USER MANUAL

GNSS EQUIPMENT

NGR-3000

NGR-3000 UM.E 20251211-08

NOTICE TO USERS

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- Please read this manual carefully to ensure proper use before installation and use of the product.
- Please keep the manual for your future reference.

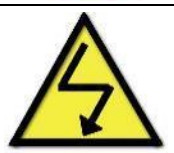
MODIFY RECORD

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	Generally modified
4	Q/A	2019/03/31	All	04	Software update
5	Q/A	2021/07/16	All	05	Software update
6	Q/A	2022/06/13	All	06	Software update
7	Q/A	2025/07/07	All	07	Some modification
8	Q/A	2025/12/11	All	08	Software update

VERSION COMPARISON TABLE

Manual Version	Program Version	Remarks
20250707_07	v2.07, 2025/06/09	
20251211_08	v2.08, 2025/12/05	

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

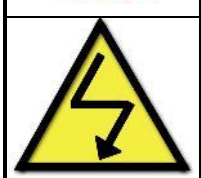
	**Warning** Connect the earthing cord to ship's body. Observe the compass safe distance to prevent deviation of an onboard magnetic compass.
	**Prohibited** Don't open the equipment unless you have fully understood the structure and circuits of the equipment. Only qualified personnel should work inside 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's new generation, compatible with GPS, Beidou, Glonass, and Galileo systems.

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

The main features of NGR-3000 are:

- Comprehensive navigation data displays.
- Alarms: 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.
- A DGNSS beacon receiver (external) may be connected to NGR-3000 to add DGNSS function.

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

EQUIPMENT LIST:

Scope of Supply				
No.	**Name**	**Q'ty**	**Part No.**	**Description**
1	NGR-3000 Main Unit	1	N992530	
2	NGA100 GNSS Antenna	1	N581010/ N581020	Cable length 10m or 20m
3	Installation Materials			
3.1	Antenna Mount Pole	1	N563030	
3.2	Steel Tie	2	N170400	
3.3	Accessories	1		
4	Options			
4.1	DGNSS Upgrading Kit	1	N502561	
4.2	NFB700A Flush Mount Brackets	1	N561070	
4.3	NND-100 NMEA distributor	1	N995710	
4.4	NND-200 NMEA distributor	1	N995720	

2. OPERATIONAL OVERVIEW

2.1 Control Description

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

When operating with the knob, turn the knob to select an item on the 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 for more than 3 seconds.
DIM	Press to change the LCD brightness.
Touch-screen Button	**Description**
MENU	Enter to display different modes.
ACK	Acknowledge the current alert.
	Change day/night mode.

2.2 Power ON/OFF

- **Turn on the power**

Press the **PWR** button to turn on the power. Usually, it will take about 45 seconds to find its position when turned on for the very first time.

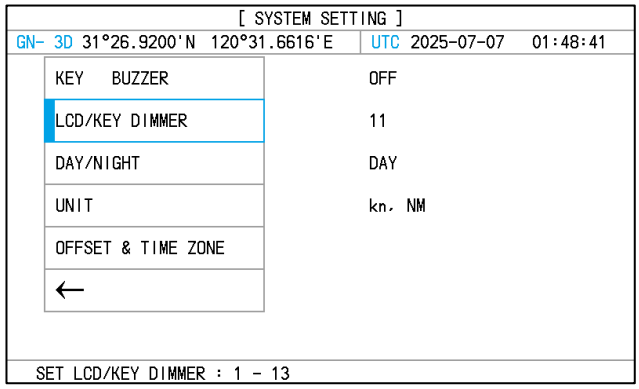
- **Turn off the power**

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

2.3 Adjust Dimmer and Contrast

There are two ways to adjust the brightness and contrast of the LCD.

- Adjust the brightness in the **[SYSTEM SETTING]** by clicking **[LCD/KEY DIMMER]**.



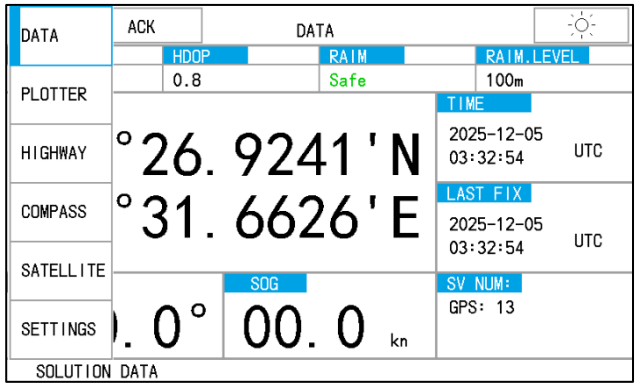
- Press the **DIM** button to adjust the brightness.

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

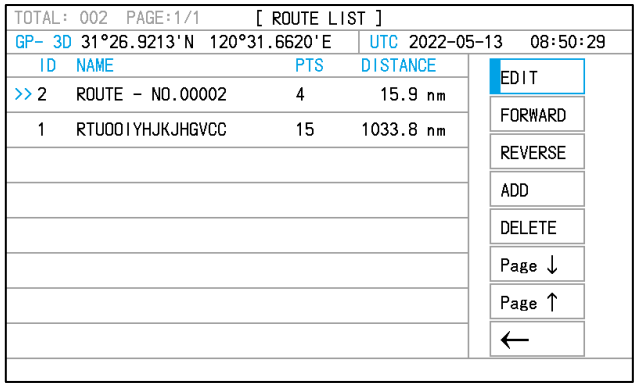
Most operations of your unit are carried out through the menu. If you get lost in operation, press the **PWR** button to return to the **MAIN** menu. Please refer to the complete MENU TREE in the Appendix.



1) Click the **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.

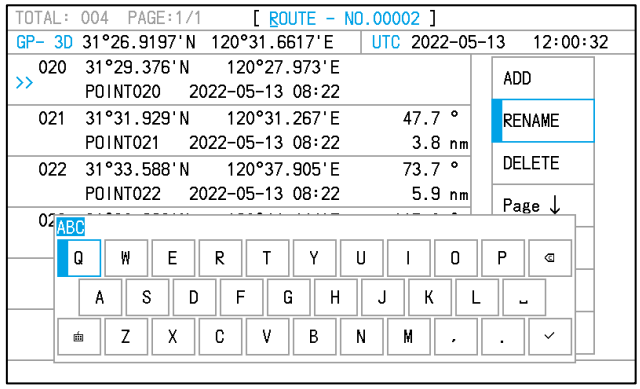
2.5 How to Enter Character Data

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



Operate the menus until the above screen appears. (Please refer to **WAYPOINT/ROUTE**)

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



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

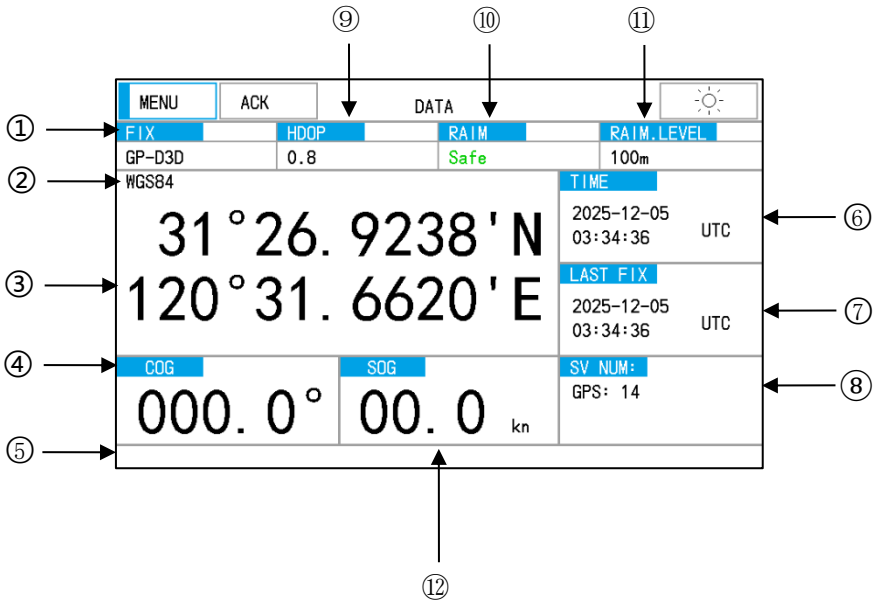
2.6 Display Modes

There are five display modes: Data, Plotter, Highway, Compass and Satellite. Click the **MENU** button on the 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 45 seconds to find the position when turned on for the very first time. Thereafter, it takes about 30 seconds to find the position each time the power is turned on.
After fixing, the accurate position (in latitude and longitude) appears on the display. If the position could not be found, loss of position will appear in the alert column.



No.	Item	Symbol	Remark
①	Fix Mode	GP-D3D	See Note 1.
②	Datum	WGS84/PZ90	
③	Position in LAT & LON		
④	Course over Ground	COG	
⑤	Alert Column		Click to enter the alert list when an alert exists.
⑥	Time	UTC/LMT	GNSS Time
⑦	Final Fixing Time	LAST FIX	
⑧	Quantity of Satellites Being Tracked	SATELLITE	

No.	Item	Symbol	Remark
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	

Note 1:

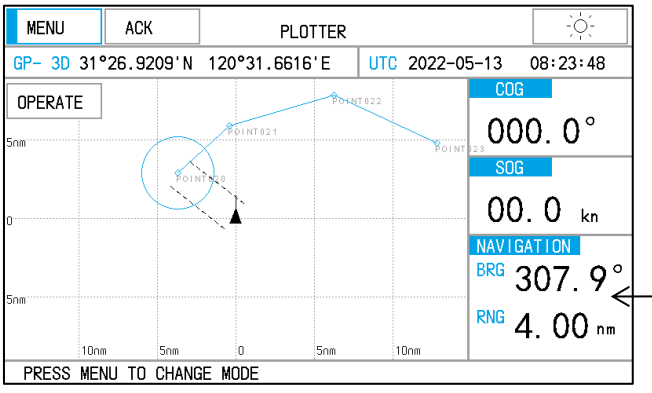
GN - D 3D

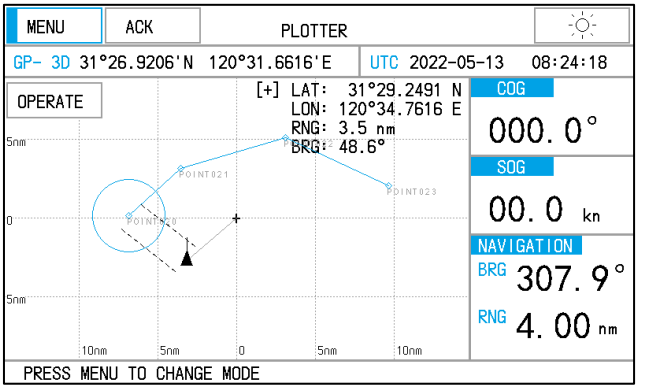
Fix mode, **D**: Differential/SBAS, **blank**: Autonomous

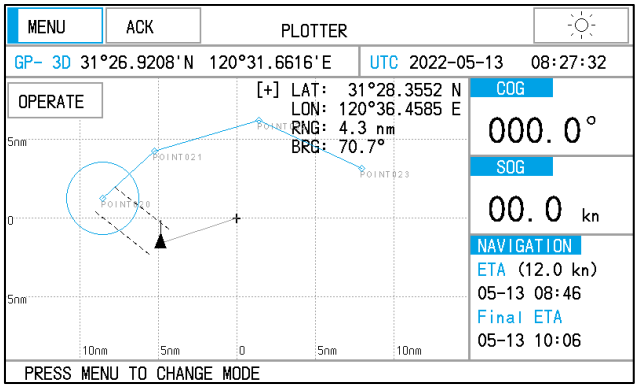
GNSS mode, **GN**: GNSS combine mode, **GP**: GPS, **GB**: BDS, **GL**: Glonass, **GA**: Galileo

2.6.2 Plotter display

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

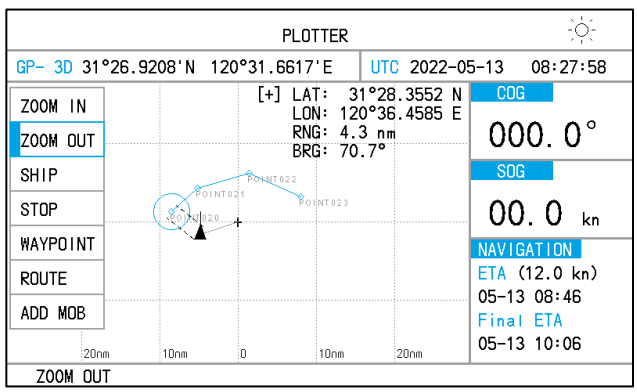




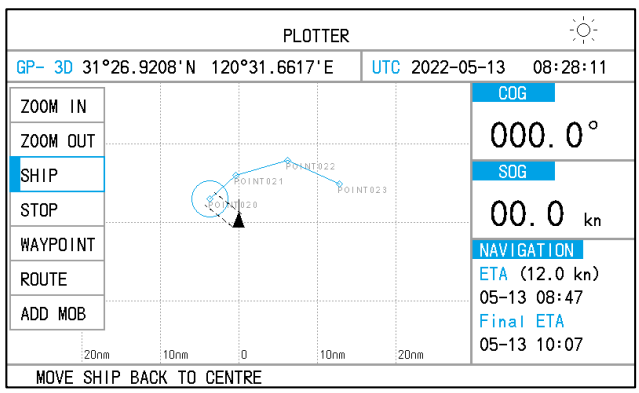


You may increase or decrease the display range on the Plotter display. The range in the Plotter display is available among 0.02, 0.05, 0.1, 0.2, 0.5, 1, 2, 5, 10, 20, 40, 80, 160 and 320 nautical miles.

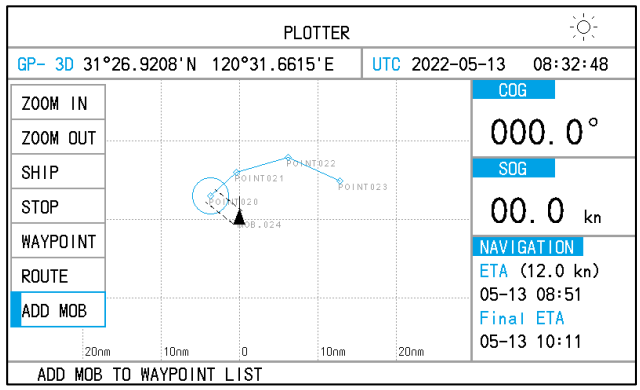
1) Click the **OPERATE** button. The pop-up menu appears.
2) Click **[ZOOM IN]** or **[ZOOM OUT]** to select the desired range.
3) Click on any blank space to finish.



Press **[SHIP]** to return.

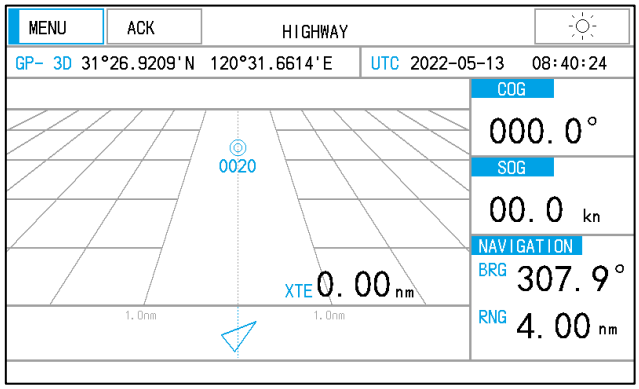


Press **[ADD MOB]** to add a waypoint named “MOB.XXX” based on the ship/cursor location.



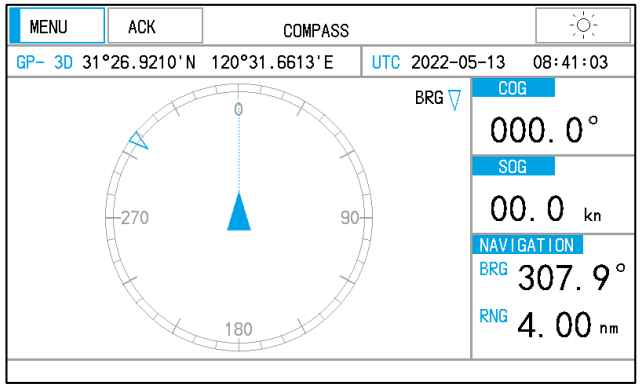
2.6.3 Highway display

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



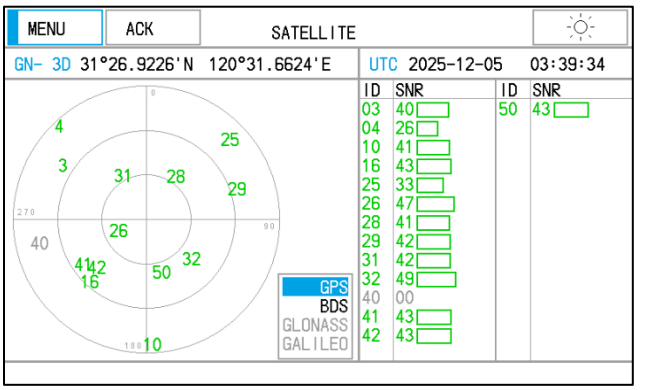
2.6.4 Compass display

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



2.6.5 Satellite display

The **SATELLITE** display shows satellites currently tracked, together with the strength of receiving signals. Only the enabled GNSS system can view satellite signals. Enable the satellite system in [GNSS Settings]->[GNSS Mode].

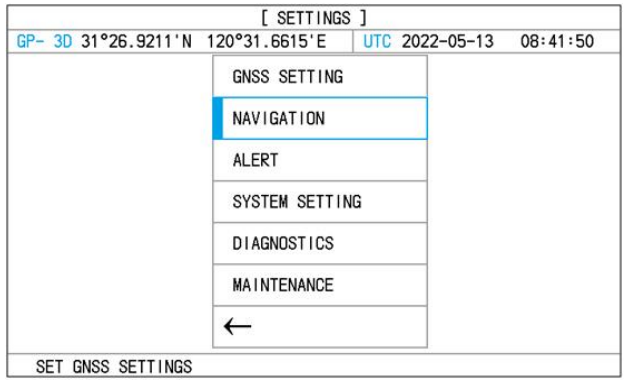


3. NAVIGATION PLANNING

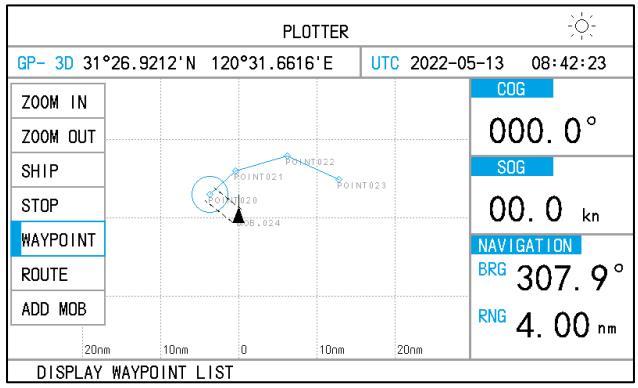
Typically, a trip from one place to another involves several course changes, requiring a series of waypoints which you navigate to, one after another. The sequence of waypoints leading to the ultimate destination is called a route. NGR-3000 can automatically advance to the next waypoint on a route, so 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.

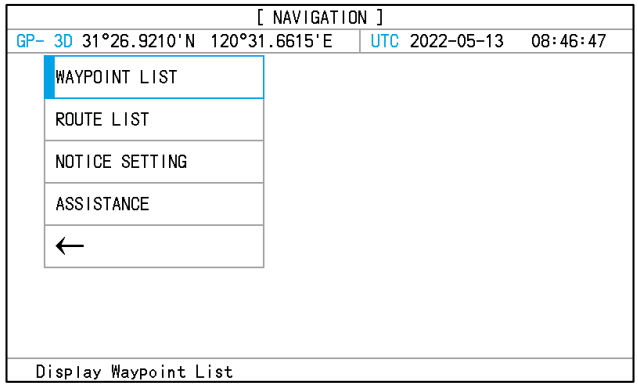


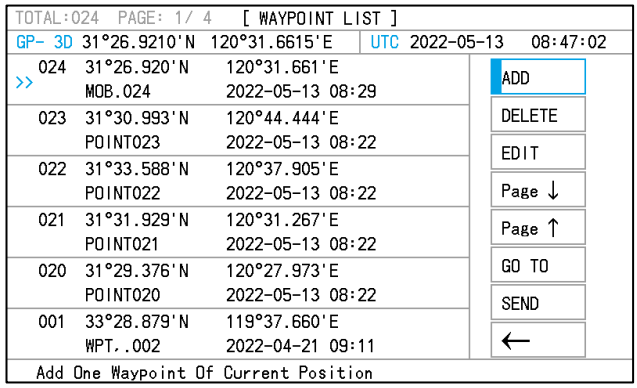
(2) Click **[PLOTTER]** in **[MENU]**, then click **[WAYPOINT]** / **[ROUTE]** in **[OPERATE]** to open the menu.



3.1 Register Waypoints

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





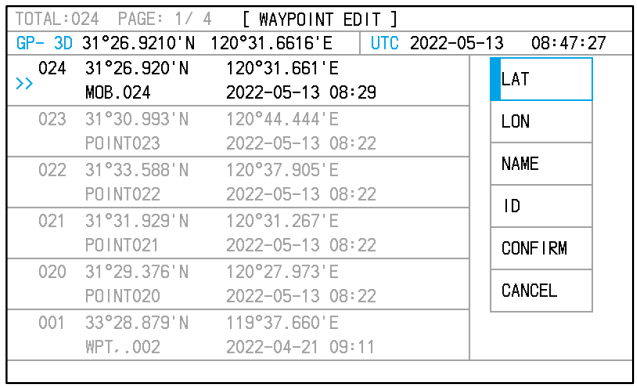
1) Click to select the desired waypoint.
2) Select **[ADD]**, **[DELETE]** or **[EDIT]** desired.

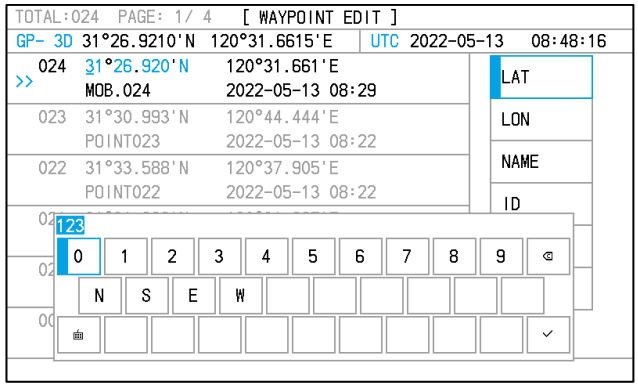
3.1.1 Insert a new waypoint

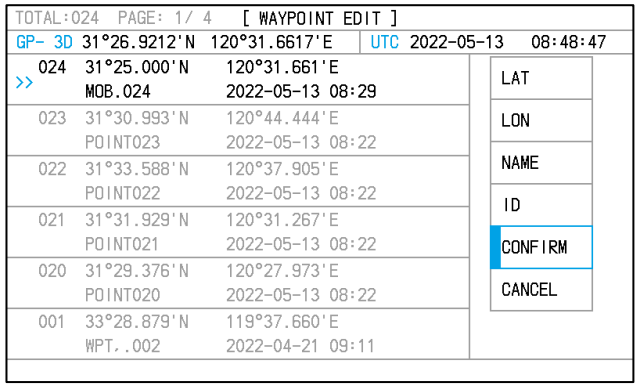
Create a new waypoint with the position as own ship's current position. The new waypoint will be inserted before the waypoint that is selected by the current cursor.

3.1.2 Edit a waypoint

Edit the selected waypoint.



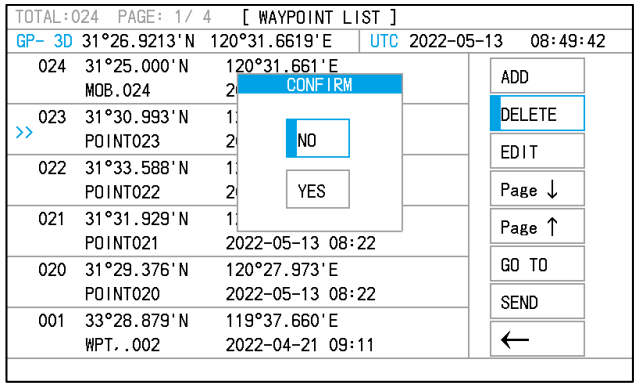




1) Click **[EDIT]** to edit the contents of the waypoint.
2) Click **[LAT]** or **[LON]** to locate the first character to edit and click the character desired.
3) Click the **[√]** key.
4) Click **[CONFIRM]** to finish the waypoint edition.

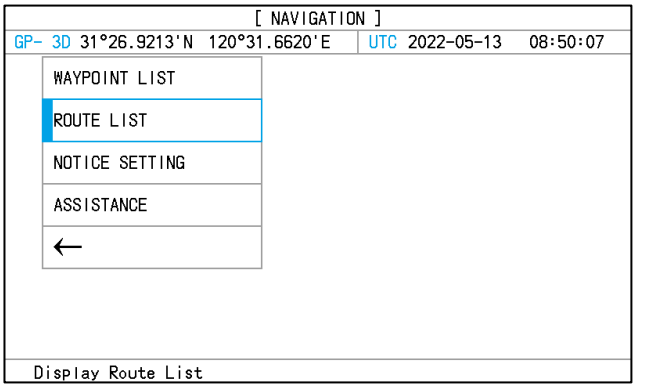
3.1.3 Delete a waypoint

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

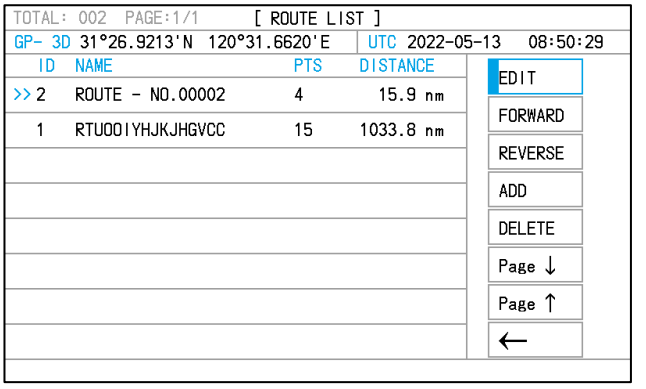


3.2 Route Planning

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



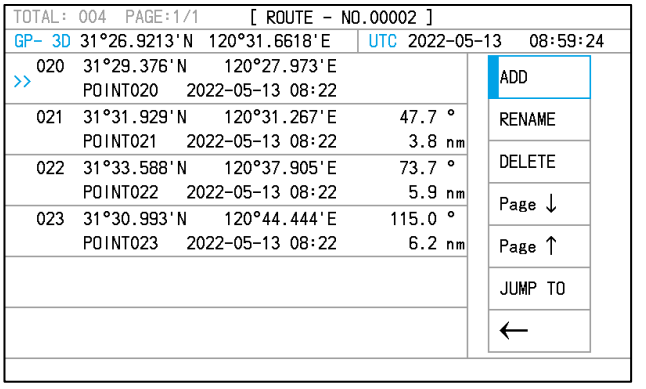
1) Click to select the desired route from **[ROUTE LIST]**.



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 the route from the 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

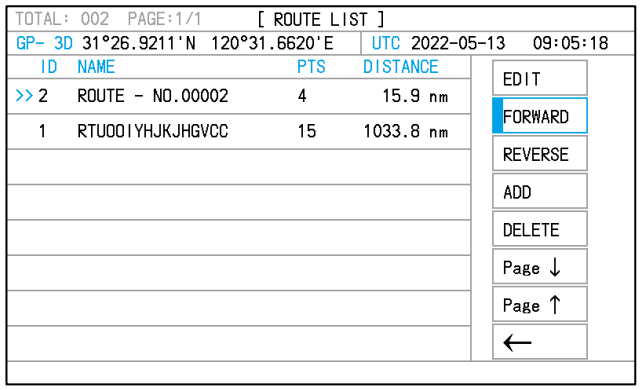
Click **[RENAME]**, the pop-up menu appears.
The route name can be up to 17 characters.
The operation is as follows:
1) Click **[RENAME]** to rename the desired route.
2) Click the character among A-Z, 0-9 desired.
3) Click [√] to finish.

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 the **PLOTTER** page.

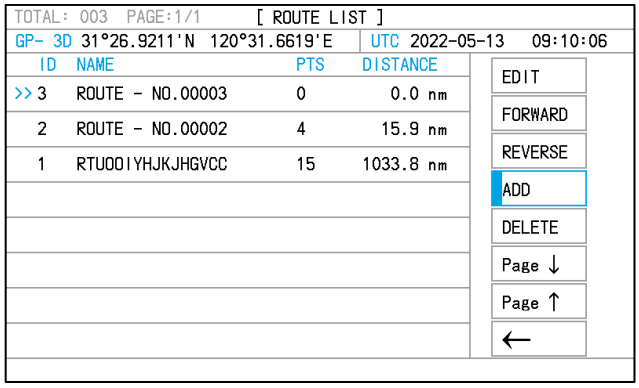


3.2.3 Reverse navigation

Click **[REVERSE]** to start navigation in reverse. The screen will switch to the **PLOTTER** page.

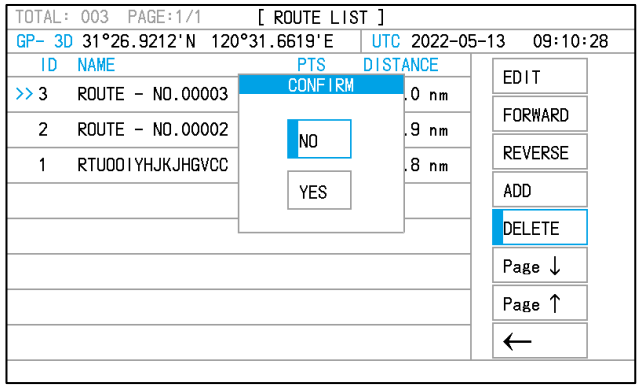
3.2.4 Create a new route

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

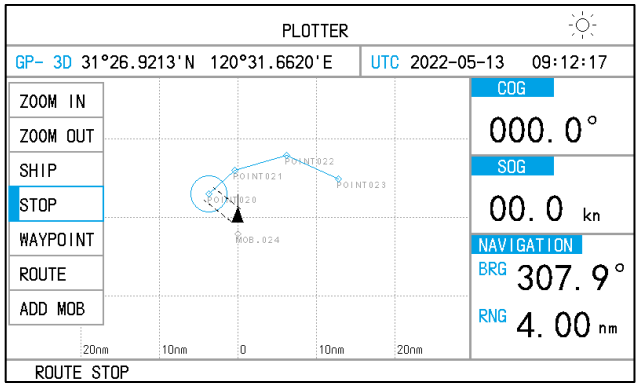


3.2.5 Delete a route

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



3.3 Stop the Navigation by the Current Route

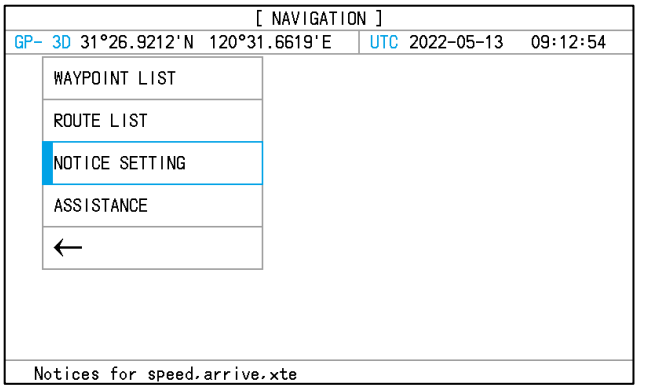


Click **[PLOTTER]** in **[MENU]**, then click **[STOP]** to stop the navigation by the current route. The route is cleared on the **PLOTTER** display.

4. NOTICE

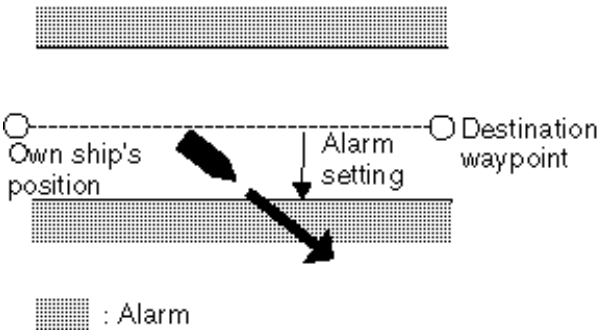
Important note: All these navigational alarms (XTE, SPEED, ARV, ANC) should be switched off on SOLAS- (or IMO-) compliant ships.

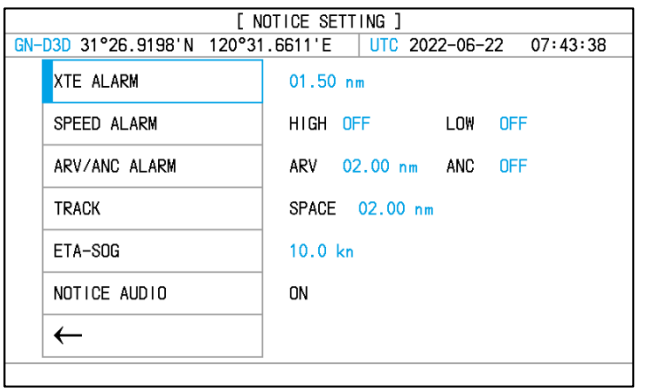
Select **[SETTINGS]-[NAVIGATION]-[NOTICE SETTING]** to open the menu.

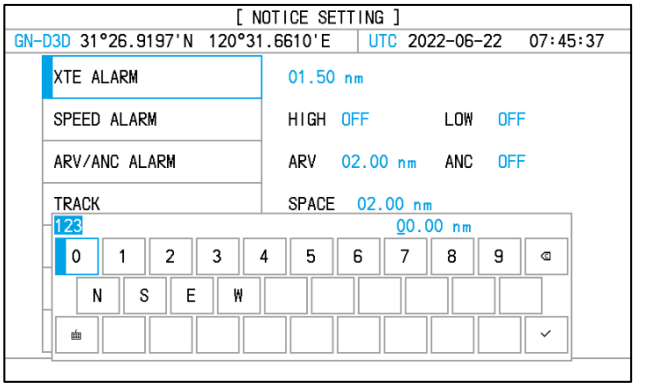


4.1 XTE (Cross Track Error) Alarm

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



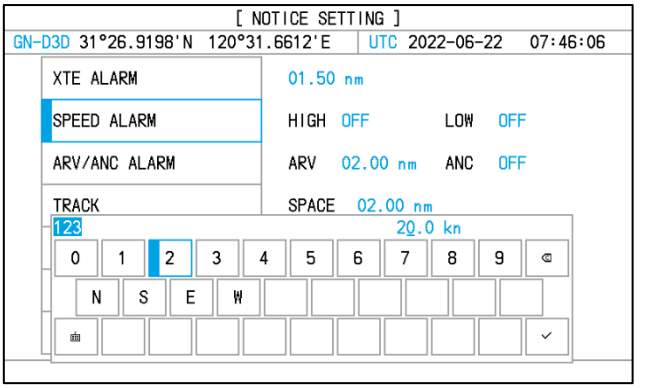




1) Click the value field to edit.
2) Click the digits among 0-9 until the desired digit is obtained.
3) When the value is set to 0, the alarm will be turned off.

4.2 Speed Alarm

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

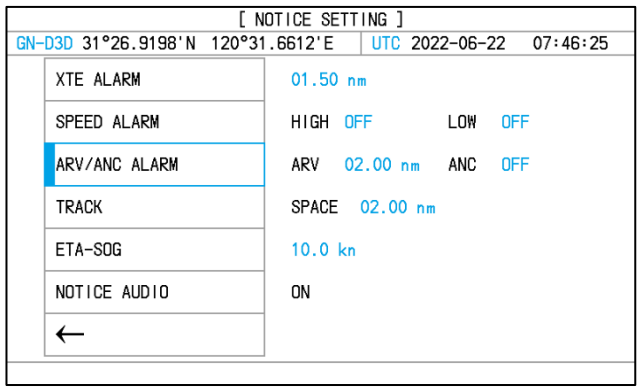


LOW: Alarm is activated when the speed is lower than the speed set in the field.
HIGH: Alarm is activated when the speed is higher than the speed set in the field.

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

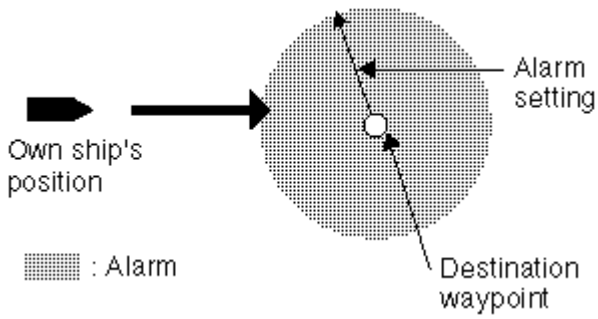
4.3 Arrival Alarm and Anchor Watch Alarm

You may activate the arrival alarm or the anchor watch alarm but 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.

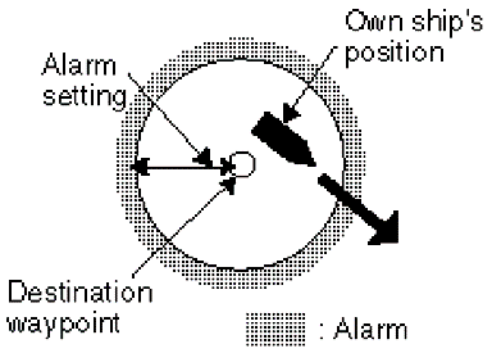


1) Click the **ARV** alarm value to edit.
2) Click the digits among 0-9 until the desired digit is got.
3) Turn the knob to move the cursor to the next digit to edit.
4) When the value is set to 0, the alarm will be turned off.

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 the current position as the destination.

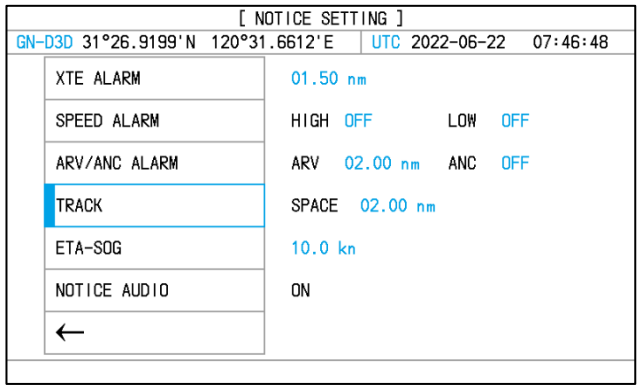
1) Click the **ANC** alarm value to edit.
2) Click the digits among 0-9 until the desired digit is obtained.
3) Turn the knob to move the cursor to the next digit to edit.
4) When the value is set to 0, the alarm will be turned off.

The alarm range is (0.01-99.99 nm).

NOTE:
The 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.



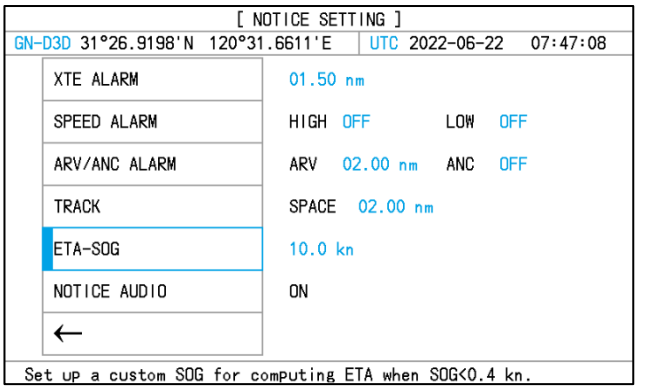
If **OFF** is selected, the track will not be recorded.

If **SPACE** is selected, the track will be recorded every a 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 forwarding a route, but SOG < 0.4 kn, ETA will be calculated according to this SOG. The default is 10.0 kn



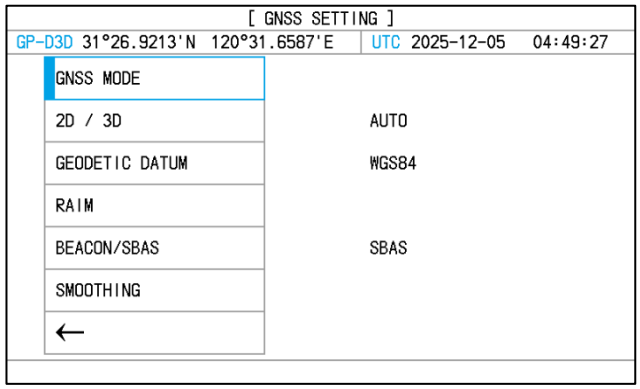
4.6 Notice Audio

Set whether an audible alarm is required for Notice.

5. MENU SETTING

5.1 GNSS Setting

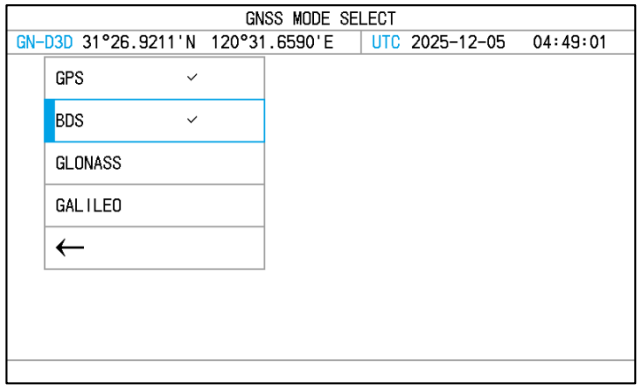
Click **[MENU]-[SETTINGS]-[GNSS SETTING]** to open the menu as follows.



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

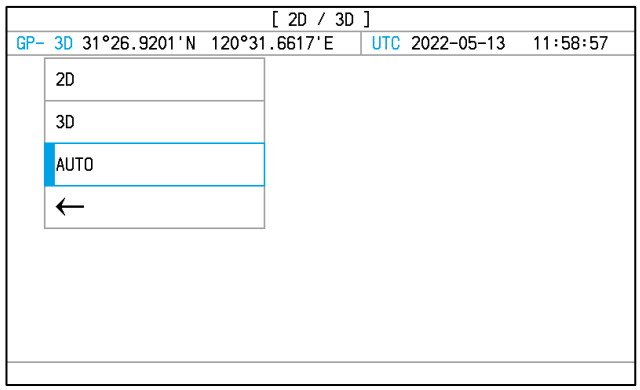
5.1.1 GNSS mode

There are four GNSS systems that can be selected: GPS, BDS, GLONASS and GALILEO. BDS and GLONASS can not be enabled at the same time.



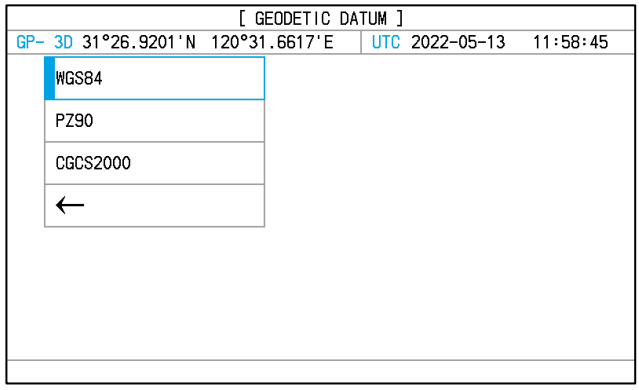
5.1.2 2D/3D

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 the following conditions:

- **Conditions for the "safe" state**
  The result of the 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.

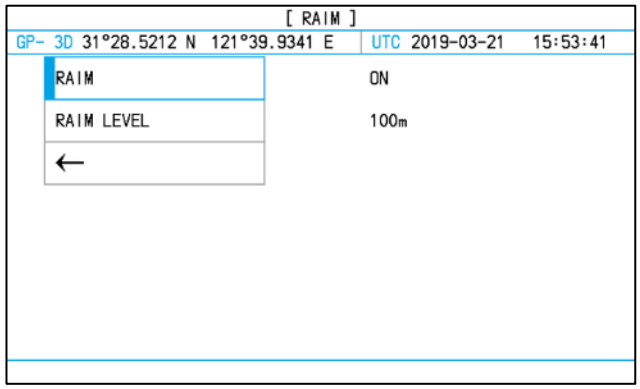
- **Conditions for the "caution" state**
  The "caution" status will be used to indicate:
  – Insufficient information to reliably calculate with a confidence level above 95 % for the selected accuracy level, or
  – The probability of false alarms >5 %, or
  – The probability of not detecting an error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

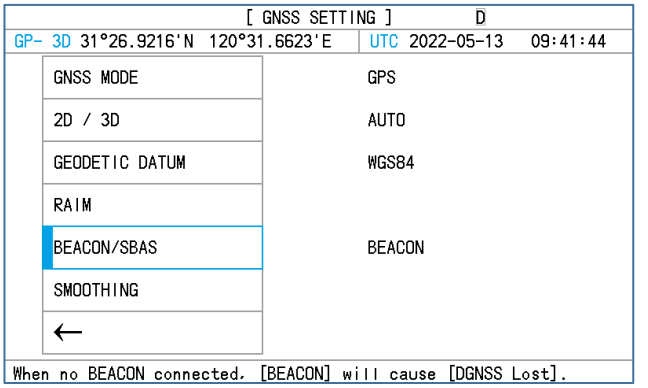
5.1.4.2 RAIM level

RAIM level can be set between 10-100m.



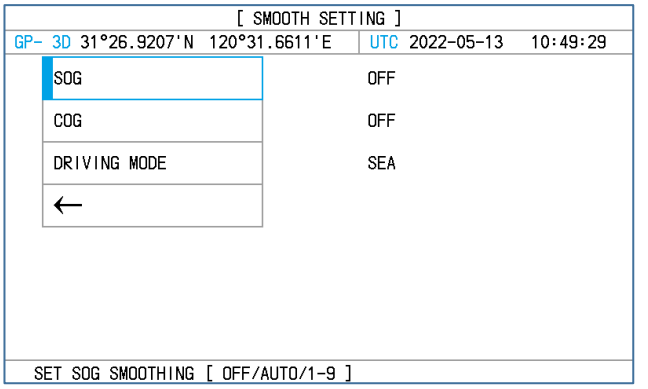
5.1.5 Beacon/SBAS

The system will detect the DGNSS signal when **[BEACON]** is selected. If no DGNSS signal is coming, a warning “DGNSS Lost” will be raised.



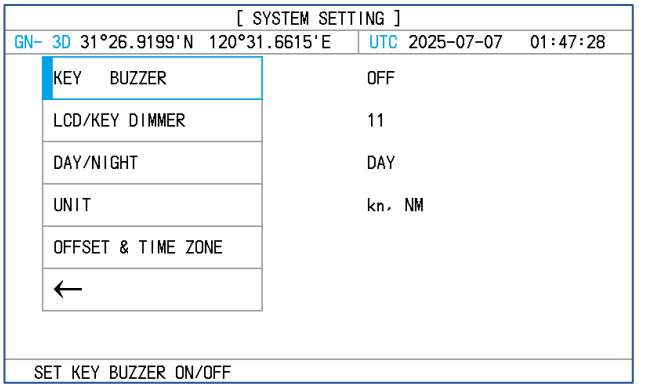
5.1.6 Smoothing

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.



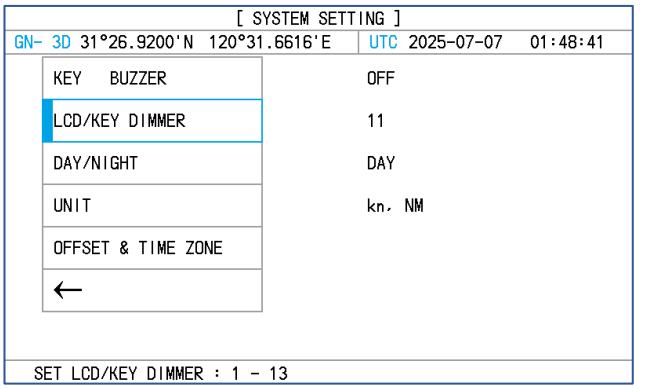
It includes **KEY BUZZER**, **LCD/KEY DIMMER**, **DAY/NIGHT**, **UNIT** and **OFFSET & TIME ZONE** items.

5.2.1 Key buzzer

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

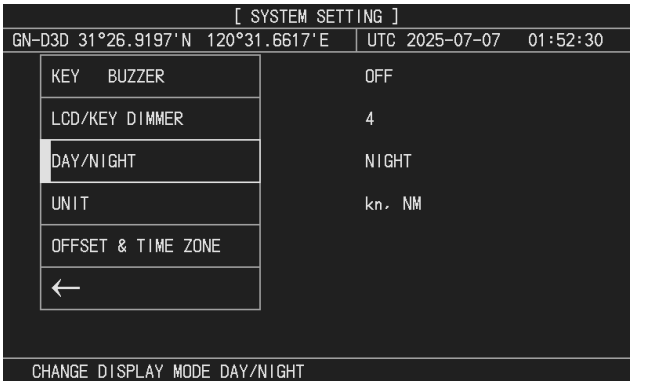
5.2.2 LCD/Key dimmer

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



5.2.3 Day/Night

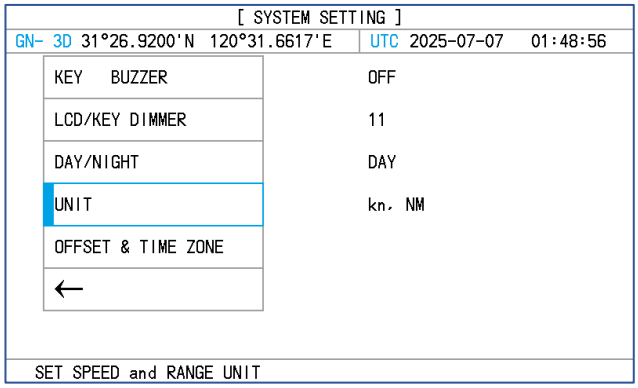
Change the display mode between **DAY** and **NIGHT**. For example:



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

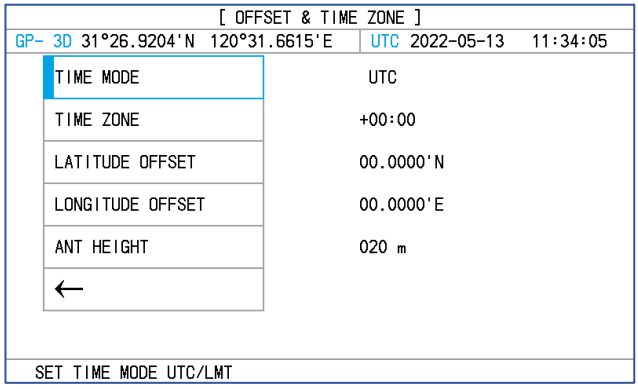
5.2.4 Unit

Unit can be set as **kn, NM** or **km/h, km**.



5.2.5 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 the GNSS antenna.



5.3 Alert

List of all alerts that could be generated:

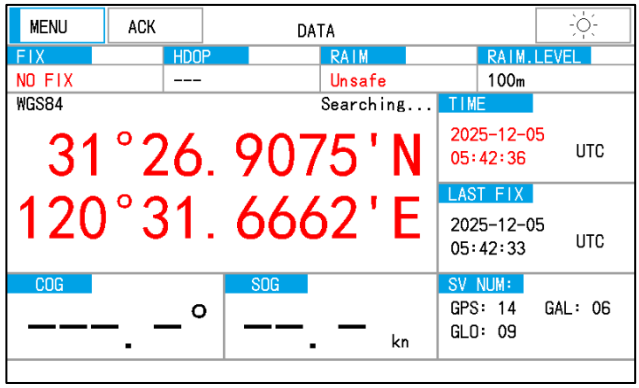
ID	Ins	Cat	Prio	Escal	Resp	Alert Title	Alert description
3056	1	B	C	/	/	HDOP exceeded	HDOP > 4.0 check antenna
3015	2	B	W	W	Yes	Loss of position	Loss of position check antenna
3055	3	B	W	W	Yes	DGNSS Lost*	Loss of differential signal
3012	4	B	W	W	Yes	Integrity status	Accuracy is unsafe check antenna
3062	5	B	W	W	YES	System fault	GNSS module malfunctioned

Ins: Instance of an alert;
Prio: Alert priority (W – Warning, C – Caution);

Cat: Alert category;
Escal: W – An unacknowledged warning will be repeated as a warning after 4 minutes;
Resp: Transfer responsibility.

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

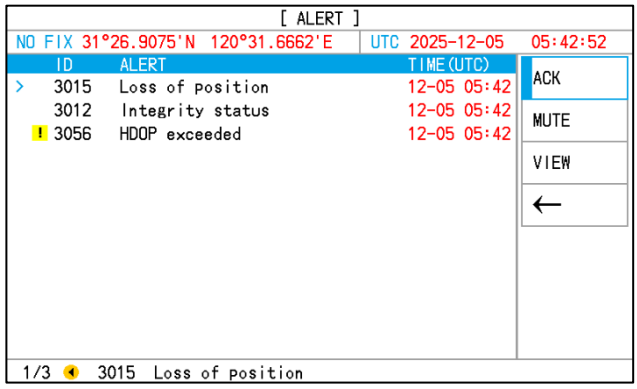
When an alert occurs, the buzzer sounds (except for a caution) and the title of the alert appears at the bottom of the display. Click on the bottom to enter the alert list.



Alert mark description:

MARK	PRIORITY	STATE
	WARNING	ACTIVE-UNACKNOWLEDGED
		ACTIVE-SILENCED
		ACTIVE-ACKNOWLEDGED
		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.

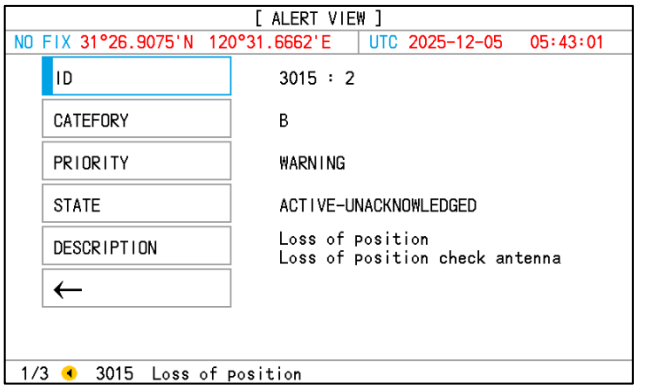
[ACK]: Acknowledge the alert selected.

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

[VIEW]: View the details of the alert selected, as shown on the right.

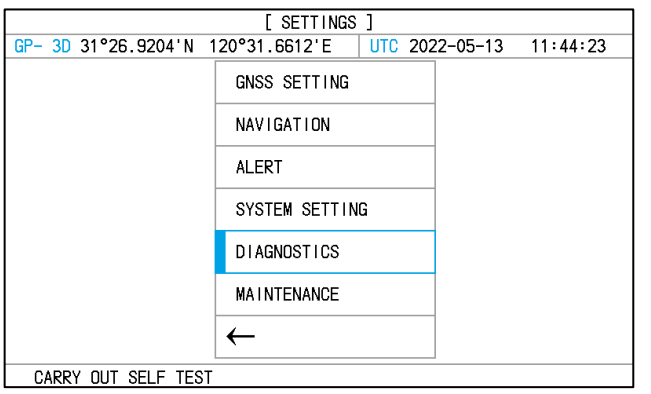
[←]: Back to the upper menu.

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



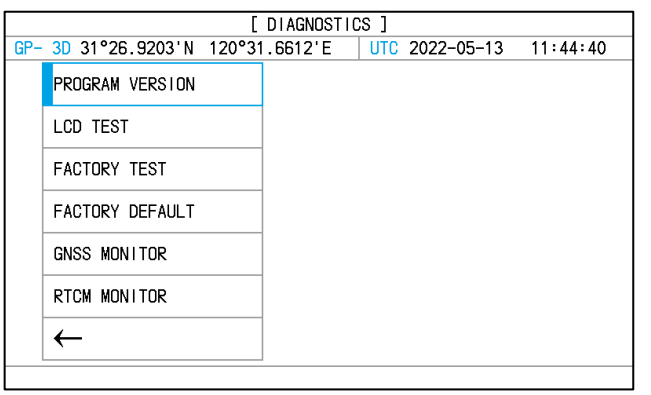
5.4 Diagnostics

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



5.4.1 Program version

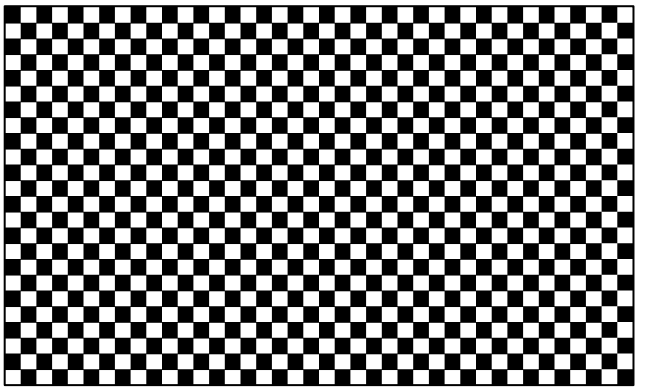
Select **[PROGRAM VERSION]** item to check the software version, etc.



5.4.2 LCD test

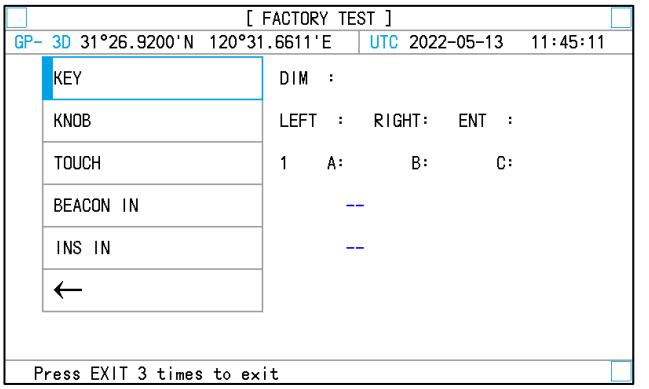
LCD TEST is used for testing the screen.

Click [**LCD TEST**] to enter the test screen, and turn the 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.

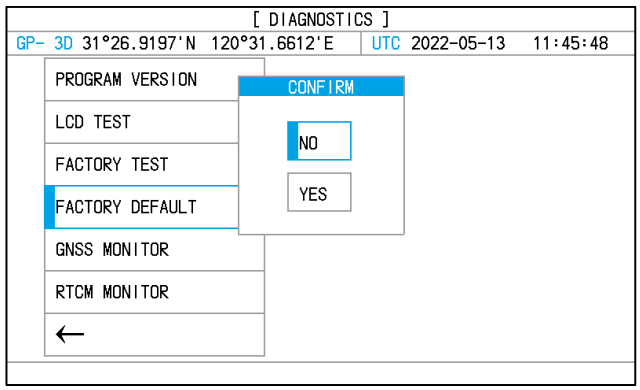


KEY test: Press the **DIM** key.
KNOB test: Turn the knob to the left and right, then press it.
TOUCH test: Touch the corner of the screen. The box corresponding to the item will be filled with blue color.

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

5.4.4 Factory default

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

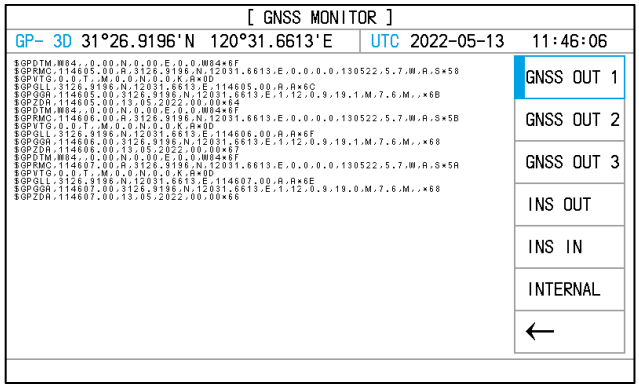


NOTE:

The navigation settings and GNSS settings will be restored 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.



5.4.6 RTCM monitor

When **[BEACON/SBAS]** in **[GNSS SETTING]** is set to **BEACON**, DGPS beacon input will be checked by NGR-3000.

6. INSTALLATION

6.1 Installation of Main Unit

The main unit can be installed on a tabletop, 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 that 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, 0.2 m. Steering compass, 0.15 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 the reception of the GNSS signal.
- The location should be well away from a VHF/UHF antenna. GNSS equipment is interfered with by a harmonic wave of a VHF/ UHF antenna.
- There should be no obstruction 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 that 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. The pin definition for the connector is shown above.
Suggest using the 3A Power Supply Unit (DC 24V output).

6.3.2 Interfaces

PIN NO.	DESCRIPTION	TYPE
1	BEACON IN+	RTCM SC-104 V2.3
2	BEACON IN_	
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 to receive the differential signal from DGPS beacon.
[GNSS OUT] is used to output position data.
[BAM IN/OUT] is used to communicate with CAM.

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-	

The alert list is described in Section 5.3.

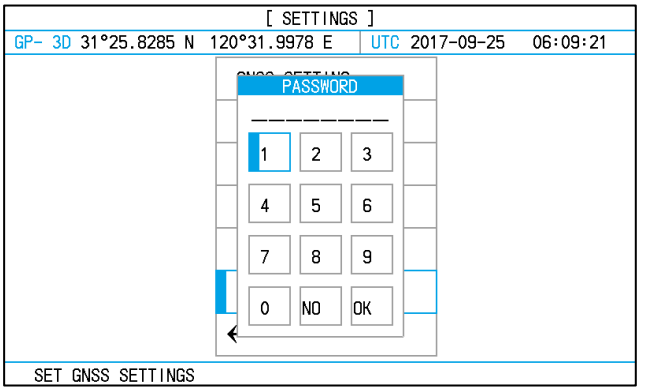
6.3.4 Grounding

Ground the unit as follows to prevent interference:

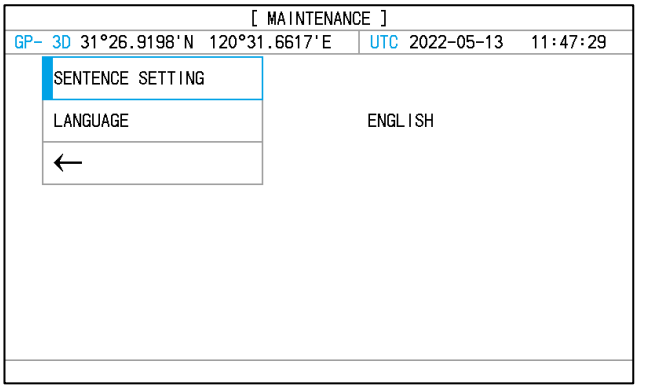
- The ground wire should be 1.25mm2 or larger.
- The ground wire should be as short as possible.

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 the menu of **[MAINTENANCE]**.



A password is required to enter **[MAINTENANCE]** menu.



6.4.1 Language setting

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

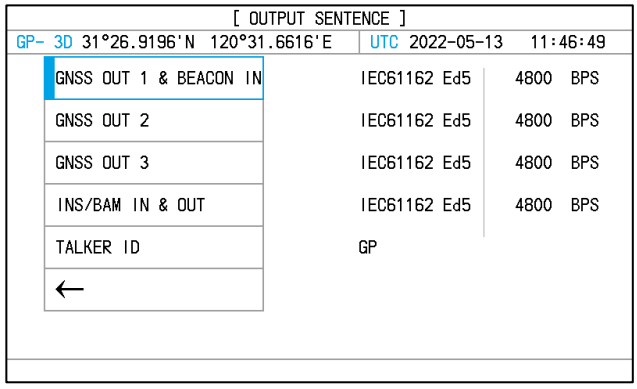
6.4.2 Sentence setting

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

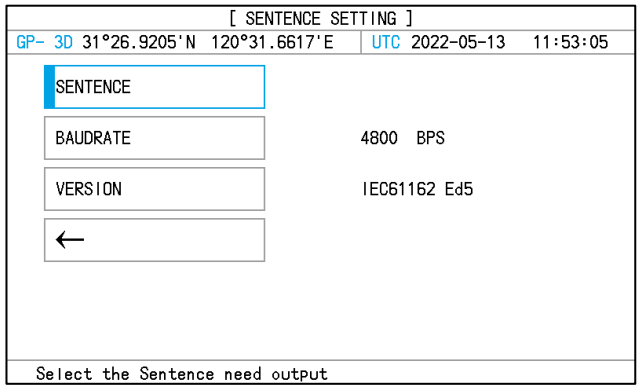
- **Data sentences:**
  The following sentences are available: GBS, GNS, GGA, DTM, RMC, VTG, ZDA, GSA, XTE, WPL, BOD, RTE, GLL, APB, VLW, GFA, GRS, GST, GSV, RMB, BWC, HDT. When selecting sentences, the load rate needs to be kept below 100%. Each sentence can be set to be sent once every 1/2/5/10 seconds.
- **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

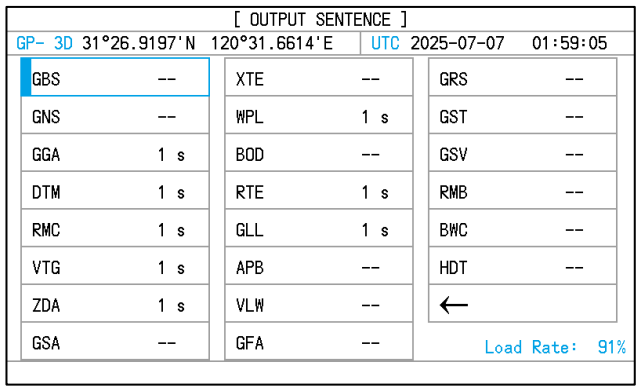
Click **[MAINTENANCE]-[SENTENCE SETTING]**, the following menu appears.



Click the ports to set the 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 the 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 the specified waypoint.

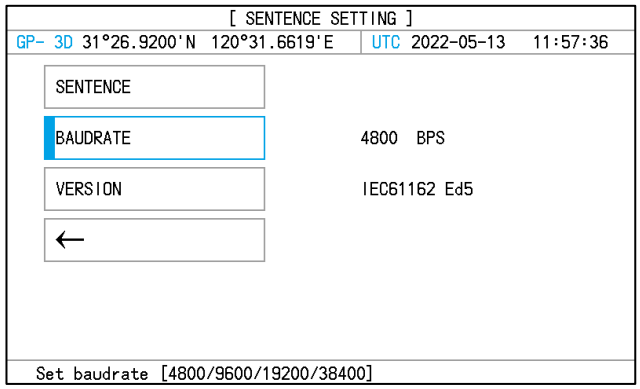
HDT: Heading true.

NOTE 1: *By default, GNS, GBS, GGA, RMC, VTG, ZDA and DTM are selected.*

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

6.4.2.2 Baud rate

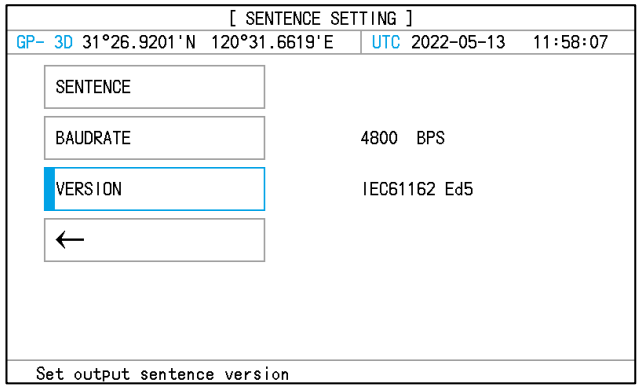
Select each of the four outputs to configure the baud rate.
The default baud rate of all ports is 4800bps.
Click BAUDRATE continuously until a desired rate is shown.



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

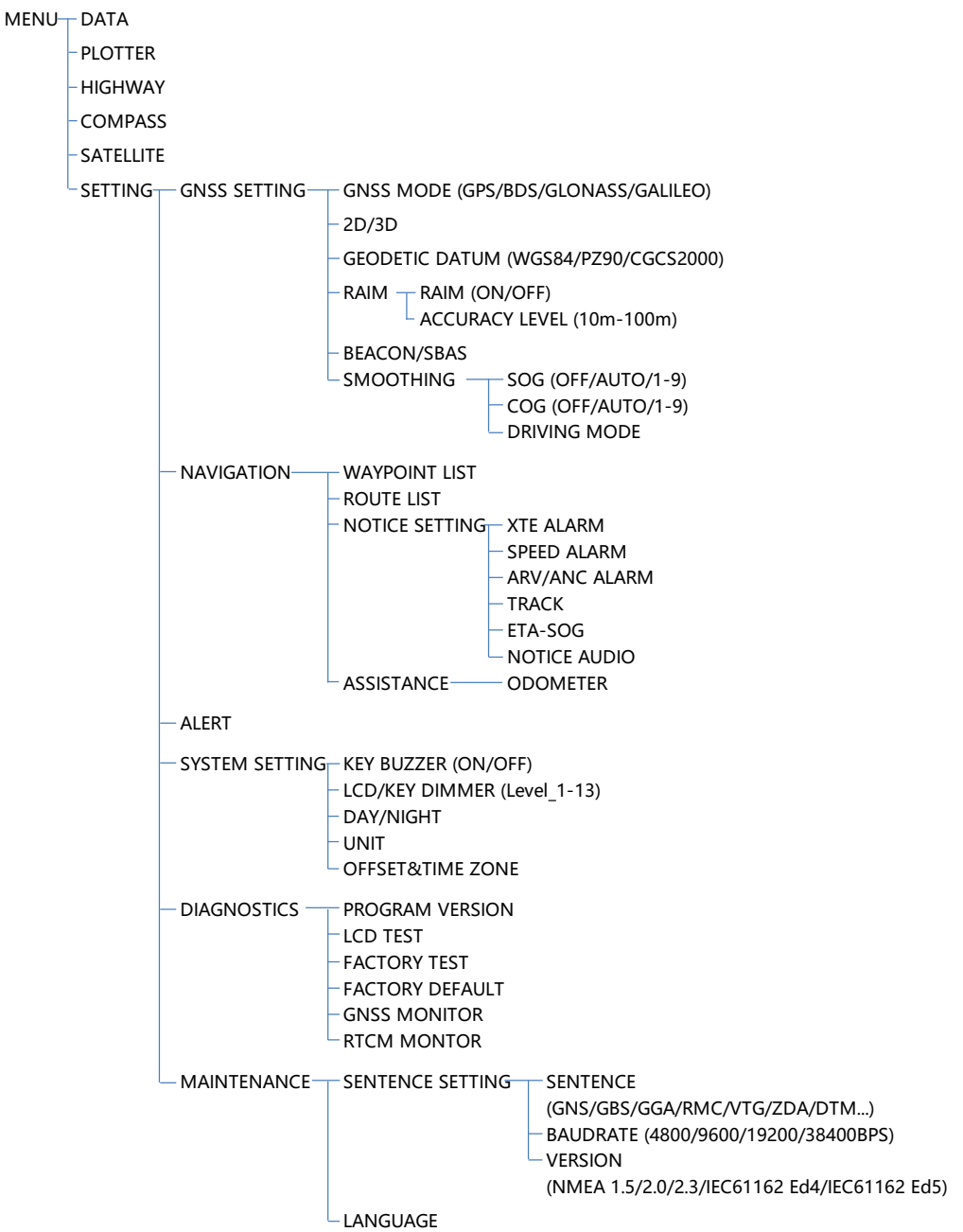
6.4.2.3 NMEA version

Select each of the four outputs to configure the NMEA version.
Click VERSION continuously until the 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, Galileo
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) Galileo E1 (1575.42 MHz)
3	Position Accuracy	less than 10m (GPS), less than 5m(DGPS), 95% of the time, horizontal dilution of position (HDOP) ⩽ 4
4	SOG Accuracy	<0.1kn
5	Tracking Velocity	999 kts
6	Position-fixing Time	Cold start: 45 seconds, Warm start: 30 seconds
7	Position Update Interval	1 second
8	RAIM Indicators	Safe, Unsafe, Caution, N/A, off
9	Route	Up to 30
10	Waypoint	Up to 3000

- **DISPLAY SECTION**

No	Item	Description
1	Display	7-inch, color LCD, touch screen operation
2	Fix Mode	GPS, Glonass, BDS, Galileo or combined
3	Alerts	Loss of position and differential signals, HDOP ＞4
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

- **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	DGPS RTCM 10402.3
3	BAM/Ins In	ACN, HBT
4	BAM/Ins Out	ALC, ALF, HBT, ARC

- **POWER SUPPLY**

DC 24V (range 12~36V): 0.4A~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
4	Compass Safe Distance	Standard compass: 0.2m, Steering compass: 0.15m

- **OTHERS**

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

APPENDIX III SENTENCE DESCRIPTION

ACN – Alert command

```
$--ACN,hhmmss.ss,aaa,x.x,x.x,c,a*hh <CR><LF>
               |         |   |   |  ||
               |         |   |   |  | +-------------------------------- 6
               |         |   |   |  +---------------------------- 5
               |         |   |   +------------------------ 4
               |         |   +------------------------ 3
               |         +---------------------- 2
               +--------------------------- 1
```

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

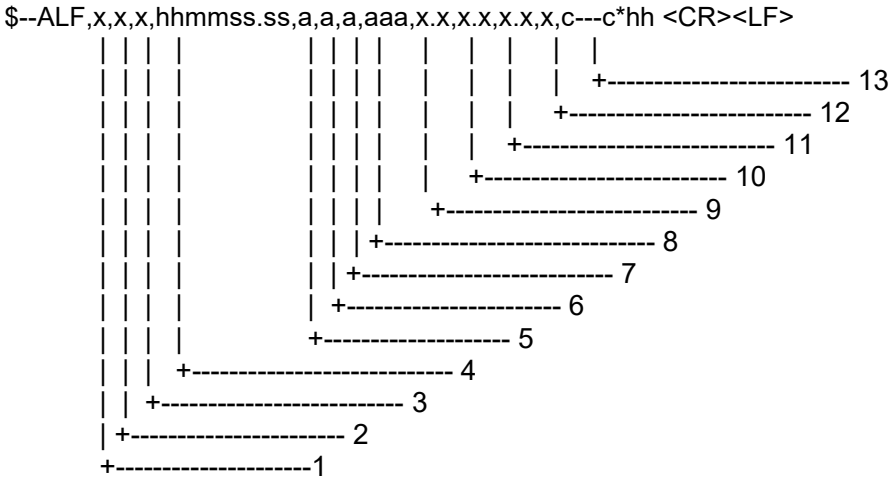
ALC - Cyclic alert list

```
$--ALC,xx,xx,xx,x.x,aaa,x.x,x.x,x.x,.....,aaa,x.x,x.x,x.x*hh <CR><LF>
          |  |  |  |  |     |  |  |  |  |  |           |
          |  |  |  |  |     |  |  |  |  |  |           |
          |  |  |  |  |     |  |  |  |  |  +----------+---------------- 7
          |  |  |  |  |     |  |  |  |  +--+--------------------------- 6
          |  |  |  |  +-----+---+---+---+----------------------------- 5
          |  |  |  +-------------------------------------------- 4
          |  |  +----------------------------------------- 3
          |  +-------------------------------------- 2
          +----------------------------------- 1
```

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.

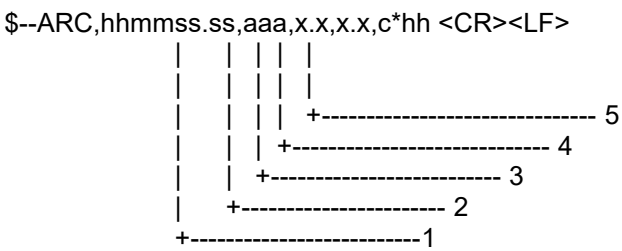
ALF - Alert sentence



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.

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

HBT – Heartbeat supervision sentence

```
$--HBT,x.x,A,x*hh<cr><lf>
         |   | |
         |   | +---------------------- 3
         |   +------------------- 2
         +------------------- 1
```

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

HDT – Heading true

```
$--HDT,x.x,T*hh<CR><LF>
          | |
          +--+----------------1
```

1. Heading, degrees true

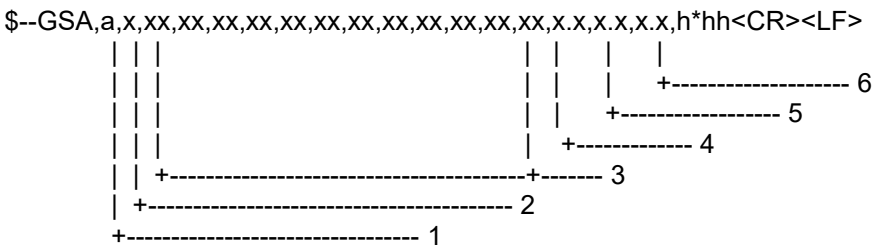
DTM - Datum reference

```
$--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

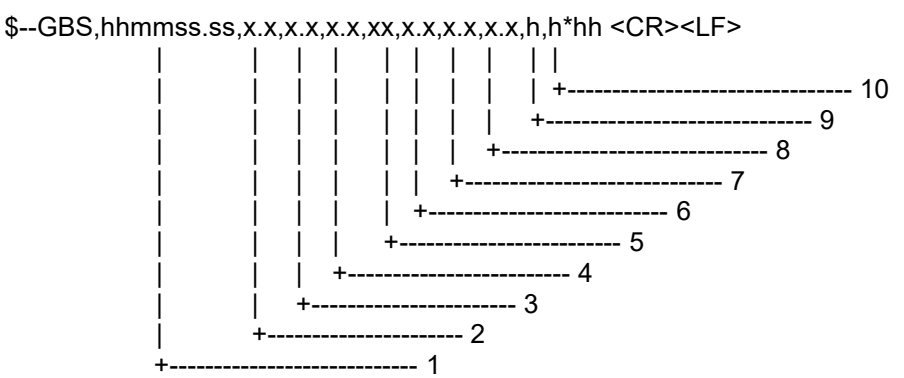
6. Reference datum WGS84 = W84
WGS72 = W72
SGS85 = S85
PE90 = P90
BDCS = C00

GSA - GNSS DOP and active satellites



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

GBS – GNSS satellite fault detection



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

GLL – Geographic position – Latitude/longitude

```
$--GLL,llll.ll,a,yyyyy.yy,a,hhmmss.ss,A,a*hh<CR><LF>
          |   |      |      |     |          |  |
          |   |      |      |     |          |  +---------------------- 5
          |   |      |      |     |          +--------------------- 4
          |   |      |      |     +--------------------------- 3
          |   |      +------+------------------------ 2
          +---+------------------------------ 1
```

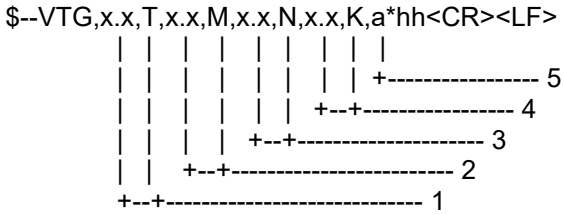
1. Latitude, N/S
2. Longitude, E/W
3. UTC of position
4. Status A=data valid V=data invalid
5. Mode indicator

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,x.x,a *hh<CR><LF>
          |             |   |      |      |  |    |   |   |    |   |   |   |
          |             |   |      |      |  |    |   |   |    |   |   |   +------------------ 11
          |             |   |      |      |  |    |   |   |    |   |   +------------------ 10
          |             |   |      |      |  |    |   |   |    |   +------------------- 9
          |             |   |      |      |  |    |   |   |    +--------------------- 8
          |             |   |      |      |  |    |   |   +--------------------- 7
          |             |   |      |      |  |    |   +------------------- 6
          |             |   |      |      |  |    +------------------ 5
          |             |   |      |      |  +------------------- 4
          |             |   |      +------+------------------- 3
          |             +---+-------------------------- 2
          +---------------------------------------- 1
```

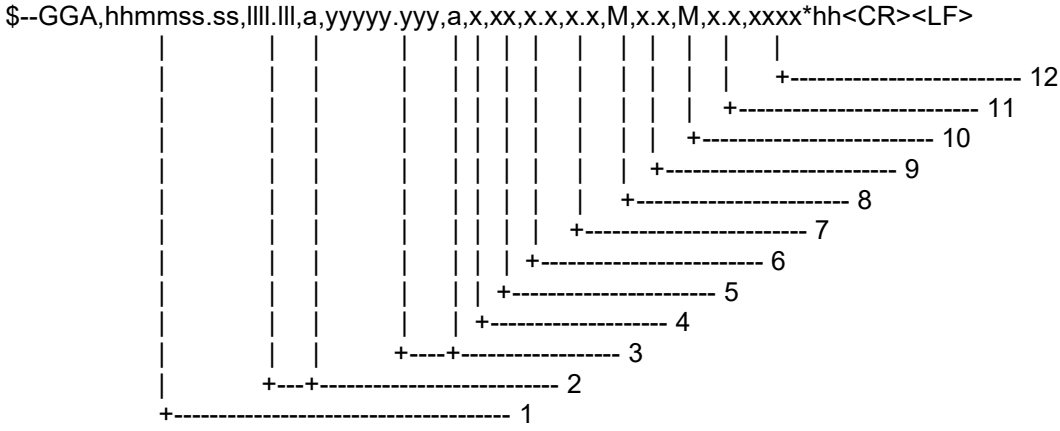
1. UTC of position
2. Latitude, N/S
3. Longitude, E/W
4. Mode indicator
5. Total number of satellites in use, 00-99
6. HDOP
7. Antenna altitude, m, re: mean-sea-level (geoid)
8. Geoidal separation, m
9. Age of differential data
10. Differential reference station ID
11. Navigational status indicator

VTG - Course over ground and ground speed



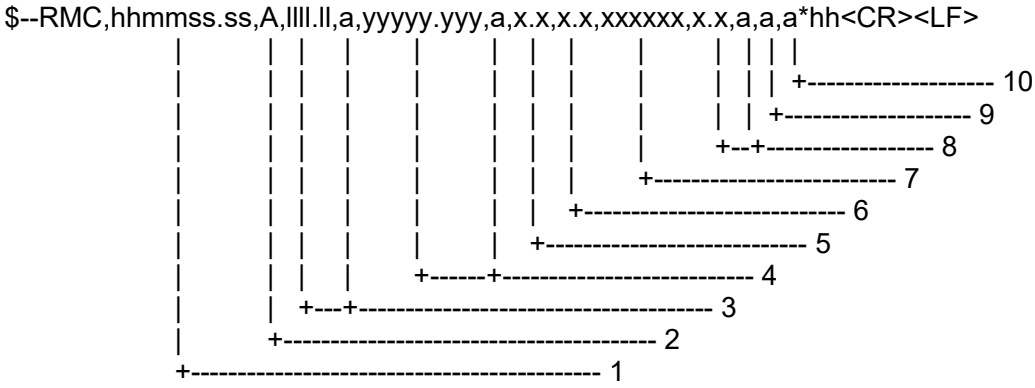
1. Course over ground, degrees true
2. Course over ground, degrees magnetic
3. Speed over ground, knots
4. Speed over ground, km/h
5. Mode indicator

GGA -Global positioning system (GPS) fix data



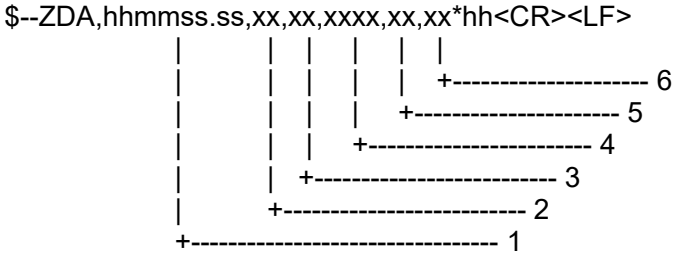
1. UTC of position
2. Latitude, N/S
3. Longitude, E/W
4. GPS quality indicator
5. Number of satellite in use,00-12, may be different from the number in view
6. Horizontal dilution of precision
7. Antenna altitude above/below
8. Unit of Antenna altitude, m
9. Geoidal separation
10. Unit of geoidal separation,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

RMC- Recommended minimum specific GPS/TRANSIT 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

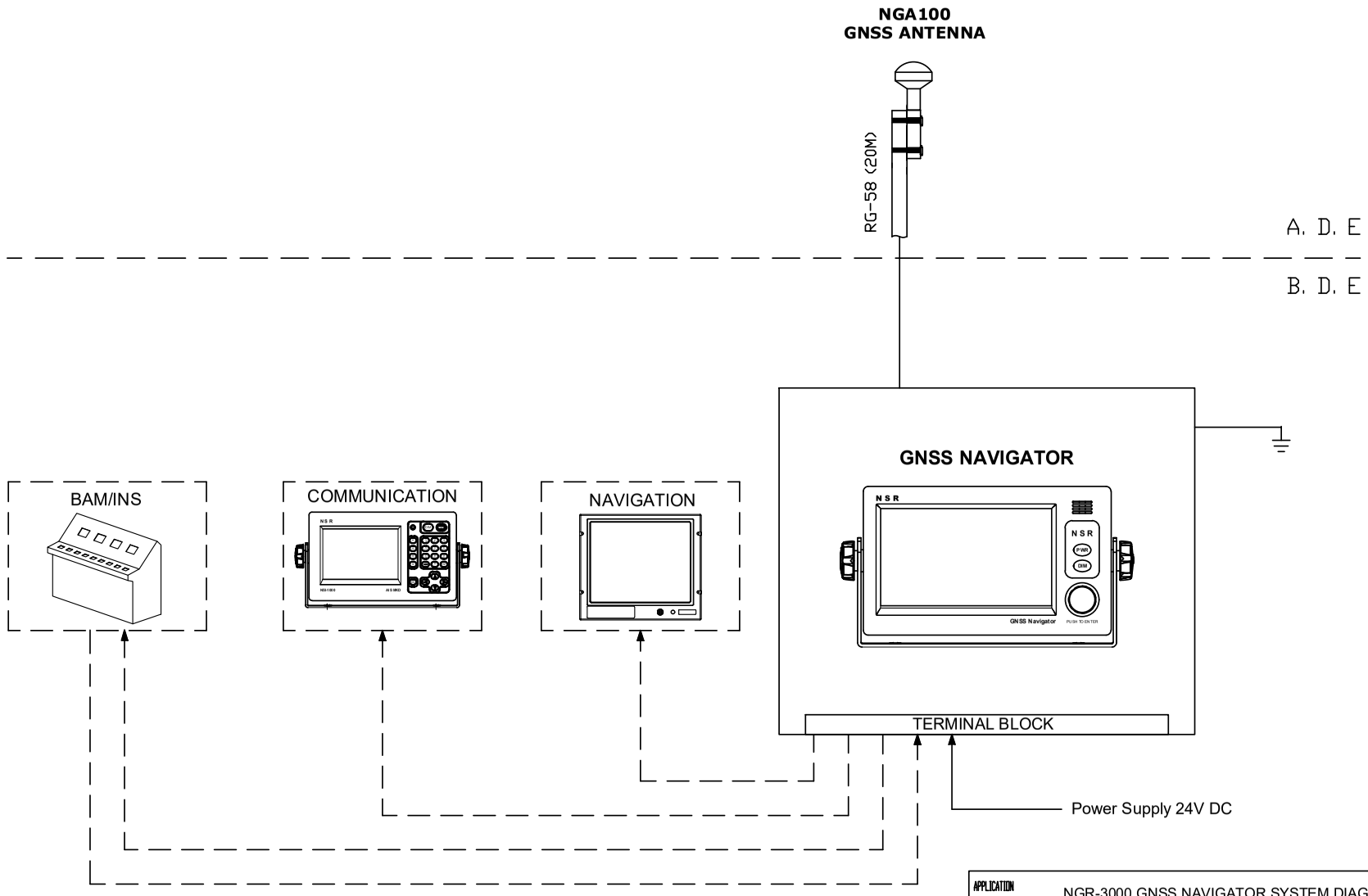


1. UTC
2. Day, 01 to 31 (UTC)
3. Month, 01 to 12 (UTC)
4. Year (UTC)
5. Local zone hours, 00h to ±14h
6. Local zone minutes, 00 to +59

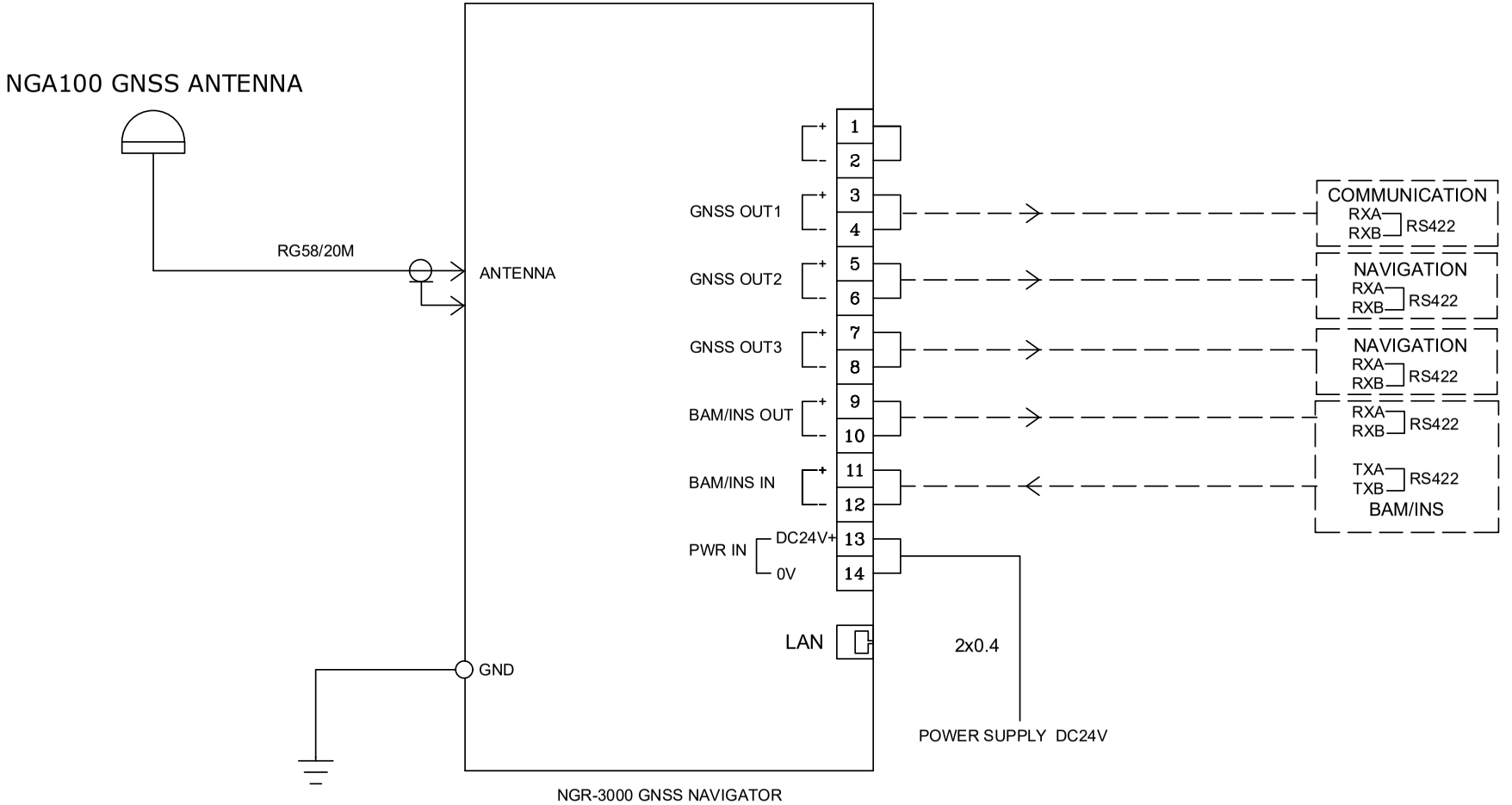
APPENDIX IV INSTALLATION DRAWING

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 MAIN UNIT SIZE DRAWING
NGR3000-ID-004	NGR-3000 MAIN UNIT MOUNT DRAWING (TABLE TYPE)
NGR3000-ID-005	NGR-3000 MAIN UNIT MOUNT DRAWING (FLUSH TYPE)
NGR3000-ID-006	NGA100 GNSS ANTENNA SIZE & MOUNTING DRAWING

NO.	DATE	REVISION & DESCRIPTION	REVIEWED	CHECKED
1			SIGNATURE	



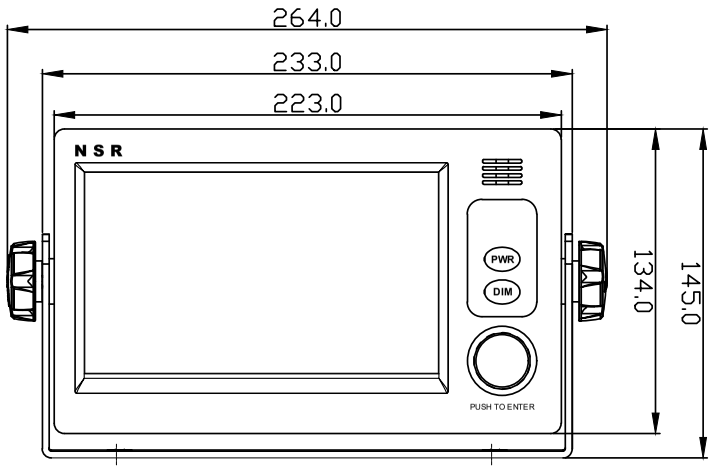
APPLICATION	NGR-3000 GNSS NAVIGATOR SYSTEM DIAGRAM				
DATE		ITEM			SIZE A4
APPROVAL		SCALE N/S	UNIT		
CHECKED					
DRAWING					
DWG. NO.	NGR3000-ID-001	NSR marine	NEW SUNRISE CO., LTD.		



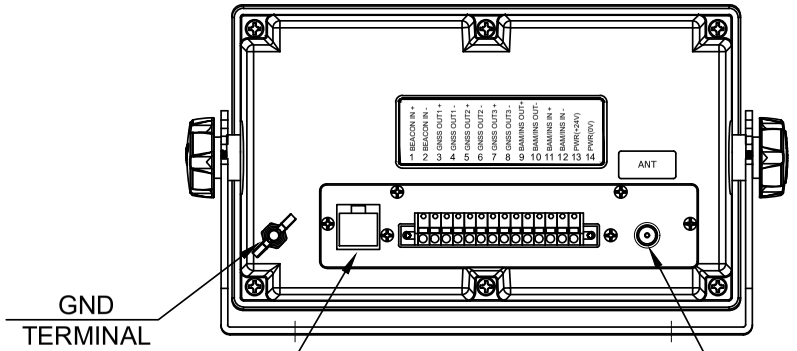
YARD SUPPLIED OR OPTIONAL

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

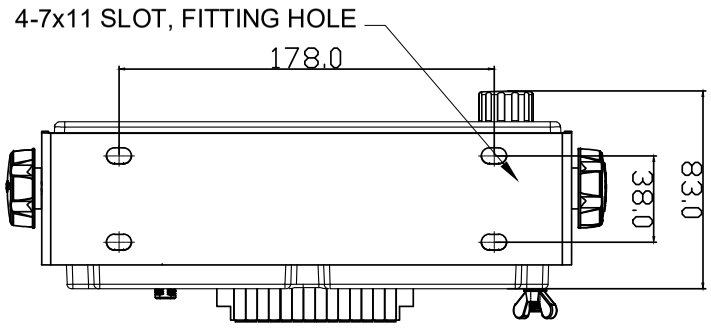
NO.	DATE	REVISION & DESCRIPTION	REVIEWED	CHECKED
1			SIGNATURE	



FRONT VIEW



REAR VIEW

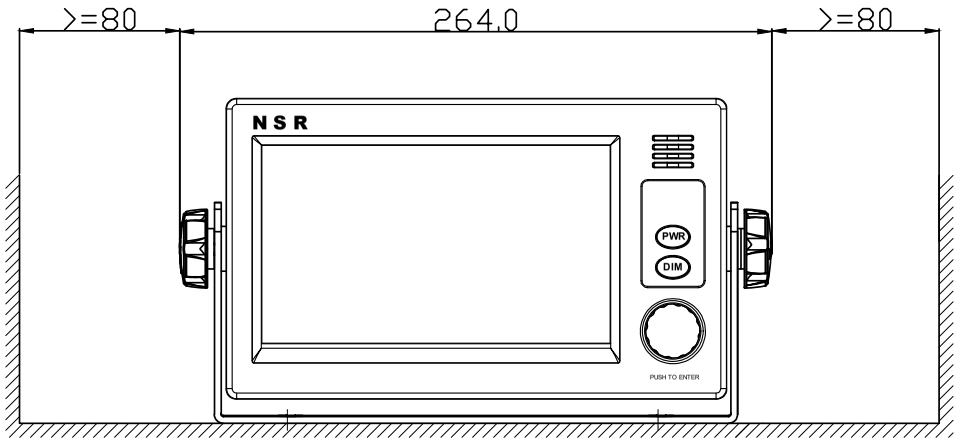


BOTTOM VIEW

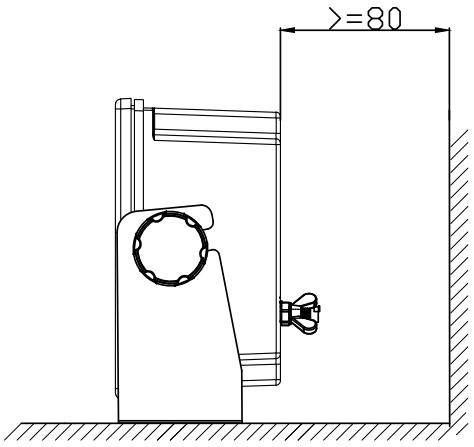
BEACON IN +	BEACON IN -	GNSS OUT1 +	GNSS OUT1 -	GNSS OUT2 +	GNSS OUT2 -	GNSS OUT3 +	GNSS OUT3 -	BAM/INS OUT+	BAM/INS OUT-	BAM/INS IN +	BAM/INS IN -	PWR(+24V)	PWR(0V)
1	2	3	4	5	6	7	8	9	10	11	12	13	14

APPLICATION	NGR-3000 MAIN UNIT SIZE DRAWING		
DATE		ITEM	SIZE A4
APPROVAL		SCALE N/S UNIT	
CHECKED			
DRAWING			
DWG NO.	NGR3000-ID-003	NSR marine	NEW SUNRISE CO., LTD.

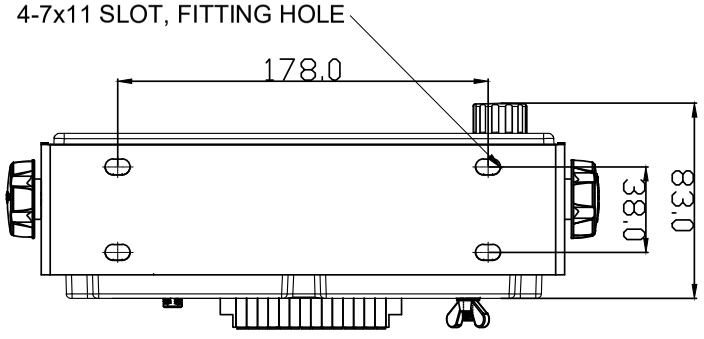
NO.	DATE	REVISION & DESCRIPTION	REVIEWED / CHECKED SIGNATURE
1			



FRONT VIEW



SIDE VIEW



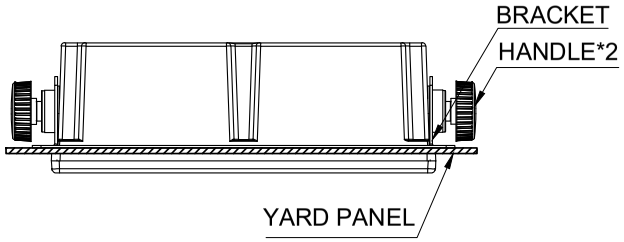
NOTE: TABLE TYPE

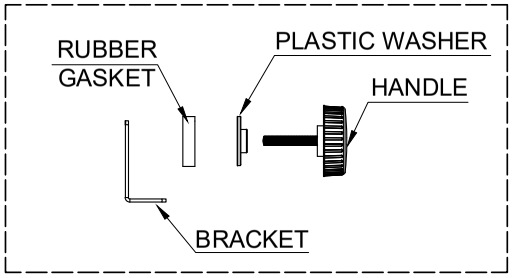
1.USE SELF-TAPPING SCREWS M5X20 FOR FIXING THE UNIT.

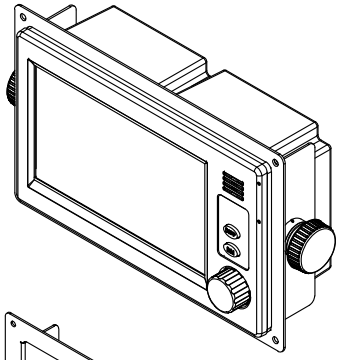
2.80MM IS MINIMUM SPACE FOR OPERATION AND CABLING.

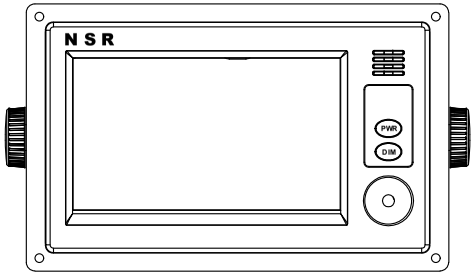
APPLICATION	NGR-3000 MAIN UNIT MOUNT DRAWING(TABLE TYPE)		
DATE		ITEM	SIZE A4
APPROVAL		SCALE N/S UNIT	
CHECKED			
DRAWING		NSR marine	NEW SUNRISE CO., LTD.
DWG. NO.	NGR3000-ID-004		

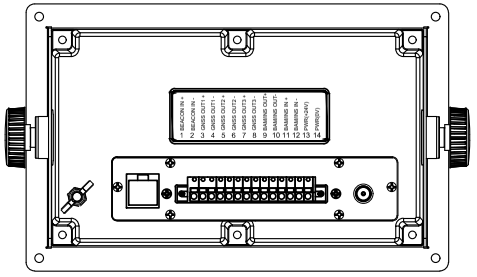
NO.	DATE	REVISION & DESCRIPTION	REVIEWED	CHECKED
1			SIGNATURE	

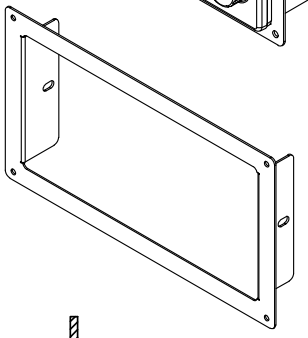


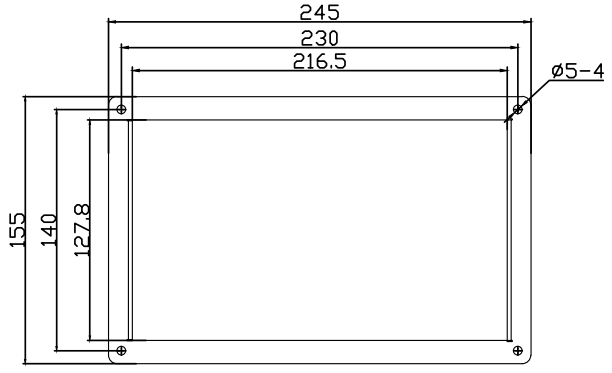




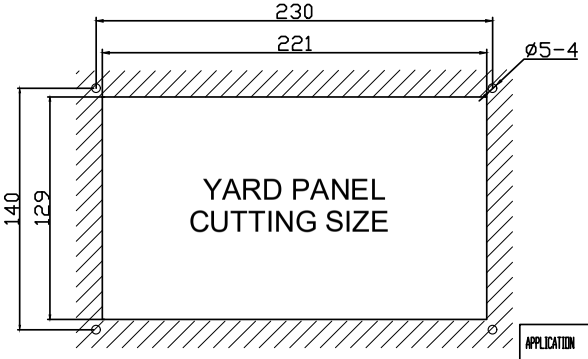


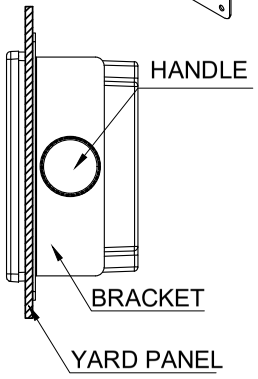






MOUNTING BRACKET SIZE

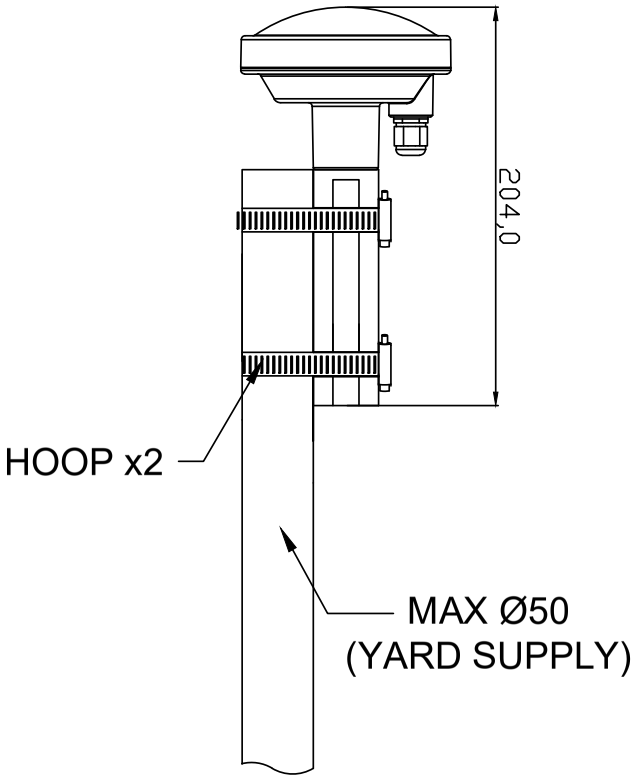


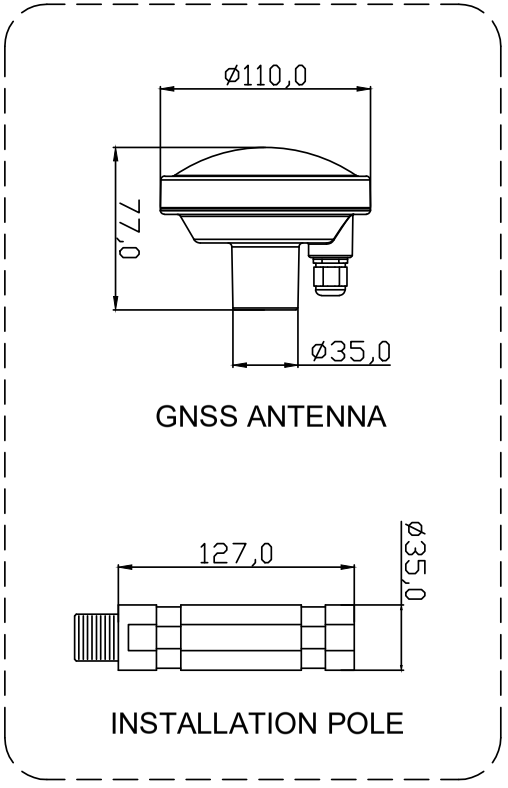


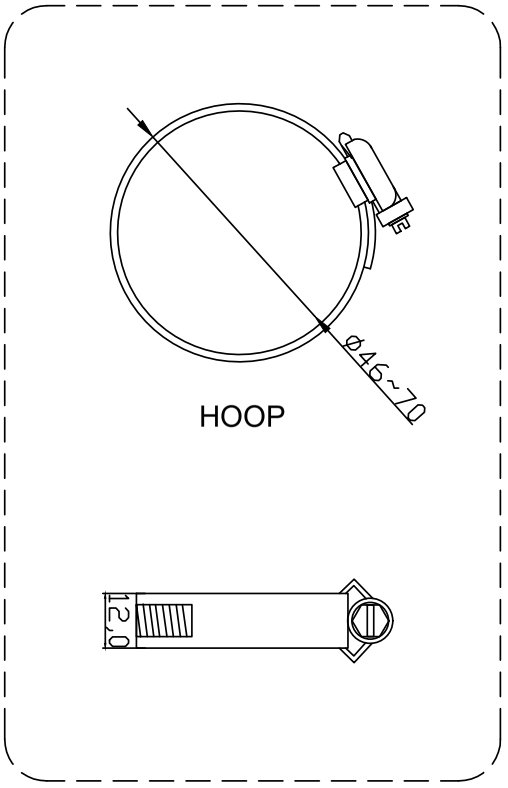
APPLICATION	NGR-3000 MAIN UNIT MOUNT DRAWING(FLUSH TYPE)		
DATE		ITEM	SIZE A4
APPROVAL		SCALE N/S UNIT	
CHECKED			
DRAWING		NEW SUNRISE CO., LTD.	
DWG NO.	NGR3000-ID-005		

NO.	DATE	REVISION & DESCRIPTION	REVIEWED / SIGNATURE	CHECKED
0				

NGA100
GNSS ANTENNA







APPLICATION	NGA100 ANTENNA SIZE&MOUNTING DRAWING		
DATE		ITEM	SIZE A4
APPROVAL		SCALE N/S UNIT	
CHECKED			
DRAWING			NEW SUNRISE CO., LTD.
DWG. NO.	NGR3000-ID-006		

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December, 2025