Operation & Installation Manual

FIBER OPTIC GYROCOMPASS

NGC-5010

NGC-5030

NGC-5050

NGC-5070

NGC-50X0 UM.E 20260209-05

NOTICE TO USERS

- Thanks for purchasing this product, NGC-5010/5030/5050/5070 Series Fiber Optic Gyrocompass.

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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.

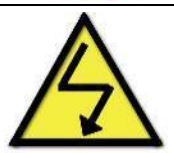
MODIFY RECORD

No	Modify by	Date	Paragraph	Version	Reason
1	Q/A	2025/08/12		01	First edition
2	Q/A	2025/11/08	1.3, 3.1, 4.4, Appendix	02	Some modification
3	Q/A	2025/12/12	1.1, 1.3, 2.2, Appendix	03	Some modification
4	Q/A	2026/01/13	2, 3, 5, Appendix A&D	04	Some modification
5	Q/A	2026/02/09	1.2, 1.3, 2.1, 2.3, 3.2, 3.3, 3.4, Appendix D&E	05	Add backup FOG, NDC-100, etc.

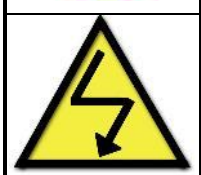
VERSION COMPARISON TABLE

Manual Version	Program Version	Remarks
20250812_01	Display Unit: v1.0.5, 23/07/2025 Interface Unit: v1.0.4, 23/07/2025	
20251108_02	Display Unit: v1.0.9, 03/11/2025 Interface Unit: v1.0.7, 03/11/2025	
20251212_03		
20260113_04	Display Unit: v1.0.11, 12/01/2026 Interface Unit: v1.0.9, 12/01/2026	
20260209_05	Display Unit: v1.0.13, 06/02/2026 Interface Unit: v1.0.10, 06/02/2026	

SAFETY INSTRUCTIONS FOR THE OPERATOR

	**Warning** Keep away from heat sources or direct sunshine. **After turning off the Fiber Optic Gyrocompass, wait 5 seconds before restarting it to avoid malfunctioning due to an instantaneous power surge.** For the safety of the ship, it is prohibited to interrupt or arbitrarily cut off the power supply to the fiber optic gyrocompass during navigation.
	**Prohibition** Don't open the equipment. Only authorized and 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.
	**Prohibited** Don't open the equipment unless you have fully understood the structure and circuits of the equipment. Only authorized and qualified personnel should work inside the equipment. Don't disassemble or try to modify the equipment.
	**Dangerous** Turn off the power at the power distribution board before installation.

CONTENTS

1. PRODUCT OVERVIEW

1.1 Product Features

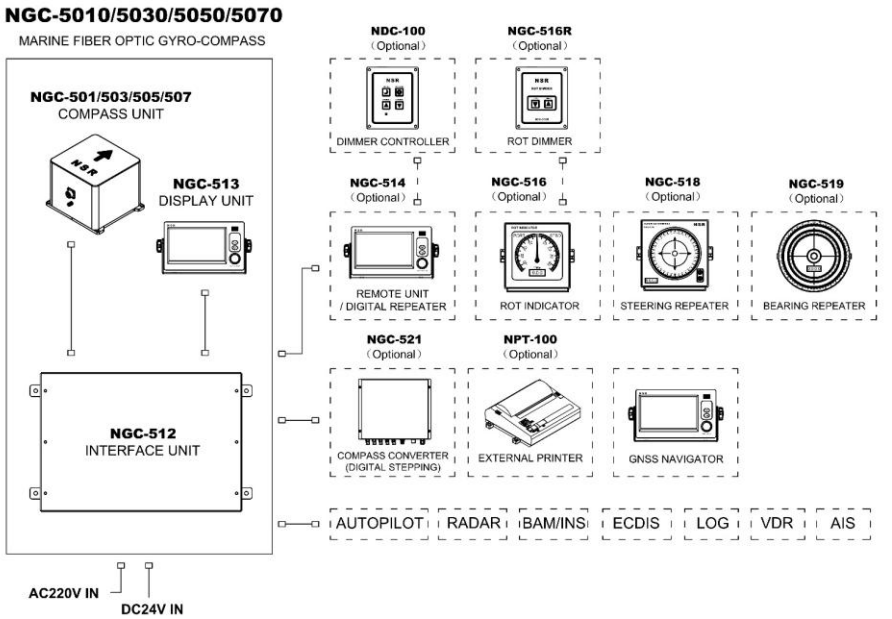
NGC-5010/5030/5050/5070 Series Fiber Optic Gyrocompass (hereinafter referred to as NGC-50X0) uses advanced optical technology and signal processing algorithms to accurately determine the heading, attitude, position and speed of a ship.

The main features of NGC-50X0 are:
- Multiple heading accuracies up to ⩽0.1° secant latitude.
- Fast settling time and flexible operating modes.
- Extremely reliable for increased operational safety.
- Large LCD, 7-inch/color, touch screen operation.
- Highly accurate HDG, ROT.
- Multi-outputs of RS422.
- Data interface to BAM System/INS.
- Maintenance-free design.
- Dual compass available.

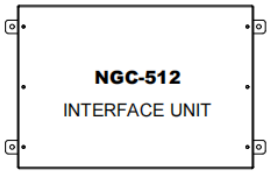
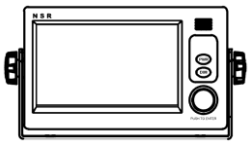
The product is compliant with the standards of IMO A.424 (XI), IMO A.821 (19), IMO A.694 (17), A.526 (13), ISO 8728, ISO 16328 and ISO 20672.

1.2 Product Components

NGC-50X0 consists of a compass unit, a display unit, and an interface unit.
The system diagram is as follows:



The unit functions are as follows:

Unit	Description
 Compass Unit NGC-501/NGC-503/ NGC-505/NGC-507	● Generate heading information.
 Interface Unit NGC-512	● Input/Output interface. ● Protocol adaptation. ● Optional units access. ● Heading information output. ● BAM management. ● External GNSS data input.
 Display Unit NGC-513	● Heading Display. ● BAM display and operation. ● Manual input of the position. ● Menu operation: language selection, brightness adjustment, application upgrade, etc.

1.3 Equipment List

Model		Part Type	Description
Standard (one of them)	NGC-5010	NGC-501	0.1° Compass Unit
		NGC-512	Interface Unit
	NGC-5030	NGC-503	0.3° Compass Unit
		NGC-512	Interface Unit
	NGC-5050	NGC-505	0.5° Compass Unit
		NGC-512	Interface Unit
	NGC-5070	NGC-507	0.7° Compass Unit
		NGC-512	Interface Unit
Standard		NGC-513	Display Unit
Options		NGC-514	Remote Unit
		NGC-516	ROT Indicator (Note)
		NGC-516R	ROT Dimmer
		NGC-518	Steering Repeater Compass
		NGC-519	Bearing Repeater Compass
		NGC-519A	Azimuth Reading Device
		NGC-519B	Wall Mounting Bracket
		NGC-519J	Junction Box
		NGC-519S	Floor-Standing Mounting Bracket
		NGC-521	Compass Converter
		NPT-100	Thermal Printer
		NDC-100	Dimmer Controller

***Note**: To comply with the standards of A.526 (13) and ISO 20672, an NGC-516 ROT Indicator should be included.*

2. BASIC OPERATION

2.1 Power on / Start up the Equipment

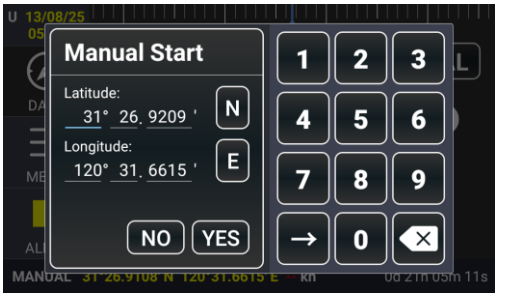
After all the connections are finished, turn on the power switch to start working, then press and hold **PWR** button on the display unit. The compass will start up after obtaining a position. NGC-50X0 supports two modes for startup.

- **AUTO MODE**

When the external GNSS data input is detected, the system will automatically start and enter the auto mode.

- **MANUAL MODE**

When the external GNSS data input is not detected, the system supports manually entering a location to activate the manual mode. Click [START], then set the location to start.



It takes about 10 minutes for NGC-50X0 to settle after startup. Before it has settled, do not move the compass unit significantly.

2.2 Display Unit Description

NGC-513 display unit can be operated with the key & knob on the panel and the 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	Press and hold: turn off/on the display unit. Press shortly: back to the display screen from the setting menu.
DIM	Press to change the LCD brightness.
Touch-screen Button	**Description**
DATA	Display the heading data.
MENU	Enter the menu for settings.
ALERT	Alert management.
Main display blank space	Switch display.

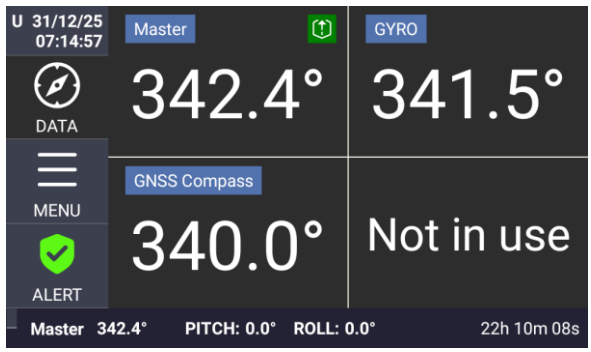
2.3 Main Display

2.3.1 Heading Display

No.	Item	Description
①	Master	Heading source
②	AUTO	Position input mode. When no positioning sentence is connected, it will switch to manual mode. Click to enter the position.
③	Time	System time, can be synced with GNSS.
④	Compass card	Show the heading on the compass card.
⑤	Menu items	Menu items, include DATA/MENU/ALERT
⑥	Heading	The heading of the vessel, white indicates valid, red indicates invalid.
⑦	Sensor data	Sensor info and attitude data. Click to switch.
⑧	Expand button	Click to show the quick operations
⑨	Location	The location is obtained from the GNSS. It's normally displayed in white, but is displayed in red or yellow when the location is invalid or doubtful.
⑩	Speed	Speed over ground
⑪	Startup time	Time since compass startup
⑫	Attitude data	Sensor info and attitude data. Click to switch.

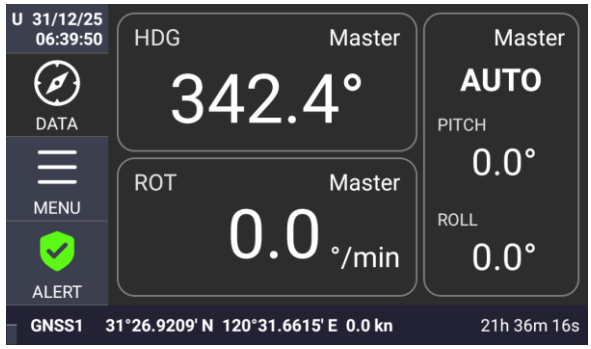
2.3.2 All Headings Display

Click **Heading** on the main display, it will show all the headings from the external compass inputs. Click one of them, and the system will change the heading source to the selected one. Indicates the current compass data source.



2.3.3 Multi-data Display

Swipe right on the screen to switch to the multi-data display. The data includes HDG, ROT, ROLL, PITCH and system status. When backup FOG is enabled and connected, Swipe again to check backup FOG data.



2.4 Adjust Brightness

Press **DIM** button to adjust the brightness. The brightness will decrease after each release. After reaching the lowest, it will return to the brightest. It can also be adjusted by dragging the brightness bar. The white line indicates the default brightness.

2.5 Turn off the Equipment

Press and hold **PWR** button on the display unit for 3 seconds, and the system will show the shutdown menu. Then click “Shutdown” to turn off, or click “Restart” to reboot the display unit.

Turn off the power switch on the interface unit to shut down the system.

2.6 Quick Operation

Click  to show the quick operations 

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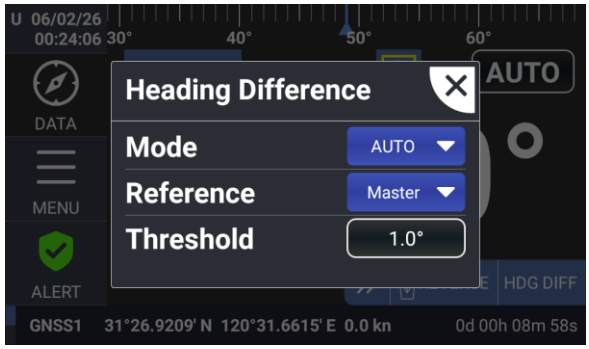
2.6.1 Reverse Heading

Click **[REVERSE]** to reverse the heading, the heading will be reversed 180 degrees, and the output will also be changed.

After enabling the heading reversal,  will be displayed on the screen.

2.6.2 Heading Difference Monitoring

Click **[HDG DIFF]** to configure heading difference monitoring.



[Mode]: There are three comparison modes: [MANUAL], [AUTO], [OFF].

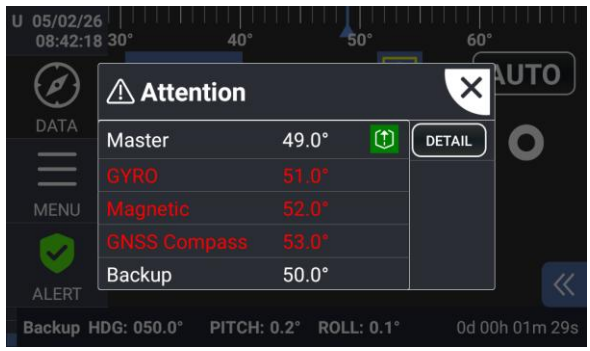
- [MANUAL]: The current heading is compared with the selected heading source.
- [AUTO]: The current heading is compared with all heading sources.
- [OFF]: Disable heading difference monitoring.

[Reference]: Select the heading Source for Comparison in Manual Mode.

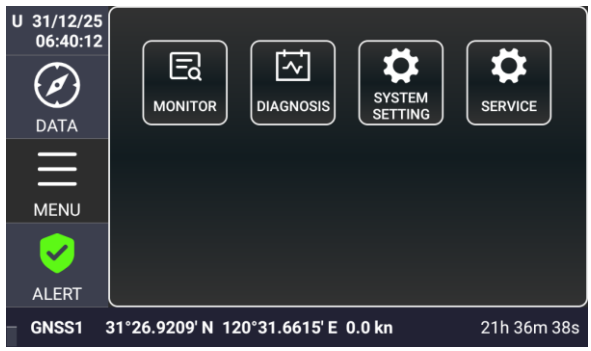
[Threshold]: Set the threshold for heading difference notification.

When the heading difference exceeds the threshold, the system will display the following notification.

In Backup FOG mode (See Section 3.4.5 Advanced), click [DETAIL] and you can briefly view the specific information.



3. Menu Operation

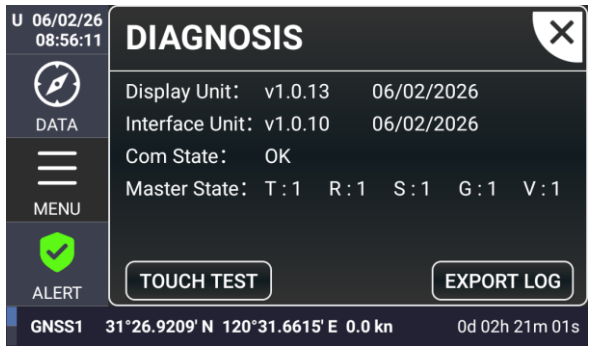


3.1 Monitor

Click **[MONITOR]** to enter the data monitor. Data from the interface unit will be shown here.

3.2 Diagnosis

It's to check the program version, system state, and touch test. The version of the display unit and interface unit will be shown here.

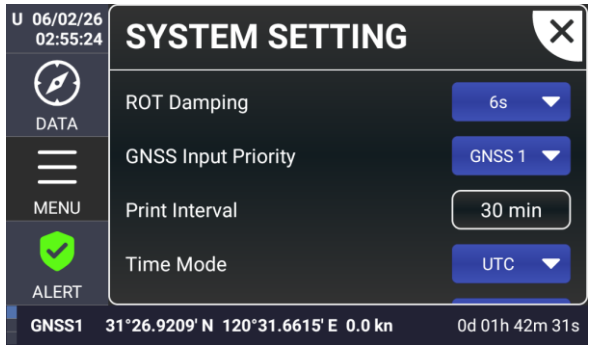


[TOUCH TEST]: For testing the touch screen.
[EXPORT LOG]: Export data logs (named in the format hour-year_month_day.txt) to a USB disk. The contents in these HH-yyyy_MM_dd.txt files contain the following

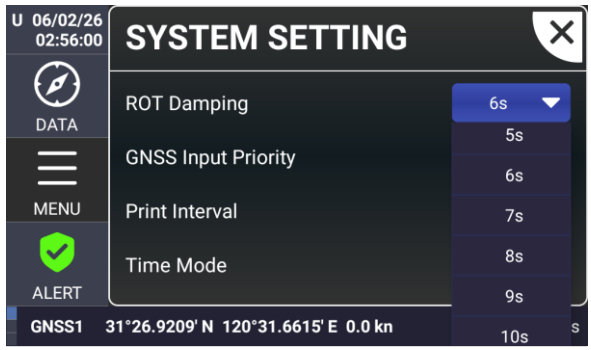
information: current time, HDG, latitude, longitude and speed.

***Note**: Disabled by default, if you need to use the [EXPORT LOG], please enable it manually, see Section 3.3 System Setting [Save log] for details.*

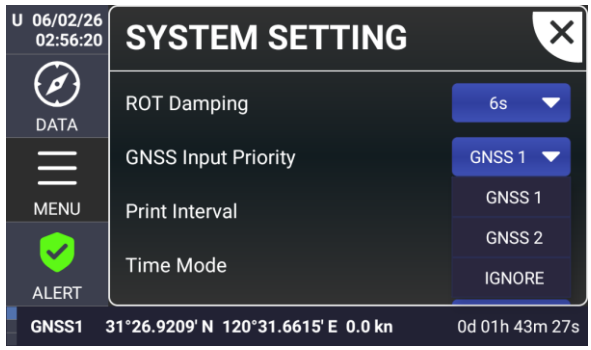
3.3 System Setting



[ROT Damping]: Set the damping for the rate of turn. 0-10s can be selected.



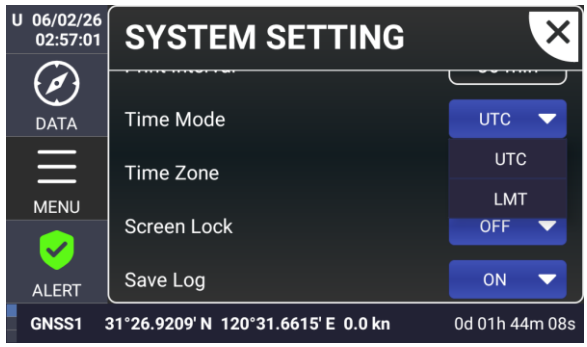
[GNSS Input Priority]: Set the priority of the GNSS input. [GNSS 1], [GNSS 2], [IGNORE] can be selected. When [IGNORE] is selected, the system will ignore GNSS data and use the position estimated by the system.



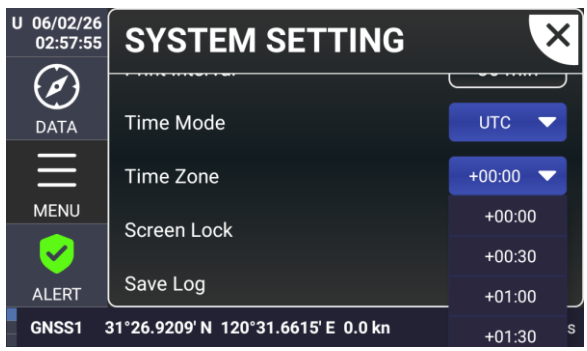
***Note**: [GNSS IGNORE] can only be used when the location is disturbed. Do not select it under normal conditions.*

[Print Interval]: Set the print interval, which can be set manually. The default is 30 minutes.

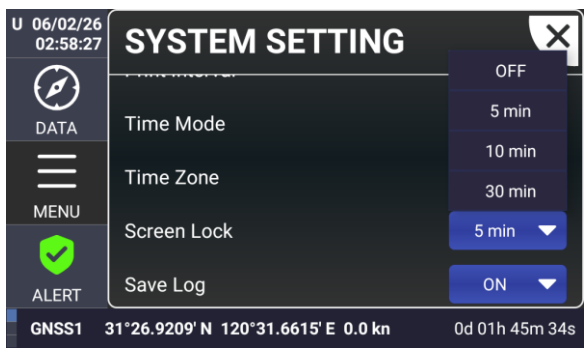
[Time Mode]: Set the time mode of the display. The default is UTC, LMT can be selected.



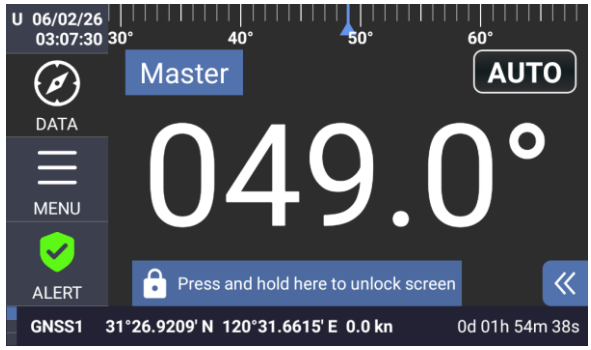
[Time Zone]: Set the time zone for local time.



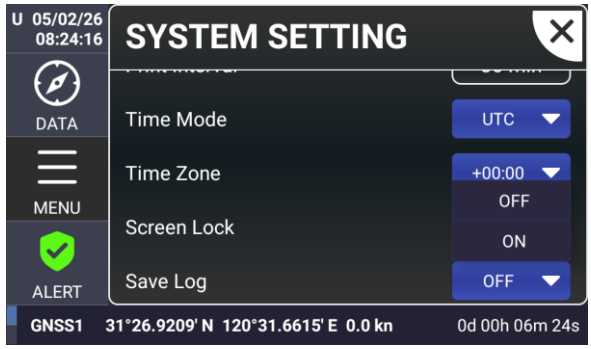
[Screen Lock]: Set the screen lock idle time. After the idle time, the screen will lock and require a specific action to unlock.



Press and hold the lock button or press the knob to unlock.



[Save Log]: Store data logs and provide the option to manually export them to a USB disk. See Section 3.2 Diagnosis.



3.4 Service

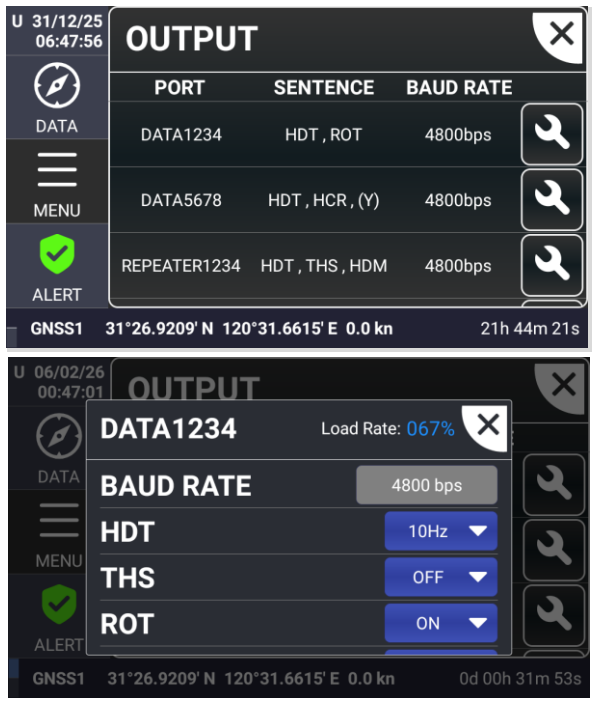
Service is generally used for installation. It is password-protected.
It contains the following settings.

3.4.1 Upgrade

Click **[UPGRADE]** to upgrade the software of the display unit.

3.4.2 Output

Click **[OUTPUT]** to set the baud rate and sentences for all output ports of the interface unit.
Baud rate can be set as: 2400, 4800 (default), 9600, 19200, 38400, 115200.
Sentences can be selected: THS, HDT, HCR, ROT …

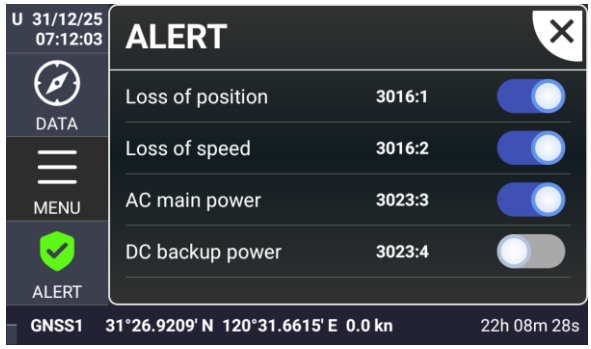


3.4.3 Language

Click **[LANGUAGE]** to change system language. English and Chinese are supported.

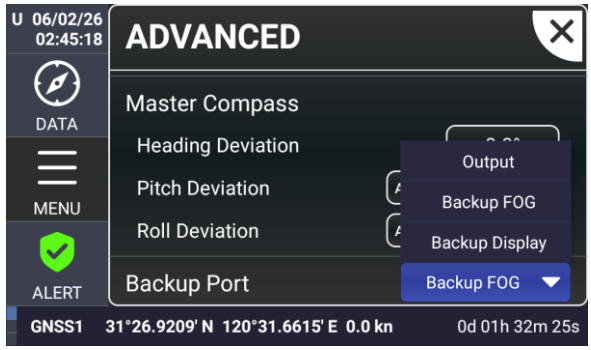
3.4.4 Alert

Click **[ALERT]** to configure the alerts. Some alerts of caution priority can be disabled.



3.4.5 Advanced

Click **[ADVANCED]** to access advanced settings.



- **Heading Output Resolution**

This is used to set the resolution of heading values in the heading output sentences, such as HDT, THS, etc.

- **Master Compass**
  - **Heading Deviation**

After the compass is installed, if there is still a deviation from the ship's heading, the heading can be corrected by adjusting the heading deviation.

- **Pitch Deviation**

Set the pitch installation deviation. Press [AUTO] to calibrate to zero directly. Click the numeric button to manually input.

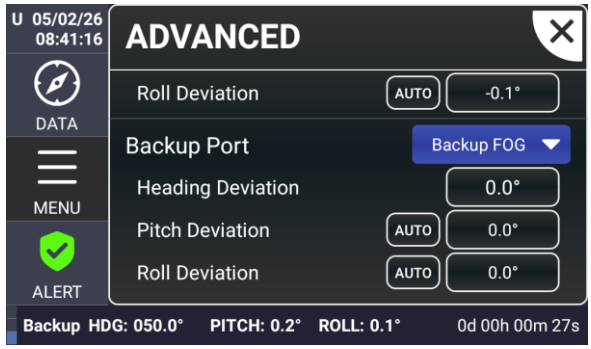
- **Roll Deviation**

Set the roll installation deviation. Press [AUTO] to calibrate to zero directly. Click the numeric button to manually input.

- **Backup Port**

Output: Default setting. The port will be used to output information such as the heading. See Section 3.4.2 Output.

Backup FOG: The system allows a second compass unit to be connected to the backup port for backup purposes.

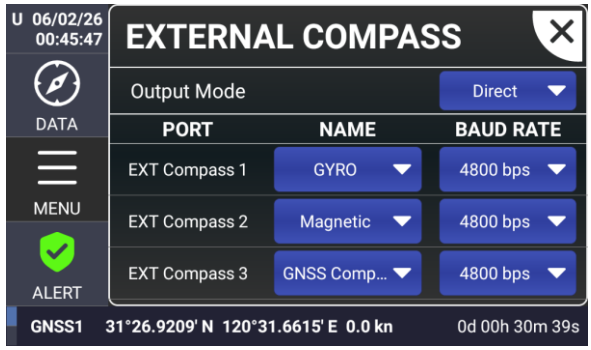


Backup Display: The system allows a second display unit to be connected to the backup port for backup purposes.

***Note**: In the Backup Display mode, the [Backup Port] setting cannot be changed from the backup Display Unit.*

3.4.6 External Compass

Click **[EXTERNAL COMPASS]** to set the external compass input parameters.



- **OUTPUT MODE**

Output mode can be set as **DIRECT** and **CONVERT**. This is the sentence output mode when an external compass source is selected as the output heading.

DIRECT: Default setting, the system will forward the external compass sentences directly.

CONVERT: System will convert the external compass sentences into the sentences configured in Section 3.4.2 Output.

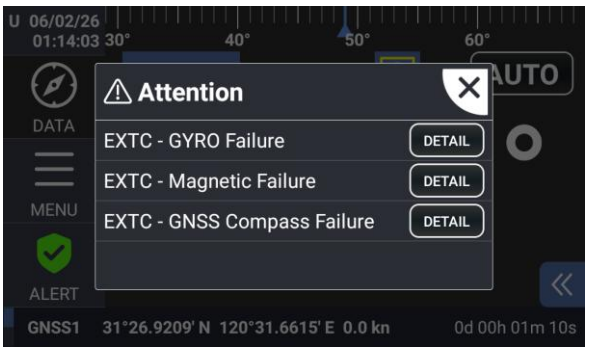
- **NAME**

Set the external compass name for display.

- **BAUD RATE**

Set the external compass input baud rate.

When an external compass has been configured, but no data has been detected, the system will display the following notification.



3.4.7 Factory Default

Click **[DEFAULT]** to reset to factory settings.

4. ALERT

4.1 Alert List

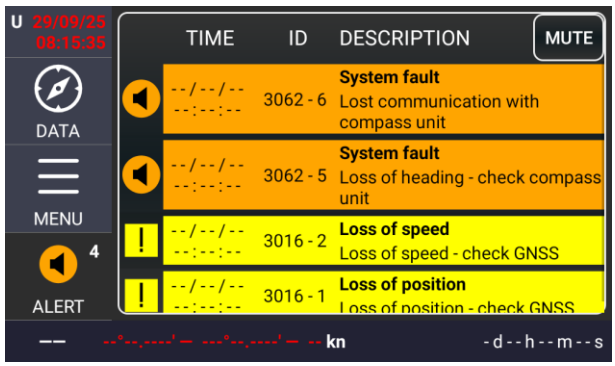
When one of the following conditions is detected, an alert will be generated:

ID	Ins	Cat	Prio	Escal	Resp	Alert Title	Alert description
3016	1	B	C	/	/	Loss of position	Loss of position - check GNSS
3016	2	B	C	/	/	Loss of speed	Loss of speed - check GNSS
3023	3	B	C	/	/	Power fail	Loss of main power
3023	4	B	C	/	/	Power fail	Loss of backup power
3062	5	B	W	W	Yes	System fault	Loss of heading - check compass unit
3062	6	B	W	W	Yes	System fault	Lost communication with compass unit

Ins: Instance of an alert;
Prio: Alert priority (W – Warning, C – Caution);
Cat: Alert category;
Escal: Alert escalation, W – An unacknowledged warning will be repeated as a warning after 3 minutes;
Resp: Transfer responsibility, the timeout is 90 seconds.
For alerts with a caution priority, the device will not produce any audible signals. Alerts with a warning priority will produce audible signals when activated and not acknowledged.

4.2 Alert Operation

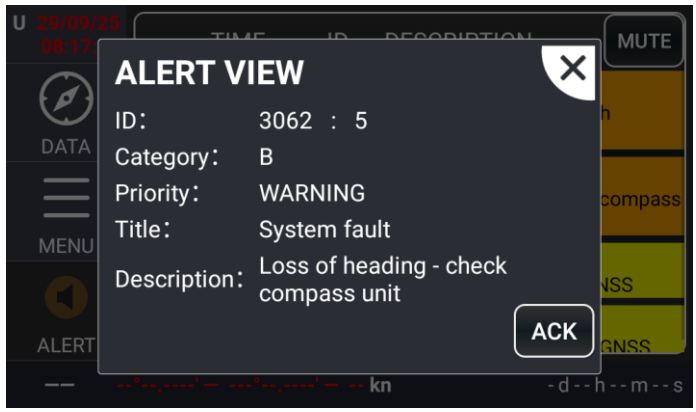
When there are active alerts, the icon of the top priority alert will appear on the **[ALERT]**, and the number in the upper right corner shows the total number of active alerts.
Click **[ALERT]** button on the screen, and the alert list will be displayed.
Click **[MUTE]** to mute all alerts for 30s.
Click **[ ]** to return to the highest priority alert.



The alert time is synchronized with the GNSS time. If it is not synchronized, the time will not be displayed.
Click an item in the list to view the details. For an unacknowledged warning, it can be

acknowledged.

For example:



5. INSTALLATION

5.1 Installation of Compass Unit

The compass unit should be installed on a mounting platform with good rigidity and low deformation. It should be mounted as far away as possible from oil and dust areas and preferably in a vibration-free area along the ship's center line.

When selecting a mounting location for the compass unit, keep in mind the following points:

- Care must be taken when mounting the compass unit to ensure that there is sufficient space for cables and connectors. The cables should not be laid near or in parallel with other power cables.
- Observe the compass safe distances to prevent deviation of a magnetic compass.
- Master compass and any repeaters used for taking visual bearings shall be installed or adjusted in a ship with their fore and aft datum lines parallel to the ship's fore and aft datum line to within ±0.5°. The lubber line shall be in the same vertical plane passing through the center of the card of the compass and shall be aligned accurately in the fore and aft direction.

5.2 Installation of Display Unit

The display unit can be installed on a tabletop, on the overhead, or in a panel (optional flush mounting brackets required). Refer to the outline 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 compass safe distances to prevent deviation of a magnetic compass.
- The nominal viewing distance is 60 cm.

5.3 Installation of Interface Unit

Four screws are supplied to mount the processor unit. It’s recommended that the interface unit be installed on the wall.

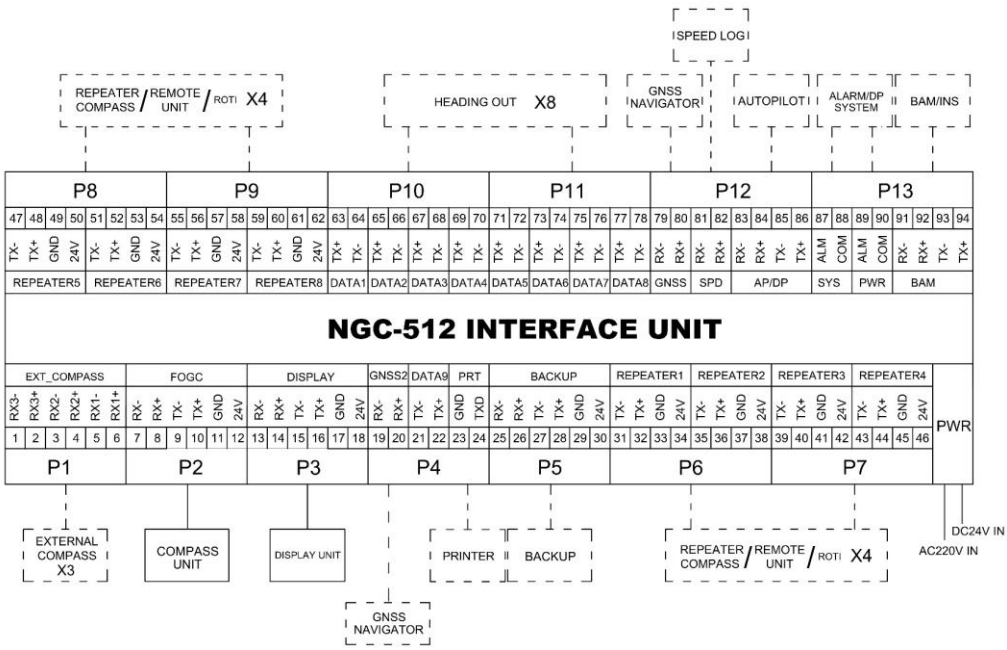
Note:

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

The cables and connectors supplied with the equipment are essential spare parts or tools for convenient installation. Cables for output to other ship components requiring gyrocompass heading data are not included.

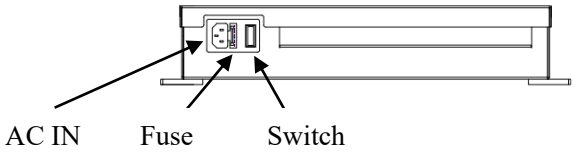
5.4 Cabling

The system wiring is as follows. Please refer to the installation drawings for cable connections.



5.4.1 Power Connection

The equipment is supplied with AC 220V, and DC 24V as an option. The connections are shown above. AC power should be connected to a continuous power supply.



BACKUP POWER IN (optional):

Interface Unit	DESCRIPTION
PWR (DC IN)	24V
	0V

***Note**: When only 24V DC is supplied, the repeater power will not be supplied.*

5.4.2 Compass Unit Connection

The compass unit should be connected to **P2** of the interface unit.

Interface Unit		Compass Unit	
PIN NO.	**DESCRIPTION**	**PIN NO.**	**DESCRIPTION**
7	FOGC RX-	9PIN-6	TX-
8	FOGC RX+	9PIN-5	TX+
9	FOGC TX-	9PIN-4	RX-
10	FOGC TX+	9PIN-3	RX+
11	FOGC GND	9PIN-2	GND
12	FOGC 24V	9PIN-1	24V

5.4.3 Display Unit Connection

The display unit should be connected to **P3** of the interface unit.

Interface Unit		Display Unit	
PIN NO.	**DESCRIPTION**	**PIN NO.**	**DESCRIPTION**
13	DISPLAY RX-	7	TX1-
14	DISPLAY RX+	6	TX1+
15	DISPLAY TX-	9	RX1-
16	DISPLAY TX+	8	RX1+
17	DISPLAY GND	1	0V
18	DISPLAY 24V	2	24V

Note: PIN 10/11, PIN 20/21 and PIN 24/25 on the display unit are fixed to transfer THS at 10Hz and ROT at 5Hz, the baud rate is 4800, and cannot be configured.

5.4.4 Repeater Connection

The interface unit supports eight repeater/remote unit/ROT indicator outputs, marked as REPEATER1-8 (Pin31-Pin62).

For REPEATER1-4, the baud rate is fixed to 4800bps. For REPEATER5-8, the baud rate supports 2400/4800/9600/19200/38400/57600/115200 bps.

PIN NO.	DESCRIPTION	TYPE
31	REPEATER1 TX-	IEC 61162-1/IEC 61162-2/NMEA 0183 THS, HDT, ROT, HCR … configurable
32	REPEATER1 TX+	
33	REPEATER1 GND	Power output, every output is protected by a self-recovering fuse.
34	REPEATER1 24V	
...	...	...
59	REPEATER8 TX-	IEC 61162-1/IEC 61162-2/NMEA 0183 THS, HDT, ROT, HCR … configurable
60	REPEATER8 TX+	
61	REPEATER8 GND	Power output, every output is protected by a self-recovering fuse.
62	REPEATER8 24V	

5.4.5 Heading Outputs

There are 9 heading outputs in the interface unit, marked as DATA1-9 (Pin63-Pin78, Pin 21-22).

For DATA1-4, the baud rate is fixed to 4800bps. For DATA5-8, the baud rate supports 2400/4800/9600/19200/38400/57600/115200 bps.

PIN NO.	DESCRIPTION	TYPE
63	DATA1 TX+	IEC 61162-1/IEC 61162-2//NMEA 0183 THS, HDT, ROT, HCR … configurable
64	DATA1 TX-	
...	...	...
77	DATA8 TX+	IEC 61162-1/IEC 61162-2//NMEA 0183 THS, HDT, ROT, HCR … configurable
78	DATA8 TX-	
21	DATA9 TX-	IEC 61162-1/IEC 61162-2//NMEA 0183 THS, HDT, ROT, HCR … configurable
22	DATA9 TX+	

5.4.6 Sensor Input Connection

The interface unit supports two GNSS inputs and one SPEED LOG input. Speed error correction can be achieved by obtaining the speed of GNSS or SDME.

PIN NO.	DESCRIPTION	TYPE
82	SPD RX+	IEC 61162-1 VBW
81	SPD RX-	
80	GNSS RX+	IEC 61162-1 RMC, GNS, GLL, GGA, VTG, ZDA
79	GNSS RX-	
20	GNSS2 RX+	IEC 61162-1 RMC, GNS, GLL, GGA, VTG, ZDA
19	GNSS2 RX-	

Location: Get from GNSS, the priority of the formats: RMC > GNS > GLL > GGA.

Speed: Get from GNSS and SDME, the priority of the formats: RMC > VTG > VBW.

5.4.7 Alert Interface

There is one alert interface (IEC 61162-1, baud rate 4800bps) for BAM. There are also two contact signal outputs. One is used to indicate the power failure. One is used to indicate the ready signal and system fault.

PIN NO.	DESCRIPTION	TYPE
94	BAM TX+	IEC 61162-1 ALF, ALC, ARC
93	BAM TX-	
92	BAM RX+	IEC 61162-1 ACN, HBT
91	BAM RX-	
90	PWR COM	Contact signal for power failure. NC/NO can be switched by S3 on the PCB.
89	PWR ALM	
88	SYS COM	Contact signal for ready and system fault. NC/NO can be switched by S4 on the PCB.
87	SYS ALM	

The alert list is described in Section 3.1

5.4.8 Printer Connection

There is an interface for the printer (NPT-100).

Interface Unit		NPT-100	
PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
24	PRT TXD	3	RXD
23	PRT GND	5	GND

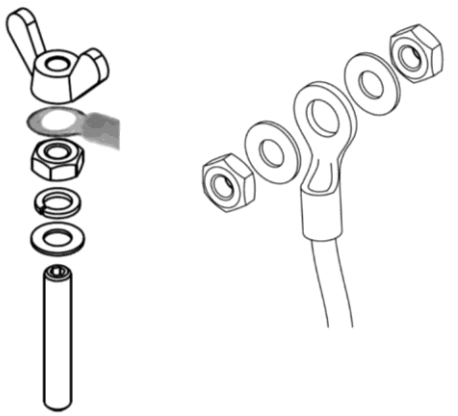
5.4.9 Backup Port

Backup port can be set as an interface for output (default)/backup FOG/backup display. This is set in Section 3.4.5.

PIN NO.	DESCRIPTION	TYPE
25	RX-	**OUTPUT**: IEC 61162-1/2, NMEA 0183 THS, HDT, ROT, HCR … configurable. **Backup FOG**: Connect the compass unit. **Backup Display**: Connect the display unit.
26	RX+	
27	TX-	
28	TX+	
29	GND	
30	24V	

5.4.10 Grounding

All system components, including the compass unit, the interface unit, and the display unit, must be properly grounded to prevent equipment failure due to voltages on the equipment enclosure. The grounding accessories supplied with the unit are shown in the figure below.



Note:

1. *The grounding of the equipment should be carried out according to the above diagram. The cross-sectional area of the copper wire of the grounding cable must be greater than or equal to 1.5mm².*
2. *A spring washer and nut are required to secure the grounding wire.*

APPENDIX A ABBREVIATIONS AND SYMBOLS

Abbreviations

Abbreviation	Meaning
BAM	Bridge Alert Management
CAM	Central Alert Management
DIFF	Difference
EXT	External
HDG	Heading
LMT	Local Mean Time
STBY	Standby
U/L	UTC/LMT

Symbols

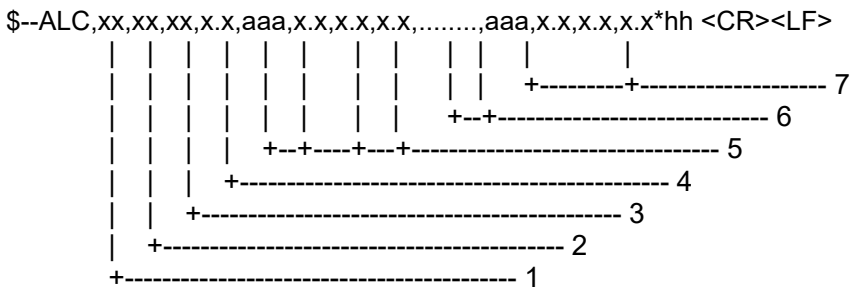
Mark	Priority	State	ACTION
	Warning	Active-unacknowledged	Audible, visual and flash
		Active-silenced	Visual and flash
		Active-acknowledged	Visual
		Active-responsibility transferred	Visual
		Rectified-unacknowledged	Visual and flash
	Caution	Active	Visual
	/	No active alerts	/

APPENDIX B TECHNICAL SPECIFICATIONS

No.	Item	Description
1	Settling Time	10 min
2	Heading Accuracy	NGC-5010: ≤0.1° secφ
		NGC-5030: ≤0.3° secφ
		NGC-5050: ≤0.5° secφ
		NGC-5070: ≤0.7° secφ
3	Main Power Supply	AC220V(100-240V) / DC 24V(12-36V)
4	Power Consumption	≤55W (Without repeater)
5	Display	7-inch, color LCD, touch screen operation 154 (W) × 87 (H) mm 1024 × 600 dots resolution
6	Size	224 (W) × 170 (H) × 200 (D) mm (Compass Unit)
		390 (W) × 71 (H) × 244 (D) mm (Interface Unit)
		264 (W) × 145 (H) × 83 (D) mm (Display unit)
7	Weight	4.7kg（Compass Unit)
		5.2kg (Interface Unit)
		1.5kg (Display unit)
8	Applicable Sea Area	Latitude: -70° ~ +70° Longitude: -180° ~ +180°
9	Ambient Temperature	-20° C ~ +55° C operational
10	Compass Safe Distance	Standard: 0.30m, Steering: 0.05m (Compass Unit)
		Standard: 0.35m, Steering: 0.20m (Interface Unit)
		Standard: 0.25m, Steering: 0.10m (Display Unit)
		Standard: 0.25m, Steering: 0.15m (Remote Unit)
		Standard: 0.45m, Steering: 0.30m (Rot Indicator)
		Standard: 0.55m, Steering: 0.35m (Steering Repeater)
		Standard: 0.45m, Steering: 0.25m (Bearing Repeater)
11	IP Grade	IEC60529 IP22
12	Nominal viewing distance	60cm

APPENDIX C SENTENCE DESCRIPTION

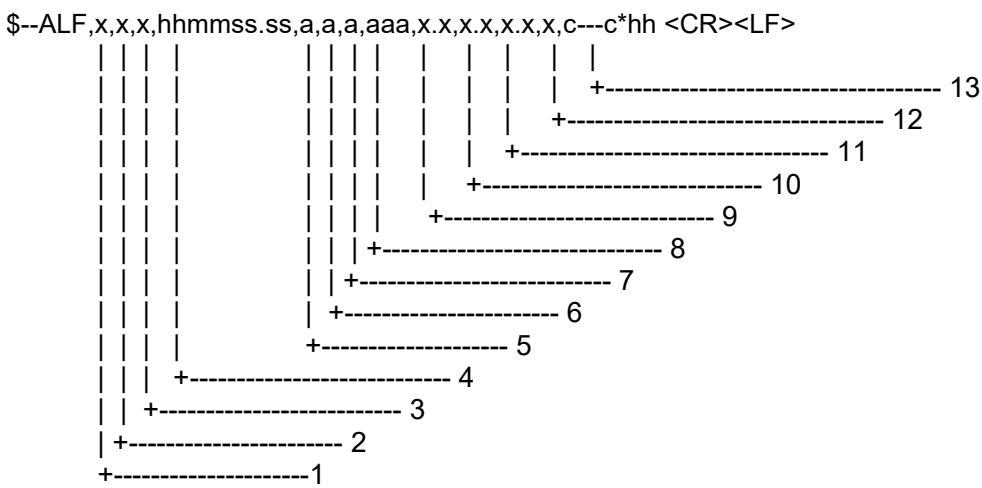
ALC - Cyclic alert list



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.

ARC – Alert command refused

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

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

HCR – Heading correction report

```
$--HCR,x .x,a,a,x .x*hh<CR><LF>
          |   | |   +------------------------------- 4
          |   | +--------------------------------- 3
          |   +----------------------------- 2
          +--------------------------- 1
```

1. Heading, degrees true
2. Mode indicator
3. Correction state
4. Correction value

HDT – Heading true

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

1. Heading, degrees true

ROT – Rate of turn

```
$--ROT,x.x,A*hh<CR><LF>
          |   |
          |  +-------------------2
          +----------------1
```

1. Rate of turn, ° /min, "-" = bow turns to port
2. Status, A= data valid, V= data invalid

THS – True heading and status

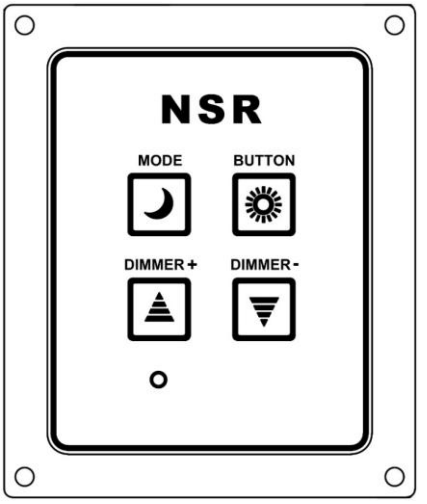
```
$--THS,x.x,a*hh<CR><LF>
          |  |
          | +-------------------2
          +----------------1
```

1. Heading, degrees true
2. Mode indicator

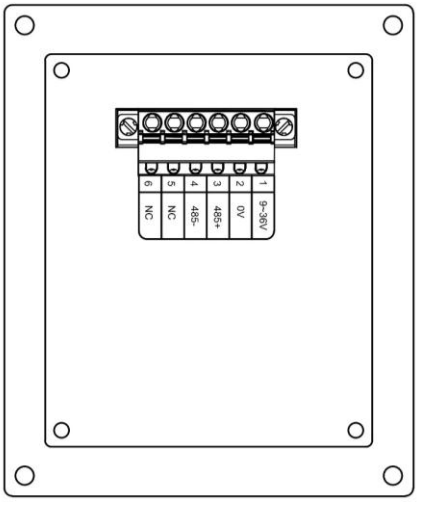
APPENDIX D INSTRUCTIONS ON DIMMER CONTROLLER

NDC-100 Dimmer Controller is an optional part which mainly used for remote brightness control. When the Display Unit / Remote Unit, in which case, panel operation is impossible, a Remote Dimmer Controller is necessary to operate the Display Unit / Remote Unit.

D.1 PRODUCT LAYOUT



Front View



Back View

D.2 BASIC OPERATION

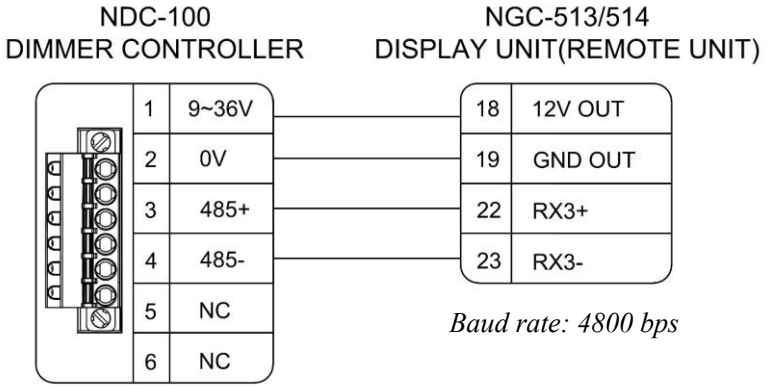
Panel Key	Description
	Unavailable. Reserved for future day/night mode.
	Press the key shortly to adjust NDC-100 key backlight.
	Short-press: Increase brightness; Long-press: Switch to maximum (99) brightness.
	Short-press: Reduce brightness; Long-press: Switch to minimum (49/50) brightness.

D.3 TECHNICAL SPECIFICATIONS

Power supply:	DC24V (range: 9~36V)
Brightness level:	1/10/20/30/40/50/60/70/80/90/99
Interface:	RS485 (default) / RS422
Baud rate:	4800 bps
Operating temp:	-15℃～+55℃
Size:	100 (W) ×120 (H)×19.5 (D) mm

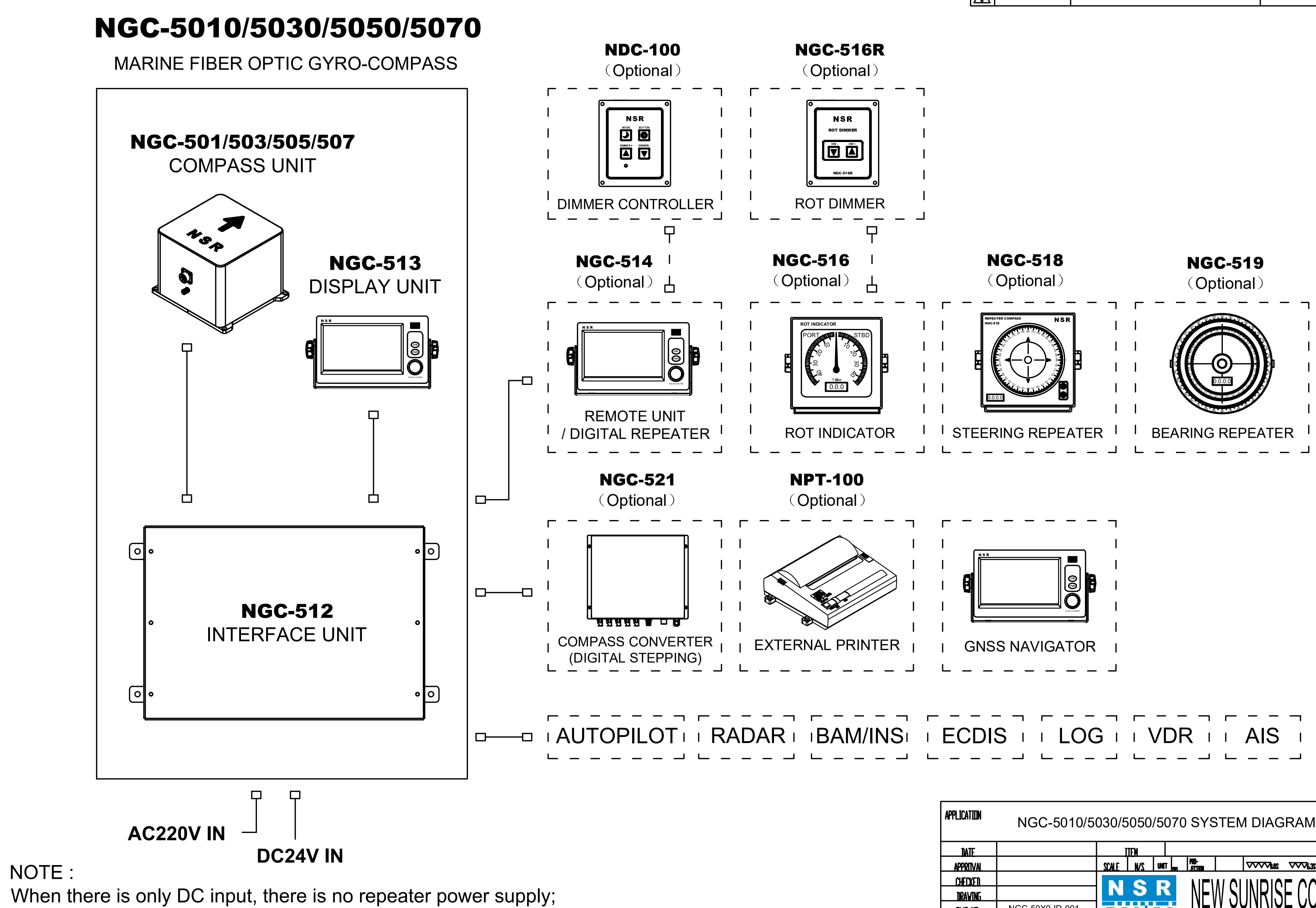
D.4 INSTALLATION

NDC-100 is a flush mount type. Make a cutting area as shown in the attached drawings.



APPENDIX E INSTALLATION DRAWINGS

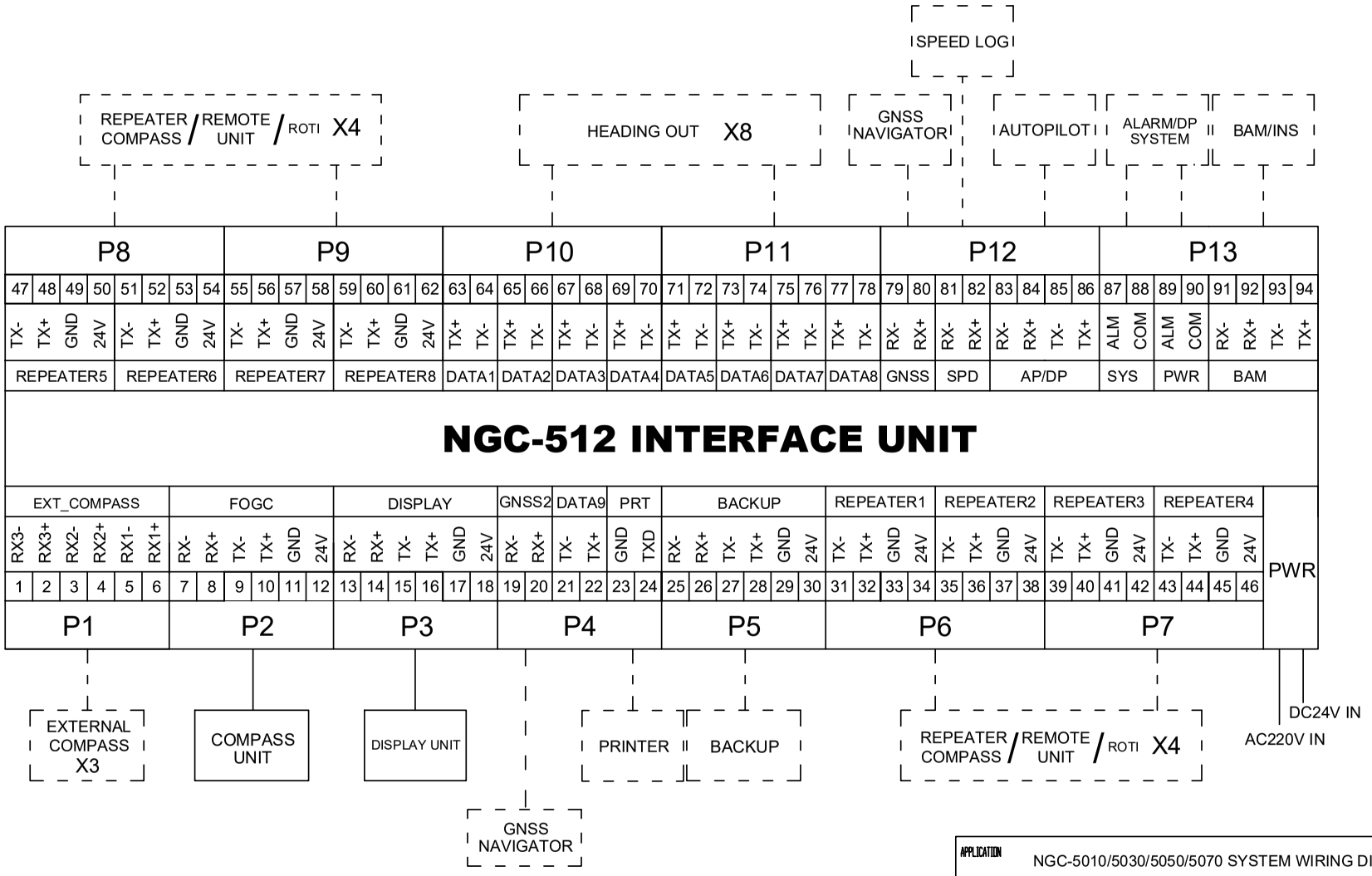
Drawing No.	Description
NGC-50X0-ID-001	NGC-5010/5030/5050/5070 SYSTEM DIAGRAM
NGC-50X0-ID-002	NGC-5010/5030/5050/5070 SYSTEM WIRING DIAGRAM
NGC-50X0-ID-003	NGC-513/514 DISPLAY UNIT (REMOTE UNIT) DRAWING
NGC-50X0-ID-004	NGC-513/514 DISPLAY UNIT (REMOTE UNIT) SIZE DRAWING
NGC-50X0-ID-005	NGC-513/514 DISPLAY UNIT (REMOTE UNIT) MOUNTING DRAWING (TABLE TYPE)
NGC-50X0-ID-006	NGC-513/514 DISPLAY UNIT (REMOTE UNIT) MOUNTING DRAWING (FLUSH TYPE)
NGC-50X0-ID-007	NGC-501/503/505/507 COMPASS UNIT SIZE DRAWING
NGC-50X0-ID-008	NGC-512 INTERFACE UNIT SIZE DRAWING
NGC-50X0-ID-009	NGC-516 ROT INDICATOR SIZE DRAWING
NGC-50X0-ID-010	NGC-518 STEERING REPEATER SIZE DRAWING
NGC-50X0-ID-011	NGC-516R ROT DIMMER SIZE DRAWING
NGC-50X0-ID-012	NGC-519 BEARING REPEATER SIZE&MOUNTING DRAWING
NGC-50X0-ID-013	NGC-519J JUNCTION BOX SIZE DRAWING
NGC-50X0-ID-014	NGC-519A AZIMUTH READING DEVICE SIZE&MOUNTING DRAWING
NGC-50X0-ID-015	NPT-100 MARINE THERMAL PRINTER DRAWINGS
NGC-50X0-ID-016	NDC-100 DIMMER CONTROLLER SIZE DRAWING
NGC-50X0-ID-017	NGC-521 COMPASS CONVERTER SIZE DRAWING


NGC-5010/5030/5050/5070
MARINE FIBER OPTIC GYRO-COMPASS
NGC-501/503/505/507
COMPASS UNIT
NGC-513
DISPLAY UNIT
NGC-512
INTERFACE UNIT
NDC-100
(Optional)
DIMMER CONTROLLER
NGC-516R
(Optional)
ROT DIMMER
NGC-514
(Optional)
REMOTE UNIT
/ DIGITAL REPEATER
NGC-516
(Optional)
ROT INDICATOR
NGC-518
(Optional)
STEERING REPEATER
NGC-519
(Optional)
BEARING REPEATER
NGC-521
(Optional)
COMPASS CONVERTER
(DIGITAL STEPPING)
NPT-100
(Optional)
EXTERNAL PRINTER
GNSS NAVIGATOR
AUTOPILOT
RADAR
BAM/INS
ECDIS
LOG
VDR
AIS
AC220V IN
DC24V IN
NOTE :
When there is only DC input, there is no repeater power supply;

NO.	DATE	REVISION & DESCRIPTION	REVIEWED / CHECKED SIGNATURE

APPLICATION	NGC-5010/5030/5050/5070 SYSTEM DIAGRAM
DATE	
APPROVAL	
CHECKED	
DRAWING	
DWG. NO.	NGC-50X0-ID-001

NEW SUNRISE CO., LTD.

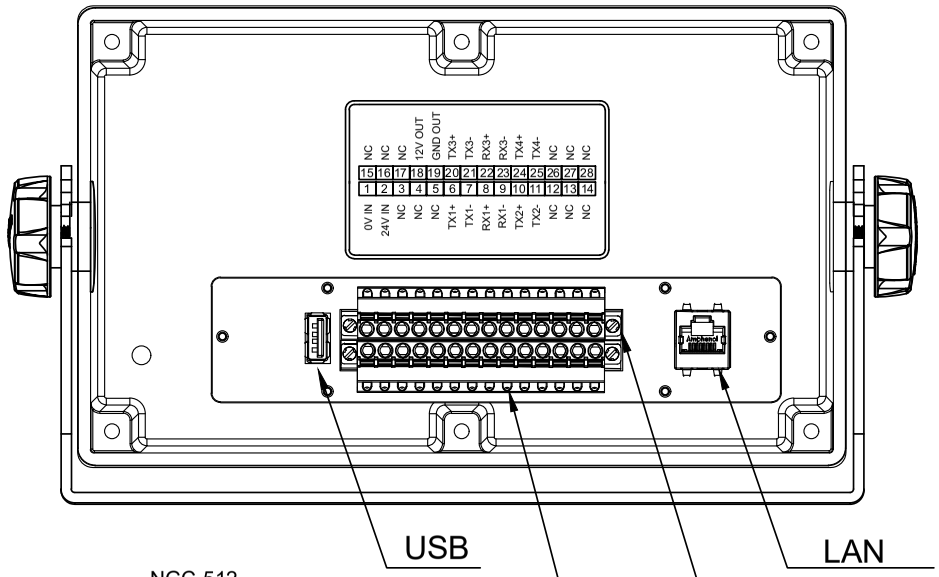


NO.	DATE	REVISION & DESCRIPTION	REVIEWED	CHECKED
1			SIGNATURE	

APPLICATION	NGC-5010/5030/5050/5070 SYSTEM WIRING DIAGRAM
DATE	
APPROVAL	
CHECKED	
DRAWING	
DWG. NO.	NGC-50X0-ID-002
ITEM	
SCALE	N/S
UNIT	
SIZE	A4

NSR marine NEW SUNRISE CO., LTD.

NO.	DATE	REVISION & DESCRIPTION	REVIEWED	CHECKED
1			SIGNATURE	



NGC-512
INTERFACE UNIT

DISPLAY		
	RED	24V
	BLACK	GND
	BROWN	RX+
	GRAY	RX-
	GREEN	TX+
	BLUE	TX-

1. 0V IN	15.NC
2. 24V IN	16.NC
3. NC	17.NC
4. NC	18.12V OUT
5. NC	19.GND OUT
6. TX1+	20.TX3+
7. TX1-	21.TX3-
8. RX1+	22.RX3+
9. RX1-	23.RX3-
10.TX2+	24.TX4+
11.TX2-	25.TX4-
12.NC	26.NC
13.NC	27.NC
14.NC	28.NC

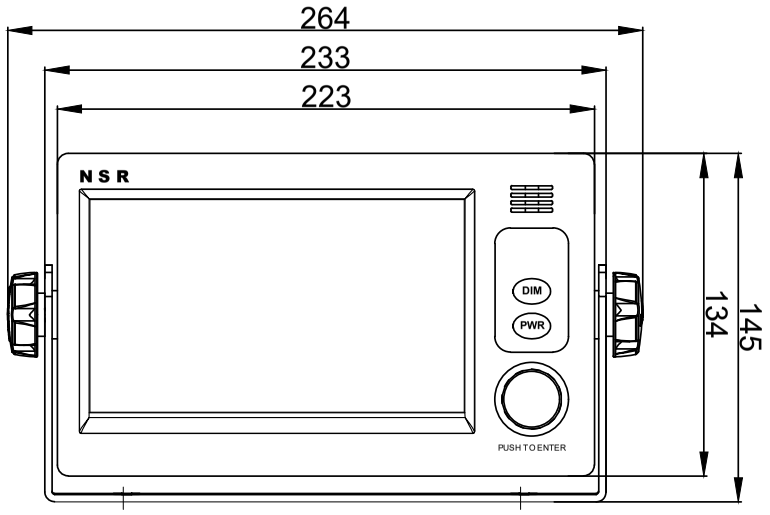
NDC-100
DIMMER CONTROLLER

1	24V
2	0V
3	485+
4	485-
5	NC
6	NC

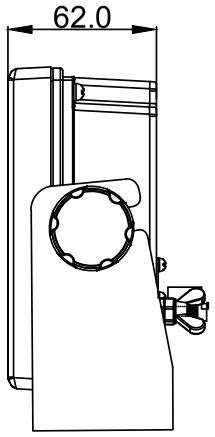
NOTE :
Ports TX2/3/4 provide fixed outputs: THS(10Hz) and ROT(5Hz), baud rate 4800 bps.

APPLICATION	NGC-513/514 DISPLAY UNIT (REMOTE UNIT) DRAWING		
DATE		ITEM	SIZE A4
APPROVAL		SCALE N/S UNIT	
CHECKED			
DRAWING		NSR marine	NEW SUNRISE CO., LTD.
DWG. NO.	NGC-50X0-ID-003		

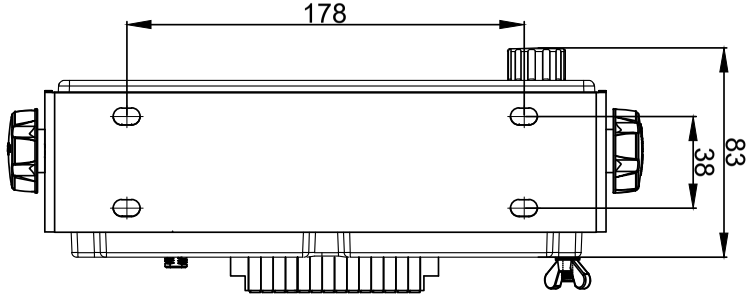
NO.	DATE	REVISION & DESCRIPTION	REVIEWED / CHECKED SIGNATURE
1			



FRONT VIEW



SIDE VIEW

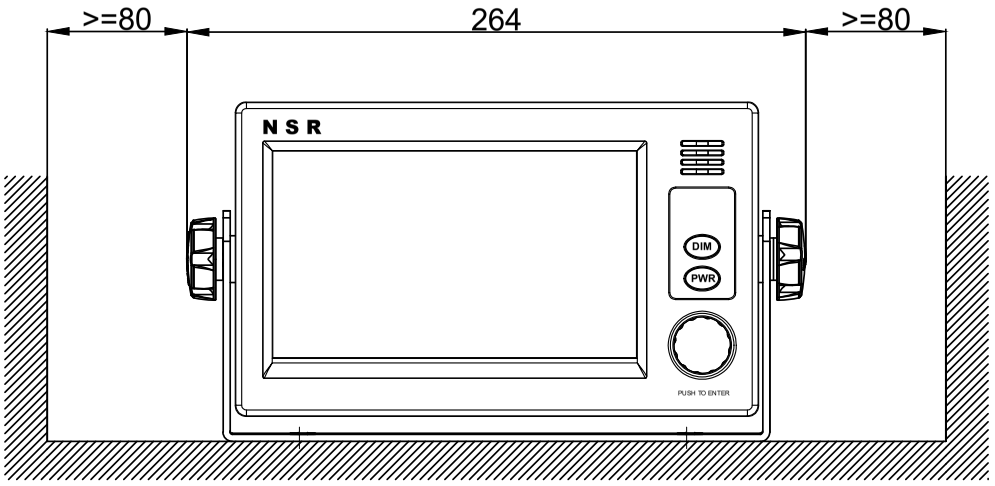


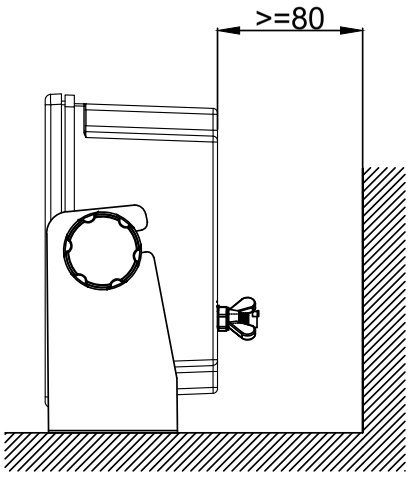
BOTTOM VIEW

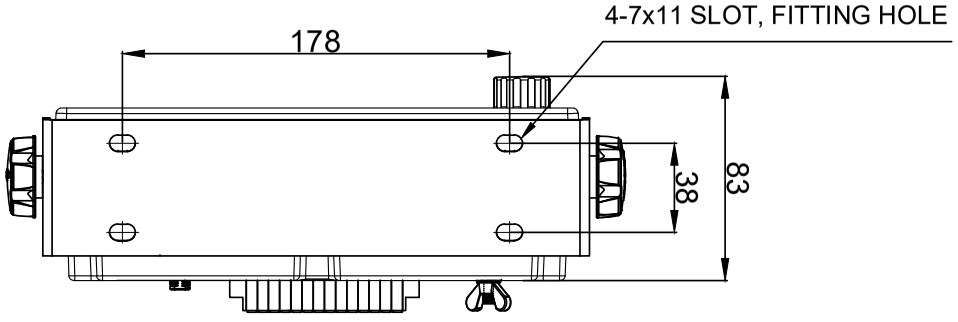
（Optional）

APPLICATION	NGC-513/514 DISPLAY UNIT (REMOTE UNIT) SIZE DRAWING		
DATE		ITEM	SIZE A4
APPROVAL		SCALE N/S UNIT	
CHECKED			
DRAWING		NSR marine	NEW SUNRISE CO., LTD.
DWG. NO.	NGC-50X0-ID-004		

NO.	DATE	REVISION & DESCRIPTION	REVIEWED	CHECKED
1			SIGNATURE	







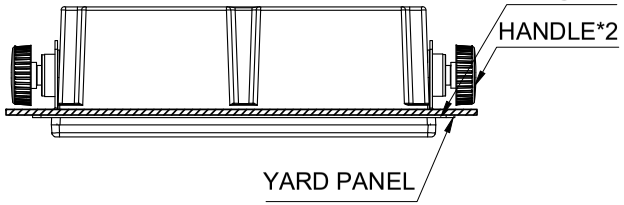
NOTE: TABLE TYPE

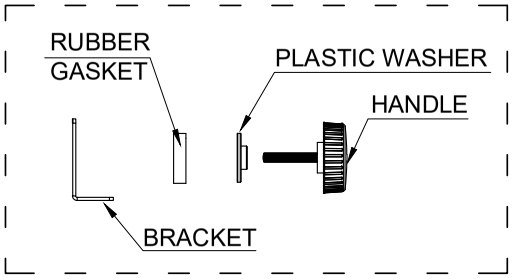
1.USE SELF-TAPPING SCREWS M5X20 FOR FIXING THE UNIT.

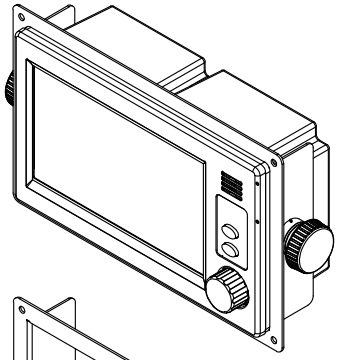
2.80MM IS MINIMUM SPACE FOR OPERATION AND CABLING.

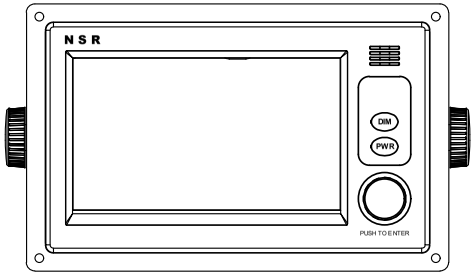
APPLICATION	NGC-513/514 DISPLAY UNIT (REMOTE UNIT) MOUNTING DRAWING		
DATE		ITEM	SIZE A4
APPROVAL		SCALE N/S UNIT	
CHECKED			
DRAWING		NSR	NEW SUNRISE CO., LTD.
DWG. NO.	NGC-50X0-ID-005		

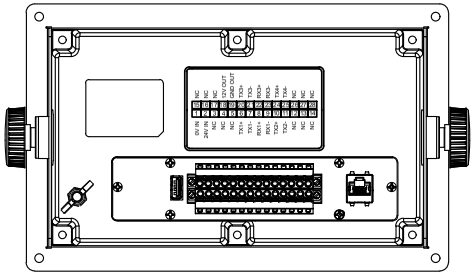
NO.	DATE	REVISION & DESCRIPTION	REVIEWED	CHECKED
1			SIGNATURE	

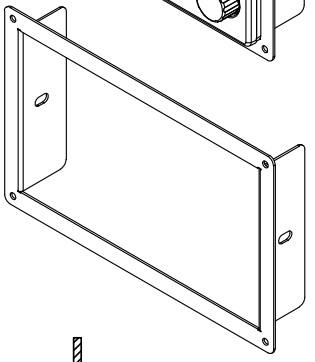


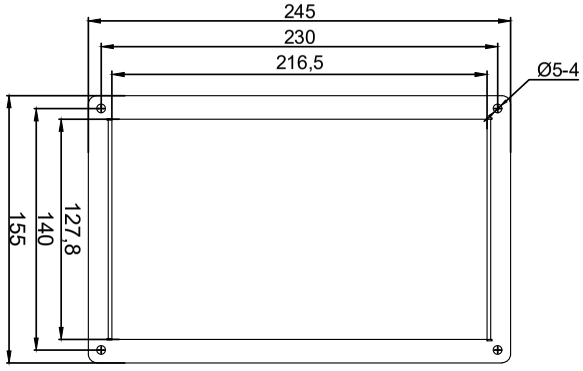




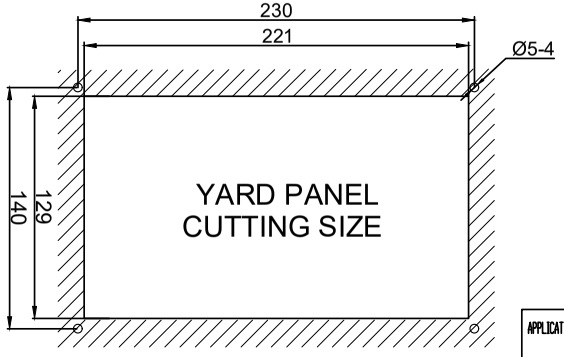


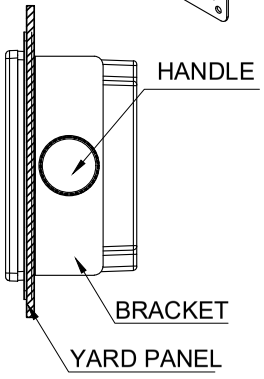






MOUNTING BRACKET SIZE

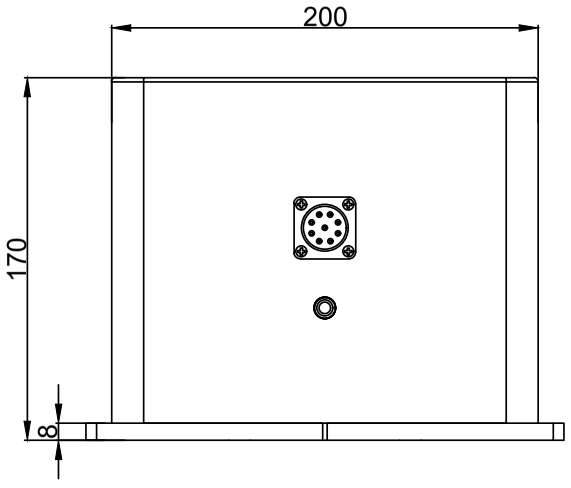


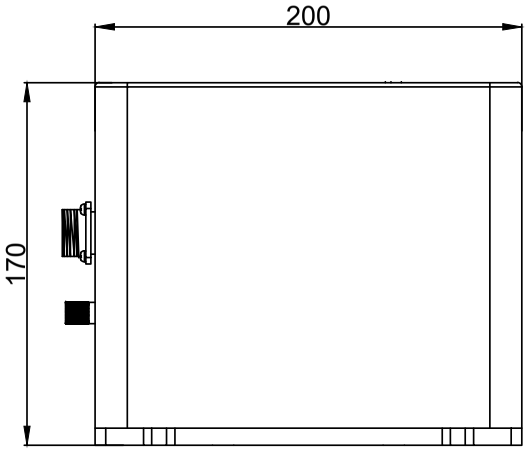


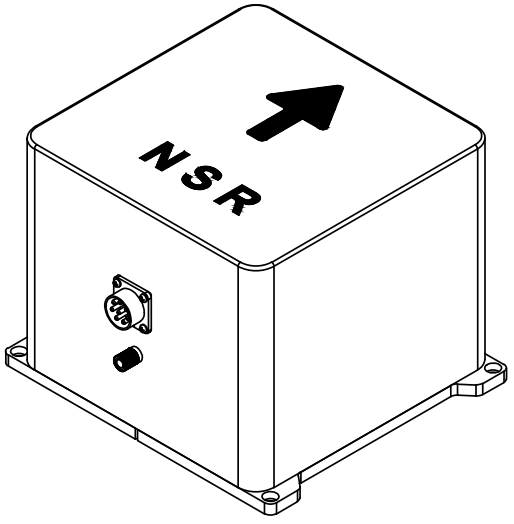
NOTE: FLUSH TYPE

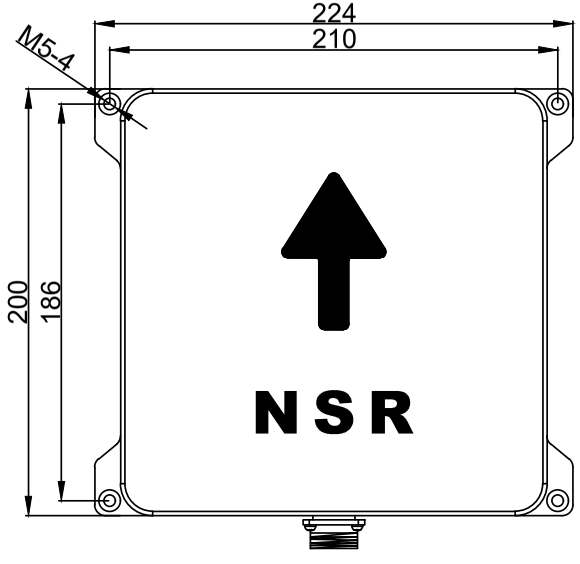
APPLICATION	NGC-513/514 DISPLAY UNIT (REMOTE UNIT) MOUNTING DRAWING		
DATE		ITEM	SIZE A4
APPROVAL		SCALE N/S UNIT	
CHECKED			
DRAWING			NEW SUNRISE CO., LTD.
DWG. NO.	NGC-50X0-ID-006		

NO.	DATE	REVISION & DESCRIPTION	REVIEWED / CHECKED SIGNATURE
1			









NGC-512 INTERFACE UNIT

FOGC	RED	24V
	BLACK	GND
	BLUE	TX+
	WHITE	TX-
	GREEN	RX+
	YELLOW	RX-

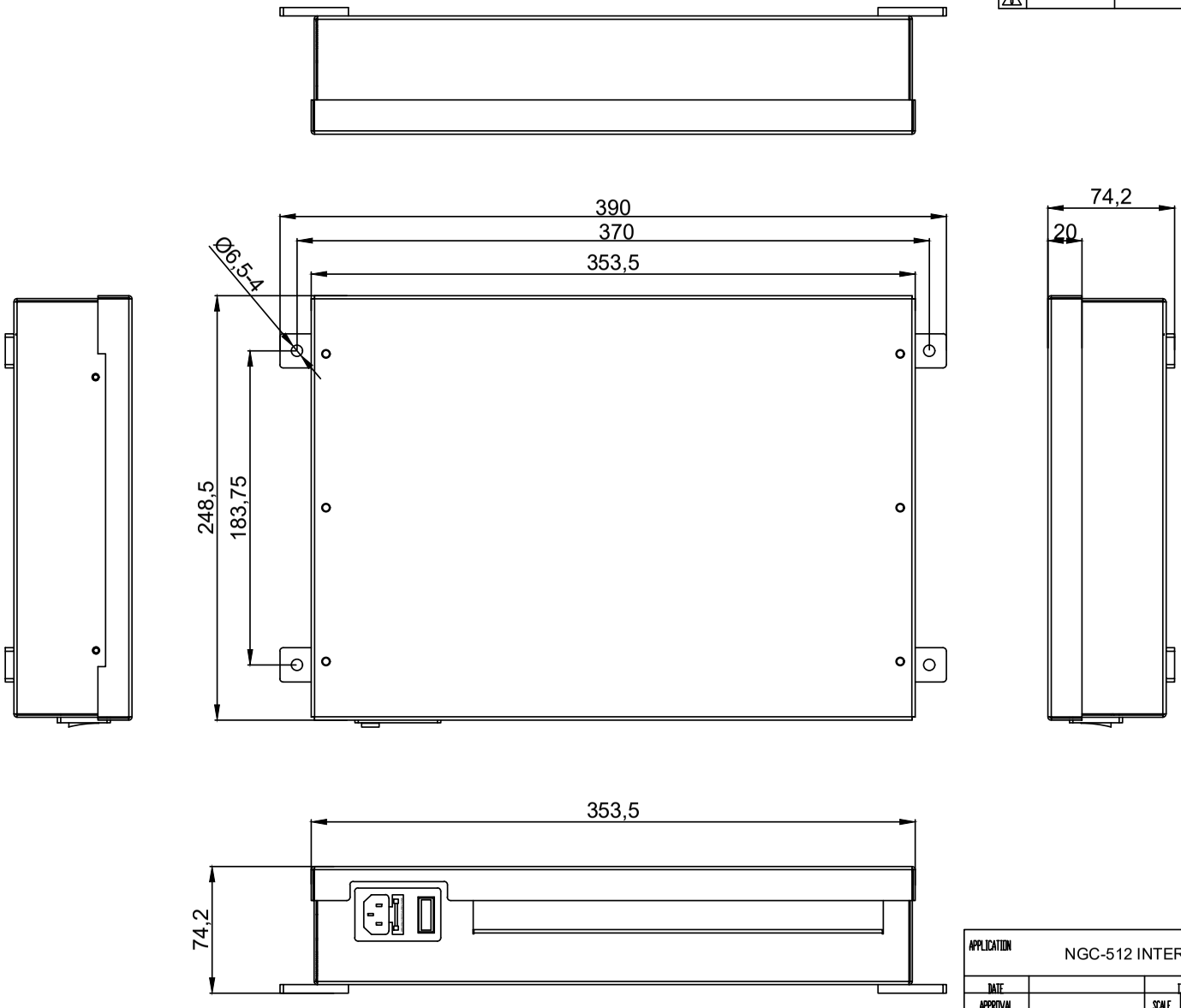
NGC-50X COMPASS UNIT

24V	9PIN-1
GND	9PIN-2
RX+	9PIN-3
RX-	9PIN-4
TX+	9PIN-5
TX-	9PIN-6

9PIN

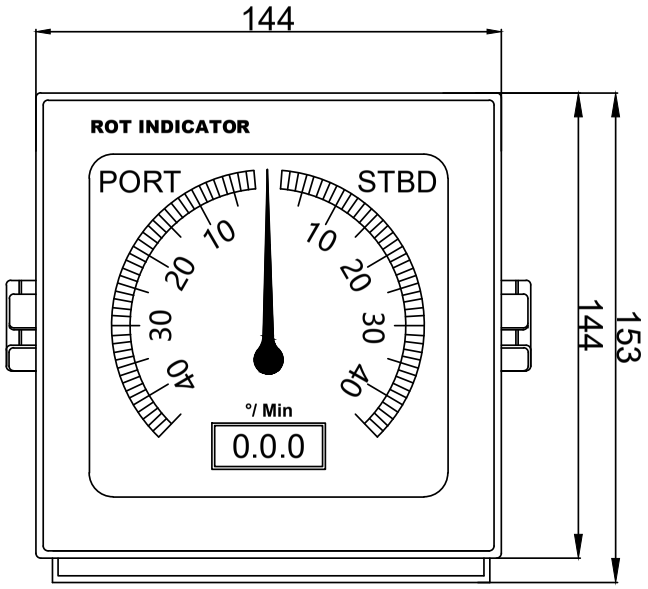
APPLICATION	NGC-501/503/505/507 COMPASS UNIT SIZE DRAWING		
DATE		ITEM	SIZE A4
APPROVAL		SCALE N/S UNIT	
CHECKED			
DRAWING			
DWG. NO.	NGC-50X0-ID-007	NSR marine	NEW SUNRISE CO., LTD.

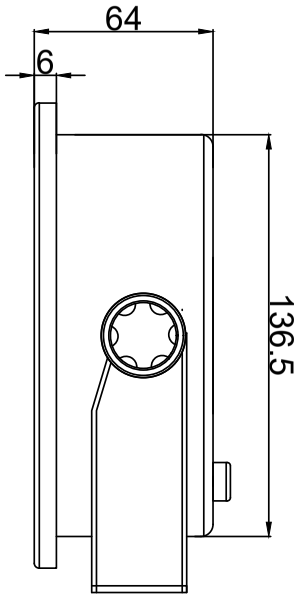
NO.	DATE	REVISION & DESCRIPTION	REVIEWED	CHECKED
1			SIGNATURE	

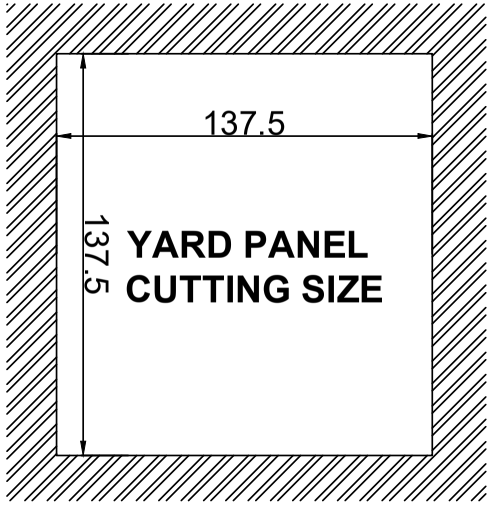


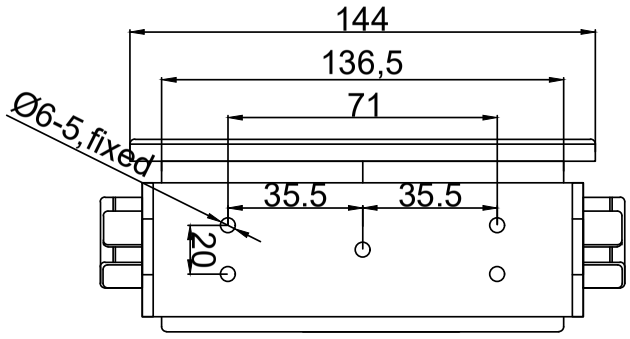
APPLICATION	NGC-512 INTERFACE UNIT SIZE DRAWING		
DATE		ITEM	SIZE A4
APPROVAL		SCALE N/S UNIT mm PROJECTION	
CHECKED			
DRAWING		NSR mapping	NEW SUNRISE CO., LTD.
DWG. NO.	NGC-50XX-ID-008		

NO.	DATE	REVISION & DESCRIPTION	REVIEWED / CHECKED SIGNATURE
1			









NGC-516
ROT INDICATOR

BLUE	RX+
GREEN	RX-
BROWN	DC24V+
GRAY	GND
—	FGND

24V	BROWN	REPEATER
GND	GRAY	
TX+	BLUE	
TX-	GREEN	

NGC-512
INTERFACE UNIT

BLUE	DIM-
BLACK	GND
GREEN	DIM+

DIM-	BLUE
GND	BLACK
DIM+	GREEN

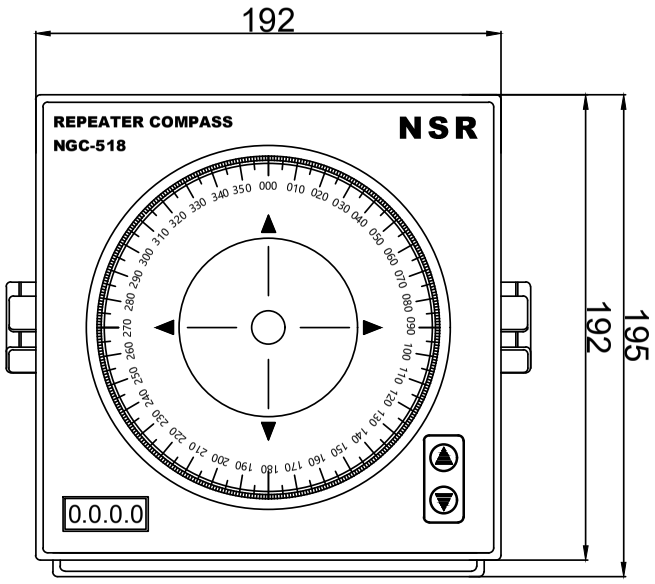
NGC-516R
ROT DIMMER

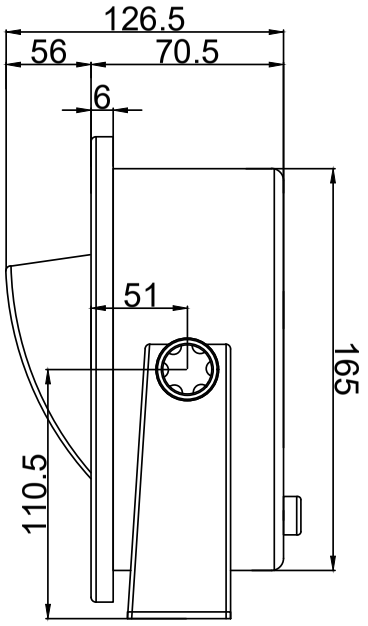
（Optional）

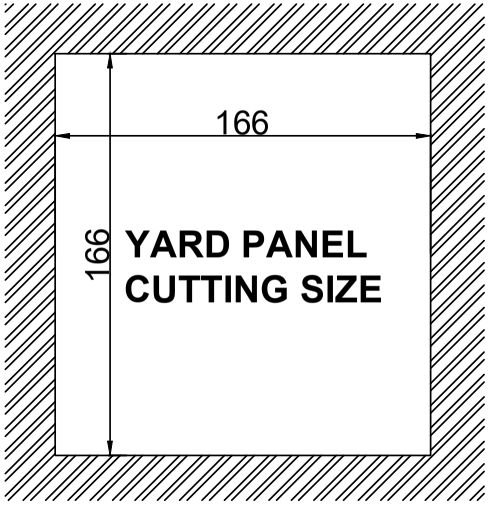
APPLICATION	NGC-516 ROT INDICATOR SIZE DRAWING
DATE	
APPROVAL	
CHECKED	
DRAWING	
DWG. NO.	NGC-50X0-ID-009
ITEM	
SCALE	N/S
UNIT	
SIZE	A4

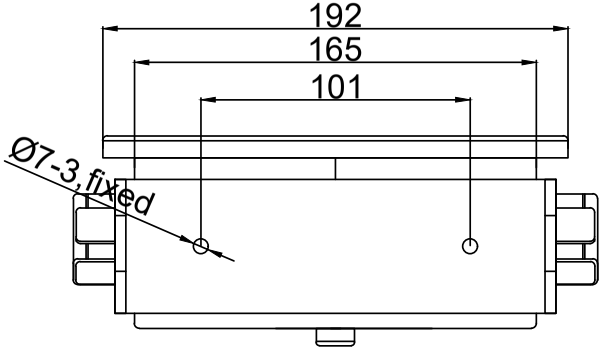
NSR marine NEW SUNRISE CO., LTD.

NO.	DATE	REVISION & DESCRIPTION	REVIEWED	CHECKED
1			SIGNATURE	









NGC-518
STEERING REPEATER

RED	DC24V
BLACK	GND
WHITE	RX+
GREEN	RX-
YELLOW & GREEN	GND

NGC-512
INTERFACE UNIT

24V	RED	REPEATER
GND	BLACK	
TX+	WHITE	
TX-	GREEN	

（Optional）

APPLICATION	NGC-518 STEERING REPEATER SIZE DRAWING		
DATE		ITEM	SIZE A4
APPROVAL		SCALE N/S UNIT	
CHECKED			
DRAWING		NSR marine	NEW SUNRISE CO., LTD.
DWG. NO.	NGC-50X0-ID-010		

NO.	DATE	REVISION & DESCRIPTION	REVIEWED / CHECKED SIGNATURE
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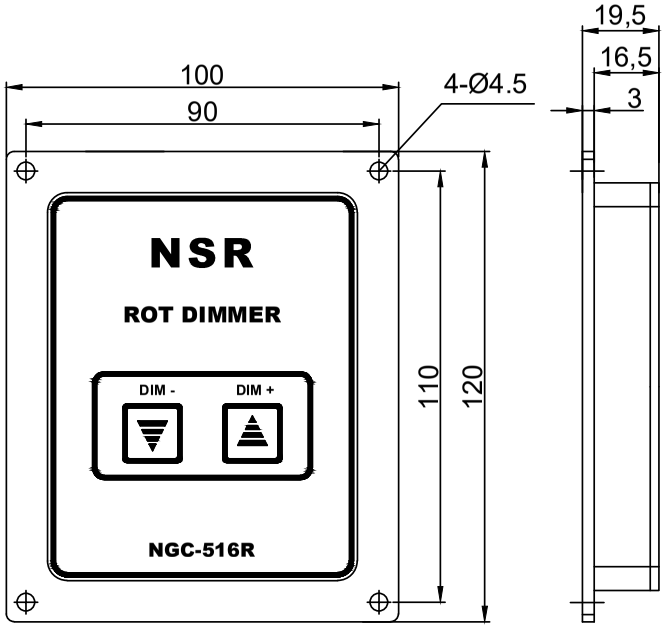
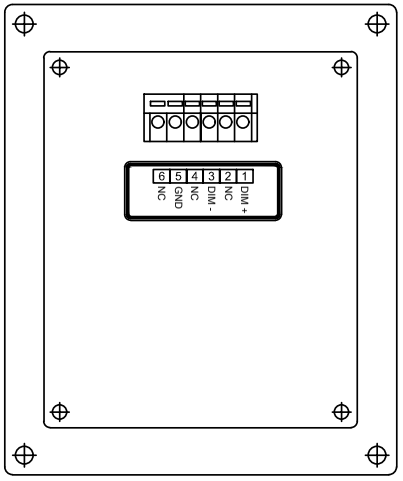
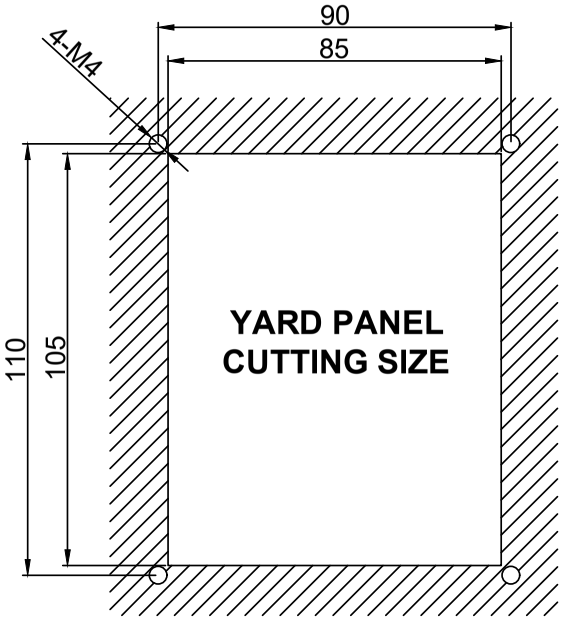
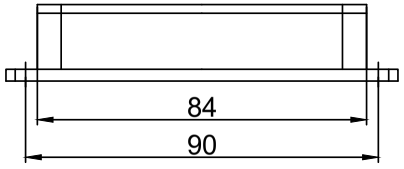
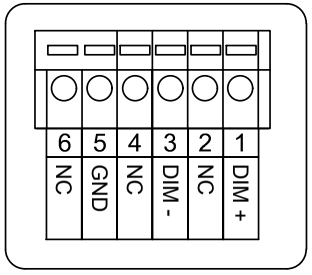








DESCRIPTION

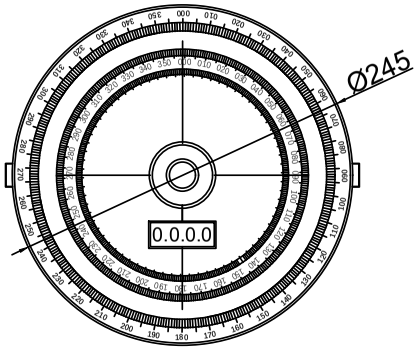


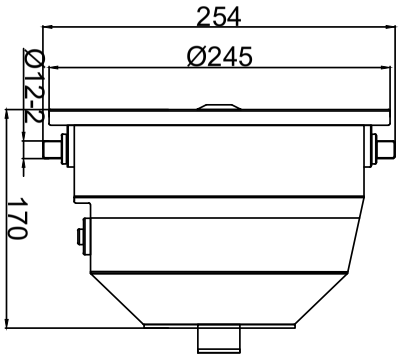
（Optional）

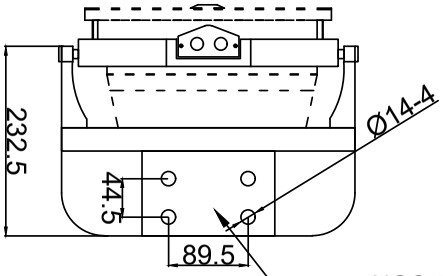
APPLICATION	NGC-516R ROT DIMMER SIZE DRAWING		
DATE		ITEM	SIZE A4
APPROVAL		SCALE N/S UNIT	
CHECKED			
DRAWING			
DWG NO.	NGC-50X0-ID-011	NSR mefino	NEW SUNRISE CO., LTD.

NO.	DATE	REVISION & DESCRIPTION	REVIEWED / CHECKED SIGNATURE
1			

NGC-519 BEARING REPEATER

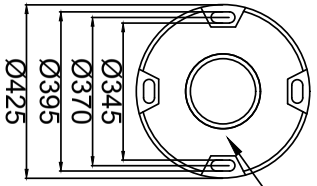




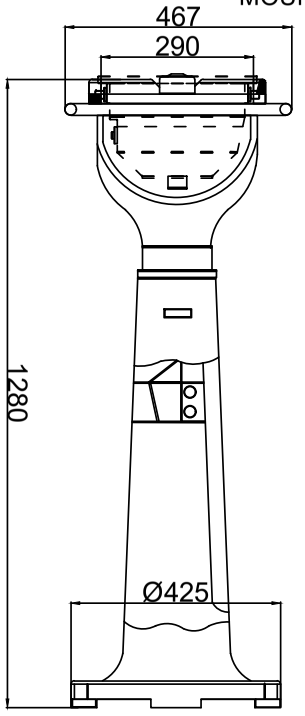


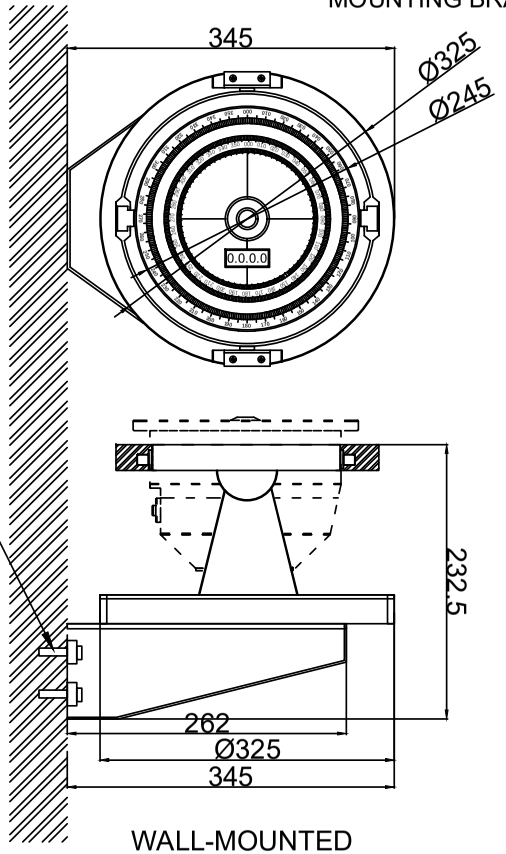
NGC-519B
MOUNTING BRACKET

FLOOR-STANDING INSTALLATION



NGC-519S
MOUNTING BRACKET





WALL-MOUNTED
INSTALLATION

（Optional）

NGC-519
BEARING REPEATER

NGC-512
INTERFACE UNIT

RED	DC24V	24V	RED	REPEATER
BLACK	GND	GND	BLACK	
WHITE	RX+	TX+	WHITE	
GREEN	RX-	TX-	GREEN	
YELLOW & GREEN	GND			

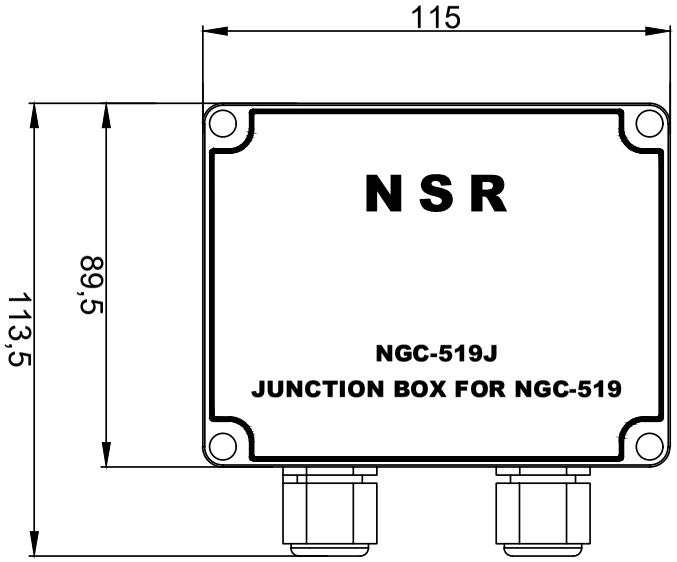
APPLICATION: NGC-519 BEARING REPEATER SIZE&MOUNTING DRAWING

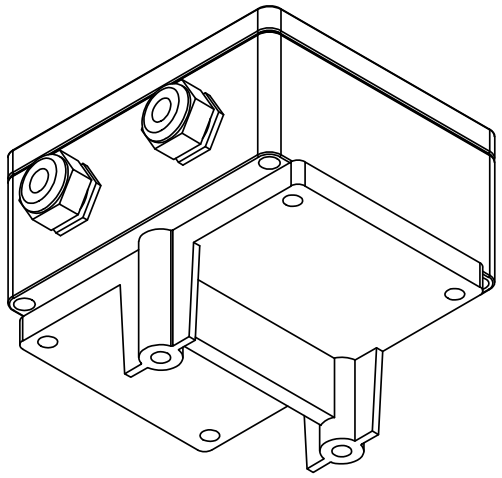
DATE
APPROVAL
CHECKED
DRAWING
DWG. NO. NGC-50X0-ID-012

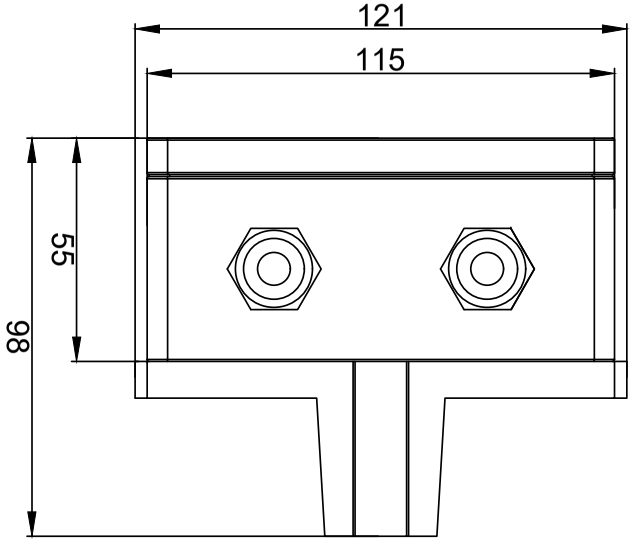
ITEM
SCALE N/S UNIT PRODUCTION
SIZE A4

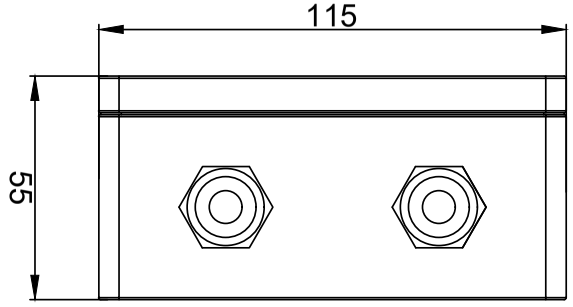
NSR marine NEW SUNRISE CO., LTD.

NO.	DATE	REVISION & DESCRIPTION	REVIEWED / CHECKED SIGNATURE
1			





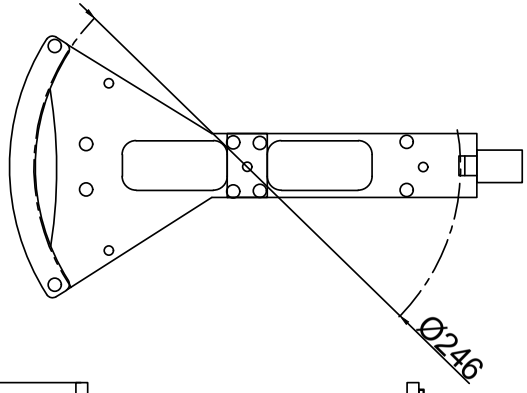


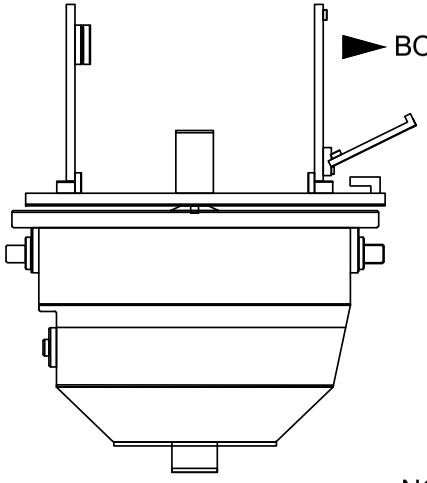


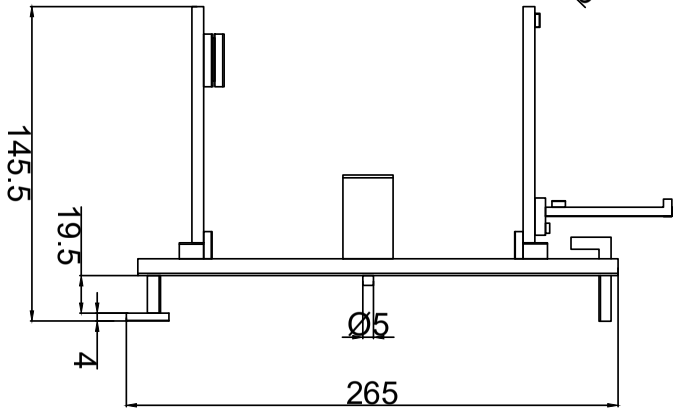
(Optional)

APPLICATION	NGC-519J JUNCTION BOX SIZE DRAWING		
DATE		ITEM	SIZE A4
APPROVAL		SCALE N/S UNIT	
CHECKED			
DRAWING		NSR marine	NEW SUNRISE CO., LTD.
DWG. NO.	NGC-50X0-ID-013		

NO.	DATE	REVISION & DESCRIPTION	REVIEWED	CHECKED
1			SIGNATURE	

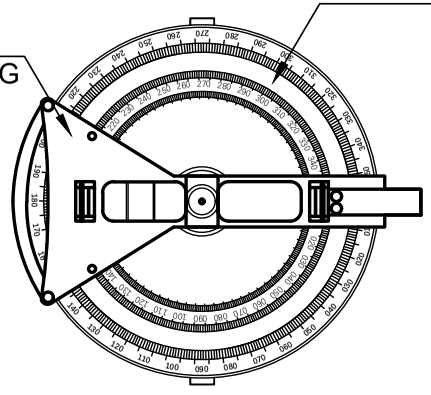


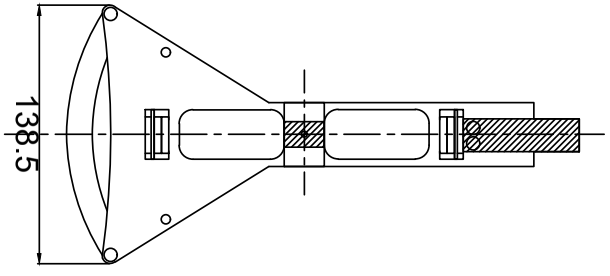




NGC-519
BEARING REPEATER

NGC-519A
AZIMUTH READING
DEVICE

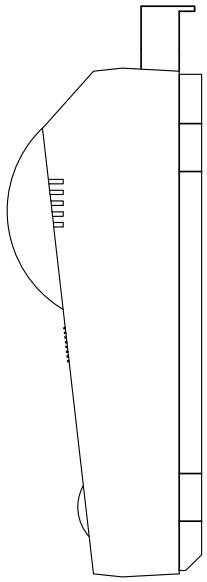


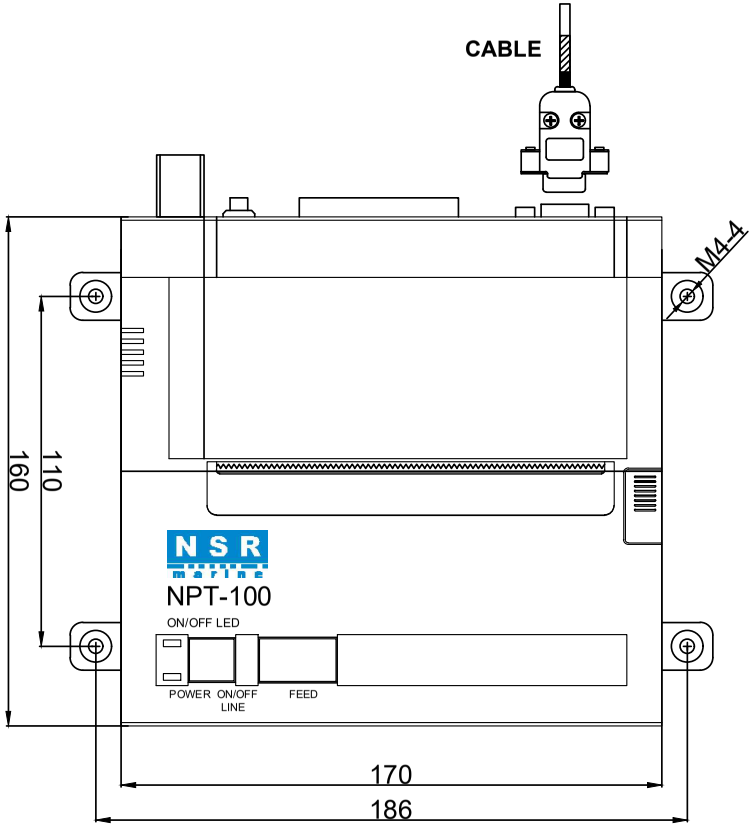


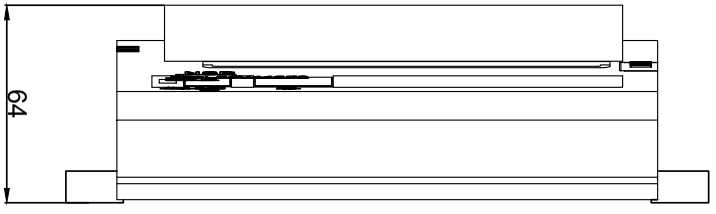
（Optional）

APPLICATION	NGC-519A AZIMUTH READING DEVICE SIZE&MOUNTING DRAWING				
DATE		ITEM		SIZE	A4
APPROVAL		SCALE	N/S	UNIT	mm
CHECKED					
DRAWING					
DWG. NO.	NGC-50X0-ID-014	NSR marine	NEW SUNRISE CO., LTD.		

NO.	DATE	REVISION & DESCRIPTION	REVIEWED	CHECKED
1			SIGNATURE	



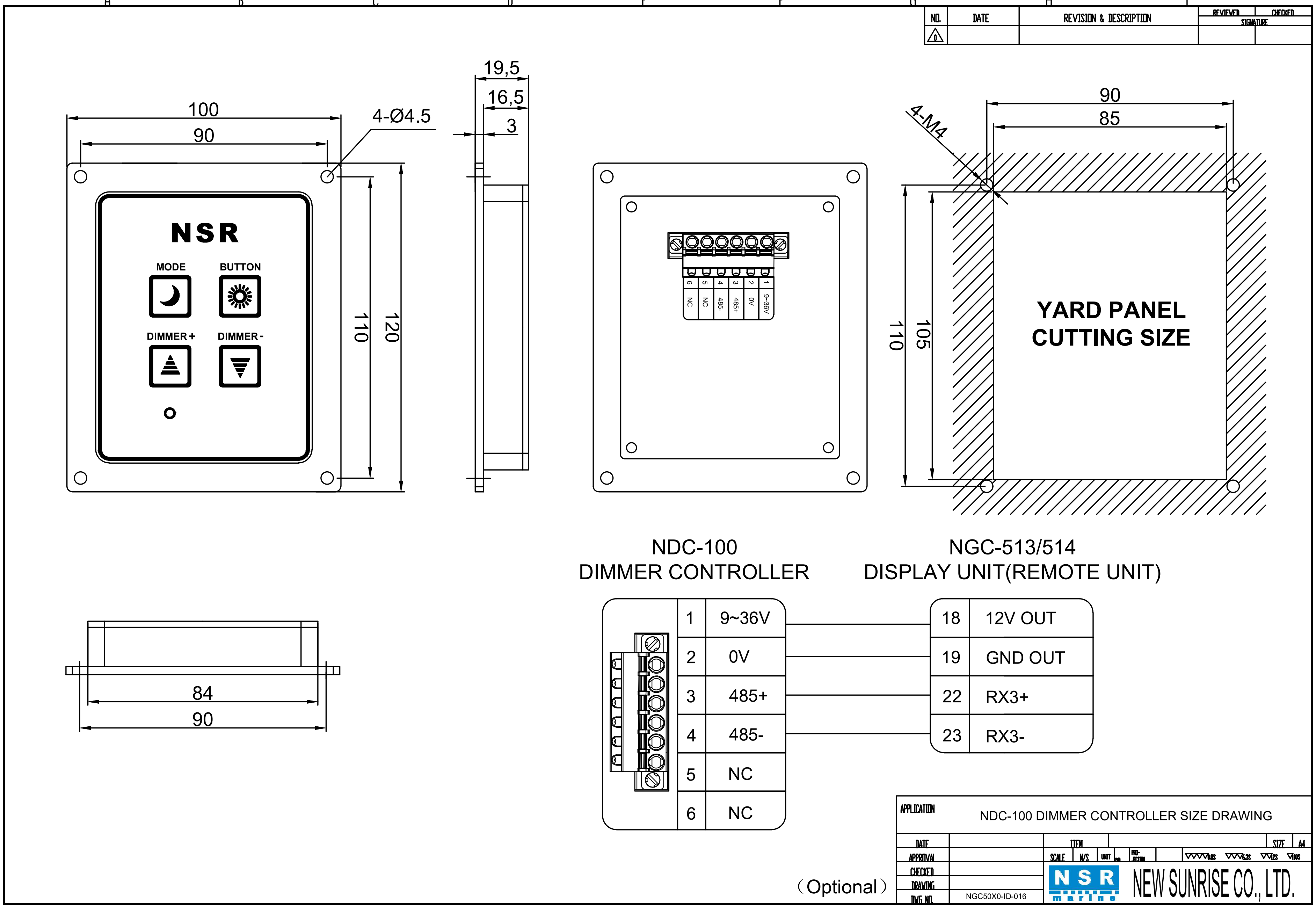




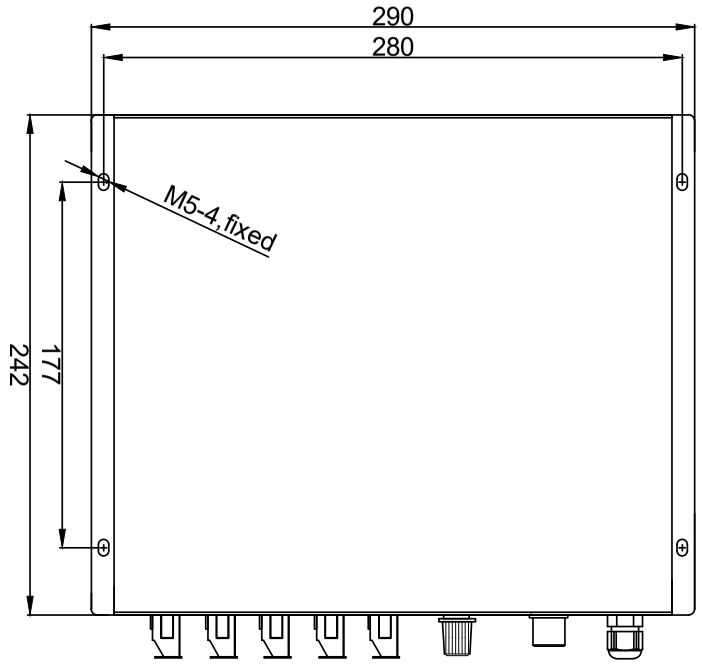
NPT-100 PRINTER		NGC-512 INTERFACE UNIT		
RED	RXD	TXD	RED	PRT
BLACK	GND	GND	BLACK	

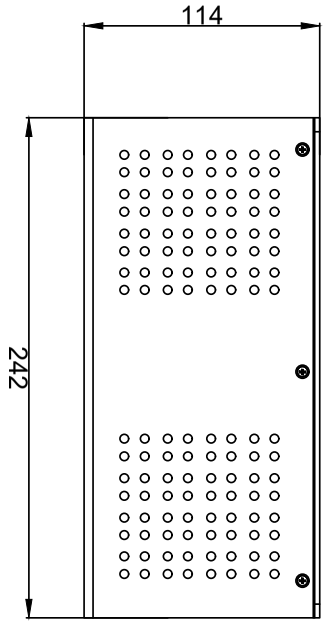
（Optional）

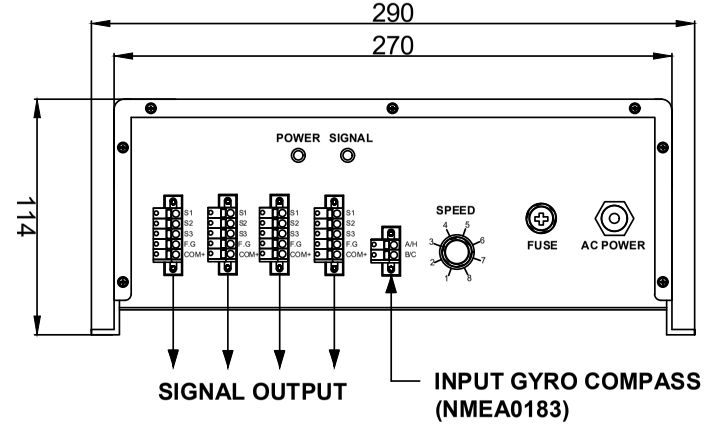
APPLICATION	NPT-100 MARINE THERMAL PRINTER DRAWINGS		
DATE		ITEM	SIZE A4
APPROVAL		SCALE N/S UNIT mm PROJECTION	
CHECKED			
DRAWING		NSR marine NEW SUNRISE CO., LTD.	
DWG. NO.	NGC-50X0-ID-015		


NSR
MODE
BUTTON
DIMMER+
DIMMER-
100
90
110
120
4-Ø4.5
19,5
16,5
3
84
90
1 9~36V
2 0V
3 485+
4 485-
5 NC
6 NC
YARD PANEL CUTTING SIZE
4-M4
90
85
110
105
NDC-100
DIMMER CONTROLLER
NGC-513/514
DISPLAY UNIT(REMOTE UNIT)
18 12V OUT
19 GND OUT
22 RX3+
23 RX3-
（Optional）
NO.
DATE
REVISION & DESCRIPTION
REVIEWED
CHECKED
SIGNATURE
APPLICATION
NDC-100 DIMMER CONTROLLER SIZE DRAWING
DATE
APPROVAL
CHECKED
DRAWING
DWG NO.
NGC50X0-ID-016
ITEM
SCALE
N/S
UNIT
SIZE
A4
NSR marine
NEW SUNRISE CO., LTD.

NO.	DATE	REVISION & DESCRIPTION	REVIEWED / CHECKED SIGNATURE
1			







（Optional）

APPLICATION	NGC-521 COMPASS CONVERTER SIZE DRAWING				
DATE		ITEM		SIZE	A4
APPROVAL		SCALE	N/S	UNIT	mm
CHECKED					
DRAWING					
DWG. NO.	NGC50X0-ID-017	NSR marine	NEW SUNRISE CO., LTD.		

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