USER MANUAL

AUTOMATIC IDENTIFICATION SYSTEM (AIS CLASS B)

NAB-1000

NAB-1000 UM.E 20250911-08

NOTICE TO USERS

- Thanks for purchasing this product NAB-1000 AIS TRANSPONDER [B].

- Please read this manual carefully to ensure proper use before installation and operation of the NAB-1000.

- 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.

- The software version in your product may be different from that described in this manual. Such differences will not affect the performance of the product. NSR reserves the right on continuous improvement of products both in software and hardware without any prior notice.

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- NSR is devoted to publishing and maintaining this manual. As we continue to improve our products to satisfy customers' needs, the 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 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 keep the manual for your future reference.

SAFETY INSTRUCTIONS for the operator

	**Warning** Keep away from the heater 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 the ship's body. Observe the compass safe distance to prevent deviation of an onboard magnetic compass.
	**Prohibition** 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.

MODIFY RECORD

No.	Modify by	Date	Paragraph	Revision	Reason
1	Q/A	2010/03/11		01	
2	Q/A	2015/03/05	2.5 etc.	02	Equipment upgraded
3	Q/A	2015/12/26	2 & 4	03	Generally modified
4	Q/A	2016/03/21	2.5 etc.	04	Equipment upgraded
5	Q/A	2018/09/30	1 & 3	05	1. Standards 2. IP grade added
6	Q/A	2018/12/27		06	Generally modified
7	Q/A	2023/09/19		07	Generally modified
8	Q/A	2025/09/11	All	08	Some modification

TABLE OF CONTENTS

1. OUTLINE

AIS is the abbreviation for Automatic Identification System, which is of a radio communication system working with TDMA technology.
Generally, there are three types of AIS transponders:

- Shipbone AIS transponder (class A and class B)
- AIS base station transponder
- AtoN AIS transponder

AIS's communication modes include SOTDMA, RATDMA, ITDMA, FATDMA and CSTDMA, which are used for different terminals and different applications.

NAB-1000 is a class B AIS transponder using **CSTDMA** technology, which can be used for coastal vessels, fishing vessels and river vessels, except SOLAS vessels.

NAB-1000 includes two TDMA/DSC receivers, one TDMA transmitter, which can work on two default channels or any other marine channels remotely set by base stations.

NAB-1000 can communicate with any other class A transponders, class B transponders, AtoN transponders and AIS base stations conforming to such international rules as IEC 62287-1, IEC 60945, IEC 61162 series, ITU-R M.1371-5.

2. PRODUCT DESCRIPTION

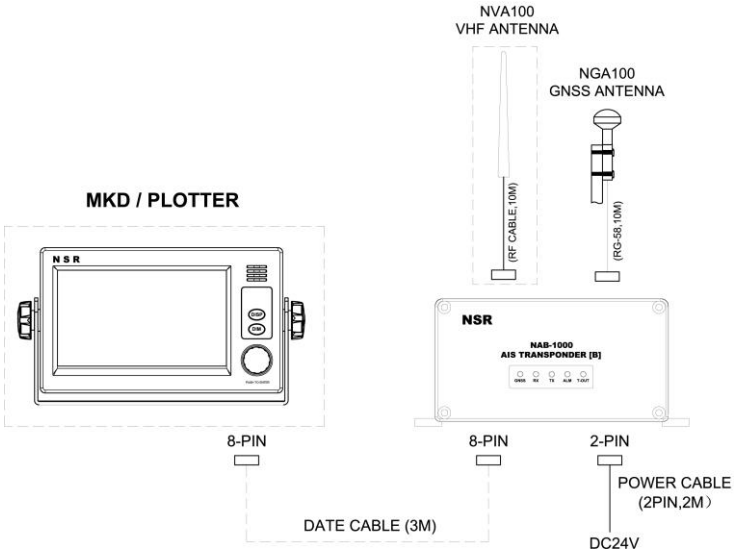
2.1 PRODUCT COMPOSITION

NAB-1000 is composed of one TDMA transmitter, two TDMA/DSC receivers, one AIS processor, one CPU, one GNSS module, one PSU and an interface board.

NAB-1000 can work on two channels independently and simultaneously.
NAB-1000 equipment list:

STANDARD				
No.	Description	Q'ty	Part No.	Remarks
1	AIS Transponder [B]	1 pc	N991310	
2	NGA100 GNSS Antenna	1 pc		with 10m cable
3	Power Cable	1 pc		2m
4	Accessories	1 set		
5	User Manual	1pc		
OPTIONS				
6	MKD	1 pc	N501911	7 inch
7	NES-3007 Plotter	1 pc	N992230	7 inch
8	NES-3010 Plotter	1 pc	N992231	10.1 inch
9	NVA100 VHF Antenna	1 pc	N582011	with cable
10	Flush Mount Bracket	1 pc	N561070	for MKD/NES-3007
11	Flush Mount Bracket	1 pc	N561010	for NES-3010

The main structure of the system is as follows:



2.2 WORKING CHANNELS

NAB-1000 can work on two of all marine channels of 25kHz bandwidth. The default channels are CH2087 and CH2088. It will change to other channels whenever a telecommand of Message 22 is received from a base station.

2.3 INTERNAL GNSS MODULE

An internal GNSS module (with GPS, BDS and GLONASS) is included in NAB-1000 to provide position source, COG and SOG data. The position accuracy will be improved significantly as DGPS level when a correction data is received from a base station in Message 17.

Class B AIS won't transmit either dynamic data or static data until the GNSS position signal is available. The only exception is that it will

transmit a position report once polled by a base station, even if the GNSS signal is unavailable.

2.4 AIS DATA

The AIS data sent by NAB-1000 includes:

DATA	CONTENTS	TRANSMIT INTERVAL
STATIC	MMSI, Name of ship, Type of ship, Vendor ID, Call sign, dimensions of ship and reference for position	6 min
DYNAMIC	MMSI, Ship's position with accuracy and integrity status, Time in UTC, COG, SOG, True heading (optional)	Speed＞2kt: 30 s Speed≤2kt: 3 min

NOTE:

1. NAB-1000 can be remotely controlled to change the reporting interval between 5s and 10 min or set into silent mode by a nearby base station, which broadcasts a telecommand in MESSAGE 23.
2. The default value is set to 37 (yacht) for type of vessel, as for the factory default.
3. The default value is set to 00000000 for MMSI, as for the factory default. In such a case, the transmission is prohibited unless MMSI is set other than 000000000.
4. The first report of dynamic data after power-up depends on the current status of NAB-1000.
   The NAB-1000 shall start transmitting position reports within:
   cold start: 30 min;
   warm start (if off for less than 1 h): 5 min;
   short signal loss (GNSS signal lost for less than 5 min): resume within a time of twice the reporting interval.

Comparison between Class A and Class B-CS AIS：

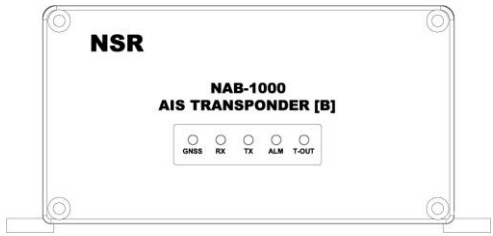
<table>
<tr><th>ITEM</th><th colspan="2">CLASS A AIS</th><th>CLASS B-CS AIS</th></tr>
<tr><td>Used for</td><td colspan="2">SOLAS vessels</td><td>No SOLAS vessels</td></tr>
<tr><td>Communication Mode</td><td colspan="2">SOTDMA</td><td>CSTDMA</td></tr>
<tr><td>Frequency range</td><td colspan="2">156.025～162.025MHz</td><td>156.025～162.025MHz</td></tr>
<tr><td rowspan="9">Report interval of dynamic data</td><td colspan="2">8 steps depending on speed and navigation status：</td><td>Two steps depending on speed:</td></tr>
<tr><td>At anchor or moored and not moving faster than 3 kt</td><td>3min</td><td rowspan="8">speed≤2kt：3 min

speed＞2kt：30s</td></tr>
<tr><td>At anchor or moored and moving faster than 3 kt</td><td>10 s</td></tr>
<tr><td>A speed of between 0～14 kt</td><td>10 s</td></tr>
<tr><td>A speed of between 0～14 kt and changing course</td><td>3 1/3 s</td></tr>
<tr><td>A speed of between 14～23 kt</td><td>6 s</td></tr>
<tr><td>A speed of between 14 ～ 23 kt and changing course</td><td>2 s</td></tr>
<tr><td>A speed of greater than 23 kt</td><td>2 s</td></tr>
<tr><td>A speed of greater than 23 kt and changing course</td><td>2 s</td></tr>
</table>

2.5 INDICATOR DESCRIPTION

There are five LED indicators on the front panel of NAB-1000: GNSS, RX, TX, ALM and T-OUT.

LED	DESCRIPTION
GNSS	When **GNSS** is off, no power is supplied. When **GNSS** flashes in green, GNSS position is not available. When **GNSS** is steadily on in green, GNSS position is available.
RX	When **RX** flashes in green, AIS message is being received. **RX** will flash once when an AIS message is received. Usually, more quickly **RX** flashes, more AIS targets nearby or better sensitivity.
TX	When **TX** flashes in red, AIS data is transmitted. As NAB-1000 transmits every 30 seconds or 3 minutes, it's not easy to identify a transmission by sight.
ALM	When **ALM** is on in red, an error is detected inside the equipment.
T-OUT	When **T-OUT** is in red, a scheduled transmission has not been sent out during the last two reporting intervals.



2.6 DATA PORTS

There are two data ports for external interfaces. One is PI/1 RS232 and the other is PI/2 RS422. Both conform to IEC61162-1 standard.

3. SPECIFICATIONS

- Frequency range: 156.025~162.025MHz
- Default channels: AIS 1, AIS 2
- Bandwidth: 25kHz
- Output power: 2W
- Communication Mode: CSTDMA
- Receiving sensitivity: Better than -109dBm
- Safe Compass Distance: 1.5m
- Data port: one RS232, one RS422
- Data format: NMEA 0183, 38400bps
  Output sentences: VDM, VDO, ACA, ACS, ALR, TXT, PNSR
- Antenna connectors: 50Ω, TNC (GNSS antenna), BNC (VHF antenna)
- Power supply: 24VDC (range: 12～38VDC)
- Power current: ≤300mA (24V) for receiving, abt 1A (24V) at transmitting moment
- Position accuracy: Abt 5-10m (within 2m, when message 17 received from base station)
- IP Grade Outdoor (GNSS and VHF Antenna): IP66
  Indoor (Transponder): IP22
- Dimensions: 81mm×174mm×160mm (H×W×D) (Transponder)
- Weight: 1.4kg (Transponder)
- Compass Safe Distance：0.05m

4. INSTALLATION

4.1 GNSS ANTENNA INSTALLATION

Refer to the attached diagram when installing the GNSS antenna. The following instructions are helpful:

- Keep the antenna from the beam sector of the radar radiation. The radar beam could damage the GNSS antenna or affect the reception.
- Keep the antenna open in all directions to the sky. The obstacle, such as the mast, can block the signal or prolong the searching time.
- Keep the antenna as high as possible. The sea water could affect the reception if iced.

The coaxial cable between the transponder and the GNSS antenna will be supplied with 10m in length as standard. Watertight treatment is required for outdoor connecting.

4.2 VHF ANTENNA INSTALLATION

It's very important to choose a proper location for VHF antenna, as a metal object close to the antenna could affect receiving sensitivity.

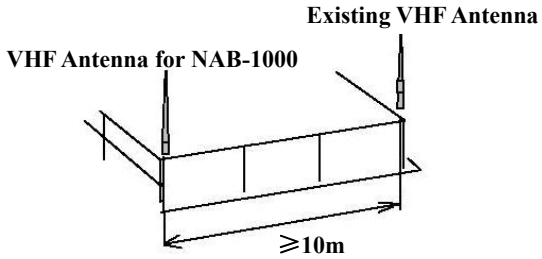
The following instructions are helpful:

- The antenna should be kept at least 0.5m from a vertical metal object to avoid RF reflection.
- The antenna should be kept at least 3m from other high-power radiators, such as the radar antenna.
- Two VHF antennas should not be installed at the same height. The AIS VHF antenna can be installed either under or above the existing VHF antenna. The distance between should be more than 2.8m. If two antennas have to be installed at the same height, the distance between them should be more than 10m.

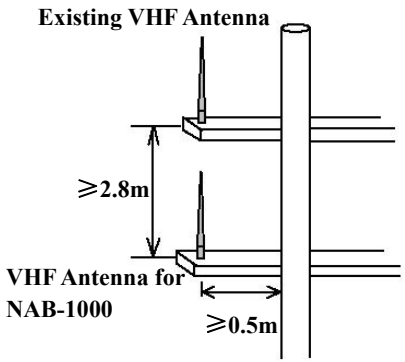
For the cabling, please refer to the suggestions below:

- The shorter the cable, the less the loss. The low-loss cable is recommended if the cable is longer than 10m.
- Watertight treatment is required for outdoor connecting.
- The RF cable should be kept at least 10cm from the power cable. The cable cross should be avoided.

① Two antennas are installed at the same height.



② Two antennas are installed in the same vertical line.



4.3 TRANSPONDER INSTALLATION

Four screws are supplied to mount the transponder. The transponder can be installed either on the table or on the wall.

Caution:

Care must be taken when mounting the transponder to ensure that there is sufficient space for cables and connectors. Especially, sharp bending of the RF cable must be avoided.

4.4 CABLING

4.4.1 POWER CONNECTION

PIN NO	DESCRIPTION
1	DC 24V (+)
2	0V

The power cable with a rated capacity of 10A should be used. Pin definition for the connector is shown above.

Caution:

Suggest using the 5A DC Power Supply Unit (DC 24V output)

4.4.2 RS-422 DATA PORT

P/I 2 (RS422) port is designed to be connected with the plotter system. The output data format is NMEA0183, as IEC61162-1 standard.

A shield cable should be used and the length should be less than 100m.

PIN NO	DESCRIPTION
1	RXA
2	RXB
3	TXA
4	TXB
5	FGND (ISO GND)
6	24V
7	0V

Caution:

Pin 6/7 can output 24VDC which can supply a connected plotter to reduce the connecting cables at the plotter.

4.4.3 RS-232 DATA PORT

P/I 1（RS232） port is designed to be connected with a MKD (AIS display unit) or NES-3007/NES-3010 plotter. The output data format is NMEA0183, as IEC61162-1 standard.

A shield cable should be used and the length should be less than 20m.

This port is also used for configuration settings with MKD or a PC.

PIN NO	DESCRIPTION
1	DC 12V
2	DC 12V
3	TX
4	RX
5	GND
6	GND
7	NC
8	NC

Caution:

The 12V on Pin 1/2 is only used for the MKD/Plotter supplied by the manufacturer (NSR). Any other external equipment is prohibited to use that power, otherwise extra load may be added to the internal PSU of NAB-1000, which could damage the equipment.

4.5 INITIALIZATION SETTING

When the installation is completed, the initialization setting is required. The settings include MMSI, name of ship, call sign, type of ship, dimensions of ship and reference for position. A special MKD/Plotter for setting or a PC installed with special program is needed. Before initialization setting, the MMSI was set to 000000000 as the factory default, in which case, transmission is disabled.

NOTE: If only the BDS positioning mode is required, the relevant factory setting should be done by NSR.

5. MAINTENANCE

5.1 PERIODICAL MAINTENANCE

The periodical maintenance is necessary to maintain the performance. A monthly maintenance program should be established and includes minimum items as shown in the below table.

ITEM	CHECK POINT
Connector	Inspect that all connectors on the rear panel of the transponder unit are firmly fitted.
Cable	Inspect the cables. Replace if damaged.
Ground Terminal	Inspect the ground terminal being in rust. If necessary, clean.
Ground Wire	Ensure that the ground wire is firmly fastened.
Transponder Unit	Dirt and dust should be removed from the transponder unit with a piece of soft dry cloth. Do not use solvents such as thinner, acetone or benzene for cleaning, which can remove paint and marks and deform the equipment.

5.2 POWER ON/OFF

The ON/OFF switch for power on the rear panel of the transponder should be Off when an internal fault or overcurrent is detected. Locate the cause before switching on the power again.

5.3 TROUBLE SHOOTING

The below troubleshooting table provides common symptoms of troubles and means to rectify them. Even it is impossible to restore with normal operation, don't attempt to check inside the equipment. Any repairing should be done by a qualified technician.

SYMPTOM	INSPECTION
Power	
Can't turn on the power	● Inspect that the power connector is firmly fitted. ● Inspect whether the power switch on the rear panel of the transponder is projected. ● Even if it is impossible to restore to normal operation, don't attempt to check inside the equipment. ● Inspect the power supply. ● Inspect fuses.
Transmission and Reception	
Can't transmit and receive	● Inspect that the VHF antenna cable is firmly fastened. ● Inspect the VHF antenna.
Can receive but cannot transmit	● Inspect that MMSI No is not 000000000. ● Inspect GNSS is available. If no GNSS data, transmission is prohibited. ● Inspect T-OUT indicator. If T-OUT is on in red, transmission is not permitted owing to an unavailable slot at the scheduled reporting moment.
Position Data	
No Position Data	● Inspect the GNSS antenna. ● Inspect the GNSS antenna cable and connectors.

[APPENDIX 1] LIST OF SHIP'S TYPE

20	WIG: ALL SHIPS OF THIS TYPE
30	FISHING VESSEL
31	TOWING VESSEL
32	LENGTH OF THE TOW EXCEEDS 200M OR BREADTH EXCEEDS 25M
33	VESSEL ENGAGED IN DREDGING OR UNDERWATER OPERATIONS
34	VESSEL ENGAGED IN DIVING OPERATIONS
35	VESSEL ENGAGED IN MILITARY OPERATIONS
36	VESSEL SAILING
37	PLEASURE CRAFT
40	HSC
50	PILOT VESSEL
51	SEARCH AND RESCUE VESSELS
52	TUGS
53	PORT TENDERS
54	VESSELS WITH ANTI-POLLUTION FACILITIES OR EQUIPMENT
55	LAW ENFORCEMENT VESSELS
58	MEDICAL TRANSPORTS
59	SHIPS ACCORDING TO RESOLUTION NO 18 (MOB-83)
60	PASSENGER SHIP
70	CARGO SHIP
80	TANKER
90	OTHER TYPE OF SHIP

[APPENDIX 2] INSTALLATION DRAWING

Drawing No.	Description
NAB1000-ID-001	NAB-1000 AIS SYSTEM DRAWING
NAB1000-ID-002	NAB-1000 AIS WIRING DRAWING
NAB1000-ID-003	NAB-1000 AIS MAIN UNIT SIZE DRAWING
NAB1000-ID-004	NAB-1000 MKD SIZE DRAWING
NAB1000-ID-005	NAB-1000 MKD MOUNTING DRAWING (TABLE TYPE)
NAB1000-ID-006	NAB-1000 MKD MOUNTING DRAWING (FLUSH TYPE)
NAB1000-ID-007	NGA100 GNSS ANTENNA MOUNTING DRAWING

NO.	DATE	REVISION & DESCRIPTION	REVIEWED / SIGNATURE	CHECKED / SIGNATURE
1				

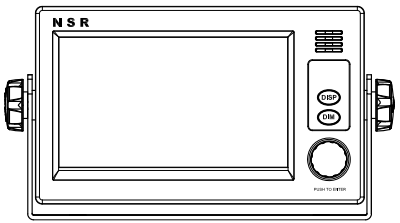
NVA100
VHF ANTENNA

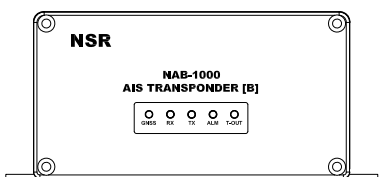
NGA100
GNSS ANTENNA

(RF CABLE,10M)

(RG-58,10M)

MKD / PLOTTER





8-PIN

8-PIN

2-PIN

POWER CABLE
(2PIN,2M）

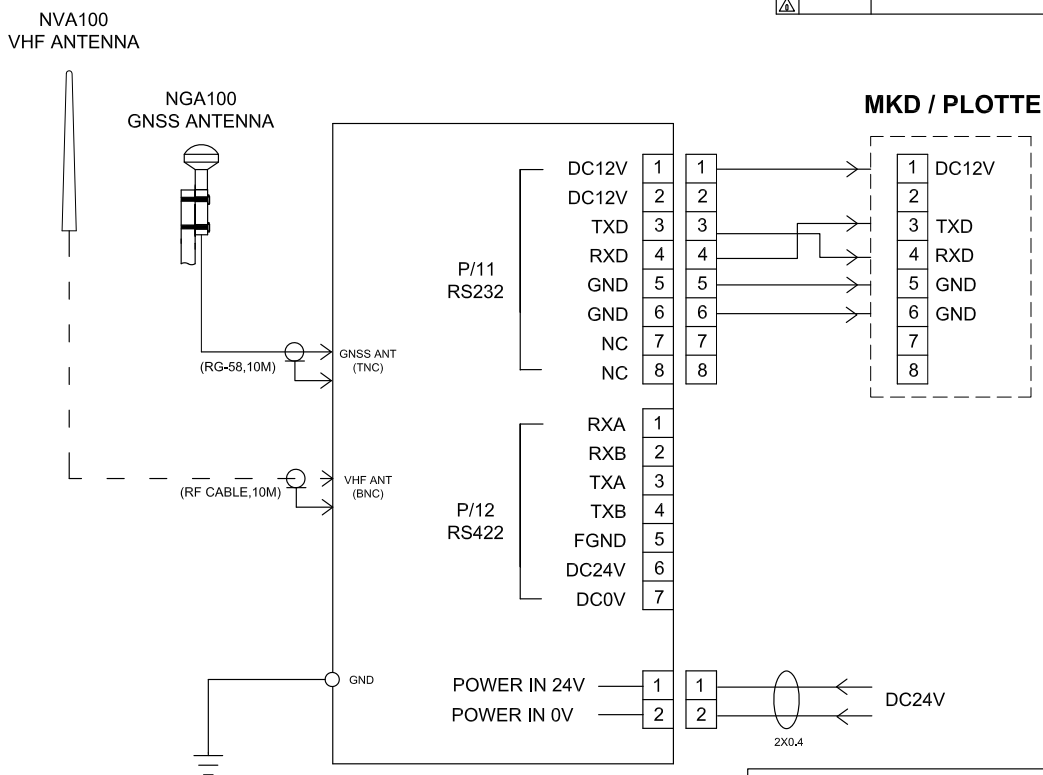
DATE CABLE (3M)

DC24V

OPTIONAL

APPLICATION	NAB-1000 AIS SYSTEM DRAWING				
DATE		ITEM			SIZE A4
APPROVAL		SCALE N/S	UNIT	PRODUCTION	
CHECKED		NSR marine	NEW SUNRISE CO., LTD.		
DRAWING					
DWG NO.	NAB1000-ID-001				

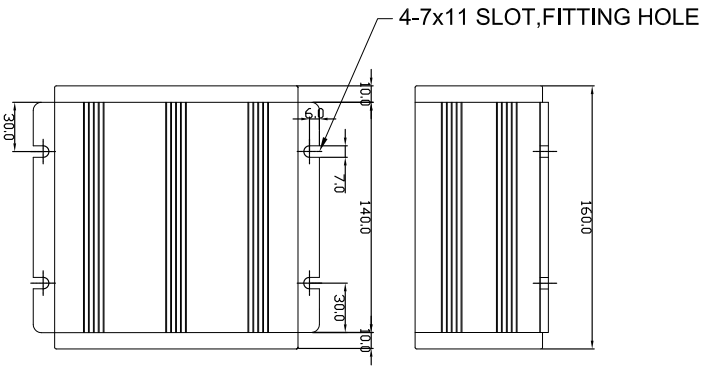
NO.	DATE	REVISION & DESCRIPTION	REVIEWED / SIGNATURE	CHECKED
1				

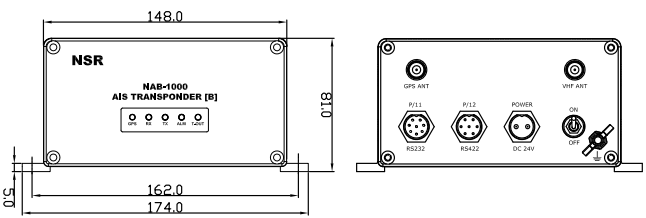


NAB-1000 AIS TRANSPONDER

APPLICATION	NAB-1000 AIS WIRING DRAWING		
DATE		ITEM	SIZE A4
APPROVAL		SCALE N.S. UNIT PRODUCTION	
CHECKED		NSR marine	NEW SUNRISE CO., LTD.
DRAWING			
DWG NO.	NAB1000-ID-002		

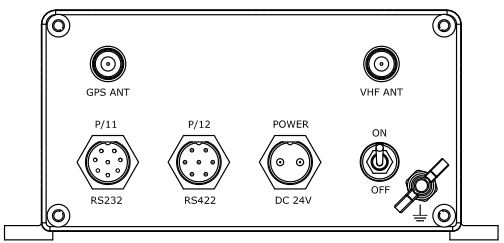
NO.	DATE	REVISION & DESCRIPTION	REVIEWED / CHECKED SIGNATURE
1			





P/11	P/12
1.DC12V	1.RXA
2.DC12V	2.RXB
3.TXD	3.TXA
4.RXD	4.TXB
5.GND	5.FGND
6.GND	6.DC24V
7.NC	7.DC0V
8.NC	

DEFINED DECLARATION



AIS MAIN UNIT PANEL DESCRIPTION

NOTE:
1. FITTING HOLE SIZE= 162*140-7Ø SLOT HOLE

APPLICATION	NAB-1000 AIS MAIN UNIT SIZE DRAWING		
DATE		ITEM	SIZE A4
APPROVAL		SCALE N/S UNIT mm PRODUCTION	
CHECKED		NSR marine	NEW SUNRISE CO., LTD.
DRAWING			
DWG NO.	NAB1000-ID-003		

NO.	DATE	REVISION & DESCRIPTION	REVIEWED / CHECKED SIGNATURE
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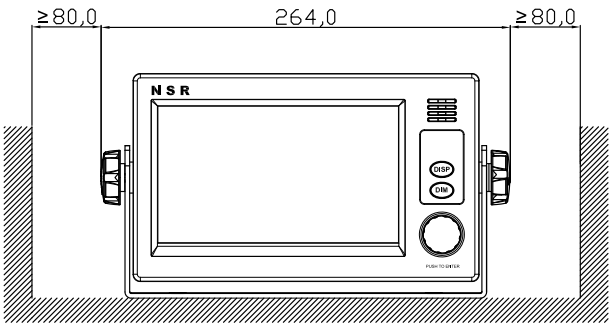
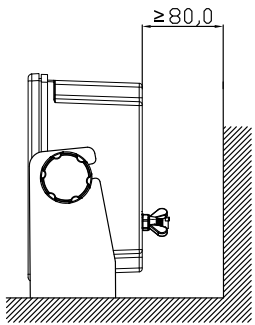
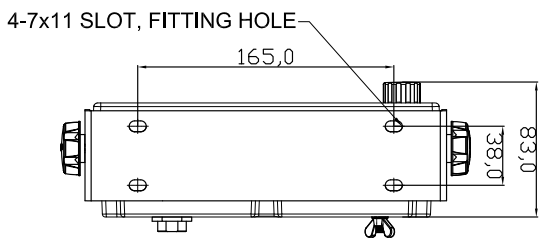






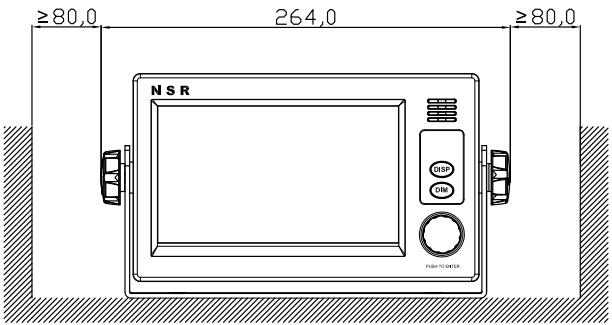
NOTE: TABLE TYPE

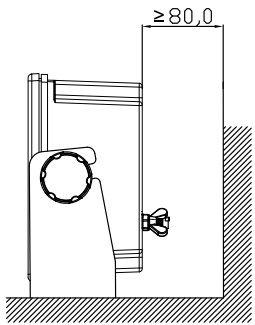
1.USE SELF-TAPPING SCREWS M5X20 FOR FIXING THE UNIT.

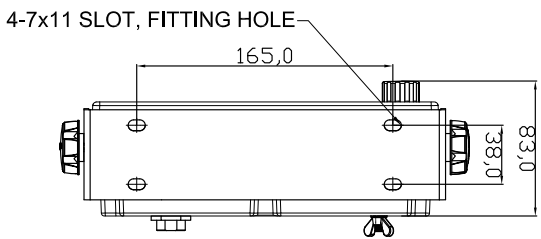
2.80MM IS MINIMUM SPACE FOR OPERATION AND CABLING.

APPLICATION	NAB-1000 MKD MOUNT DRAWING (TABLE TYPE)		
DATE		ITEM	SIZE A4
APPROVAL		SCALE N.S. UNIT mm PROJECTION	
CHECKED		NSR marine	NEW SUNRISE CO., LTD.
DRAWING			
DWG NO.	NAB1000-ID-005		

NO.	DATE	REVISION & DESCRIPTION	REVIEWED / CHECKED SIGNATURE
1			







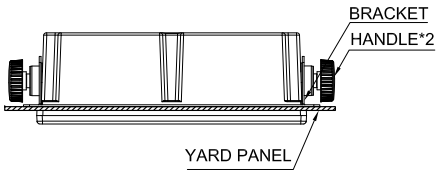
NOTE: TABLE TYPE

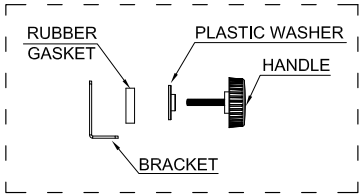
1.USE SELF-TAPPING SCREWS M5X20 FOR FIXING THE UNIT.

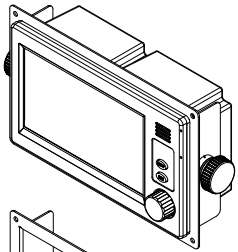
2.80MM IS MINIMUM SPACE FOR OPERATION AND CABLING.

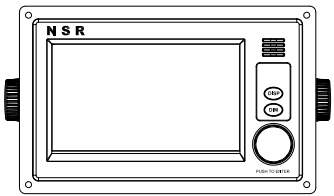
APPLICATION	NAB-1000 MKD MOUNTING DRAWING (TABLE TYPE)		
DATE		ITEM	SIZE A4
APPROVAL		SCALE N.S. UNIT mm PROJECTION	
CHECKED		NSR marine	NEW SUNRISE CO., LTD.
DRAWING			
DWG NO.	NAB1000-ID-005		

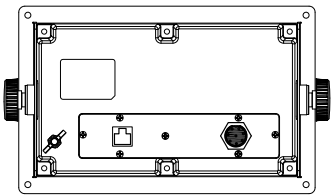
NO.	DATE	REVISION & DESCRIPTION	REVIEWED / CHECKED SIGNATURE
1			

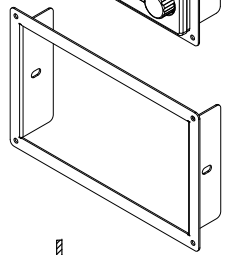


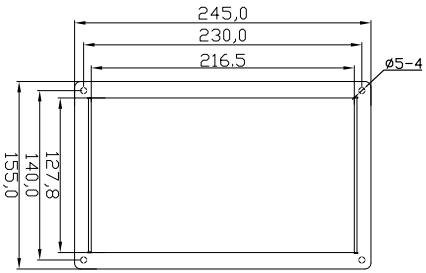




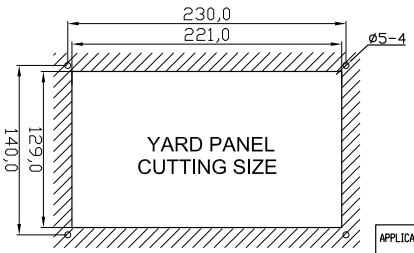


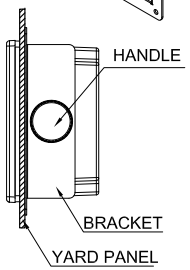






MOUNTING BRACKET SIZE

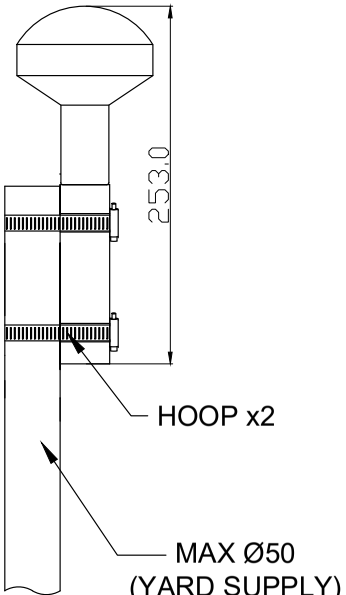




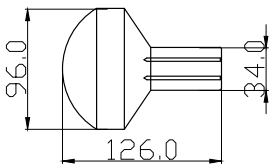
APPLICATION	NAB-1000 MKD MOUNTING DRAWING (FLUSH TYPE)				
DATE		ITEM			SIZE A4
APPROVAL		SCALE N/S	UNIT	PRODUCTION	
CHECKED		NSR marine	NEW SUNRISE CO., LTD.		
DRAWING					
DWG NO.	NAB1000-ID-006				

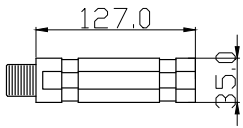
NO.	DATE	REVISION & DESCRIPTION	REVIEWED / SIGNATURE	CHECKED
1				

NGA100
GNSS ANTENNA

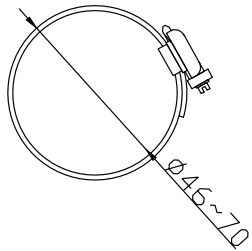


ANTENNA & MOUNT POLE





HOOP SIZE



APPLICATION	NGA100 ANTENNA SIZE&MOUNTING DRAWING
DATE	
APPROVAL	
CHECKED	
DRAWING	NAB1000-ID-007
DWG NO.	

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September, 2025