USER MANUAL

GNSS EQUIPMENT

NGR-3000

NGR-3000 UM.E 20241203-11

NOTICE TO USERS

- Thanks for your purchasing this product NGR-3000 GNSS equipment.
- The copyright of this manual is owned by the manufacturer, NEW SUNRISE CO., LTD (NSR). Prior written permission is required for copying or reproducing the manual or part of the manual.
- NSR is devoted to publish and maintain this user manual. As we continue to improve our products to satisfy customers' needs, information in this document is subject to change without prior notice. NSR does not make any representations or warranties (implied or otherwise) regarding the accuracy and completeness of this document.
- Software version in your product may be some different from that described as in this manual. Such difference will not affect the performance of the product. NSR reserves the right of continuous improvement on products both in software and in hardware without any prior notice.
- NSR will assume no responsibility for the damage caused by improper use or modification of the product or claims of loss of profit by a third party, and shall in no event be liable for any loss of profit or any commercial damage, including but not limited to special, incidental, consequential, or other damage.
- Please read this manual carefully to ensure proper use before installation and use of the product.
- Please keep the manual for your future reference.

Modify Record

No.	Modify by	Date	Paragraph	Version	Reason
1	Q/A	2017/06/14		01	First edition
2	Q/A	2017/08/15		02	Add navigation function
3	Q/A	2017/09/29		03	General modification
4	Q/A	2019/03/31	All	04	Software upgrade
5	Q/A	2021/07/16	All	05	Software upgrade
6	Q/A	2022/06/13	All	06	Software upgrade
7	Q/A	2022/08/04	2, 5, Appendix	07	Add DGNSS functions
8	Q/A	2023/02/21	All	08	General modification
9	Q/A	2024/03/28	1, Appendix	09	Some modification
10	Q/A	2024/08/20	1, Appendix	10	Some modification
11	Q/A	2024/12/03	1, 2.3, 5.4, 6.3, 6.4, Appendix	11	Some modification

SAFETY INSTRUCTIONS FOR THE OPERATOR

	**Warning** Keep away from heat source or direct sunshine.
	**Prohibition** Don't open the equipment. Only qualified personnel should work inside the equipment. Don't disassemble or try to modify the equipment.
	**Dangerous** Turn off the power immediately when smoke or fire is emitted.

SAFETY INSTRUCTIONS FOR THE INSTALLER

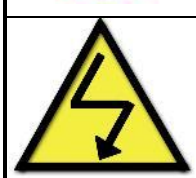
	**Warning** Connect the earthing cord to ship's body. Observe the compass safe distance to prevent deviation of an onboard magnetic compass.
	**Prohibited** Don't open the equipment unless you have fully understood the structure and circuits of the equipment. Only qualified personnel should work inside the equipment. Don't disassemble or try to modify the equipment.
	**Dangerous** Turn off the power at power distribution board before installation.

TABLE OF CONTENTS

1. PRODUCT FEATURES

NGR-3000 is an IMO GNSS equipment of NSR' new generation, compatible with GPS, Beidou and Glonass system.

NGR-3000 GNSS equipment consists of a display unit and an antenna unit.
The high sensitive GNSS equipment tracks up to 50 satellites simultaneously. It ensures optimum accuracy in determination of vessel position, course and speed.

The main features of NGR-3000 are:

- Comprehensive navigation data displays.
- Alerts: Loss of Position, loss of differential signal, HDOP Exceeded.
- Menu-driven operation.
- 7 inch, color LCD, touch screen operation with adjustable brightness.
- 3 GNSS data outputs, BAM/INS input/output.
- Possible to be upgraded to DGNSS.

The product meets the requirements of relative IMO and IEC regulation & standards, including IMO MSC.112 (73), MSC.302 (87), IEC 61108-1, IEC 62923-1, IEC 62923-2, IEC 62288 etc.

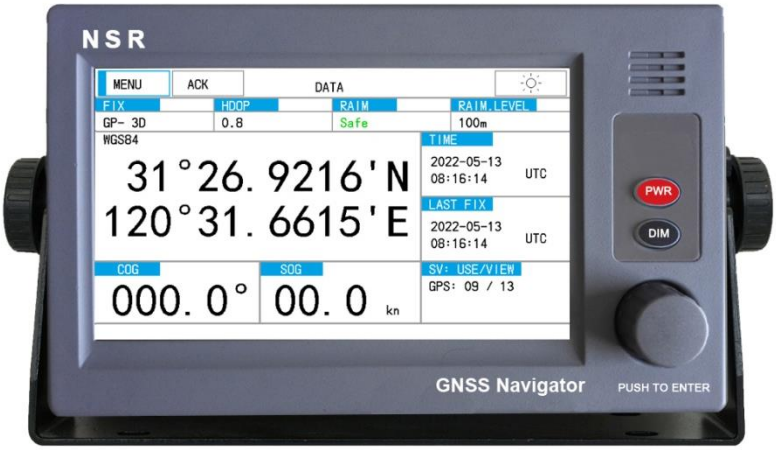
EQUIPMENT LIST:

Scope of Supply					
No.	**Name**	**Type**	**Q'ty**	**Part No.**	**Description**
1	Main Unit	NGR-3000	1	N992530	N992531 with NDG-100
2	GNSS Antenna	NGA100	1		Cable length 10m or 20m
3	Installation Materials				
3.1	Antenna Mount Pole		1		
3.2	Steel Tie		2		
3.3	Accessories		1		
4	Options				
4.1	Beacon	NDG-100	1	N502561	Antenna
4.2	Flush Mount Bracket	NFB700A	1	N561070	
4.3	NMEA distributor	NND-100	1	N995710	
4.4	NMEA distributor	NND-200	1	N995720	

2. OPERATIONAL OVERVIEW

2.1 Control Description

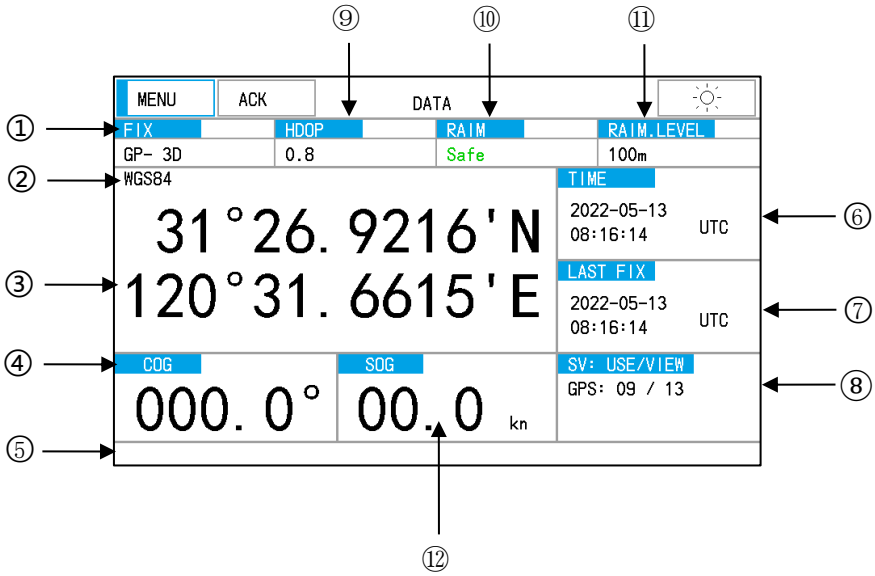
The GNSS equipment can by operated by key & knob on panel or touch-screen.



When operated with knob, turn the knob to select an item on screen and press the knob to confirm the selection.

Panel Button	Description
	Turn to select an item. Press to confirm the selection or input.
PWR	Power ON/OFF. To power OFF, press and hold this button more than 3 seconds.
DIM	Press to change the LCD brightness.
Touch-screen Button	**Description**
MENU	Enter to display different modes.
ACK	Acknowledge current alert.
	Change day/night mode.

NGR-3000 takes about 120 seconds to find position when turned on for the very first time. Thereafter, it takes about 15 seconds to find position each time the power is turned on. After fixed, the accurate position (in latitude and longitude) appears on the display.



No.	Item	Symbol	Remark
①	Fix Mode	GP-D3D	See2.2
②	Datum	WGS84/PZ90	
③	Position in LAT & LON		
④	Course over Ground	COG	
⑤	Alert Column		
⑥	Time	UTC/LMT	GNSS Time
⑦	Final Fixing Time	LAST FIX	
⑧	Quantity of Satellites Being Tracked	SATELLITE	
⑨	Horizontal Dilution of Precision	HDOP	
⑩	Receiver Autonomous Integrity Monitoring	RAIM	Safe/unsafe/caution/off
⑪	Accuracy Level for RAIM		10-100m
⑫	Speed over Ground	SOG	

2.2 Power ON/OFF

- **Turn on the power**

Press the **PWR** button to turn on the power. Usually it will take about 2 minutes to find its position when turned on for the very first time.
The equipment shows receiver status at the bottom of the screen.

Indication	Meaning
GP-2D/ GP-3D	GPS fix
GP-D2D/GP-D3D	Differential GPS fix
GB-2D/GB-3D	BDS fix
GB-D2D/GB-D3D	Differential BDS fix
GL-2D/ GL-3D	Glonass fix
GL-D2D/GL-D3D	Differential Glonass fix
GN-2D/GN-3D	GNSS fix
GN-D2D/GN-D3D	Differential GNSS fix

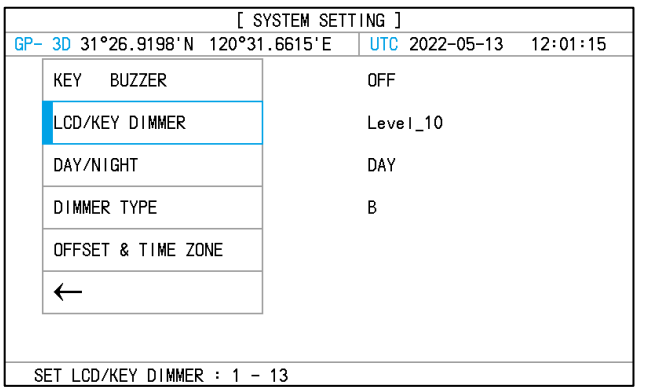
Note: GP-GPS, GB-BDS, GL-Glonass, GN-GNSS.

- **Turn off the power**

Press and hold down the **PWR** button for 3s until the screen goes blank.

2.3 Adjust Dimmer

There are two ways to adjust the brightness of the LCD.
- Adjust the brightness in the **[SYSTEM SETTING]** by clicking **[LCD/KEY DIMMER]**.



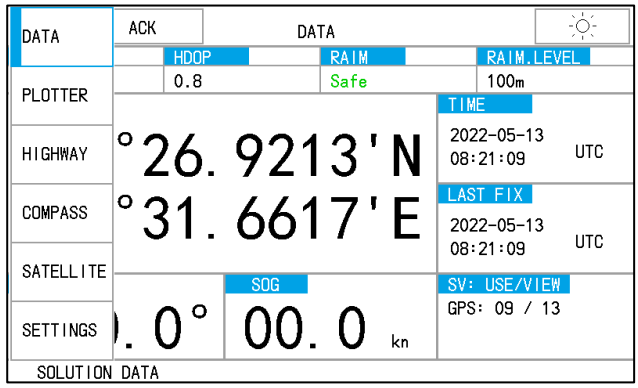
- Press the **DIM** button to adjust the brightness.

Note:

When the power is turned off, the last status of brightness is stored. Therefore, when the power is turned on next time, the screen will display with the last brightness before powered off.

2.4 Basic Menu Operation

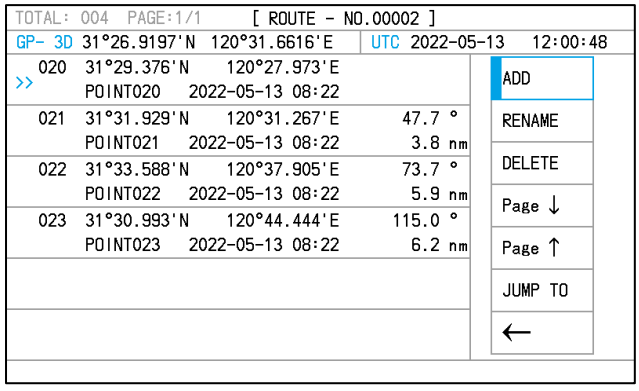
Most operations of your unit are carried out through the menu. If you get lost in operation, press the **PWR** button to return to the **MAIN** menu. Please refer to complete MENU TREE in the Appendix.



1) Click **MENU** button on the main screen to display the modes and settings.
2) Turn the knob and press the knob to confirm the selection or click directly to select an item on screen.

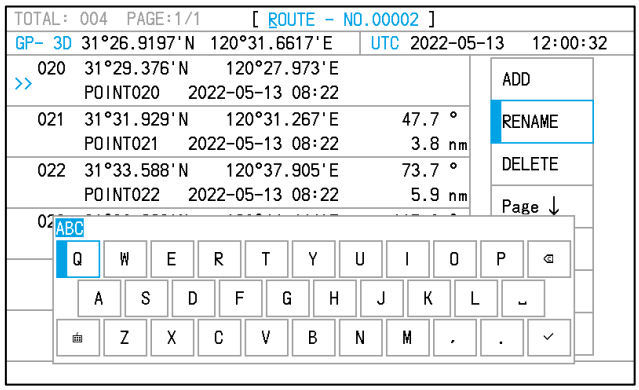
2.5 How to Enter Character Data

In some instances, it is necessary to enter character data. The following example shows how to rename a route by soft keyboard.



Operate the menus until the above screen is got. (Please refer to the related sections of **WAYPOINT/ROUTE**.)

1) When the first line is selected, click **[EDIT]** to locate the first character to edit.
   Click **[RENAME]** to rename the route desired.



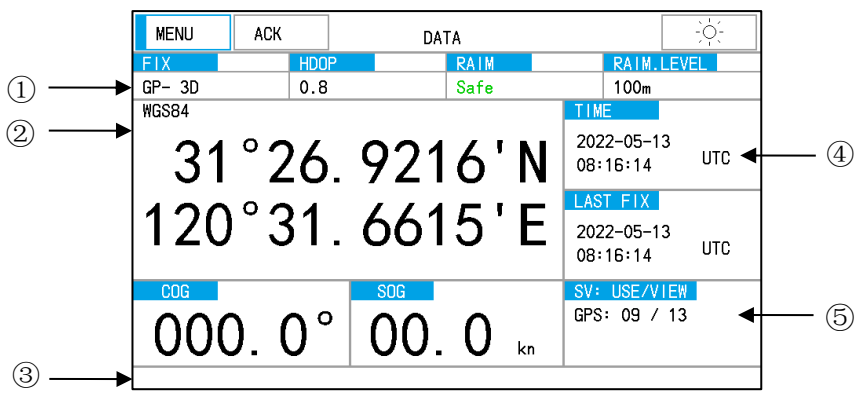
2) Click the character among A-Z desired,
3) Click **[abc]** to change to digit input, then click the number 0-9 desired.
4) Click **[√]** to finish.

2.6 Display Modes

There are six display modes: Data, Plotter, Highway, Compass, Satellite and Beacon (which switches with the Satellite display). Click **MENU** button on screen to select a display mode.

2.6.1 Data display

The **DATA** display is the default display mode of the equipment.



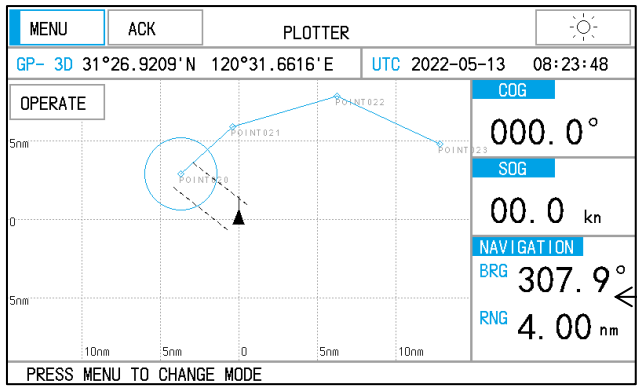
Basic data will be displayed in this mode, including position in latitude and longitude, course, speed, date and time.

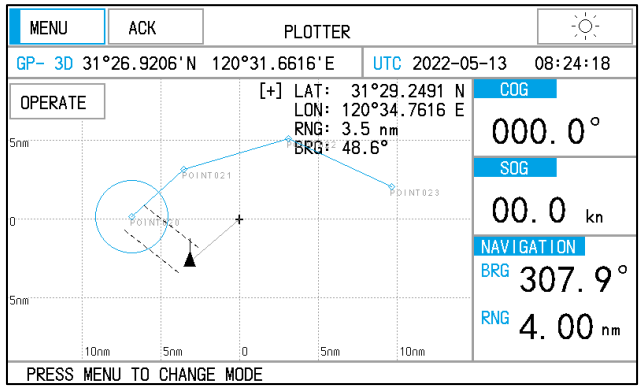
NGR-3000 takes about 40 seconds to find position when turned on for the very first time. There after it takes about 15 seconds to find position each time the power is turned on. After fixed, the accurate position (in latitude and longitude) appears on the display. If position could not be found, loss of position will appear at alert column.

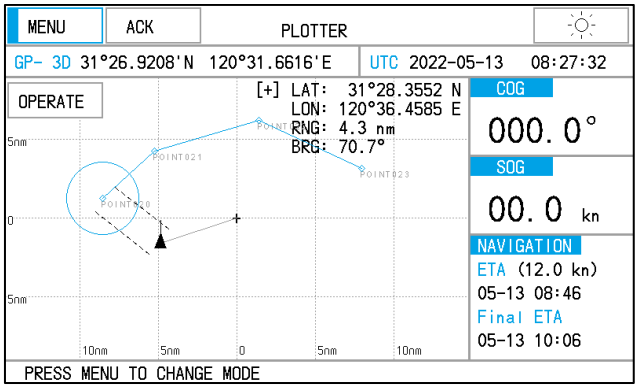
NO.	Item	Remark
①	2D/3D	D2D/D3D when in Differential mode
②	Position in LAT & LON	
③	Alert column	Click to enter the alert list when alert exist
④	Time	UTC/LMT
⑤	Number of satellites tracked	

2.6.2 Plotter display

The **PLOTTER** display traces own ship's track, shows position, course, speed, and sets display range.

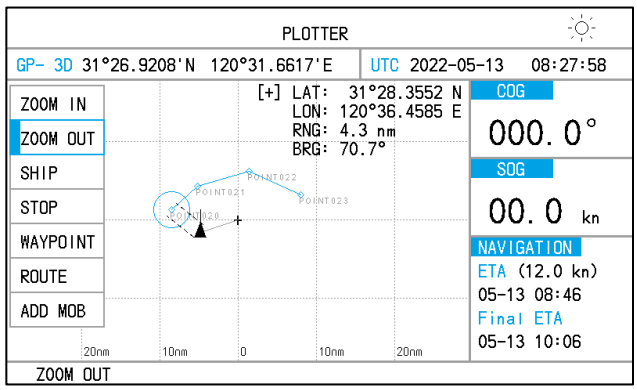




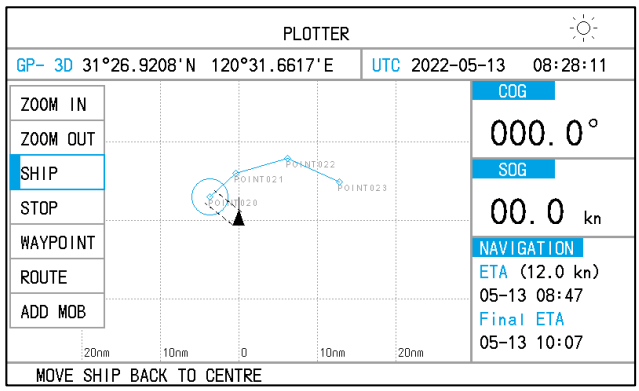


You may increase or decrease the display range on the Plotter display. The range in the Plotter display is available among 0.02, 0.05, 0.1, 0.2, 0.5, 1, 2, 5, 10, 20, 40, 80, 160 and 320 nautical miles.

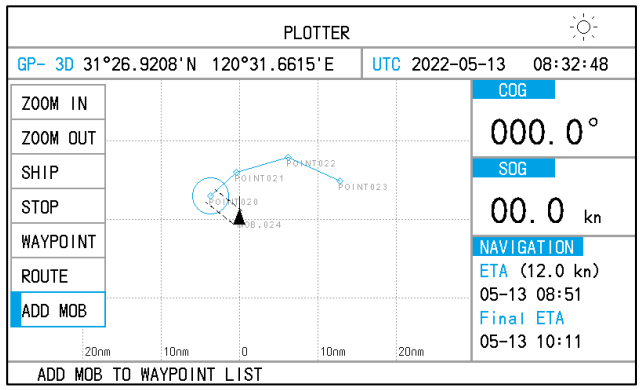
1) Click **OPERATE** button. The pop-up menu appears.
2) Click **[ZOOM IN]** or **[ZOOM OUT]** to select the desired range.
3) Click on any blank space to finish.



Press **[SHIP]** to return.

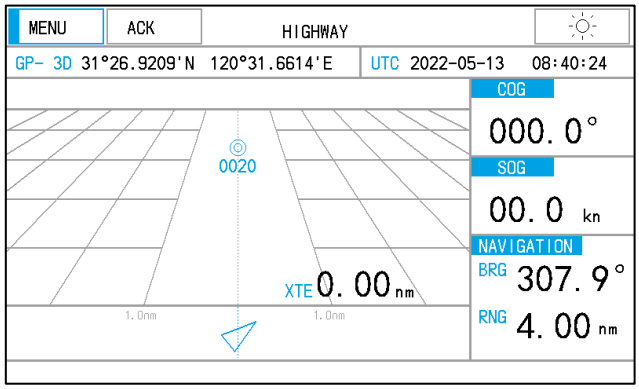


Press **[ADD MOB]** to add a waypoint named “MOB.XXX” based on the ship/cursor location.



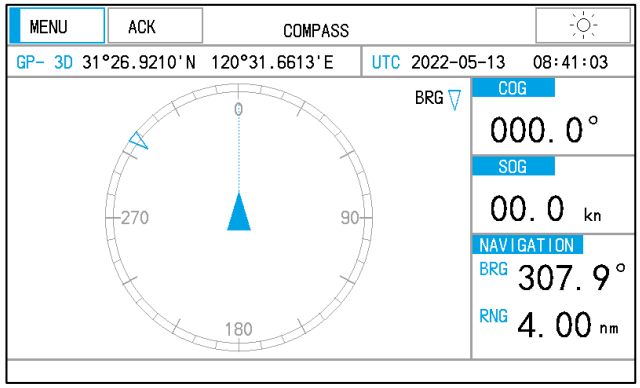
2.6.3 Highway display

The **HIGHWAY** display provides a 3-D view of own ship’s route toward destination. Navigation data is also shown.



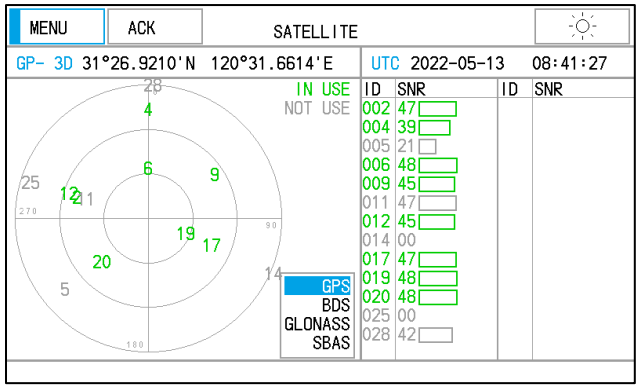
2.6.4 Compass display

The **COMPASS** display provides course with ship’s speed, and position.



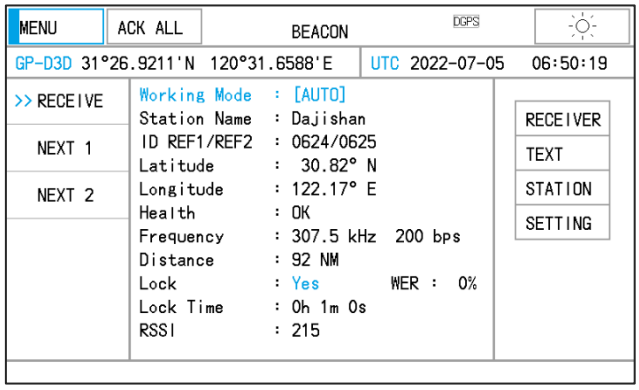
2.6.5 Satellite display

The **SATELLITE** display shows satellites currently tracked, together with the strength of receiving signals.



2.6.6 Beacon display

Click on the **SATELLITE** display to switch to the **BEACON** display and vice versa.



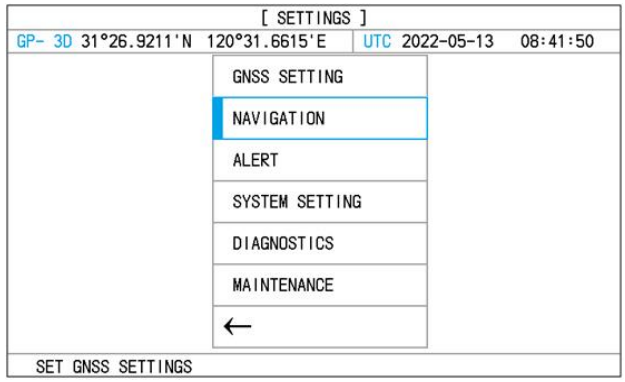
[RECEIVE]: The channel used to calculate location.
[NEXT 1] / [NEXT 2]: Two channels used for duty.
[TEXT]: Check special text message received from station.
[STATION]: Check the nearest 10 stations and all stations stored.
[SETTING]: Set the working mode of BEACON. See Section 5.1.5 for details.

3. NAVIGATION PLANNING

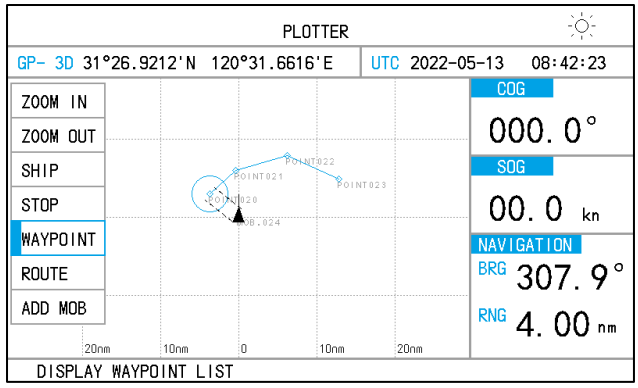
Typically, a trip from one place to another involves several course changes, requiring a series of waypoints which you navigate to, one after another. The sequence of waypoints leading to the ultimate destination is called a route. NGR-3000 can automatically advance to the next waypoint on a route, so you do not have to change the destination waypoint repeatedly. NGR-3000 can store 30 routes and each route may include up to 100 waypoints.

There are two ways to enter Waypoint and Route.

(1) Click **[MENU]-[SETTINGS]-[NAVIGATION]** to open the menu.

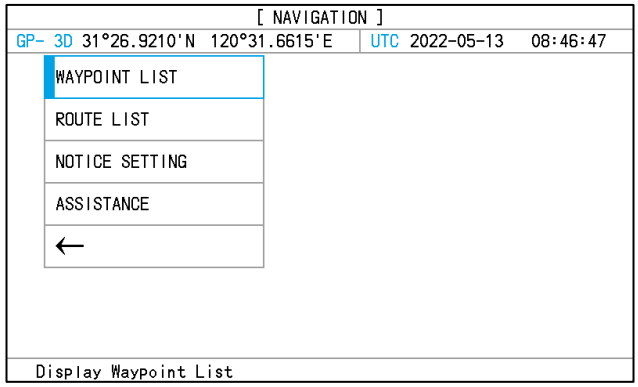


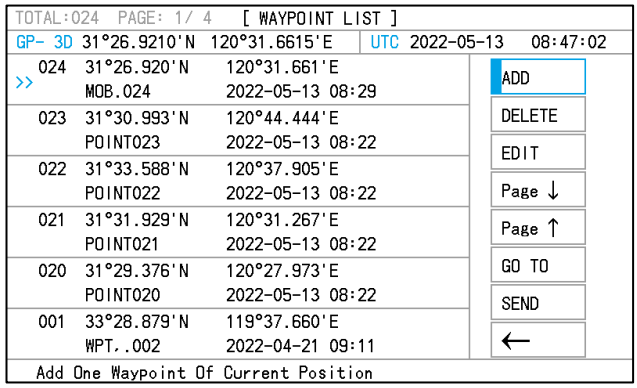
(2) Click **[PLOTTER]** in **[MENU]**, then click **[WAYPOINT]** / **[ROUTE]** in **[OPERATE]** to open the menu.



3.1 Register Waypoints

Click **[NAVIGATION]-[WAYPOINT LIST]** to open the waypoint list.





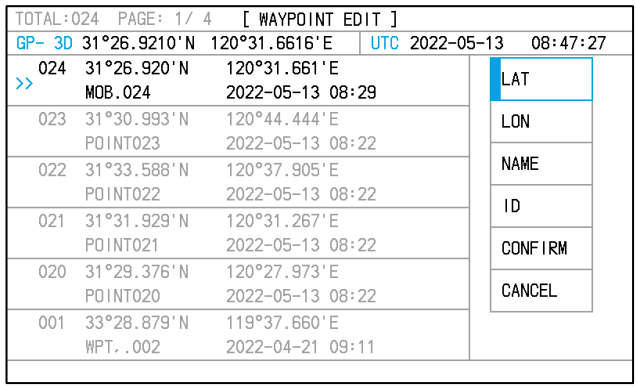
1) Click to select the waypoint desired.
2) Select **[ADD]**, **[DELETE]** or **[EDIT]** desired.

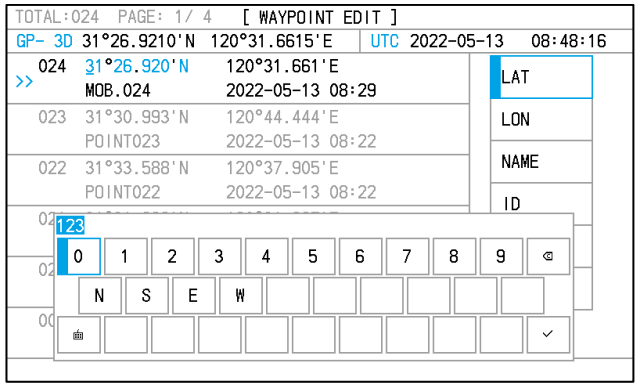
3.1.1 Insert a new waypoint

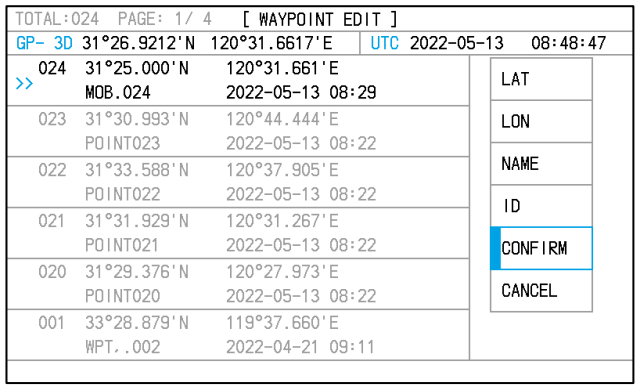
Create a new waypoint with the position as own ship's current position. The new waypoint will be inserted before the waypoint which is selected by the current cursor.

3.1.2 Edit a waypoint

Edit the selected waypoint.



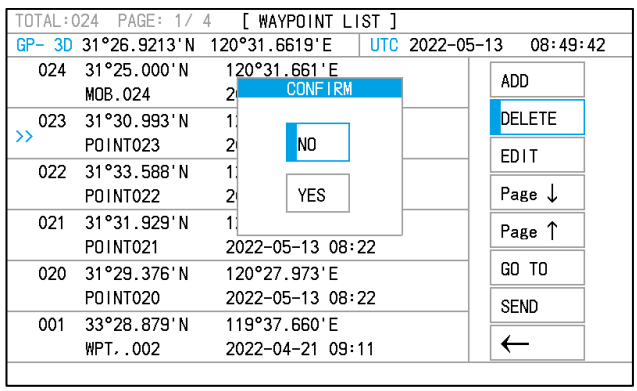




1) Click **[EDIT]** to edit the contents of the waypoint.
2) Click **[LAT]** or **[LON]** to locate the first character to edit and click the character desired.
3) Click the **[√]** key.
4) Click **[CONFIRM]** to finish the waypoint edition.

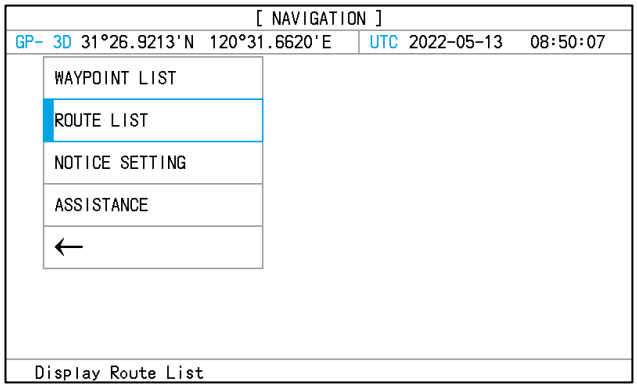
3.1.3 Delete a waypoint

Click **[DELETE]** to delete the selected waypoint. Click “YES” to confirm the operation.

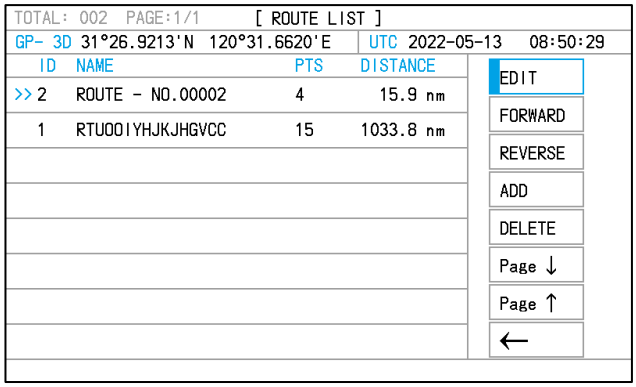


3.2 Route Planning

Click **[NAVIGATION]-[ROUTE LIST]** to open the route list.



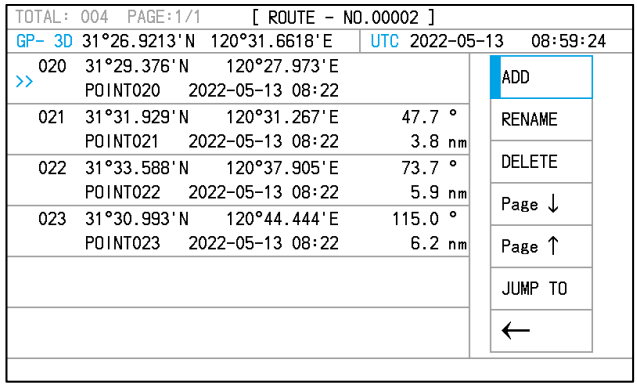
1) Click to select route desired from **[ROUTE LIST]**.



2) Click **[EDIT]**, **[FORWARD]**, **[REVERSE]**, **[ADD]**, **[DELETE]**, **[Page ↓]** or **[Page↑]** desired.

3.2.1 Edit a route

1) Click to select a route in **[ROUTE LIST]**.
2) Click **[EDIT]** to edit the route.
3) Select **[ADD]**, **[DELETE]** to add or delete a waypoint in the route, **[RENAME] to** rename the route.



ADD a waypoint

Add a waypoint to route from route list.

Click **[ADD]** to add the current position as a new waypoint to the route.

The screen will change to **[WAYPOINT LIST]** display.

RENAME the route

Click **[RENAME]**, the pop-up menu appears.

The route name can be made of up to 17 characters.

The operation is as follows:

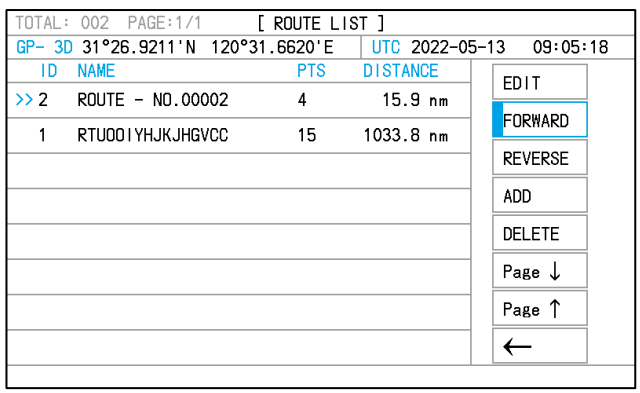
1) Click **[RENAME]** to rename the route desired.
2) Click the character among A-Z, 0-9 desired.
3) Click [√] to finish.

DELETE a waypoint

Click **[DELETE]** to delete the selected waypoint from the route.

3.2.2 Forward navigation

Click **[FORWARD]** in **[ROUTE LIST]** menu to start navigation forward. The screen will switch to **PLOTTER** page.

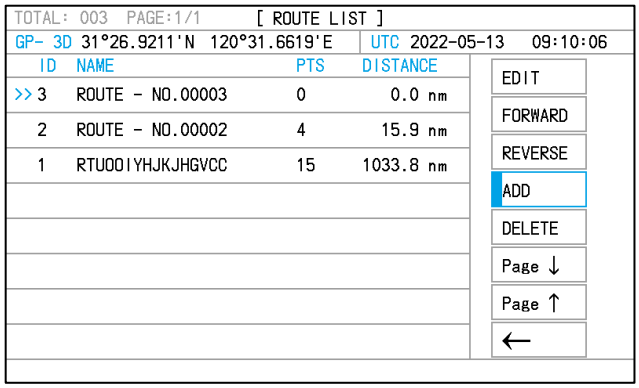


3.2.3 Reverse navigation

Click **[REVERSE]** to start navigation reversely. The screen will switch to **PLOTTER** page.

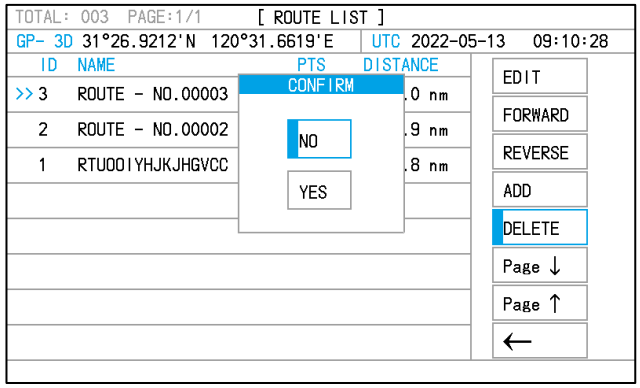
3.2.4 Create a new route

Click **[ADD]** to add a new route just after the current route.

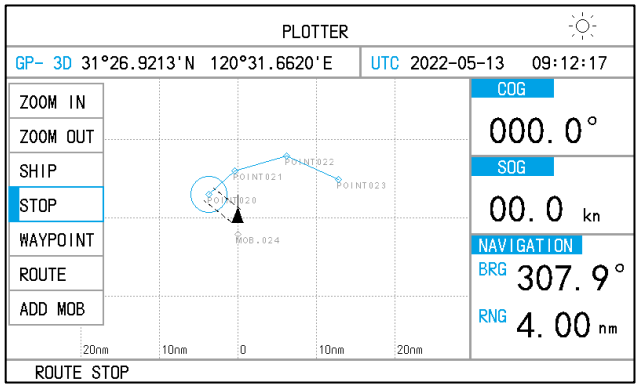


3.2.5 Delete a route

Click **[DELETE]** to delete the selected route from route list. Click "YES" to confirm the operation.



3.3 Stop the Navigation by the Current Route

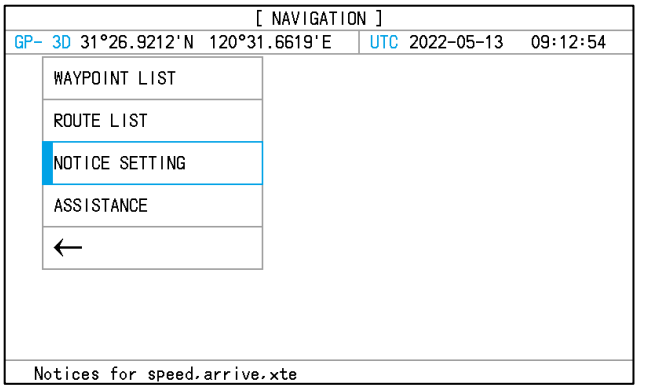


Click **[PLOTTER]** in **[MENU]**, then click **[STOP]** to stop the navigation by the current route. The route is cleared on the **PLOTTER** display.

4. NAVIGATION ALARMS

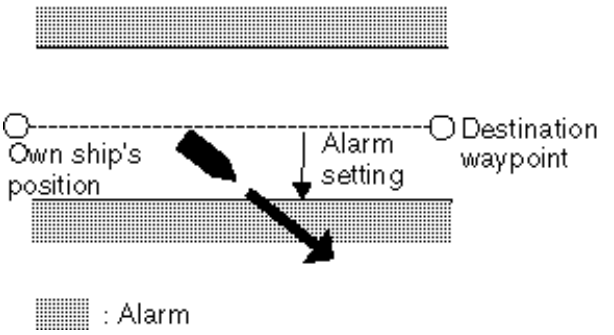
Important Note: All these navigational alarms (XTE, SPEED, ARV, ANC) should be switched off on SOLAS- (or IMO-) compliant ships.

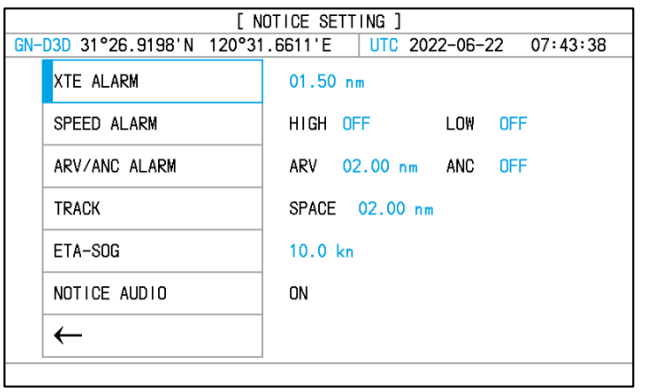
Select **[SETTINGS]-[NAVIGATION]-[NOTICE SETTING]** to open the menu.

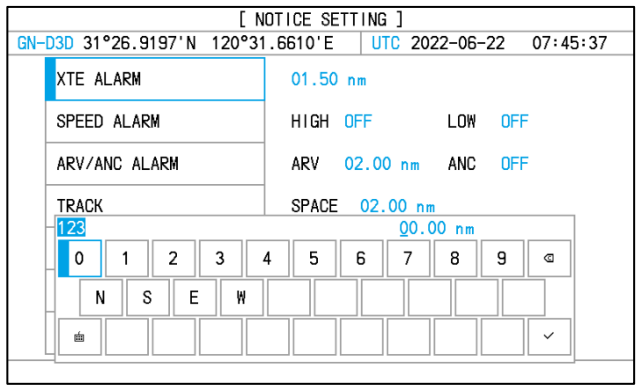


4.1 XTE (Cross Track Error) Alarm

The XTE alarm warns you by an internal buzzer when own ship is off its intended route.



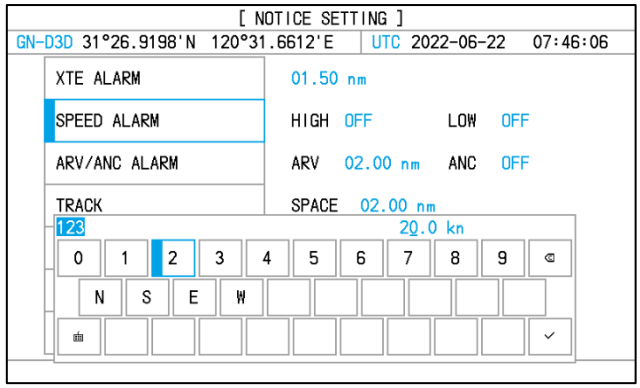




1) Click the value field to edit.
2) Click the digits among 0-9 desired until the desired digit is got.
3) When the value is set to 0, alarm will be turned off.

4.2 Speed Alarm

The speed alarm is activated when ship's speed is higher (or lower) than the set value.

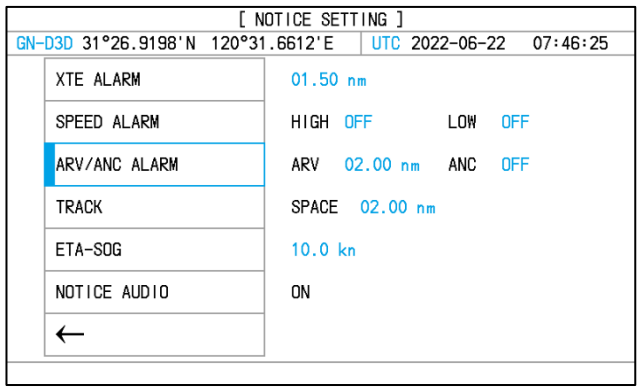


LOW: Alarm is activated when speed is lower than the speed set in the field.
HIGH: Alarm is activated when speed is higher than the speed set in the field.

1) Click the **HIGH/LOW** speed value to edit.
2) Click the digits among 0-9 until the desired digit is got.
3) When the value is set to 0, alarm will be turned off.

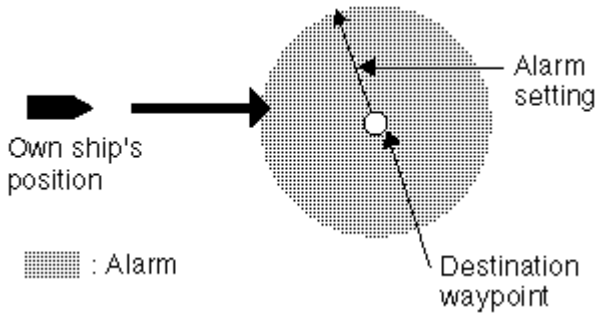
4.3 Arrival Alarm and Anchor Watch Alarm

You may activate the arrival alarm or the anchor watch alarm while they cannot be activated together.



- **Arrival Alarm**

The arrival alarm informs you that own ship is approaching a destination waypoint. The area that defines an arrival zone is that of a circle which you approach from the outside of the circle. The alarm will be activated if own ship enters the circle.

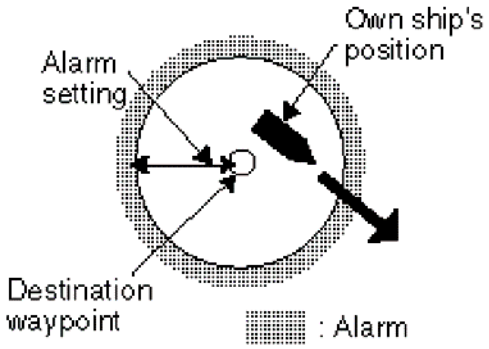


1) Click the **ARV** alarm value to edit.
2) Click the digits among 0-9 until the desired digit is got.
3) Turn the knob to move the cursor to the next digit to edit.
4) When the value is set to 0, the alarm will be turned off.

The alarm range is (0.01-99.99 nm).

- **Anchor Watch Alarm**

The anchor watch alarm sounds to warn you that own ship is moving beyond the set area.



Before setting the anchor watch alarm, set current position as destination.

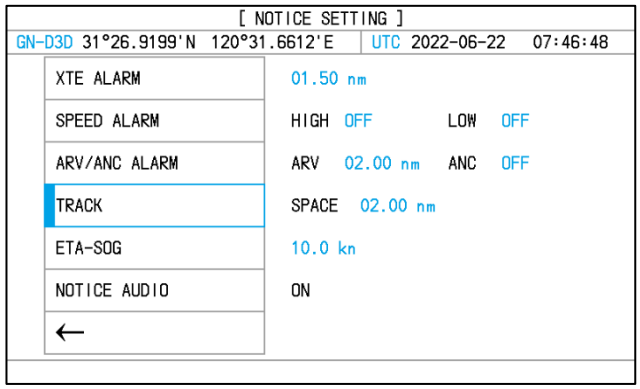
1) Click the **ANC** alarm value to edit.
2) Click the digits among 0-9 until the desired digit is got.
3) Turn the knob to move the cursor to the next digit to edit.
4) When the value is set to 0, alarm will be turned off.

The alarm range is (0.01-99.99 nm).

Note:
Anchor watch alarm and arrival alarm are combined to serve a route. After a route is finished while the destination is arrived at, keep the navigation on the route while setting ANC. The anchor watch starts.

4.4 Track Record

Click **[TRACK]** to set the interval of every two recorded dots.



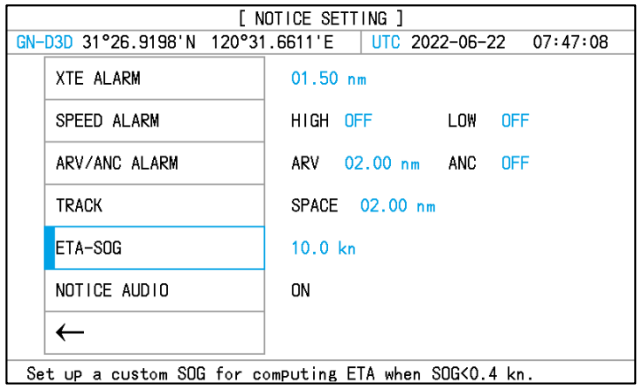
If **OFF** is selected, the track will not be recorded.

If **SPACE** is selected, the track will be recorded every certain distance which can be configured.
If **AUTO** is selected, the track will be recorded every minute or every certain distance which

can be configured, whichever is reached first.

4.5 ETA-SOG

When forward a route but SOG < 0.4 kn, ETA will be calculated according to this SOG. Default is 10.0 kn



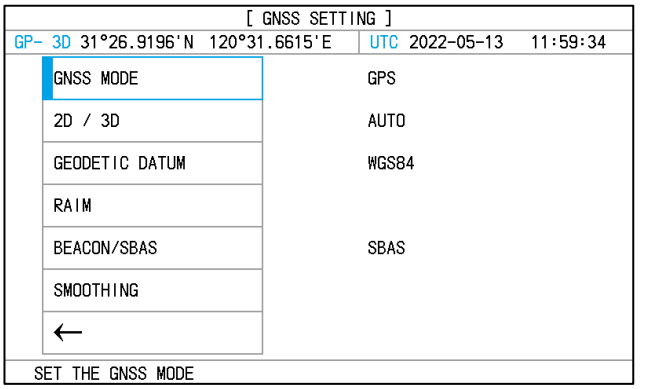
4.6 Notice Audio

Set whether an audible alarm is required for Notice.

5. MENU SETTING

5.1 GNSS Setting

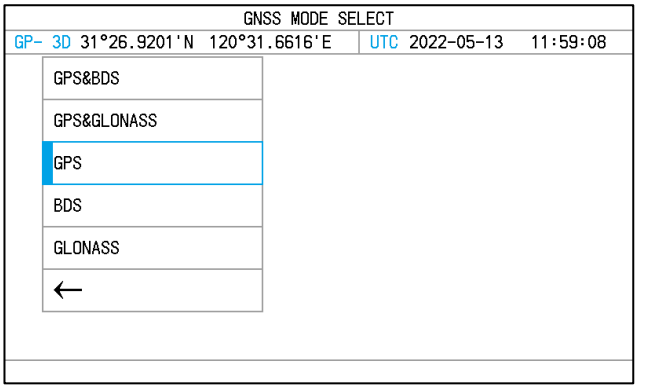
Click **[MENU]-[SETTINGS]-[GNSS SETTING]** to open the menu as follows.



It includes **GNSS MODE**, **2D/3D**, **GEODETIC DATUM**, **RAIM**, **BEACON/SBAS** and **SMOOTHING** settings.

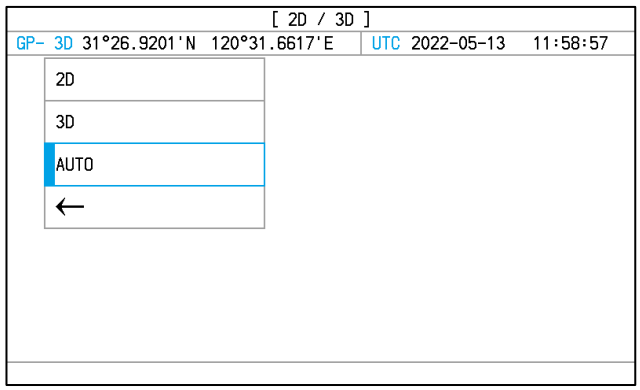
5.1.1 GNSS mode

There are five modes can be selected: GPS & BDS, GPS & GLONASS, GPS, BDS and GLONASS.



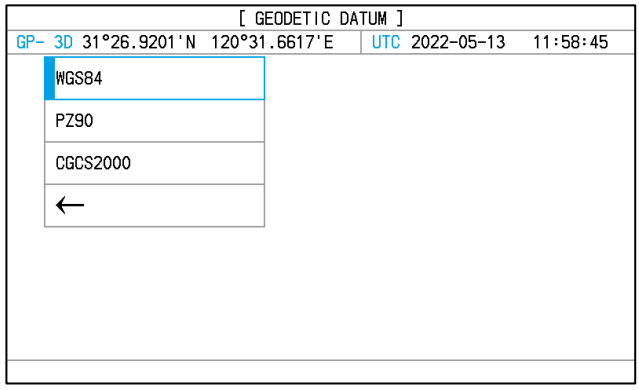
5.1.2 2D/3D

Select 2D or 3D fix mode.



5.1.3 Geodetic datum

Totally there are three systems to be selected: WGS84, PZ-90 and CGCS2000.



5.1.4 RAIM

5.1.4.1 RAIM

RAIM (Receiver Autonomous Integrity Monitoring) can be set to **ON** or **OFF**.
When set to **ON**, RAIM will display SAFE, UNSAFE or CAUTION in below conditions:

- **Conditions for the "safe" state**
  The result of integrity calculation by means of RAIM will be stated as "safe", if the integrity calculation can be performed with a confidence level above 95 % for the selected accuracy level and RAIM calculates the probable position error to be within the selected accuracy level.
  This generally requires at least 5 "healthy" satellites available and in a robust geometry, i.e. the worst 4 satellite geometry is still suitable for navigation.

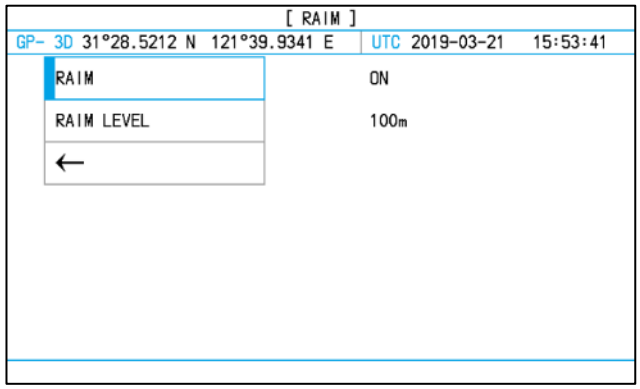
- **Conditions for the "caution" state**
  The "caution" status will be used to indicate:
  – Insufficient information to reliably calculate with a confidence level above 95 % for the selected accuracy level, or
  – The probability of false alarms >5 %, or
  – The probability of not detecting an error condition >5 %.

  Those conditions may occur if an insufficient number of satellites are available, for example 4 or 5 with 2 satellites "close" together in azimuth and elevation, causing the geometry to degrade to the point that the RAIM calculation becomes unreliable. Note that the resulting accuracy based on 4 or 5 satellites in use may be within the selected accuracy level, but the RAIM algorithm cannot verify it.

- **Conditions for the "unsafe" state**
  The "unsafe" status will be used if the integrity calculation is performed with a confidence level above 95 % for the selected accuracy level, and RAIM calculates the probable position error exceeding the selected accuracy level. Note that also here a robust geometry is required to reach this confidence level. The "unsafe" state can be reached when satellite range errors degrade the navigation solution, causing the resulting accuracy to be outside the selected accuracy level.

5.1.4.2 RAIM level

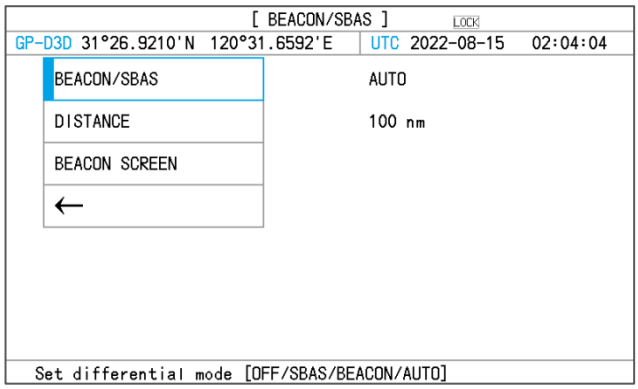
RAIM level can be set between 10-100m.



5.1.5 Beacon/SBAS

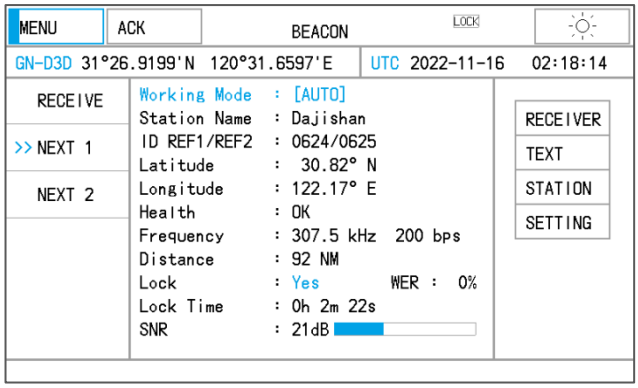
This menu is used to set the differential mode, distance and enter **BEACON SCREEN**.
Click **[BEACON/SBAS]** to change the mode among BEACON, SBAS and AUTO options.
[SBAS] is a differential mode based on satellite. The coverage is wider, but not as accurate as BEACON.

[AUTO]: Use BEACON first, and switch to SBAS when the distance to the nearest base station is greater than [DISTANCE].



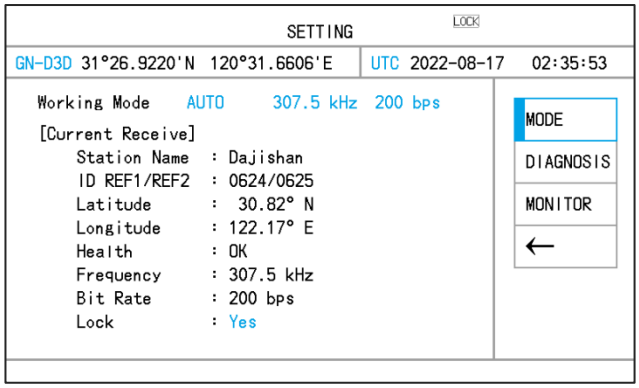
Note: *LOCK indicates that the differential signal of the base station is locked.*

Click [**BEACON SCREEN**] to open the BEACON window as follows.

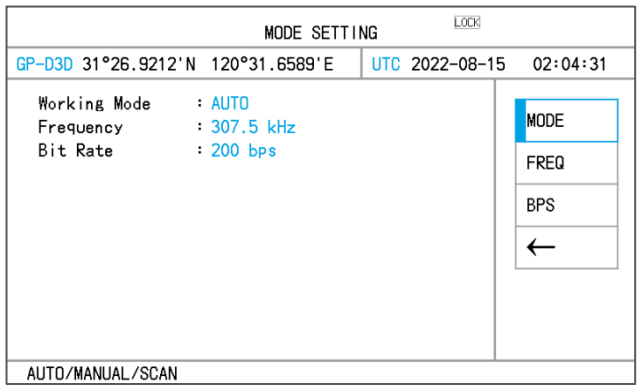


5.1.5.1 Set beacon mode

Click **[SETTING]** in **BEACON SCREEN** to set BEACON mode. The following menu appears.



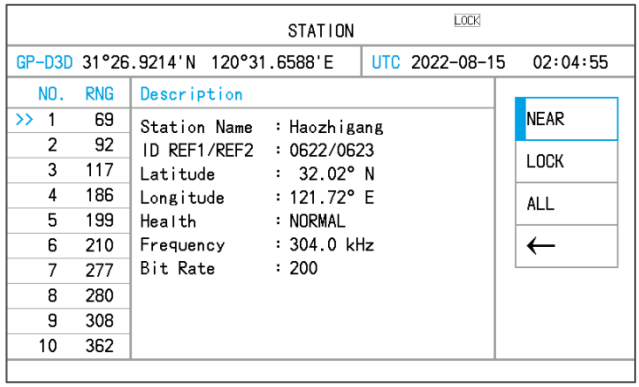
Click **[MODE]** to switch directly between **[AUTO]**, **[MANUAL]** and **[SCAN]**.



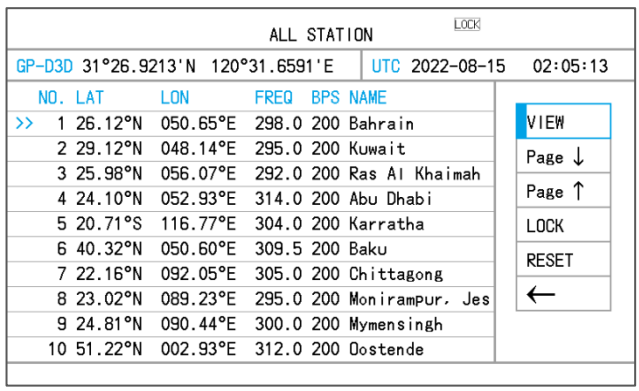
[AUTO]: Search the nearest 10 base stations for DGNSS signals.
[MANUAL]: Lock the DGNSS signal according to the set frequency and bit rate.
[SCAN]: Search for DGNSS signals at all frequencies and bit rates.

5.1.5.2 Station list

Click **[STATION]** in **BEACON SCREEN**. The following screen appears.

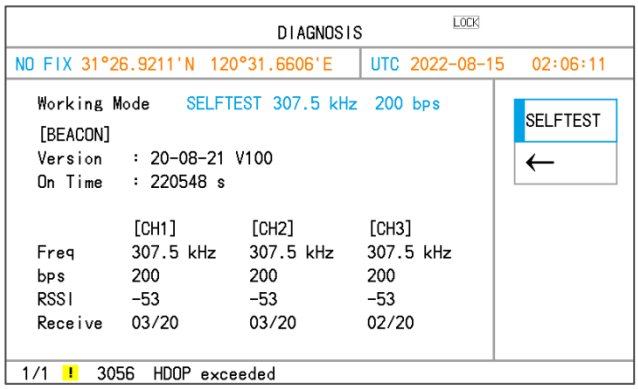


[LOCK]: Manually lock to the selected station.
[ALL]: Check all stored stations.

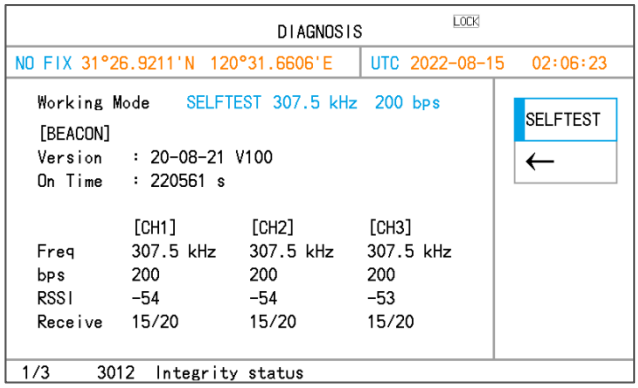


5.1.5.3 Beacon self-test

Click **[SETTING]-[DIAGNOSIS]** in **BEACON SCREEN**. The following menu appears.

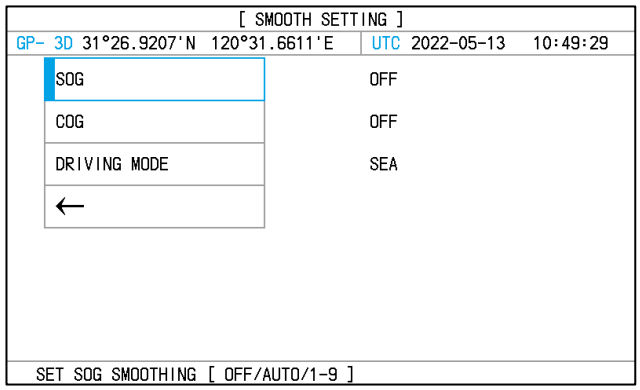


Click **[SELFTEST]** to start self-test.



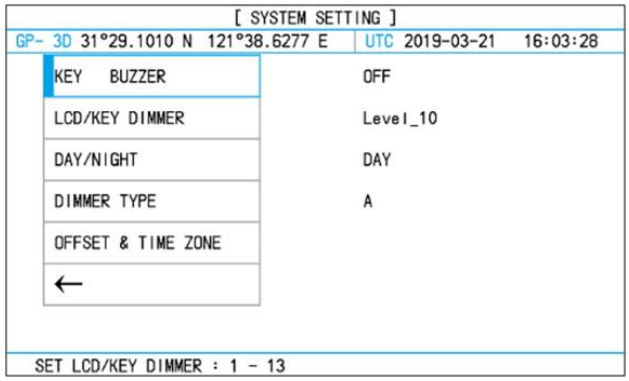
5.1.6 Smoothing

Change the COG and SOG averages to adjust the smoothness.



5.2 System Setting

Click **[MENU]-[SETTINGS]-[SYSTEM SETTING]** to open the menu as follows.



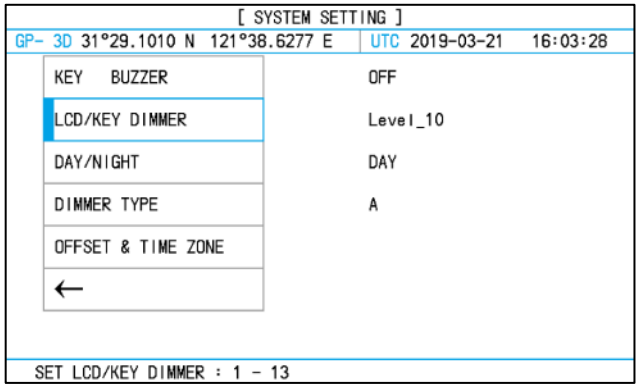
It includes **KEY BUZZER**, **LCD/KEY DIMMER**, **DAY/NIGHT**, **DIMMER TYPE** and **OFFSET & TIME ZONE** items.

5.2.1 Key buzzer

Key buzzer can be turned off so that operation is not heard.

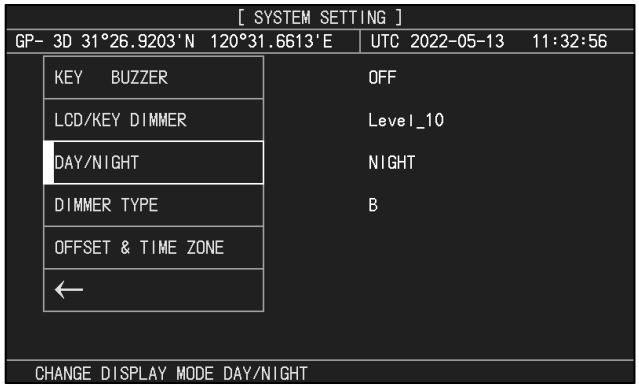
5.2.2 LCD/KEY dimmer

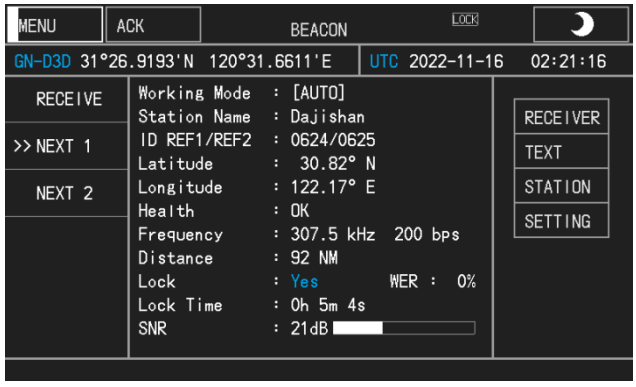
Dimmer can be adjusted either by **DIM** button or set in menu.



5.2.3 Day/Night

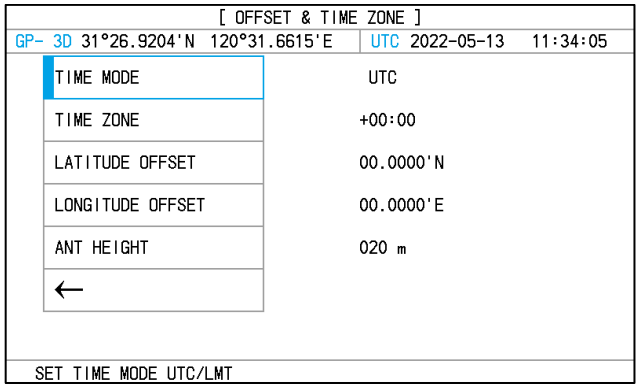
Change the display mode between **DAY** and **NIGHT**. For example:





You can also click the  icon at upper right corner of main or beacon screen to change the display between day mode and night mode.

5.2.4 Offset & Time zone



[TIME MODE]: Time can be set as **UTC** or **LMT** in **TIME MODE**.
[TIME ZONE]: Set time zone from **-13:00** to **+13:00**.
[LATITUDE OFFSET]: Set the latitude offset to add to the calculation of the position.
[LONGITUDE OFFSET]: Set the longitude offset to add to the calculation of the position.
[ANT HEIGHT]: Set the height of GNSS antenna.

5.3 Alert

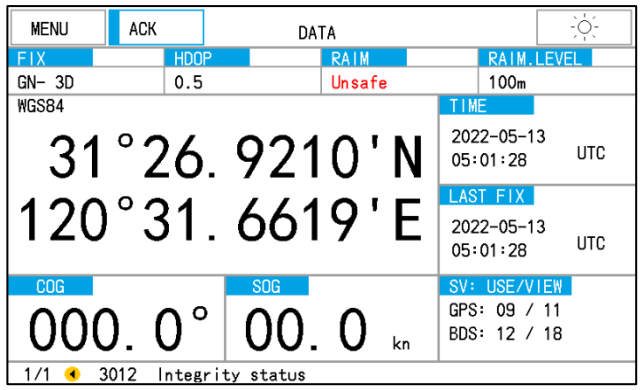
List of all alerts that could be generated:

ID	Ins	Cat	Prio	Escal	Resp	Alert Title	Alert description
3056	1	B	C	/	/	HDOP exceeded	HDOP > 4.0 check antenna
3015	2	B	W	W	Yes	Loss of position	Loss of position check antenna
3055	3	B	W	W	Yes	DGNSS Lost*	Loss of differential signal
3012	4	B	W	W	Yes	Integrity status	Accuracy is unsafe check antenna

Ins: Instance of an alert;
Prio: Alert priority (W – Warning, C – Caution);
Cat: Alert category;
Escal: W – An unacknowledged warning will be repeated as warning after 4 minutes;
Resp: Transfer responsibility;

*****: "DGNSS Lost" takes effect when BEACON is selected.

When an alert occurs, the buzzer sounds (except for a caution) and the title of alert appears at the bottom of display. Click on the bottom to enter the alert list.

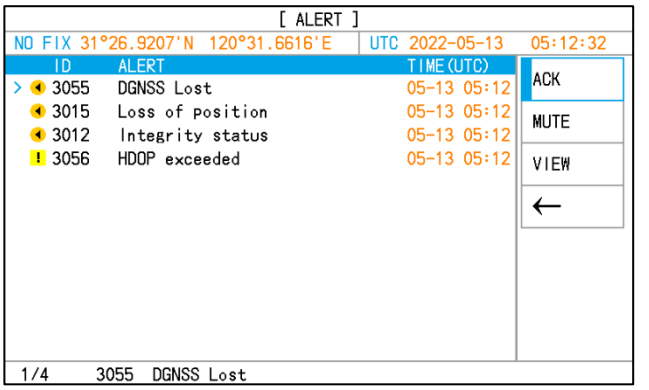


Alert mark description:

MARK	PRIORITY	STATE
	WARNING	ACTIVE-UNACKNOWLEDGED
		ACTIVE-SILENCED
		ACTIVE-ACKNOWLEDGED
MARK	PRIORITY	STATE
	WARNING	ACTIVE-RESPONSIBILITY TRANSFERRED
		RECTIFIED-UNACKNOWLEDGED
	CAUTION	ACTIVE

Click **[MENU]-[SETTINGS]-[ALERT]** to open the **[ALERT]** screen, it shows all currently

alerts. Time is synchronized when GNSS is fixed, and not synchronized when GNSS is not fixed.



> : Point to the currently selected alert, click the alert to select.

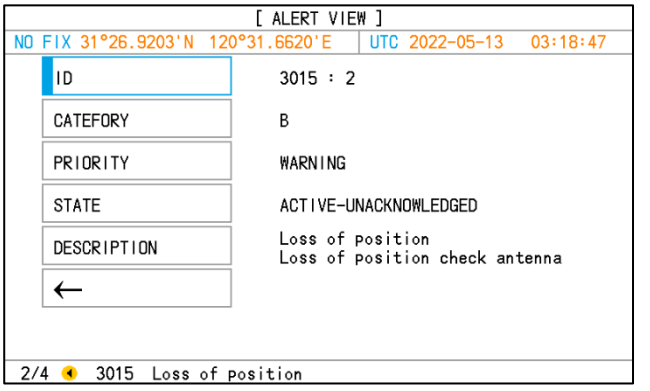
[ACK]: Acknowledge the alert selected.

[MUTE]: Make all alerts silent for 30 seconds.

[VIEW]: View the details of alert selected, it will show as below.

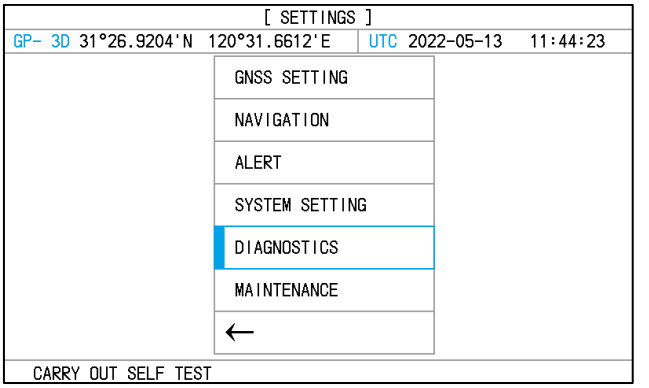
[←]: Back to upper menu.

[PWR]: Short press to return to the main screen.



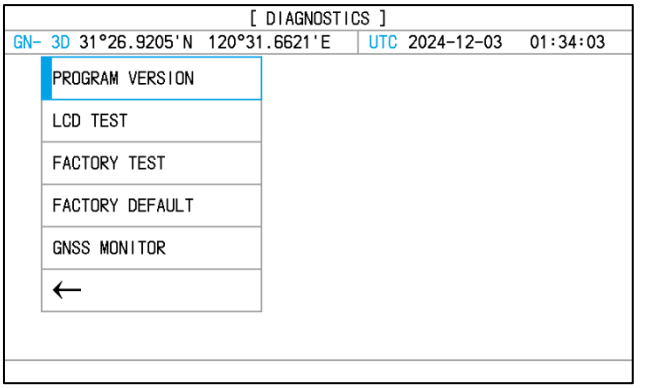
5.4 Diagnostics

Click **[MENU]-[SETTINGS]-[DIAGNOSTICS]** to check software version, keypad and LCD for proper operation, etc.



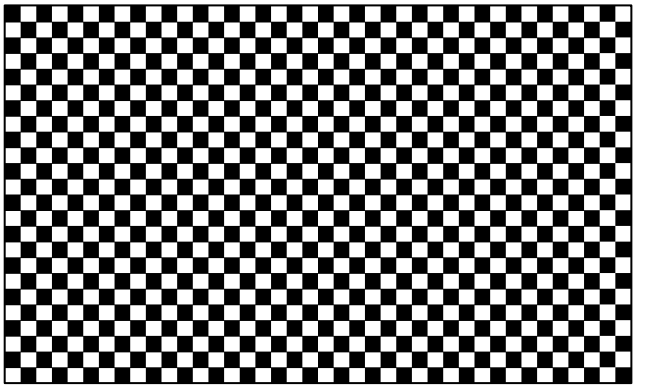
5.4.1 Software version

Select **[PROGRAM VERSION]** item to check the software version.



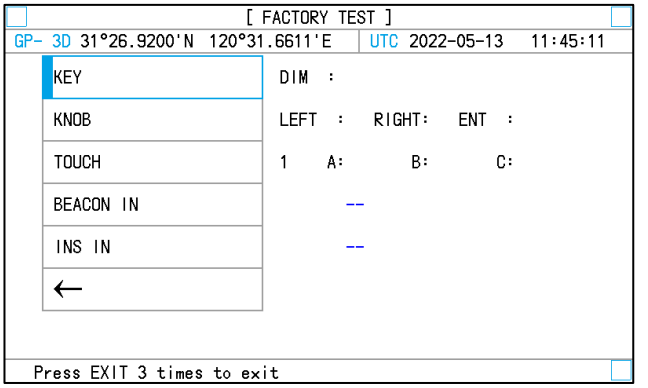
5.4.2 LCD test

LCD TEST is used for testing the screen.
Click [**LCD TEST**] to enter the test screen, turn knob **c**ontinuously to test the LCD.
Press the knob to exit.



5.4.3 Factory test

It is designed to test whether the key, knob and touch-screen are working or not, etc.
Click **[FACTORY TEST]** to enter the following view.

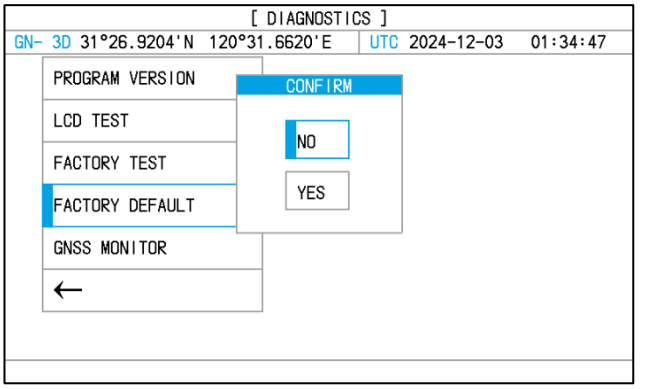


KEY test: Press **DIM** key.
KNOB test: Turn the knob to left and right, then press it.
TOUCH test: Touch the corner of the screen. The box corresponding to the item will be filled with blue color.

If everything is good, **OK** icon will appear.

5.4.4 Factory default

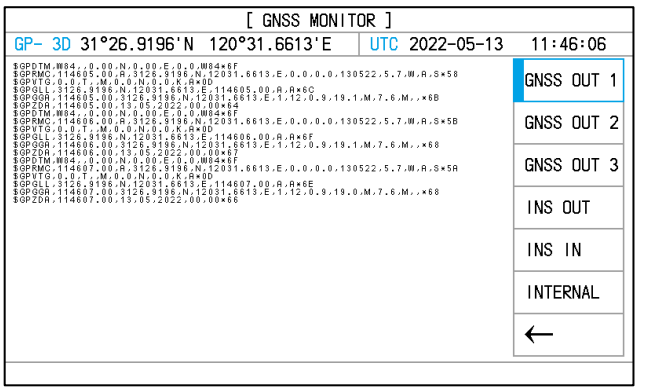
FACTORY DEFAULT is to return the system to factory default setting.
Select **[FACTORY DEFAULT]** item in **[DIAGNOSTICS]** menu, then click "**YES**" to confirm the operation.



Note:
The navigation settings and GNSS settings will restore to factory default while the waypoints and routes registered remain unchanged.

5.4.5 GNSS monitoring

It's to check the GNSS data appearing on output ports.



6. INSTALLATION

6.1 Installation of Main Unit

The main unit can be installed on a table-top, on the overhead, or in a panel (optional flush mounting brackets required). Refer to the drawings at the end of this manual for installation instructions. When selecting a mounting location, keep in mind the following points:

- Locate the unit away from exhaust pipes and vents.
- The mounting location should be well ventilated.
- Mount the unit where shock and vibration are minimal.
- Locate the unit away from equipment which generates electromagnetic fields such as a motor or generator.
- Allow sufficient maintenance space at the sides and rear of the unit and leave sufficient slack in cables, to facilitate maintenance and servicing.
- Observe the following compass safe distances to prevent deviation of a magnetic compass. Standard compass, 0.5 m. Steering compass, 0.3 m.

6.2 Installation of Antenna Unit

Install the antenna unit by referring to the antenna installation drawings at the end of this manual. When selecting a mounting location for the antenna unit, keep in mind the following points:

- Do not cut the antenna cable.
- Select a location out of the radar beam. The radar beam will obstruct or prevent reception of the GNSS signal.
- The location should be well away from a VHF/UHF antenna. A GNSS equipment is interfered by a harmonic wave of a VHF/ UHF antenna.
- There should be no obstruct within the line-of-sight to the satellites. Objects within line-of-sight to a satellite, for example, a mast, may block reception or prolong acquisition time.
- Mounting the antenna unit as high as possible keeps it free from interfering objects and water spray, which can interrupt reception of GNSS satellite signal if the water freezes.
- If the antenna cable is to be passed through a hole which is not large enough to pass the connector, you may unfasten the connector. Refasten it after running the cable through the hole.

6.3 Cabling

6.3.1 Power connection

PIN NO.	DESCRIPTION	TYPE
13	PWR (+24V)	DC Power
14	PWR (0V)	

The power cable with a rated capacity of 3A should be used. Pin definition for the connector is showed above.
Suggest using the 3A Power Supply Unit (DC 24V output).

6.3.2 Interfaces

PIN NO.	DESCRIPTION	TYPE
3	GNSS OUT 1+	IEC 61162-1/ IEC 61162-2
4	GNSS OUT 1-	
5	GNSS OUT 2+	IEC 61162-1/ IEC 61162-2
6	GNSS OUT 2-	
7	GNSS OUT 3+	IEC 61162-1/ IEC 61162-2
8	GNSS OUT 3-	
9	BAM OUT+	IEC 61162-1/ IEC 61162-2
10	BAM OUT-	
11	BAM IN+	IEC 61162-1/ IEC 61162-2
12	BAM IN-	
13	PWR (+24V)	DC Power
14	PWR (0V)	

[Beacon IN] is used for receive differential signal from DGNSS beacon.
[GNSS OUT] is used for output position data.

The default baud rate is 4800 bps, which can also be changed among 4800/ 9600 / 19200 / 38400 bps.

6.3.3 Alert interface

There is one alert interface (IEC 61162-1/IEC 61162-2) for BAM.

PIN NO.	DESCRIPTION	TYPE
9	BAM OUT+	IEC 61162-1/ IEC 61162-2 ALF,ALC,ARC,HBT
10	BAM OUT-	
11	BAM IN+	IEC 61162-1/ IEC 61162-2 ACN,HBT
12	BAM IN-	

Alert list is described in Section 5.3.

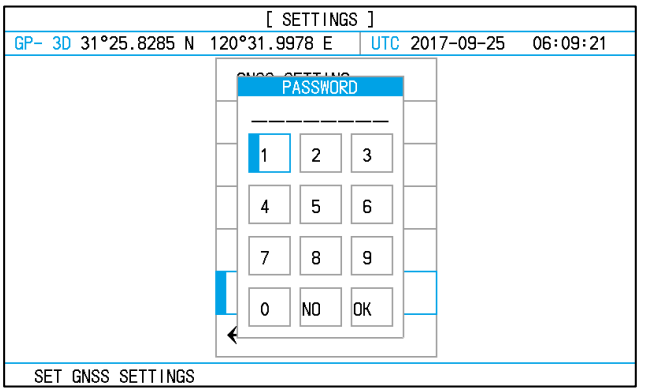
6.3.4 Grounding

Ground the unit as follows to prevent interference:

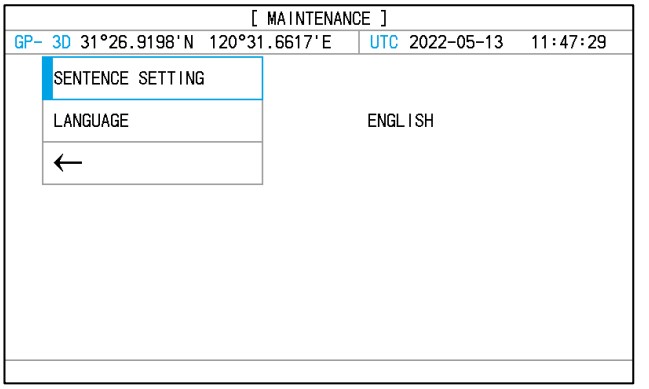
- The ground wire should be 1.25mm2 or larger.
- The ground wire should be as short as possible.

6.4 Initial Settings

This equipment can output navigation data to external equipment, in NMEA 0183 format. For example, it can output position data to a radar or echo sounder.
Initial settings are done in menu of **[MAINTENANCE]**.



Password is required to enter **[MAINTENANCE]**.



6.4.1 Language setting

[LANGUAGE]: Change language (ENGLISH/中文/ Español).

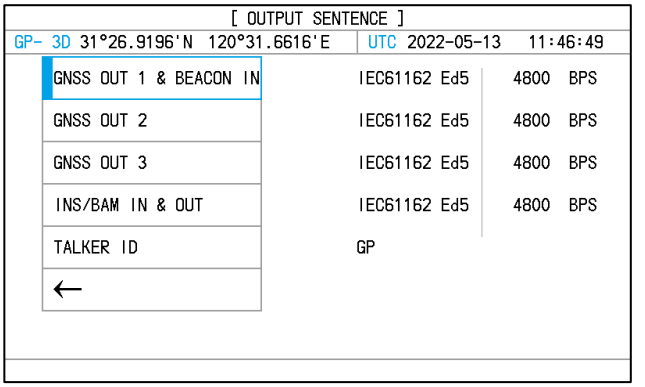
6.4.2 Sentence setting

For each GNSS data output, following items can be configured.

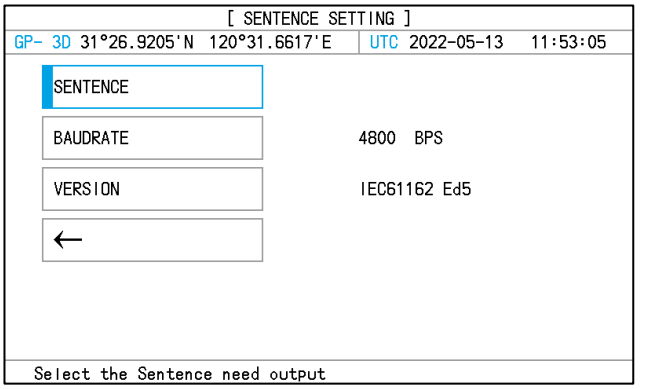
- **Data sentences:**
  The following sentences are available: GBS, GNS, GGA, DTM, RMC, VTG, ZDA, GSA, XTE, WPL, BOD, RTE, GLL, APB, VLW, GFA, GRS, GST, GSV, RMB, BWC. When selecting sentences, the load rate needs to be kept below 100%. Each sentence can be set to be sent once every 1/2/5/10 seconds.
- **NMEA version**
  There are five versions to be selected: NMEA1.5, NMEA2.0, NMEA2.3, IEC61162 Ed4 and IEC61162 Ed5.
- **Baudrate**
  It can be 4800/9600/19200/38400bps.

6.4.2.1 Sentence

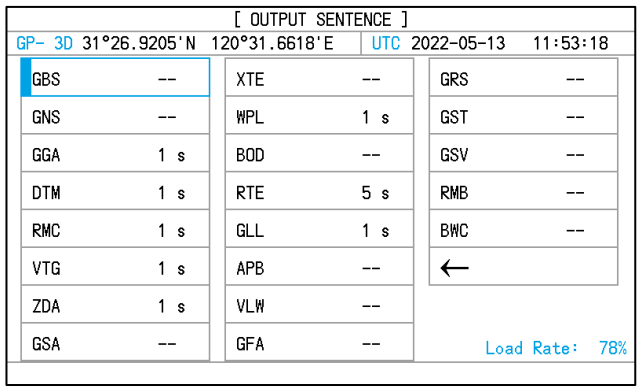
Click **[MAINTENANCE]-[SENTENCE SETTING]**, the following menu appears.



Click the ports to set sentence. For example:



Click each sentence continuously to choose 1s/2s/5s/10s. "--" means no output.



Data sentence description

ACN: Equipment is operating normally, or for supervision of a connection between two units.

ALC: Cyclic alert list. The cyclic alert list transmission shall never stop. When all alerts are in normal state the cyclic alert list is empty i.e. number of alert entries is 0.

ALF: Report an alert condition and the alert state of a device. An ALF message shall be published for an alert each time the alert information in this sentence changes and on alert request (see ALC – Cyclic alert list).

GNS: Fix data for GPS, GLONASS.

GBS: Support Receiver Autonomous Integrity Monitoring (RAIM).

GGA: GPS position fixing condition (time of fix, latitude, longitude, receiving condition, number of satellites used, DOP).

HBT: The sentence is transmitted at regular intervals specified in the corresponding equipment standard. The repeat interval may be used by the receiving unit to set the time-out value for the connection supervision.

RMC: Generic navigational information (UTC time, latitude, longitude, ground speed, true course, day, month, year).

VTG: Actual track and ground speeds.

ZDA: UTC time (day, month, year).

DTM: Datum reference.

GSA: GNSS receiver operating mode, satellites used in the navigation solution reported by the GGA 2148 or GNS sentences, and DOP values.

RTE：Waypoint identifiers, listed in order with starting waypoint first, for the identified route.

BWC：Bearing and distance to waypoint – Great circle.

RMB：Recommended minimum navigation information.

XTE： Cross-track error, measured.

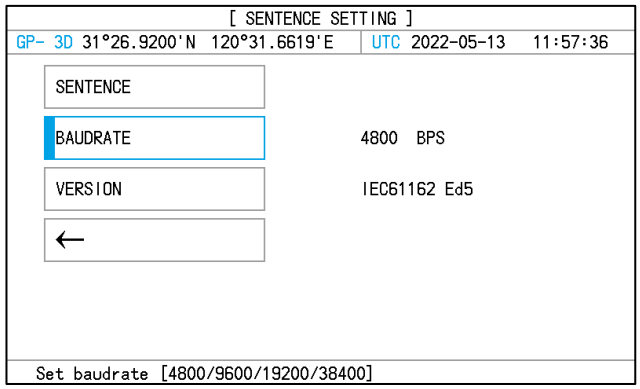
WPL：Latitude and longitude of specified waypoint.

Note 1: *As default, GGA, DTM, RMC, VTG, ZDA ,DTM, WPL, RTE and GLL are selected.*

Note 2: *Click* ***[TALKER ID]****, you can modify the Talker ID of the output sentence.*

6.4.2.2 Baud rate

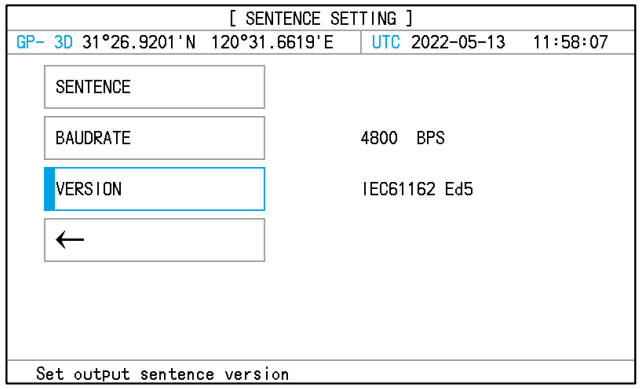
Select each of four outputs to configure the baud rate.
Default baud rate of all ports is 4800bps.
Click BAUDRATE continuously until a desired rate is shown.



The baud rate can be selected among 4800/9600/19200/38400bps.

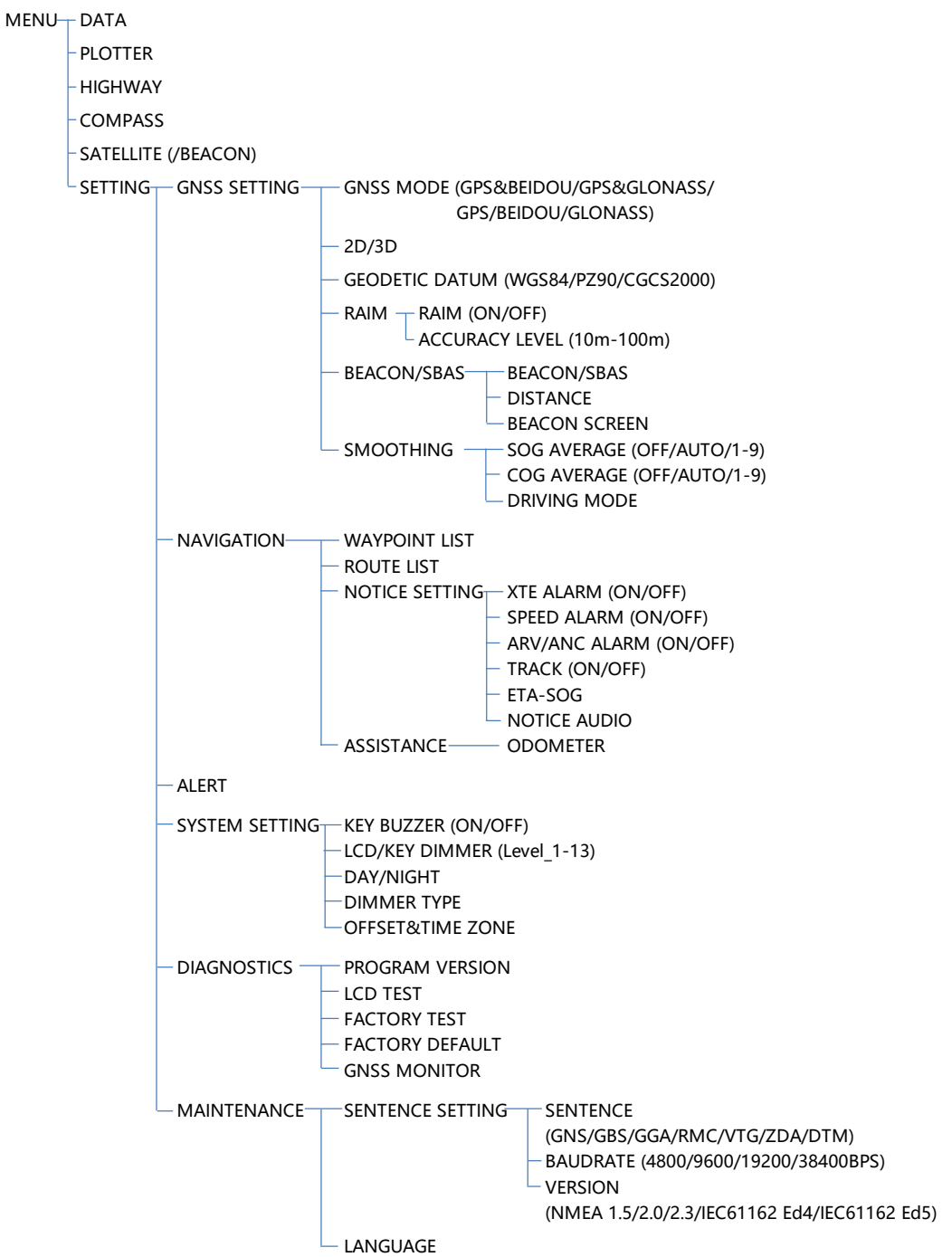
6.4.2.3 NMEA version

Select each of four outputs to configure the NMEA version.
Click VERSION continuously until a desired one is shown.



The NMEA version can be selected among NMEA 1.5 / NMEA 2.0 / NMEA 2.3 / IEC61162 Ed4 / IEC61162 Ed5.

APPENDIX I MENU TREE



APPENDIX II TECHNICAL SPECIFICATIONS

- **GNSS EQUIPMENT**

No	Item	Description
1	Receiving System	GPS, BDS, Glonass, SBAS
2	Rx signal and Frequency	GPS L1 C/A (1575.42 MHz) Glonass L1 C/A (1598.0625 ~ 1609.3125 MHz) BeiDou B1I (1561.098 MHz) SBAS L1 (1575.42 MHz)
3	Position Accuracy	less than 10m (GPS), less than 5m(DGPS), 95% of the time, horizontal dilution of precision (HDOP) ⩽ 4
4	Tracking Velocity	999 kts
5	Position-fixing Time	Warm start: 30 seconds, Cold start: 45 seconds
6	Position Update Interval	1 second
7	RAIM Indicators	Safe, Unsafe, Caution, N/A, off
8	Route	Up to 30
9	Waypoint	Up to 999

- **DISPLAY SECTION**

No	Item	Description
1	Display	7 inch, color LCD, touch screen operation
2	Fix Mode	GPS, Glonass, BDS or combined
3	Alerts	Loss of position and differential signals, HDOP ＞4, Integrity status
4	Display Modes	Data, Plotter, Highway, Compass, Satellite
5	Track Plotter Display	0.02 to 320nm, 14 steps
6	Navigation Alarm	Arrival and Anchor Watch XTE, Speed
7	Satellite Information	Satellite number, Elevation, Signal level

- **DGNSS BEACON (For DGNSS type)**

No	Item	Description
1	Frequency	283.5 kHz to 325.0 kHz
2	Frequency separation	500 Hz
3	Bit rate	25, 50, 100, 200 bps
4	Operation mode	Auto, Manual, Scan

- **INPUT/OUTPUT DATA**

No	Item	Description
1	GNSS Output	NMEA0183, totally 3 ports, baud rate 4800 / 9600 / 19200 / 38400 bps
	Version	NMEA1.5, NMEA2.0, NMEA2.3, IEC61162 Ed4, IEC61162 Ed5
	Sentences	ALF, DTM, GBS, GNS, GGA, GSA, RMC, VTG, ZDA, etc.
2	Beacon In	RTCM 10402.4
3	BAM/Ins In	ACN, HBT
4	BAM/Ins Out	ALC, ALF, HBT, ARC

- **POWER SUPPLY**

DC 24V (range 12~36V), 0.25~0.5A

- **ENVIRONMENT CONDITION**

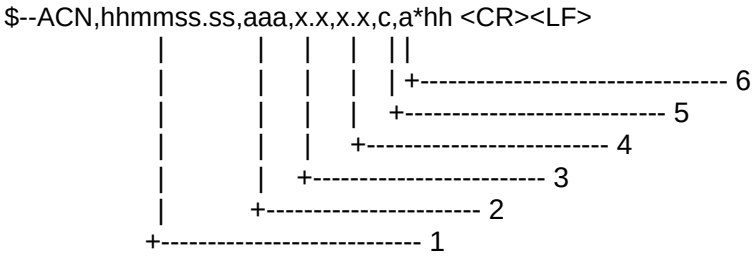
No	Item	Description
1	Ambient Temperature	Antenna Unit: -25°C to +70°C Display Unit: -15°C to +55°
2	Relative Humidity	95% at 40°C
3	IP Grade	Antenna Unit: IP66 Display Unit: IP22

- **OTHERS**

No	Item	Description
1	Size	145 (H) x 264 (W) x 83 (D) mm
2	Weight	1.25kg (main unit)

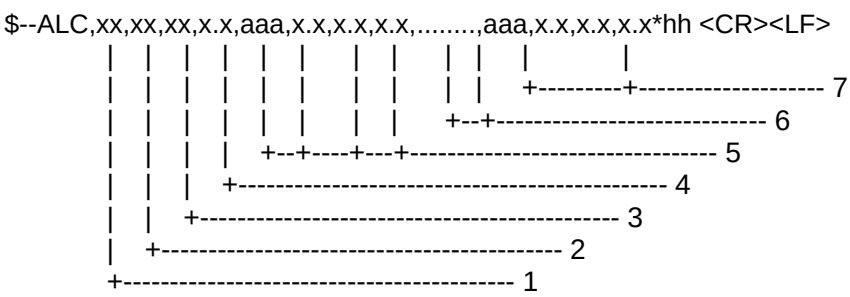
APPENDIX III SENTENCE DISCRIPTION

ACN – Alert command



1. Time
2. Manufacturer's mnemonic code
3. Alert Identifier
4. Alert Instance, 1 to 999999
5. Alert command, A, Q, O or S
6. Sentence status flag

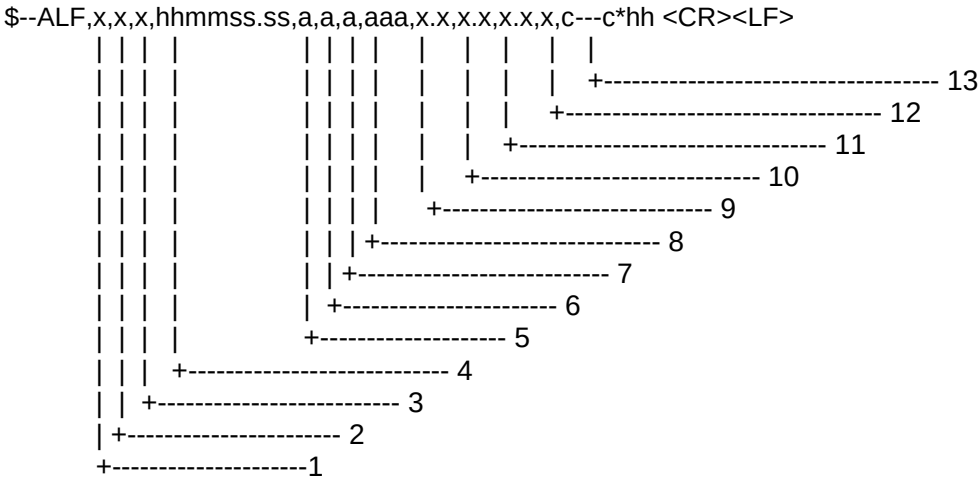
ALC - Cyclic alert list



1. Total number of sentences for this message, 01 to 99
2. Sentence number, 01 to 99
3. Sequential message identifier, 00 to 99
4. Number of alert entries
5. Alert entry 1
6. Additional Alert entries
7. Alert entry n

Each entry identifies a certain alert with a certain state. It is not allowed that an alert entry is split between two ALC sentences.

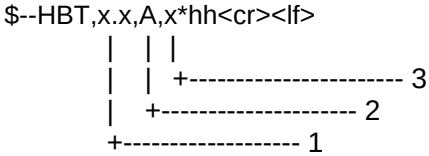
ALF - Alert sentence



1. Total number of ALF sentences for this message, 1 to 2
2. Sentence number, 1 to 2
3. Sequential message identifier, 0 to 9
4. Time of last change, see NOTE A
5. Alert category, A, B or C
6. Alert priority, E, A, W or C
7. Alert state, A, S, N, O, U or V
8. Manufacturer's mnemonic code
9. Alert identifier
10. Alert instance, 0 to 999999
11. Revision counter, 1 to 99
12. Escalation counter, 0 to 9
13. Alert text

NOTE A: If the system time is out of sync with valid ZDA sentence, this filed is NULL.

HBT – Heartbeat supervision sentence



1. Configured repeat interval
2. Equipment status
3. Sequential sentence identifier

DTM - Datum reference

```
$--DTM,ccc,a,x.x,a,x.x,a,x.x,ccc*hh<CR><LF>
          |  |   |   |  |  |  |    |
          |  |   |   |  |  |  |    +---------------------- 6
          |  |   |   |  |  |  +--------------------------- 5
          |  |   |   |  +--+------------------------------ 4
          |  |   +---+------------------------------------ 3
          |  +---------------------------------------------- 2
          +------------------------------------------------- 1
```

1. Local datum WGS84 = W84
   WGS72 = W72
   SGS85 = S85
   PE90 = P90
   BDCS = C00
   User defined = 999
   IHO datum code
2. Local datum subdivision code
3. Lat offset, min, N/S
4. Lon offset, min, E/W
5. Altitude offset, m
6. Reference datum WGS84 = W84
   WGS72 = W72
   SGS85 = S85
   PE90 = P90
   BDCS = C00

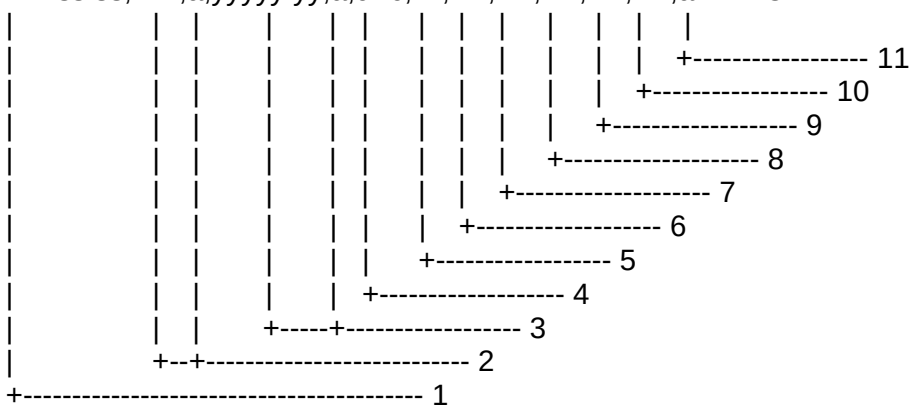
GSA - GNSS DOP and active satellites

```
$--GSA,a,x,xx,xx,xx,xx,xx,xx,xx,xx,xx,xx,xx,xx,x.x,x.x,x.x,h*hh<CR><LF>
          | | |                                 |   |    |    |
          | | |                                 |   |    |    +------------------------------ 6
          | | |                                 |   |    +------------------------- 5
          | | |                                 |   +-------------------- 4
          | | +-----------------------------------------+------------ 3
          | +------------------------------------------- 2
          +---------------------------------- 1
```

1. Mode：M = manual, forced to operate in 2D or 3D mode
   A = automatic, allowed to automatically switch 2D/3D
2. Mode：1 = fix not available, 2 = 2D, 3 = 3D
3. ID numbers of satellites used in solution
4. PDOP
5. HDOP
6. VDOP

GNS - GNSS fix data

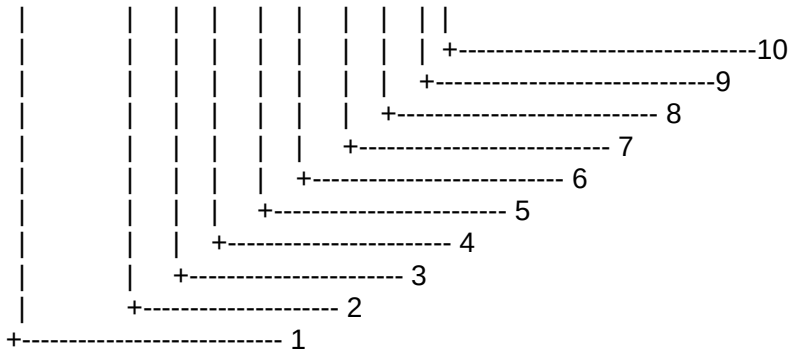
$-- GNS, hhmmss.ss,llll.ll,a,yyyyy.yy,a,c--c,xx,x.x,x.x,x.x,x.x,x.x,a *hh<CR><LF>



1. UTC of position
2. Latitude, N/S
3. Longitude, E/W
4. Mode indicator
5. Total number of satellites in use, 00-99
6. HDOP
7. Antenna altitude, m, re: mean-sea-level (geoid)
8. Geoidal separation, m
9. Age of differential data
10. Differential reference station ID
11. Navigational status indicator

GBS – GNSS satellite fault detection

$--GBS,hhmmss.ss,x.x,x.x,x.x,xx,x.x,x.x,x.x,h,h*hh <CR><LF>

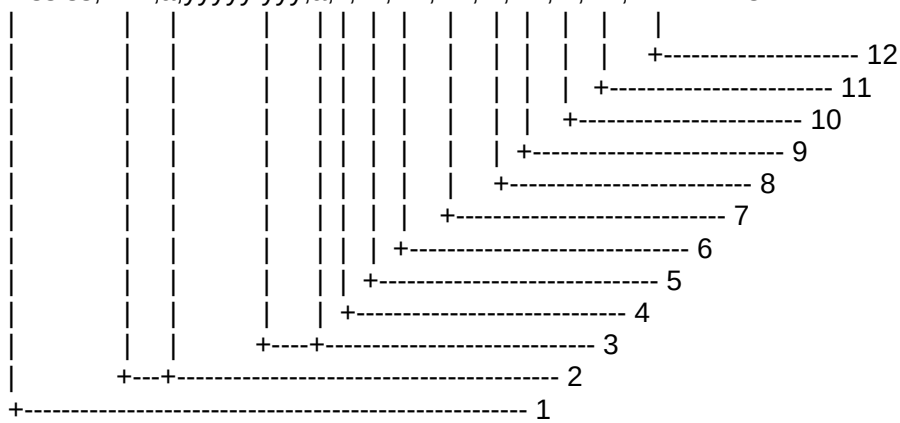


1. UTC time of the GGA or GNS fix associated with this sentence

2. Expected error in latitude
3. Expected error in longitude
4. Expected error in altitude
5. ID number of most likely failed satellite
6. Probability of missed detection for most likely failed satellite
7. Estimate of bias on most likely failed satellite
8. Standard deviation of bias estimate
9. GNSS System ID
10. GNSS Signal ID

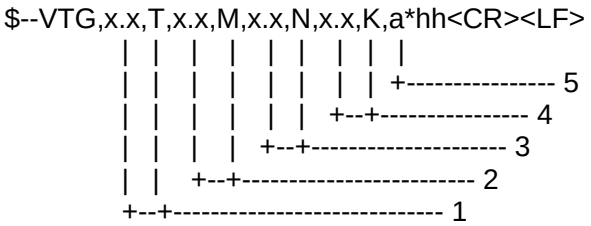
GGA -Global positioning system (GPS) fix data

$--GGA,hhmmss.ss,llll.lll,a,yyyyy.yyy,a,x,xx,x.x,x.x,M,x.x,M,x.x,xxxx*hh<CR><LF>



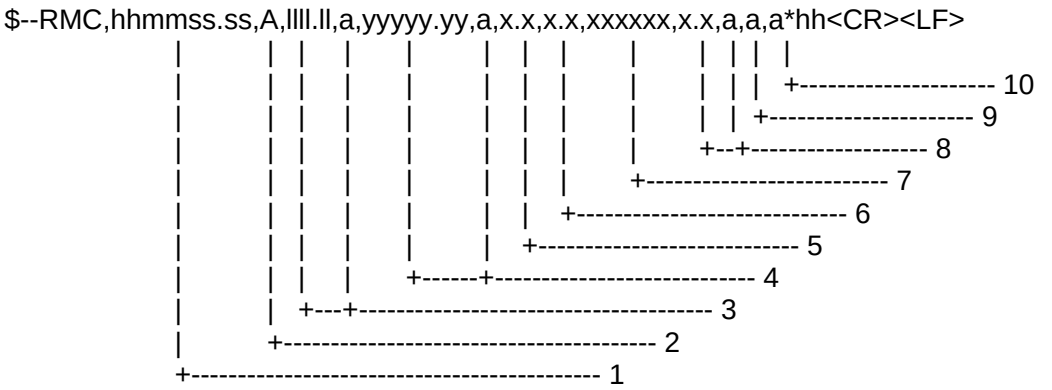
1. UTC of position
2. Latitude, N/S
3. Longitude, E/W
4. GPS quality indicator
5. Number of satellite in use,00-12, may be different from the number in view
6. Horizontal dilution of precision
7. Antenna altitude above/below
8. Unit of Antenna altitude, m
9. Geoidal separation
10. Unit of geoidal separation, m
11. Age of differential GPS data
12. Differential reference station ID, 0000-1023

VTG - Course over ground and ground speed



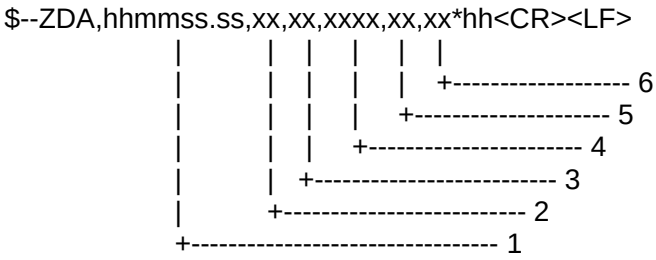
1. Course over ground, degrees true
2. Course over ground, degrees magnetic
3. Speed over ground, knots
4. Speed over ground, km/h
5. Mode indicator

RMC- Recommended minimum specific GNSS data



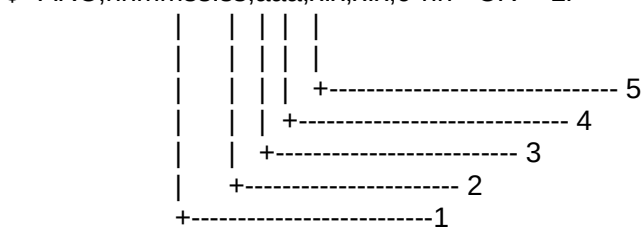
1. UTC of position fix
2. Status: A=data valid, V=navigation receiver warning
3. Latitude, N/S
4. Longitude, E/W
5. Speed over ground, knots
6. Course over ground, degrees true
7. Date: dd/mm/yy
8. Magnetic variation, degrees E/W
9. Mode indicator
10. Navigational status

ZDA - Time and date



1. UTC
2. Day, 01 to 31 (UTC)
3. Month, 01 to 12 (UTC)
4. Year (UTC)
5. Local zone hours, 00h to ±14h
6. Local zone minutes, 00 to +59

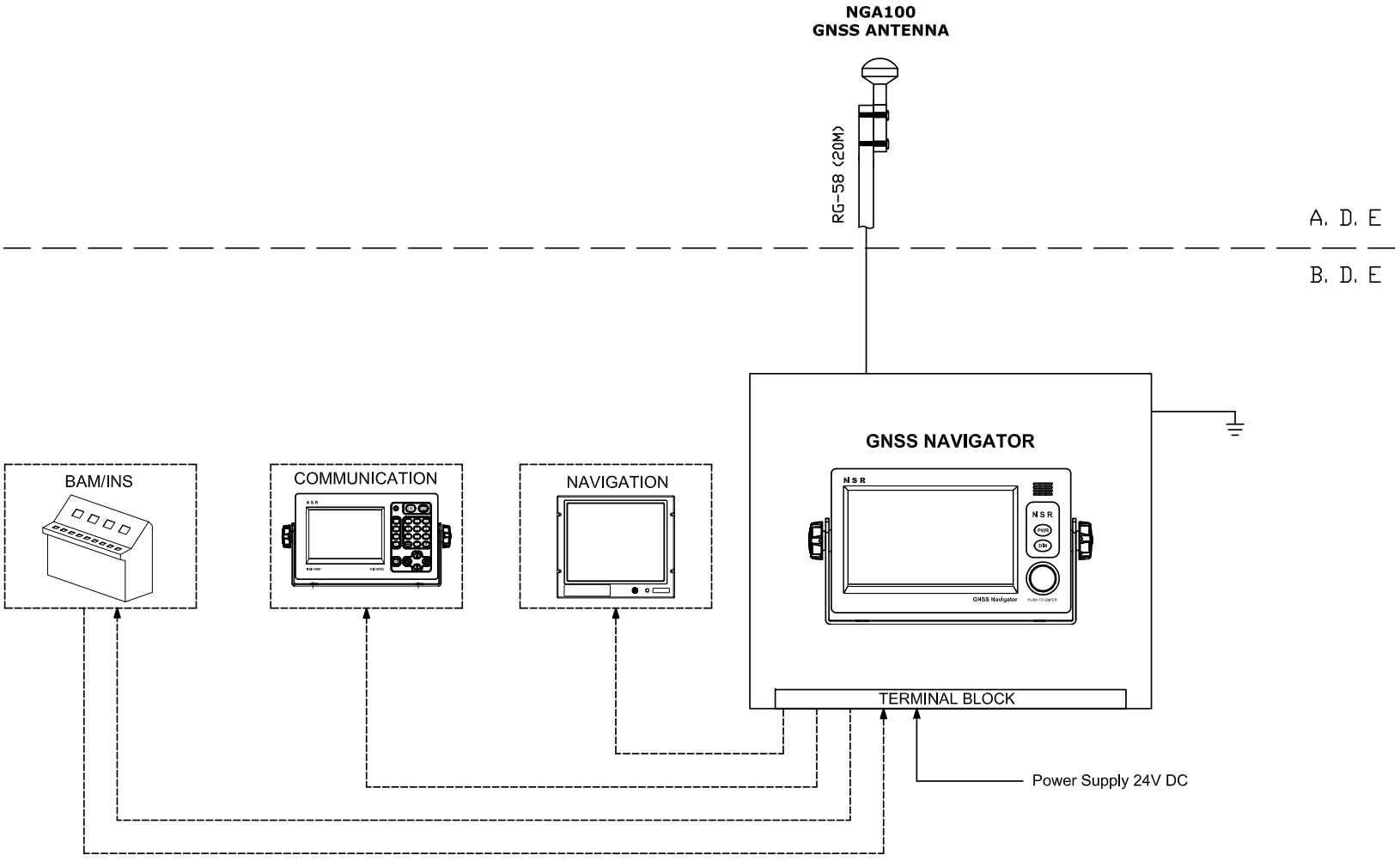
ARC - Alert command refused



1. Time
2. Manufacturer’s mnemonic code
3. Alert identifier
4. Alert instance, 1 to 999999
5. Refused alert command, A, Q,O or S

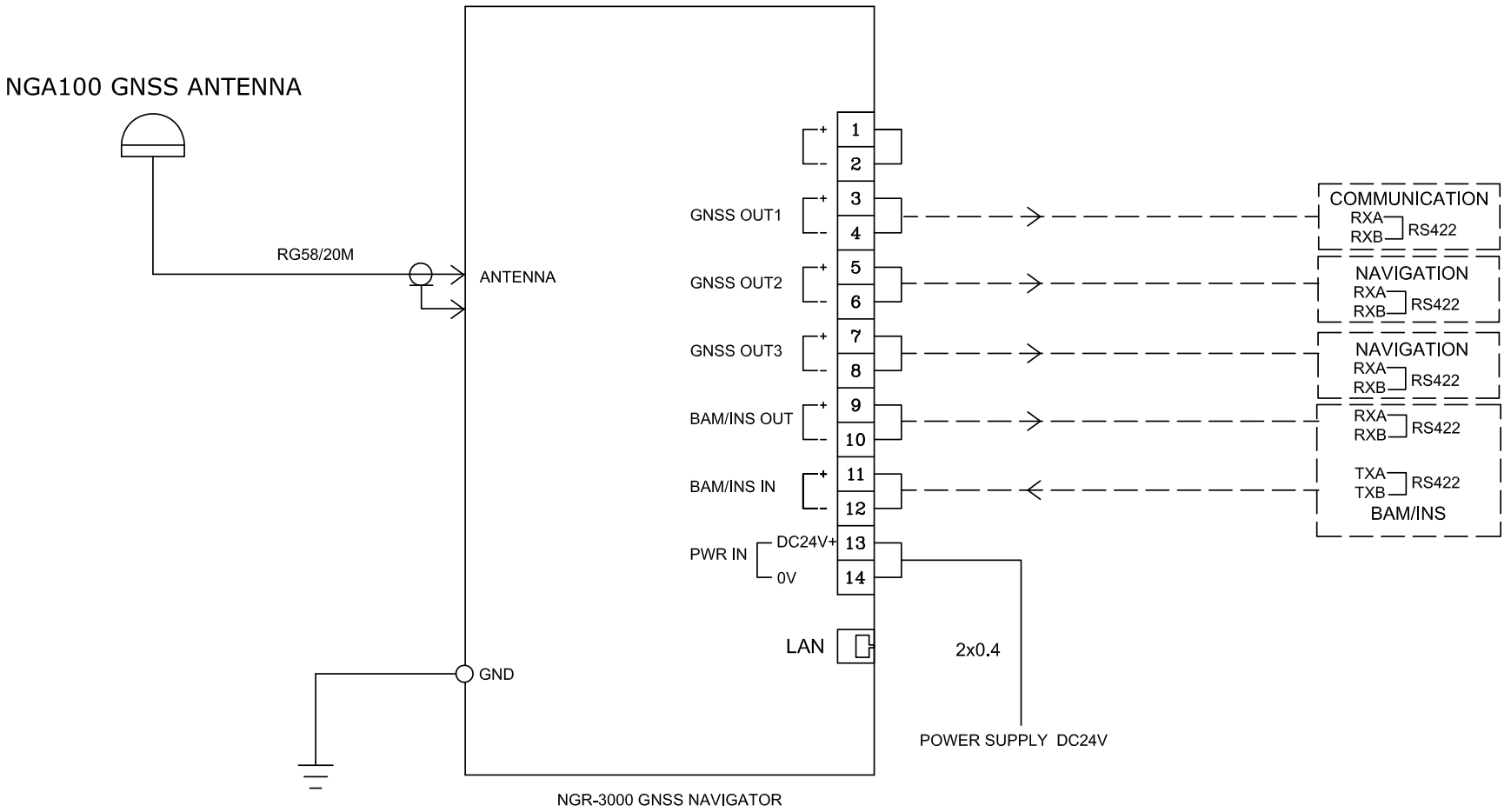
APPENDIX IV INSTALLATION DRAWING

Drawing No.	Description
NGR3000-ID-001	NGR-3000 GNSS NAVIGATOR SYSTEM DIAGRAM
NGR3000-ID-002	NGR-3000 GNSS NAVIGATOR WIRING DIAGRAM
NGR3000-ID-003	NGR-3000 GNSS NAVIGATOR SYSTEM DIAGRAM (DGPS)
NGR3000-ID-004	NGR-3000 GNSS NAVIGATOR WIRING DIAGRAM (DGPS)
NGR3000-ID-005	NGR-3000 MAIN UNIT SIZE DRAWING
NGR3000-ID-006	NGR-3000 MAIN UNIT MOUNT DRAWING (TABLE TYPE)
NGR3000-ID-007	NGR-3000 MAIN UNIT MOUNT DRAWING (FLUSH TYPE)
NGR3000-ID-008	NGA100 GNSS ANTENNA SIZE & MOUNTING DRAWING
NGR3000-ID-009	NDG-100 DGNSS BEACON SIZE & MOUNTING DRAWING



NOTE : GNSS TYPE

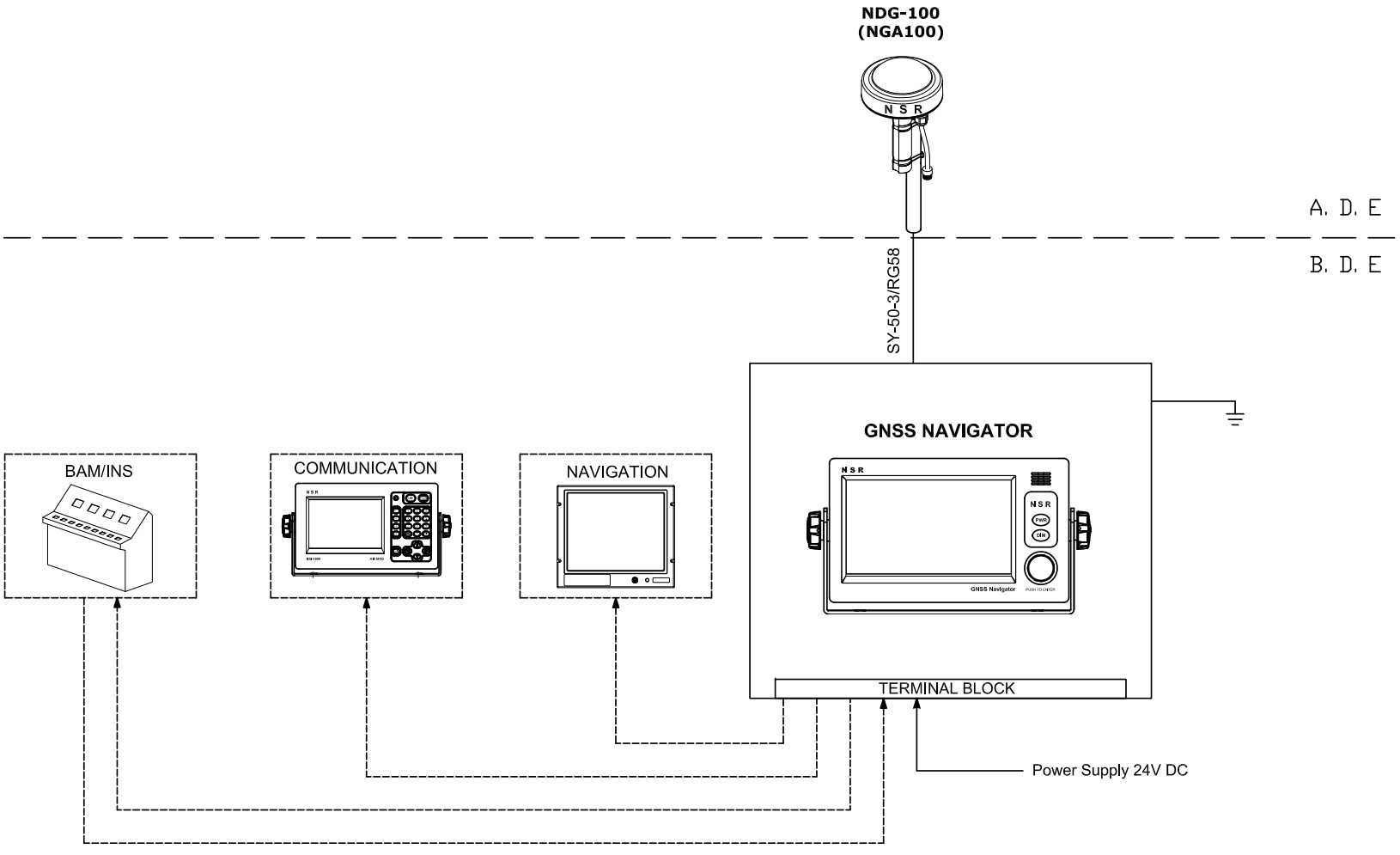
APPLICATION	NGR-3000 GNSS NAVIGATOR SYSTEM DIAGRAM				
DATE		ITEM	NGR-3000	SIZE	A4
APPROVAL		SCALE	N/S	UNIT	mm
CHECKED		NSR marine	NEW SUNRISE CO., LTD.		
DRAWING					
DWG NO.	NGR3000-ID-001				



YARD SUPPLIED OR OPTIONAL

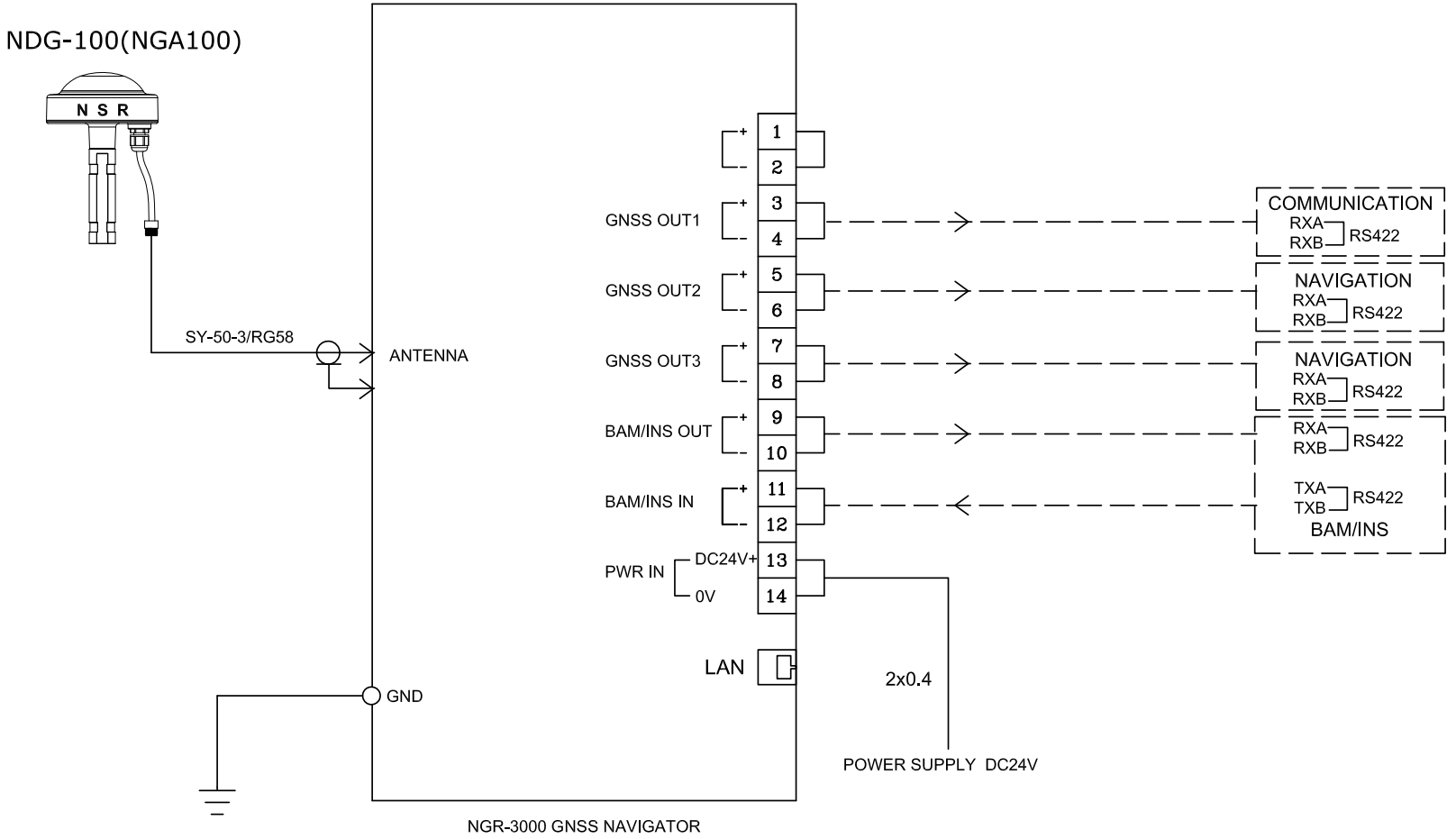
NOTE : GNSS TYPE

APPLICATION	NGR-3000 GNSS NAVIGATOR WIRING DIAGRAM		
DATE		ITEM	NGR-3000 SIZE A4
APPROVAL		SCALE	N/S UNIT mm
CHECKED		NSR marine	NEW SUNRISE CO., LTD.
DRAWING			
DWG NO.	NGR3000-ID-002		



NOTE : DGNSS TYPE

APPLICATION	NGR-3000 GNSS NAVIGATOR SYSTEM DIAGRAM		
DATE		ITEM	NGR-3000 SIZE A4
APPROVAL		SCALE	N/S UNIT mm
CHECKED		NEW SUNRISE CO., LTD.	
DRAWING			
DWG NO.	NGR3000-ID-003		

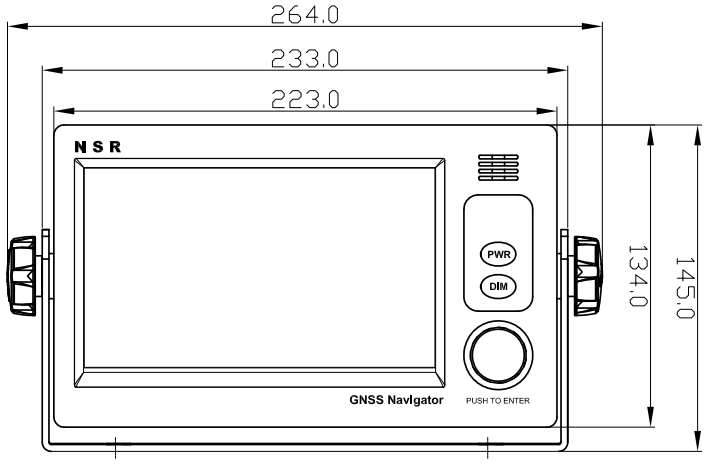


YARD SUPPLIED OR OPTIONAL

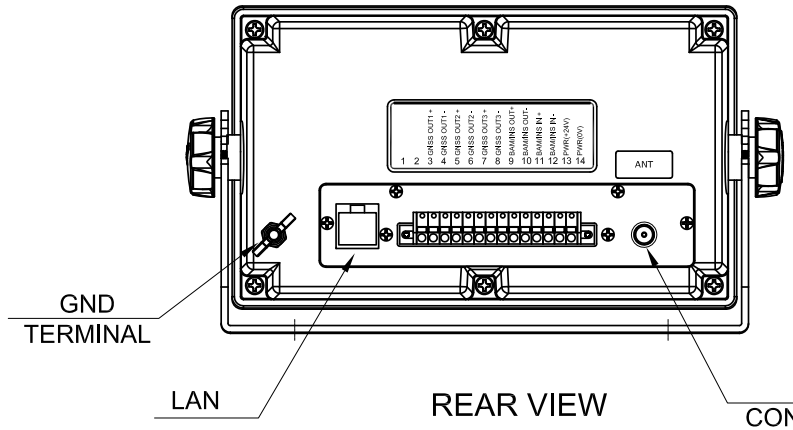
NOTE : DGNSS TYPE

APPLICATION	NGR-3000 GNSS NAVIGATOR WIRING DIAGRAM		
DATE		ITEM	NGR-3000 SIZE A4
APPROVAL		SCALE	N/S UNIT mm
CHECKED		NSR marine	NEW SUNRISE CO., LTD.
DRAWING			
DWG NO.	NGR3000-ID-004		

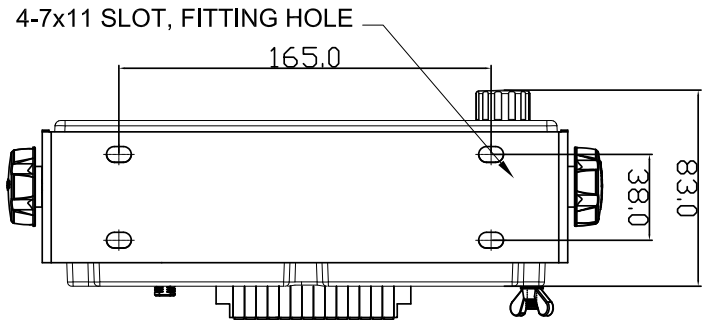
NO.	DATE	REVISION & DESCRIPTION	REVIEWED / CHECKED SIGNATURE
1			



FRONT VIEW



REAR VIEW

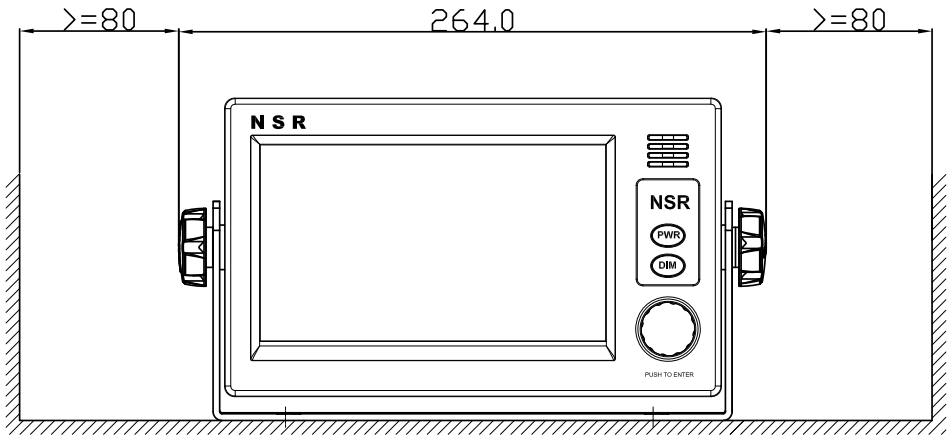


BOTTOM VIEW

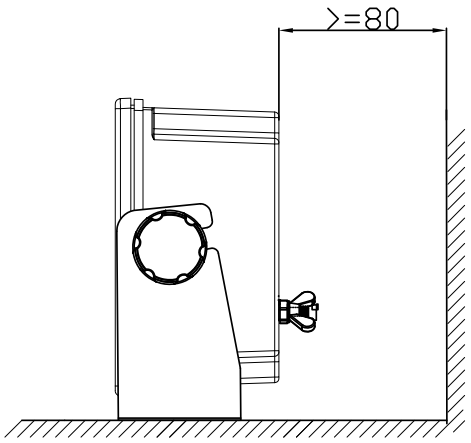
1	2	3	4	5	6	7	8	9	10	11	12	13	14
		GNSS OUT1 +	GNSS OUT1 -	GNSS OUT2 +	GNSS OUT2 -	GNSS OUT3 +	GNSS OUT3 -	BAM/INS OUT+	BAM/INS OUT-	BAM/INS IN +	BAM/INS IN -	PWR(+24V)	PWR(0V)

APPLICATION	NGR-3000 MAIN UNIT SIZE DRAWING		
DATE		ITEM	NGR-3000 SIZE A4
APPROVAL		SCALE N/S UNIT	
CHECKED			NEW SUNRISE CO., LTD.
DRAWING			
DWG NO.	NGR3000-ID-005		

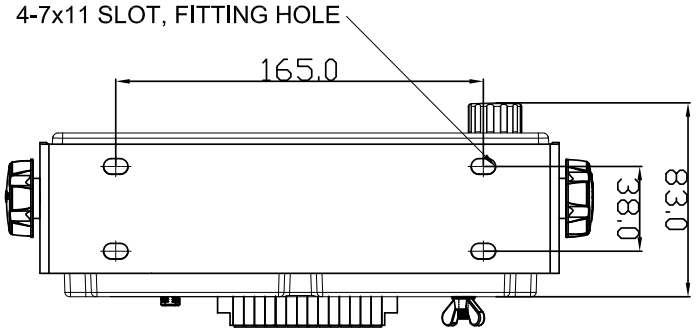
NO.	DATE	REVISION & DESCRIPTION	REVIEWED SIGNATURE	CHECKED
1				



FRONT VIEW



SIDE VIEW



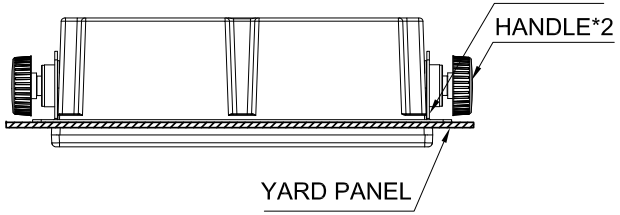
NOTE: TABLE TYPE

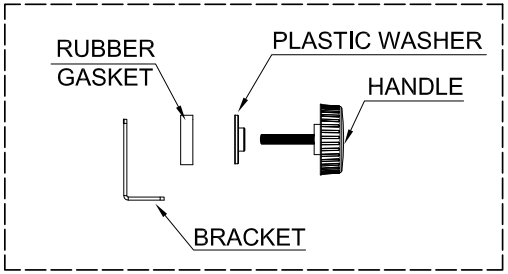
1.USE SELF-TAPPING SCREWS M5X20 FOR FIXING THE UNIT.

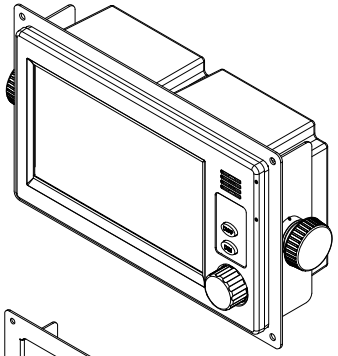
2.80MM IS MINIMUM SPACE FOR OPERATION AND CABLING.

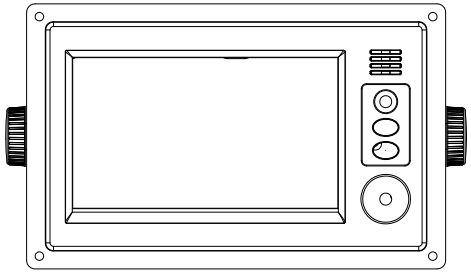
APPLICATION	NGR-3000 MAIN UNIT MOUNT DRAWING(TABLE TYPE)		
DATE		ITEM	SIZE A4
APPROVAL		SCALE N/S UNIT	PROJECTION
CHECKED			
DRAWING		NSR marine	NEW SUNRISE CO., LTD.
DWG NO.	NGR3000-ID-006		

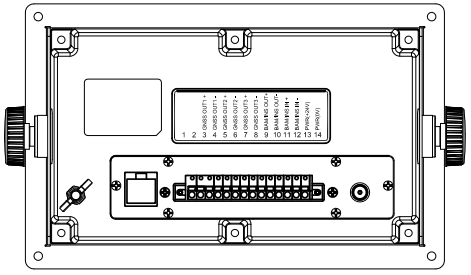
NO.	DATE	REVISION & DESCRIPTION	REVIEWED / CHECKED SIGNATURE
1			

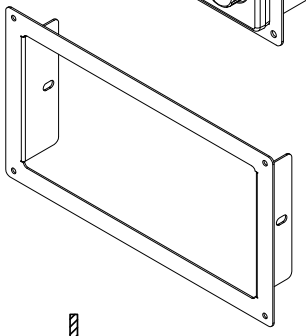


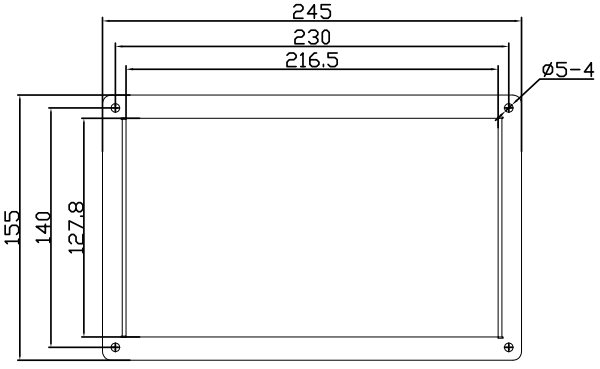




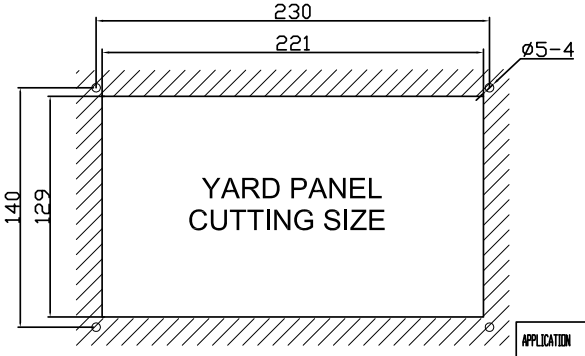


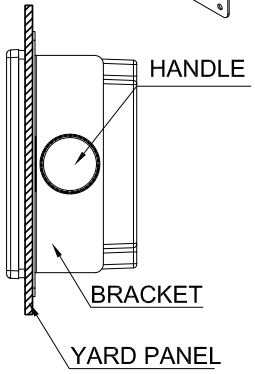






MOUNTING BRACKET SIZE





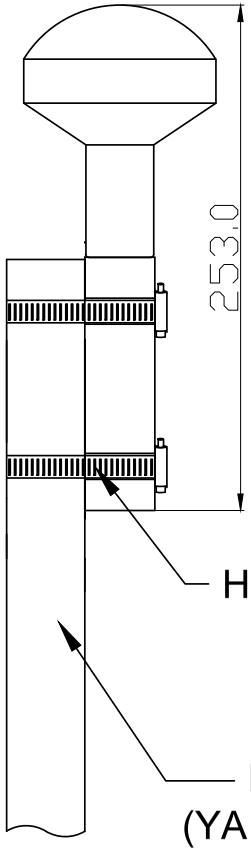
APPLICATION	NGR-3000 MAIN UNIT MOUNT DRAWING(FLUSH TYPE)
DATE	
APPROVAL	
CHECKED	
DRAWING	
DWG NO.	NGR3000-ID-007

ITEM | SCALE N/S | UNIT | SIZE A4

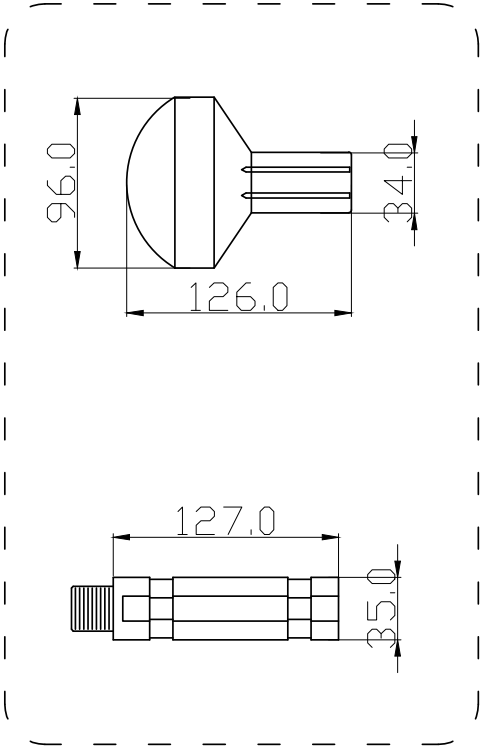
NSR marine NEW SUNRISE CO., LTD.

NO.	DATE	REVISION & DESCRIPTION	REVIEWED	CHECKED
1			SIGNATURE	

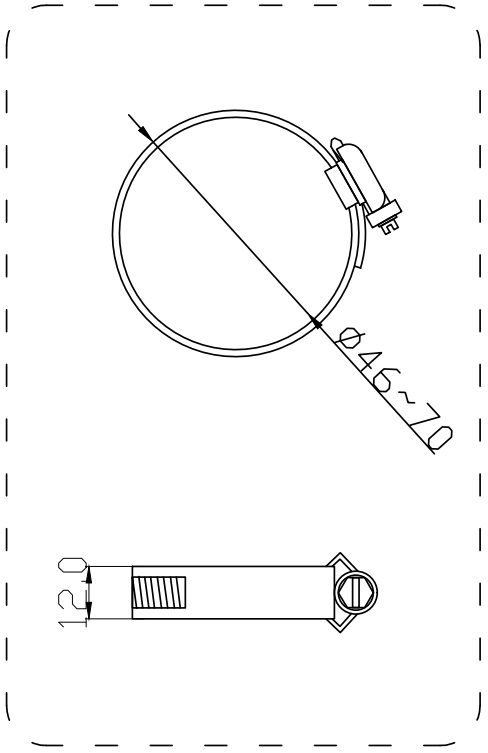
NGA100
GNSS ANTENNA



ANTENNA & MOUNT POLE



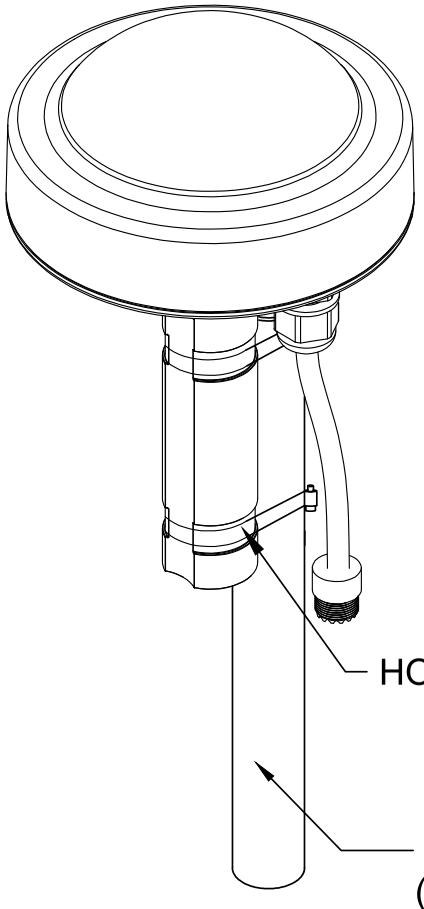
HOOP SIZE



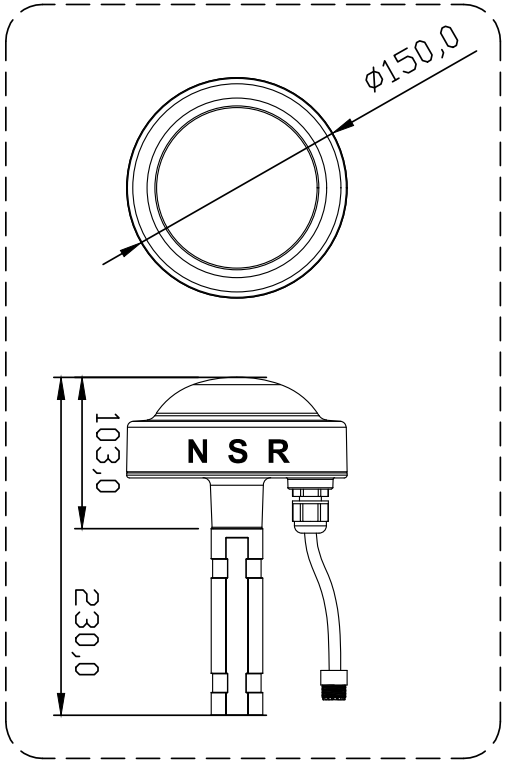
APPLICATION	NGA100 ANTENNA SIZE&MOUNTING DRAWING		
DATE		ITEM	SIZE A4
APPROVAL		SCALE N/S UNIT mm PROJECTION	▽▽▽6.3S ▽▽▽1.6S ▽▽12S ▽100S
CHECKED			
DRAWING		NSR marine	NEW SUNRISE CO., LTD.
DWG. NO.	NGR3000-ID-008		

NO.	DATE	REVISION & DESCRIPTION	REVIEWED / CHECKED SIGNATURE
1			

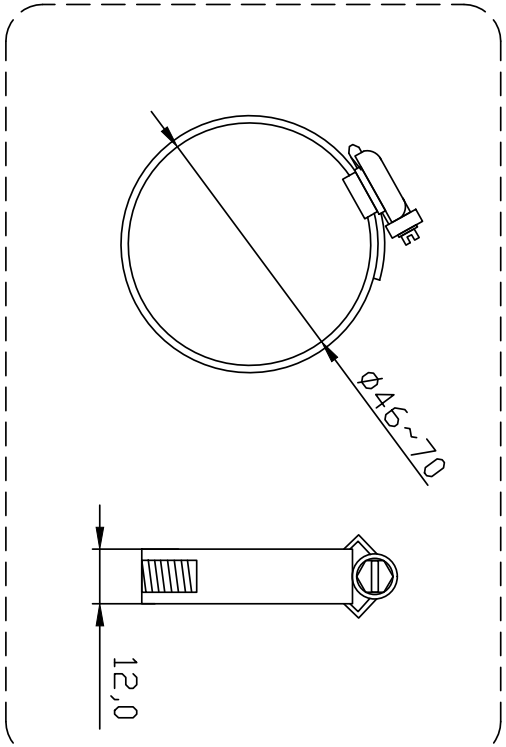
NDG-100
DGNSS ANTENNA



ANTENNA & MOUNT POLE



HOOP SIZE



APPLICATION	NDG-100 DGNSS ANTENNA SIZE&MOUNTING DRAWING		
DATE		ITEM	SIZE A4
APPROVAL		SCALE N/S UNIT	
CHECKED			
DRAWING		NSR marine	NEW SUNRISE CO., LTD.
DWG. NO.	NGR3000-ID-009		

www.nsrmarine.com

info@nsrmarine.com

December, 2024