA of another vessel in the AIS list ≤ set encounter distance.

Page Display: After enabling the collision avoidance alarm function, the AIS list page will automatically add two columns: TCPA and CPA, facilitating the viewing of collision-related data for vessels.

⑧ Area Alarm:

Default switch is off, area set to 0.5nm;

Area distance setting range: 0~50.0nm;

When the distance to another vessel in the AIS list ≤ the area setting distance, the alarm triggers after being enabled.

⑨ Vessel Overspeed Alarm:

Default off. Speed threshold set to 0.0kt;

Overspeed threshold range: 0~99.9kt;

Triggers when real-time speed exceeds preset threshold. Displays pop-up alert in lower-right corner with audible warning.

- **Alarm Setting Operation Instructions**

Touch Operation:

Cursor selects〖Setting〗, click the touch screen alarm setting〖Switch〗, open/close, click〖OK〗,〖Password input boxwill pop up, enter the password, click the touch screen〖Confirm〗/〖Cancel〗, click the touch screen〖Return〗, return to the main menu.

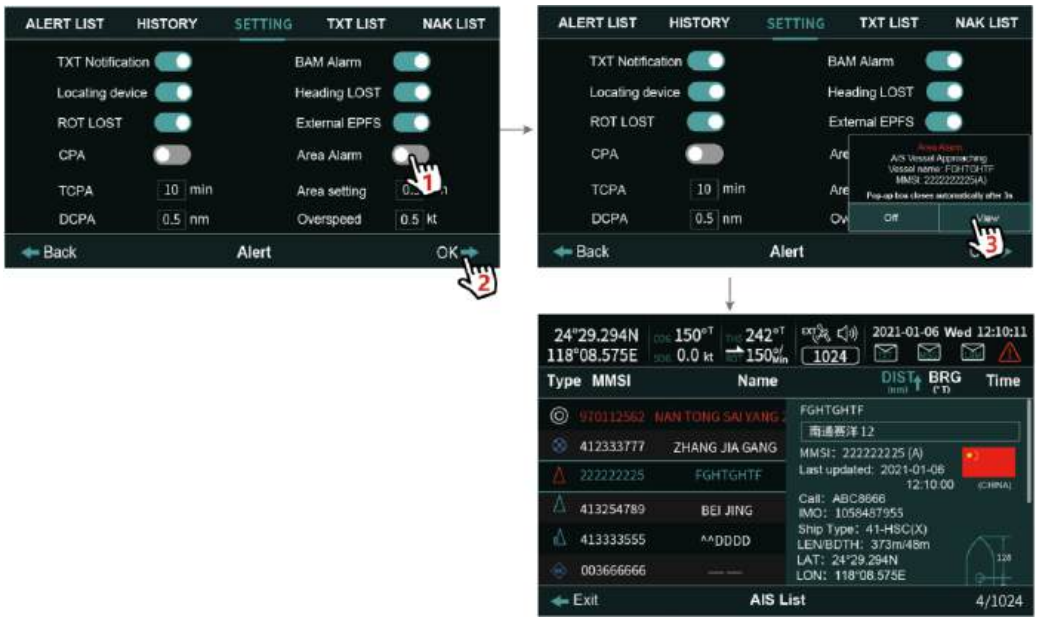
Button Operation:

Cursor selects〖Setting〗, press【Direction】key, cursor selects〖Switch〗, open/close〖Switch〗, press【Direction】keys, cursor selects〖OK〗,〖Password Input Box〗pops up, input the password through input method, press【Direction】keys, cursor selects〖Confirm〗/〖Cancel〗, press【ENT】key to confirm.

Press【Direction】keys, the cursor selects〖Return〗, press【ENT】key to return to the main menu.

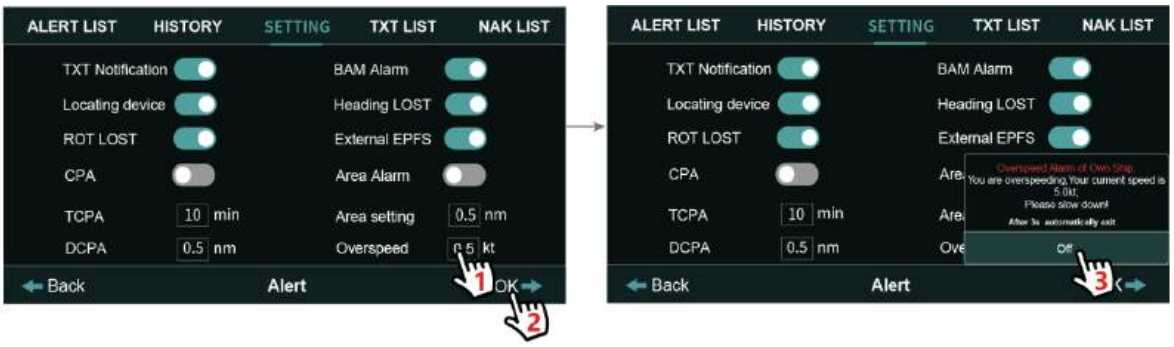
- **Area, CPA Alarm Open and Target View**

The area alarm operation is shown below:



The CPA alarm operation is shown below:

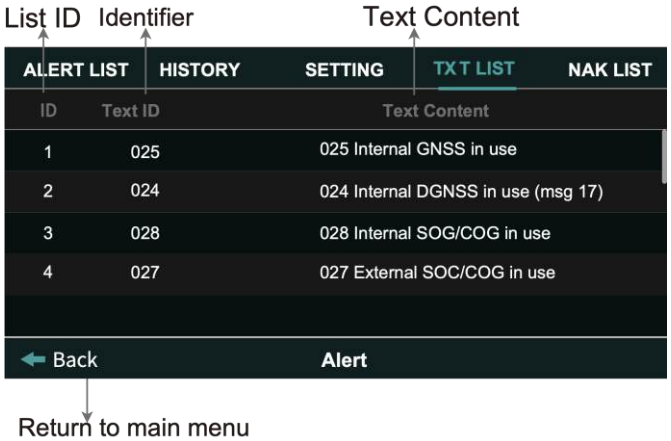
The over-speed alarm operation for this vessel is shown in the figure below:



6.4.5 TXT List

- **Page Layout and Function Overview**

This page is for viewing information only and is not actionable for individual events.



- **Instructions for browsing the list**

Touch Operation:

Cursor select 〖TXT LIST〗, press and hold the touch screen to slide up and down to see the hidden list content, click 〖Back〗 to return to the main menu.

Button Operation:

Cursor select 〖TXT LIST〗, press【∨】【>】keys to traverse all information in the list, cursor select 〖Return〗, press【ENT】key to return to main menu.

- **TXT Content Description**

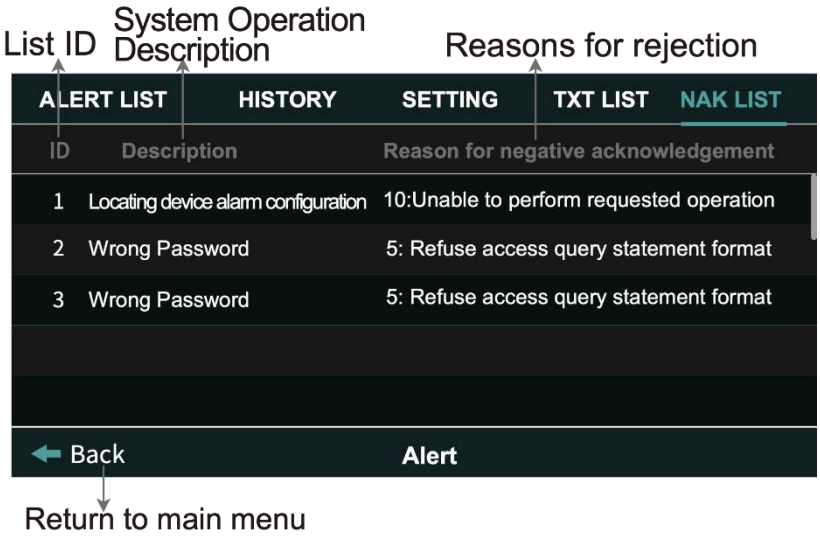
ID	Text Identifier	Text Content
1	21	AIS: External DGNSS in use
2	22	AIS: External GNSS in use
3	23	AIS: Internal DGNSS in use(beacon)
4	24	AIS: Internal DGNSS in use(message 17)
5	25	AIS: Internal GNSS in use
6	27	AIS: External SOC/COG in use
7	28	AIS: Internal SOG/COG in use
8	31	AIS: Heading Valid
9	33	AIS: Rate of turn indicator in use
10	34	AIS: Other ROT source in use
11	36	AIS: Channel management parameters changed
12	37	AIS: Low power tanker mode active
13	38	AIS: Low power tanker mode suspended
14	40	AIS: operation in allocation mode via message 16 from base station 00MIDXXXXXX
15	41	AIS: operating in data link management mode via message 20 from base station 00MIDXXXXXX
16	42	AIS: operates in channel management mode via message 22 from base station 00MIDXXXXXX, i.e. channel
17	43	AIS: operates in group assignment mode via message 23 from base

		station 00MIDXXXXXX, i.e. group
18	44	AIS: return to default operation

6.4.6 NAK List

- **Page Layout and Function Overview**

This page is for viewing messages only, and is not actionable for individual denial messages.



- **Instructions for browsing the list**

Touch Operation:

Cursor select〖NAK LIST〗, press and hold the touch screen to slide up and down to see the hidden list content, click〖Back〗to return to the main menu.

Button Operation:

Cursor selects〖NAK LIST〗, press【∨】keys to traverse all information in the list, press【>】【∨】keys to cursor selects〖Return〗, press【ENT】key to return to main menu.

- **NAK Content Description**

ID	System Operation Description	Reason for Rejection
1	Modify Ship Type	10: Unable to perform the requested operation
2	Modify MMSI	10: Unable to perform the requested operation
3	Modify IMO	10: Unable to perform the requested operation
4	Modify Call Sign	10: Unable to perform the requested operation
5	Modify Vessel Name	10: Unable to perform the requested operation
6	Modify INT A	10: Unable to perform the requested operation
7	Modify INT B	10: Unable to perform the requested operation
8	Modify INT C	10: Unable to perform the requested operation

9	Modify INT D	10: Unable to perform the requested operation
10	Modify EXT A	10: Unable to perform the requested operation
11	Modify EXT B	10: Unable to perform the requested operation
12	Modify EXT C	10: Unable to perform the requested operation
13	Modify EXT D	10: Unable to perform the requested operation
14	Modify INT EA	10: Unable to perform the requested operation
15	Modify INT EB	10: Unable to perform the requested operation
16	Modify INT EC	10: Unable to perform the requested operation
17	Modify INT ED	10: Unable to perform the requested operation
18	Modify Month	10: Unable to perform the requested operation
19	Modify Date	10: Unable to perform the requested operation
20	Modify Time	10: Unable to perform the requested operation
21	Modify Area Application	10: Unable to perform the requested operation
22	Add New Area	10: Unable to perform the requested operation
23	Modify Navigation Status	10: Unable to perform the requested operation
24	Modify Acknowledgement Mode	10: Unable to perform the requested operation
25	Modify Valid Positioning Device Alarm	10: Unable to perform the requested operation
26	Modify Sensor Alarms	10: Unable to perform the requested operation
27	Modify Destination	10: Unable to perform the requested operation
28	Modify Draught	10: Unable to perform the requested operation
29	Modify Filter	10: Unable to perform the requested operation
30	Modify Built-in Position Source	10: Unable to perform the requested operation
31	Modify Power	10: Unable to perform the requested operation
32	Modify Silent Mode	10: Unable to perform the requested operation
33	Modify the number of messages sent	10: Unable to perform the requested operation
34	Modify Positioning Device Test	10: Unable to perform the requested operation
35	Modify Pilot Plug Access	10: Unable to perform the requested operation
36	Modify User Password	10: Unable to perform the requested operation
37	Modify Admin Password	10: Unable to perform the requested operation

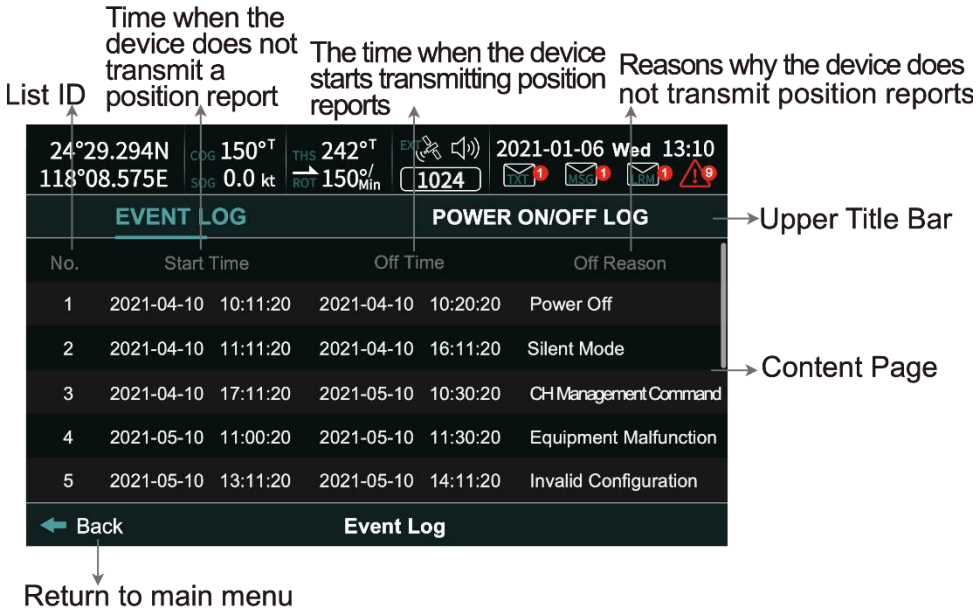
38	Wrong Password	5: Statement formatted request access denied
39	Modify Long Range Port	10: Unable to perform the requested operation
40	Modify Pilot Port	10: Unable to perform the requested operation
41	Modify Display Port	10: Unable to perform the requested operation
42	Modify DGNSS port	10: Unable to perform the requested operation
43	Modify BAM port	10: Unable to perform the requested operation
44	Modify Sensor 1 port	10: Unable to perform the requested operation
45	Modify Sensor 2 Port	10: Unable to perform the requested operation
46	Modify Sensor 3 Port	10: Unable to perform the requested operation
47	Modify Long Range Transmit CH 1	10: Unable to perform the requested operation
48	Modify Long Range Transmit CH 2	10: Unable to perform the requested operation
49	Modify ECDIS port	10: Unable to perform the requested operation
50	Missing password	5: Statement formatted request access denied
51	Modify DTE	10: Unable to perform the requested operation

6.5 Event Log and Power on/off Log

6.5.1 Event Log

- **Overview and Page Layout**

The event log automatically records information that the AIS has failed to transmit a location report at the report interval for more than 15 minutes, and the page is viewable only and not operable.



- **Reason for cessation of equipment transmission**

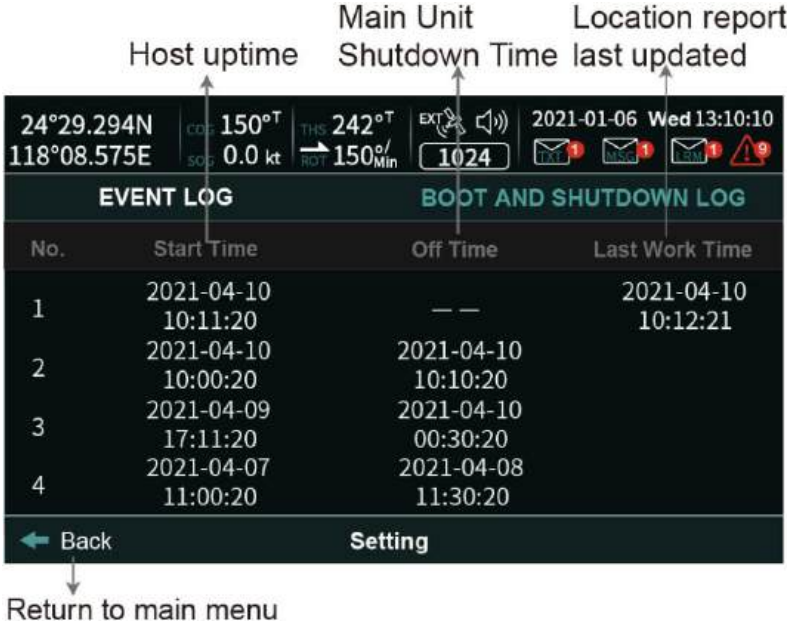
The reasons why the device does not transmit position reports are listed in the table below

No.	Reason for closing	Note
1	Power off	Device shutdown
2	The ship is in silent mode.	Location report not transmitted in silent mode
3	The channel management command shuts down transmission	The channel management command shuts down transmission: ① MKD end area setting TX/RX mode setting is set to set to “3/4/5” silence ② Onboard system setup ACA statement, TX/RX mode set to “3/4/5” silence
4	Equipment Malfunction	Device malfunction
5	Invalid configuration	Device not set up for MMSI

6.5.2 Power on/off Log

- **Overview and Page Layout**

The power-on/off log list displays up to 100 entries. When the log reaches capacity, the system automatically deletes the oldest entry to make room for new entries. The most recent entry appears at the top of the list, allowing users to prioritize viewing the latest operation records.



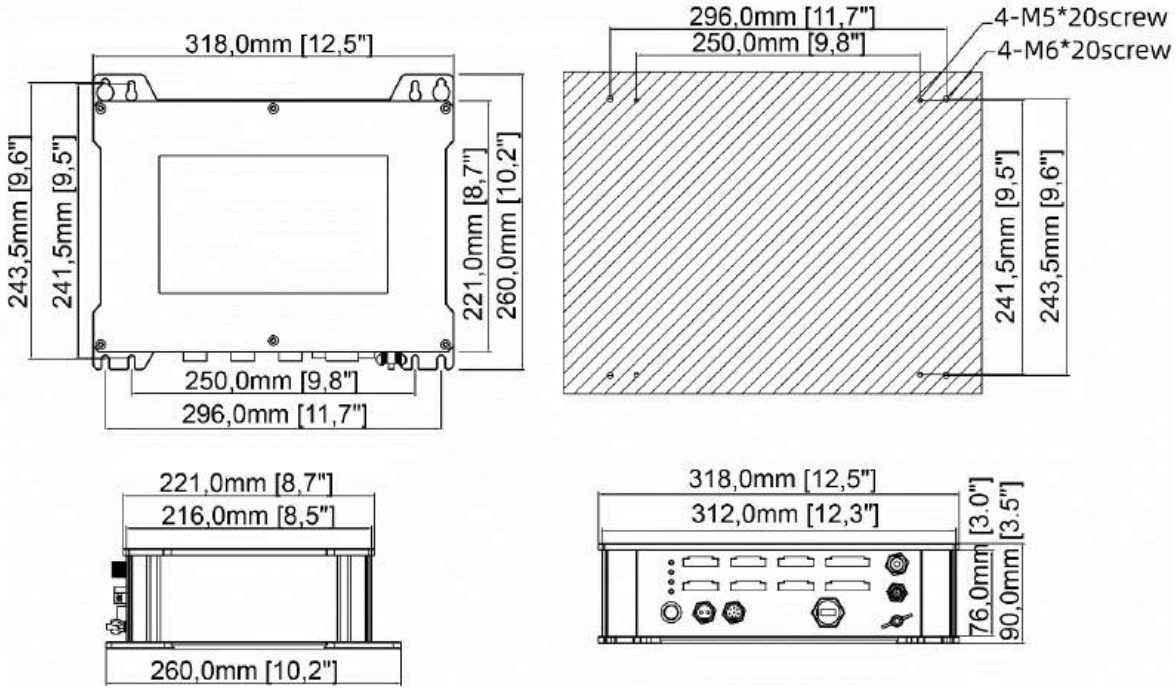
7. APPENDIX

7.1 Vessel Type Code

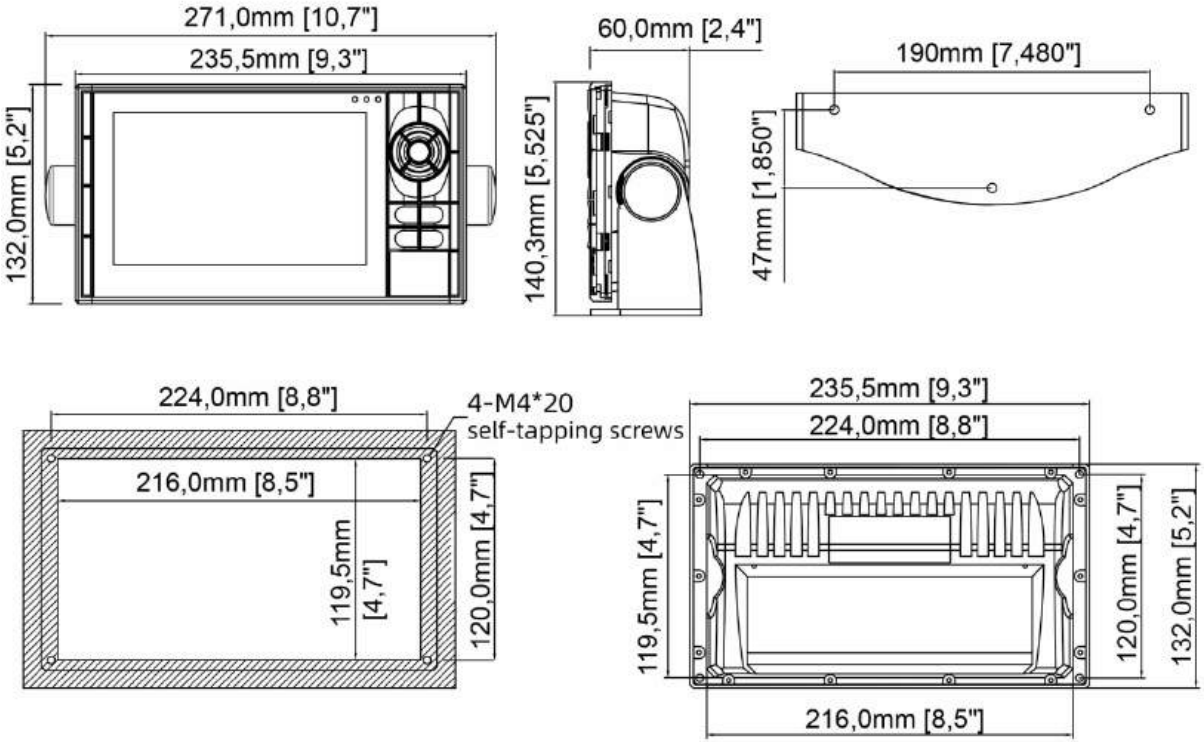
Vessel Code	Vessel Type	Vessel Code	Vessel Type
0	Unavailable or no ship	56-57	SPARE-FOR ASSIGNMENTS TO LOCAL VESSELS
1-19	FUTURE USE	58	MEDICAL TRANSPORTS
20	Wing in ground	59	SHIPS & AIRCRAFT OF STATES NOT PARTIES TO AN ARMED CONFLICT
21	Wing in ground(X)	60	PASSENGER SHIPS
22	Wing in ground(Y)	61	PASSENGER SHIPS(X)
23	Wing in ground(Z)	62	PASSENGER SHIPS(Y)
24	Wing in ground(OS)	63	PASSENGER SHIPS(Z)
25-29	FUTURE USE	64	PASSENGER SHIPS(OS)
30	FISHING	65-69	FUTURE USE
31	TOWING	70	CARGO SHIPS
32	LENGTH OF THE TOW EXCEEDS 200M OR BREADTH EXCEEDS 25M	71	CARGO SHIPS(X)
33	ENGAGED IN DREDGING OR UNDERWATER OPERATIONS	72	CARGO SHIPS(Y)
34	ENGAGED IN DIVING OPERATIONS	73	CARGO SHIPS(Z)
35	ENGAGED IN MILITARY OPERATIONS	74	CARGO SHIPS(OS)
36	SAILING	75-79	FUTURE USE
37	PLEASURE CRAFT	80	TANKER(S)
38-39	FUTURE USE	81	TANKER(S)(X)
40	High Speed Craft	82	TANKER(S)(Y)
41	High Speed Craft(X)	83	TANKER(S)(Z)
42	High Speed Craft(Y)	84	TANKER(OS)
43	High Speed Craft(Z)	85-89	FUTURE USE
44	High Speed Craft(OS)	90	OTHER TYPE OF SHIP
45-49	FUTURE USE	91	OTHER TYPE OF SHIP(X)
50	PILOT VESSEL	92	OTHER TYPE OF SHIP(Y)
51	SEARCH AND RESCUE VESSELS	93	OTHER TYPE OF SHIP(Z)
52	TUGS	94	OTHER TYPE OF SHIP(OS)
53	PORT TENDERS	95-99	OTHER TYPE OF SHIP FUTURE USE
54	VESSELS WITH ANTI-POLLUTION FACILITIES OR EQUIPMENT	100-199	Reserve for regional use
55	LAW ENFORCEMENT VESSELS	200-255	FUTURE USE

7.2 MECHANICAL DIMENSIONS

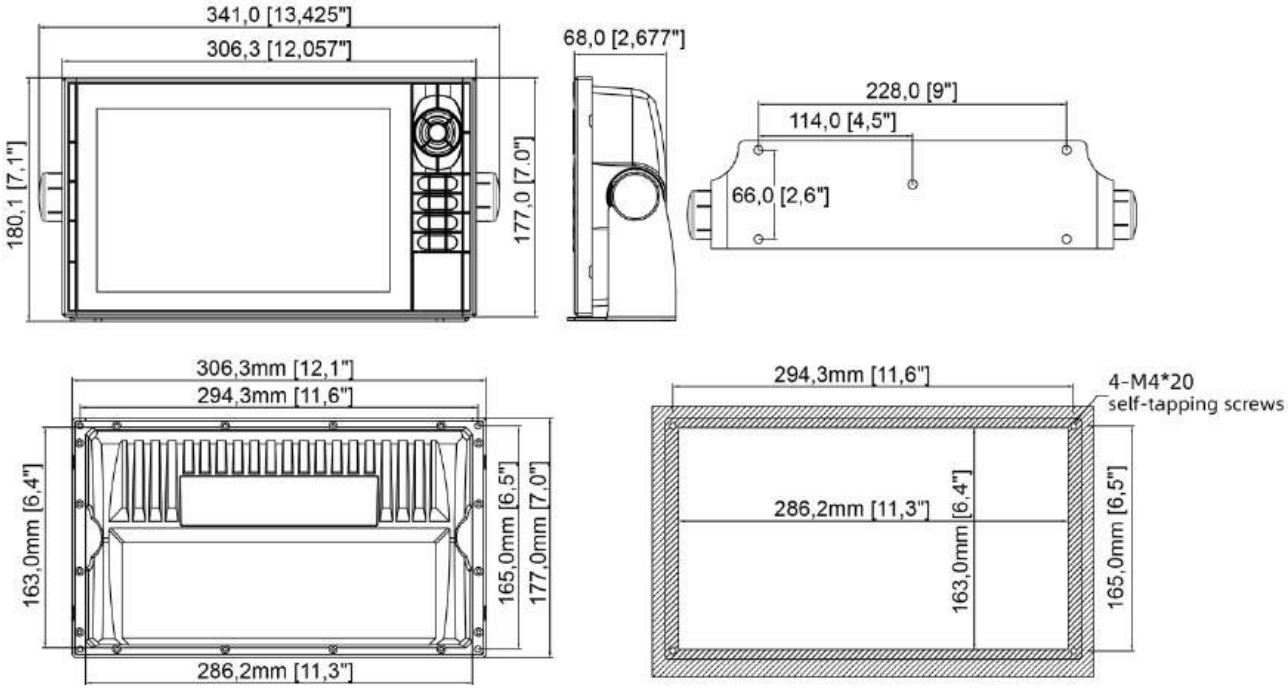
7.2.1 AIS Transponder



7.2.2 7 inch MKD Display Unit



7.2.3 10.1 inch MKD Display Unit



7.3 Abbreviation description

Abbreviation	Meaning	Abbreviation	Meaning
BDTH	Breadth	CPA	Closest Point of Approach
BRG	Bearing	COG	Course Over Ground
COORD	Coordinate	DEST	Destination
DIST	Distance	ETA	Estimated Time of Arrival
EXT	External	ft	foot
GB	BeiDou	GL	GLONASS
GNSS	Global Navigation Satellite System	GP	Global Positioning System
HDOP	Horizontal Dilution of Precision	IMO	International Maritime Organization
INT	Internal	kt	Knot
L	Local Time	LAT	Latitude
LEN	Length	LR	Long Range
LRM	Long Range Message	LON	Longitude
LCD	Liquid Crystal Display	mi	mile
m	meter	Min	Minute
MKD	Minimum Keyboard & Display	MMSI	Maritime Mobile Service Identity
MPH	miles per hour	MSG	Message
nm	nautical mile	PA	Position Accuracy
PDOP	Position Dilution of	POB	Persons On Board
PWR	Power	RAIM	Receiver Autonomous Integrity Monitoring
ROT	Rate Of Turn	RDSS	Radio Determination Satellite Service
SOG	Speed Over Ground	THS	True Heading
TXT	Text	TCPA	Time to CPA
U	Coordinated Universal Time	VOL	Volume
TX	Transmit		

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