KODEN

INSTALLATION MANUAL

GNSS Compass

KC-2000

KC-2000.IM.E 0093179024-00

KC-2000 Installation Manual

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Document Revision History

No.	Doc. No-Rev. No.	Date revised (Y/M/D)	Revised content
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When part of the document needs to be revised, the document has advanced revision number.
The document No. is indicated at the lower right side on the cover and at the left or right side of the footer region of each page.

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For Your Safe Operation

Symbol used in this Installation Manual

The following pictograms are used in this manual. The meaning of each symbol shall be well understood and the maintenance and inspection shall be carried out.

Symbol	Meaning
 Warning	**Mark for warning** This mark denotes that there is a risk of death or serious injury when dealt with incorrectly.
	**Mark for danger of high voltage** This mark denotes that there is a risk of death or serious injury due to electric shock when dealt with incorrectly.
 Caution	**Mark for caution** This mark denotes that there is a risk of slight injury or damages of devices when dealt with incorrectly.
	**Mark for prohibition** This mark denotes prohibition of specified conducts. Description of the prohibition is displayed near the mark.

Precautions on equipment

	**Be careful of high voltage inside** High voltage, which may risk you life, is used. This high voltage may remain in the circuit even after the power is switched off. To prevent contact with the high voltage circuits accidentally, a protective cover or the label with this mark is provided on the high voltage circuit. When the inside is to be checked, ensure to switch off the power and to discharge the residual voltage for safety. An engineer authorized by Koden shall carry out the inspection and maintenance works.
 Warning	**Power off in the boat** An accidental power-on during works may result in worker's electrification. To prevent such accident in advance, ensure that power in the boat and on the equipment are switched off. Furthermore, it is safer to hang a caution tag saying "Under work" near the power switch of equipment.
 Warning	**Be careful of dust** Inhaled dust may cause respiratory affection. At the time of cleaning the inside of equipment, be careful not to inhale dust. Wearing a safety mask is recommended.
 Caution	**Caution on location of installment** The equipment shall not be installed at locations which are excessively damp and suffers from water drops. Otherwise, dew condensation may occur inside the display screen, and corrosion may occur inside the unit box.

 **Caution**	**Measures against static electricity** Static electricity may be generated from the carpet on the floor in the cabin or clothes made of synthetic fiber, and it may destroy the electronic components on circuit boards. The circuit boards shall be handled with appropriate measures against static electricity.

Precautions on handling

 **Warnin**	No disassembly or modification of this equipment is allowed. It may lead to failure, firing, smoking or electric shock. In case of failure, please contact Koden's dealers or Koden.
 **Warning**	In case of smoking or firing, switch off the power in the boat and of this equipment. It may lead to firing, electric shock or damages.
	**Be careful of residual high voltage** High voltage may remain in capacitors for several minutes after switching off the power. Before inspection of the inside, please wait at least 5 minutes after switching off or discharge the residual electricity in an appropriate manner. Then, start the work.

Contents

Introduction

KC-2000 is a compass and navigation device using GNSS (satellite navigation system).

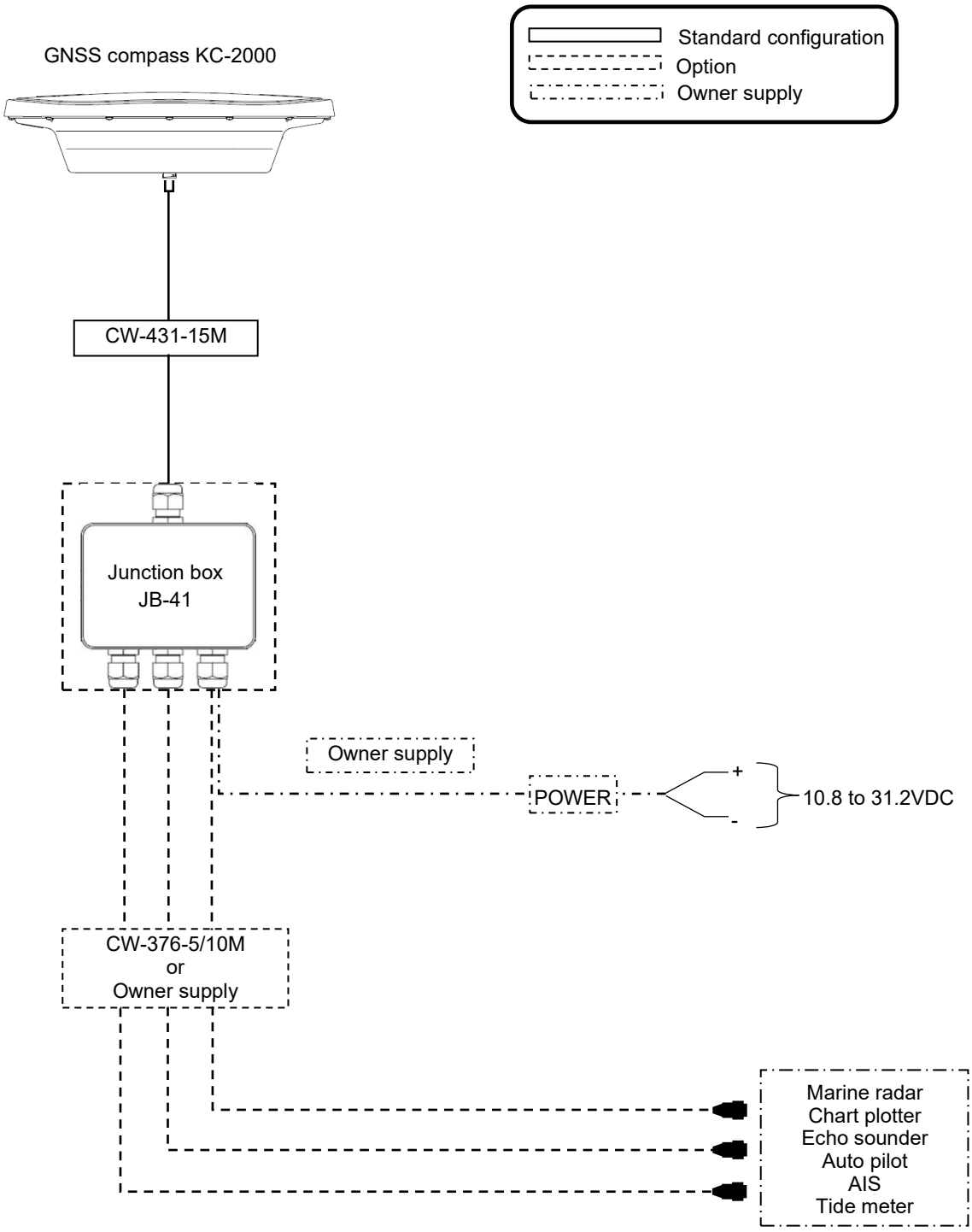
By measuring the phase difference between two GNSS antennas using radio waves from GNSS satellites, the ship's heading can be detected with high precision. It also has a navigation calculation function, so it can be used as a GNSS navigation device.

The functions of KC-2000 are as follows:

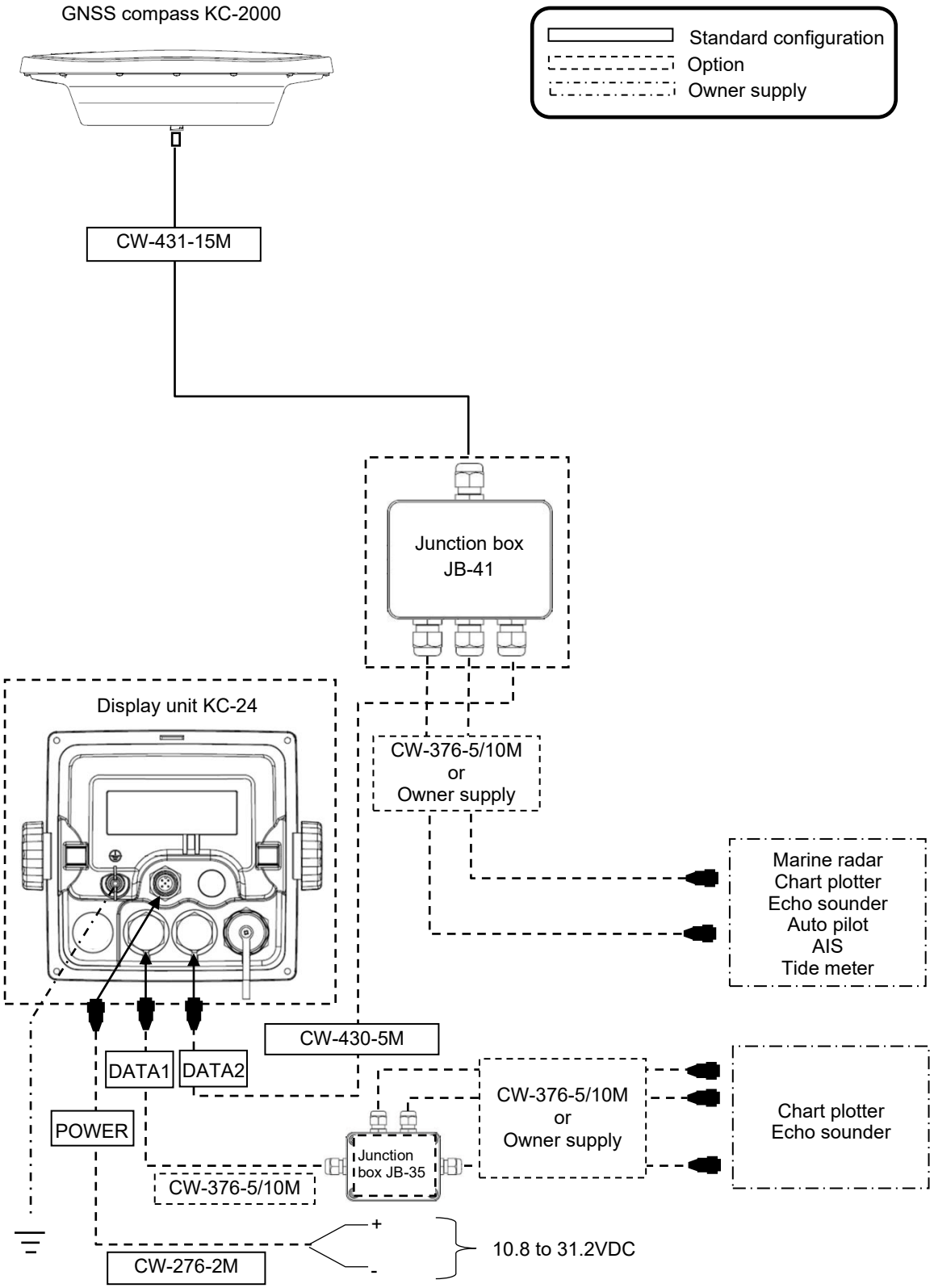
- There are four satellite positioning systems that can be used: GPS/Quasi-Zenith Satellite (Michibiki), Galileo, GLONASS, and BeiDou, so stable direction output is possible.
- In addition to heading, rolling, pitching, and heaving data can be output. If you use an echo sounder with a heaving correction function, you can observe fish sound images that are free from the effects of swells and waves.

System Configuration

Connection diagram



System Configuration (with Junction box and Display unit)



Configuration of Equipment

Standard Equipment Configuration List

No	Item	Type name	Remarks	Weight/Length	Q'ty
1	GNSS compass	KC-2000		1.2 kg	1
2	NMEA cable	CW-431-15M	12-pin water resistant connector and one end plain	15m	1
3	Installation materials	2W8U (4)	Plain washer		1set
		SW8U (4)	Spring washer		
		B8X18U	Mounting bolt (4)		
4	Installation manual	KC-2000.IM.E	English		1

Option List

No	Item	Type name	Remarks	Weight/ Length
1	Connecting cable	CW-376-5M	6-pin water resistant connector and one end plain	5m
2		CW-376-10M	6-pin water resistant connector and one end plain	10m
3		CW-373-5M	6-pin water resistant connectors at both ends	5m
4		CW-373-10M	6-pin water resistant connectors at both ends	10m
5		CW-430-5M	6-pin water resistant connector and one end plain	5m
6	DC power cable	CW-276-2M	5-pin connector and one end plain	2m
7	Junction box	JB-41	1 input / 3 outputs	0.48kg
8	Junction box	JB-35	1 input / 3 outputs	-
9	Display unit	KC-24	With protective cover, mounting base, and knobs	0.89kg
10	Installation materials	TPT5X20U	Truss tapping screw (4)	-
11	Power rectifier	PS-010	With 5A fuses 2pcs *Not available for sale in Europe	3.0kg
12	AC power cable	VV-2D8-3M	For PS-010, both ends plain	3 m
13	Mount base	D97MB90010	KC-2000 mounting stand	
14	Installation manual	KC-2000.IM.E	English	

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Chapter 1 Installation

1.1 Installation consideration

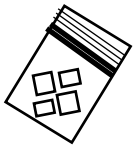
Qualified service technicians should perform the installation of the KC-2000 that comprises the following operations.

(1) Unpacking each component of the system.
(2) Inspection of the exterior of each component unit and accessory.
(3) Checking the ship's mains voltage and current capacity.
(4) Determining the installation site.
(5) Installation of compass.
(6) Installation of option items.
(7) Planning the cable routing and connections.
(8) Adjustment and setups.

1.2 Unpacking of the goods

Unpack your package and check if all the items stated in the packing list are contained in the package. If there is any trouble in the contents, please contact your dealer or our office.

Standard equipment list

No	Name of item	Type	Remarks	Weight/ Length	Qty
1	GNSS compass 	KC-2000		1.2kg	1
2	NMEA cable 	CW-431-15M	With a 12-pin waterproof connector and one end plain	15m	1
3	Installation material 	B8X18U	Mounting bolt (4) (with 2W8U (4) / SW8U (4))		1set
4	Installation manual 	KC-2000.IM.E	English		1

Note: Option of equipment is not included.

1.2.1 Inspection of the goods

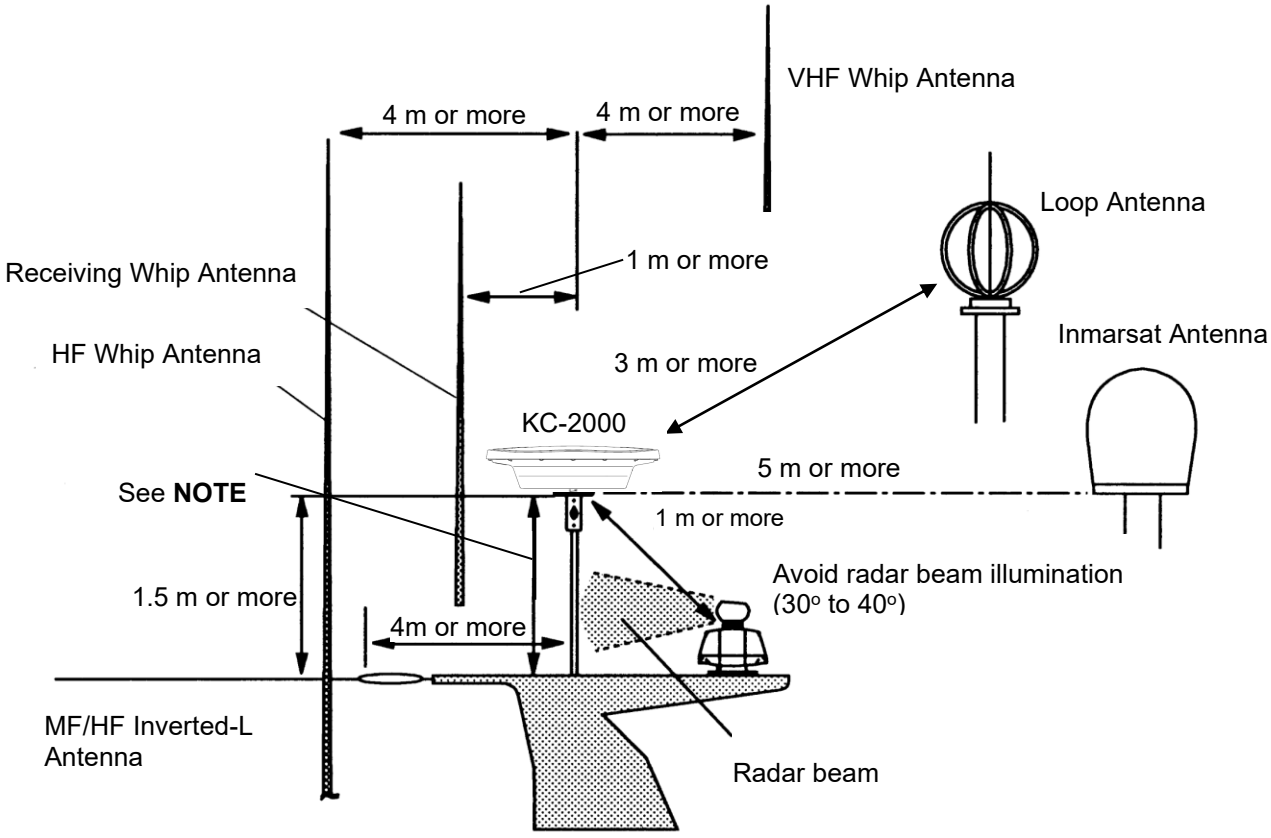
Carefully check the exterior of each component unit for dents, damage, etc. Also check the inside of component units for electrical and mechanical damages.

1.3 GNSS compass installation

1.3.1 Selection of installation location for GNSS compass

Install the GNSS compass in a location where there are no obstacles nearby and where it can easily receive radio waves from satellites. If there are obstacles in the sky around the antenna, it will not be possible to receive radio waves from the satellite evenly, which may reduce the time available for calculating the direction or deteriorate the accuracy of the direction.

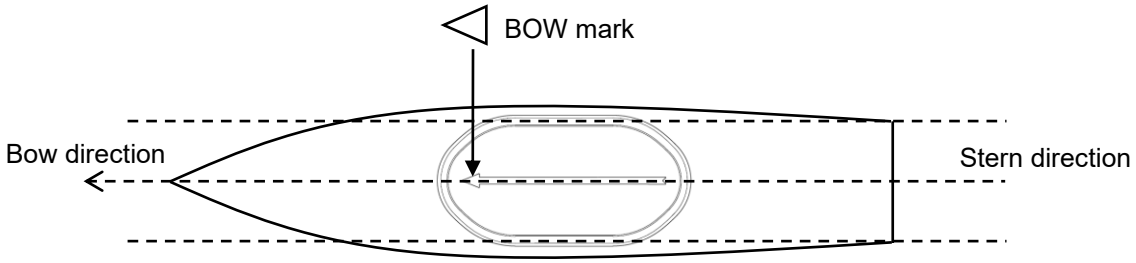
(1) Choose a location as far away from metal objects as possible.
(2) Keep it at least 4m away from the inverted L-shaped transmitting antenna for MF/HF, VHF or HF whip antenna.
(3) Place it at least 1.5m above the inverted L-shaped transmitting antenna for MF/HF.
(4) Keep the receiver at least 1m away from the receiving antenna.
(5) Avoid entering the radar beam. (Vertical beam width: 30° to 40°)
(6) Keep at least 1m away from the radar antenna.
(7) Please keep at least 5m away from the Inmarsat antenna.
(8) Keep the loop antenna at least 3m away.
(9) Keep it at least 2m away from the engine.
(10) Keep it at least 0.5m away from the surface of metal objects.



NOTE: Keep away from metallic objects at least 0.5 m.

Fig. 1.1 Recommended GNSS compass installation location

The GNSS compass, KC-2000, is installed parallel to the straight line connecting the bow and stern, with the BOW mark pointing toward the bow as shown in the figure below. It doesn't have to be on the center line connecting the bow and stern, but if you install it near the center in the longitudinal direction, there will be less discrepancy between the heading data and course data.



1.3.2 Pulling out the NMEA

The method for pulling out the NMEA cable is as follows.

1. If the mounting base has a mast pipe, pass the NMEA cable through the mast pipe.
2. Connect the NMEA cable to the connector at the center of the compass.

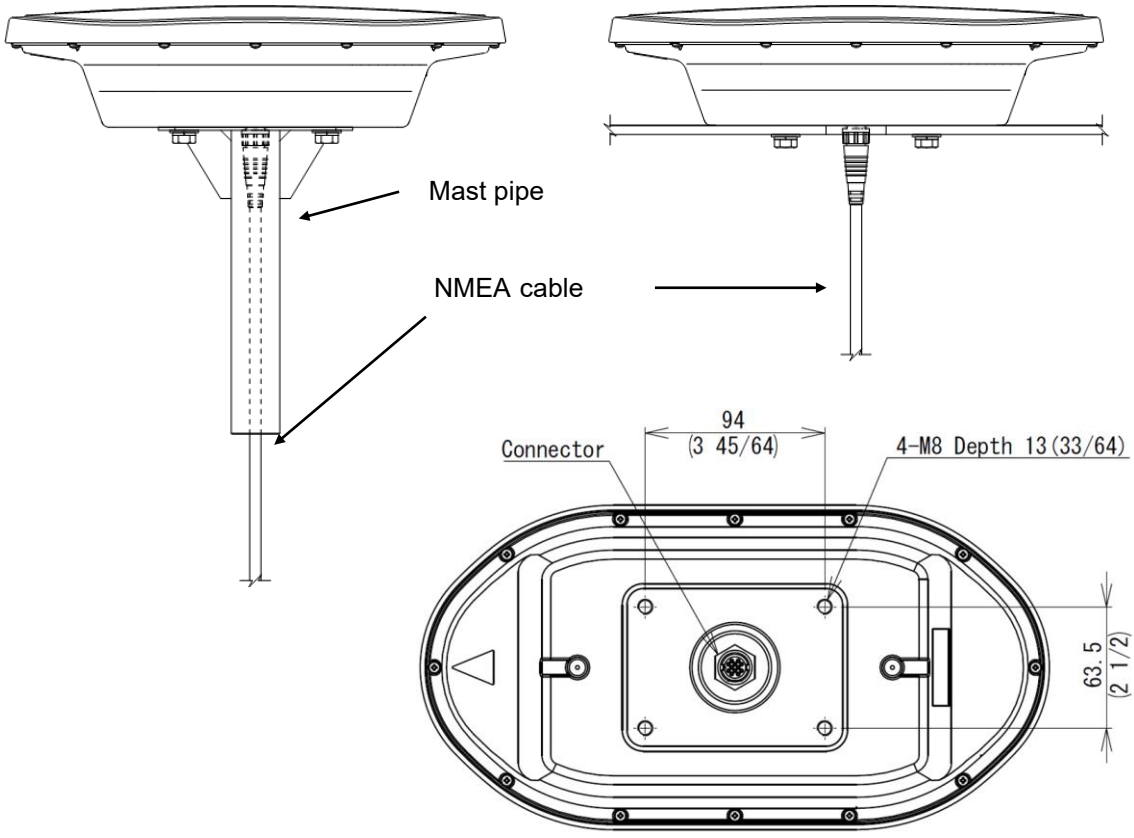


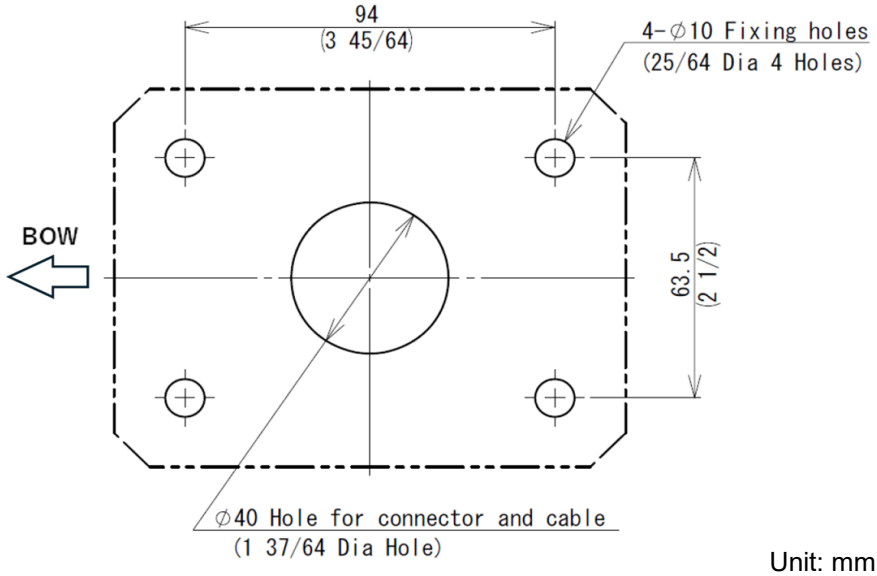
Fig. 1.2 Pulling out the NMEA cable

Unit: mm (inch)

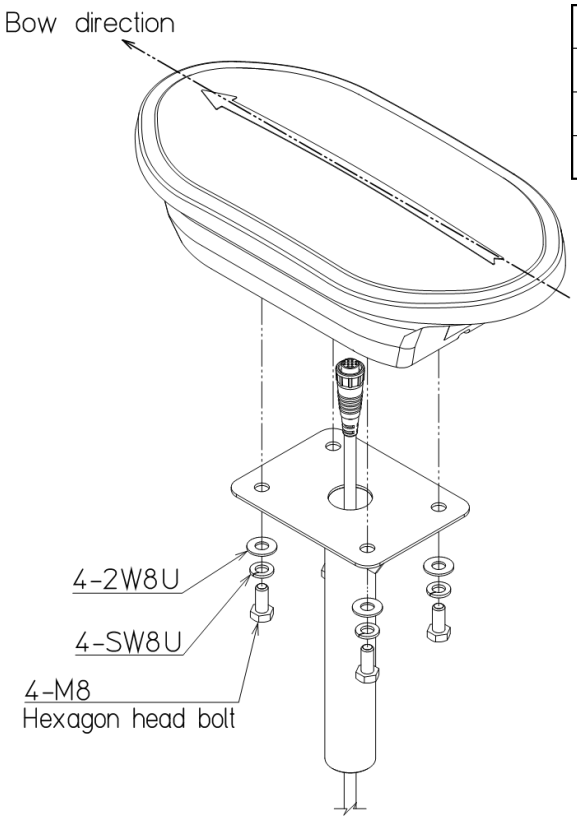
1.3.3 Installing the GNSS compass

To attach the GNSS compass, four (4) M8 bolts are used. Referring to the illustration below, make four (4) holes on the cradle, fix the bracket. When the thickness of the bracket is 2 to 6mm, supplied bolts may be used (M8 x 18). When the bracket is more than 6 mm thick, the bolts should be chosen from the below table.

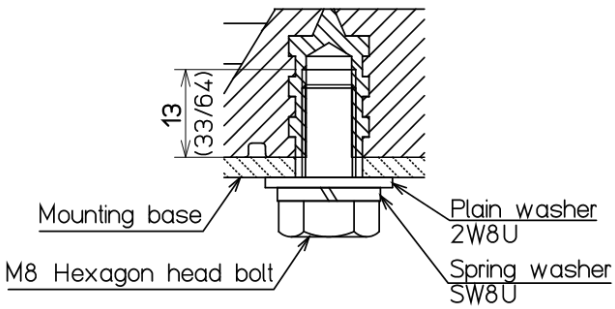
When fixing the compass to the bolt, the cable connection point will be hidden behind the mounting base, so connect the cable first.



Unit: mm (inch)



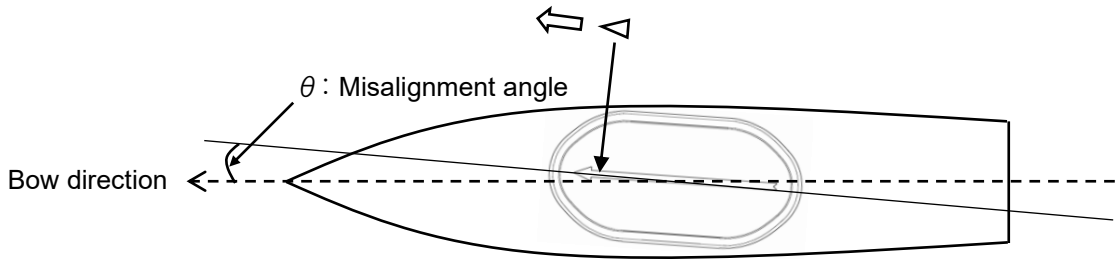
Mounting base thickness : t	Bolt length[mm]
2(5/64)≦ t ≦6(15/64)	18
6(15/64)< t ≦9(23/64)	20
9(23/64)< t ≦13(33/64)	25



Unit: mm (inch)

1.3.4 Correction of installation angle

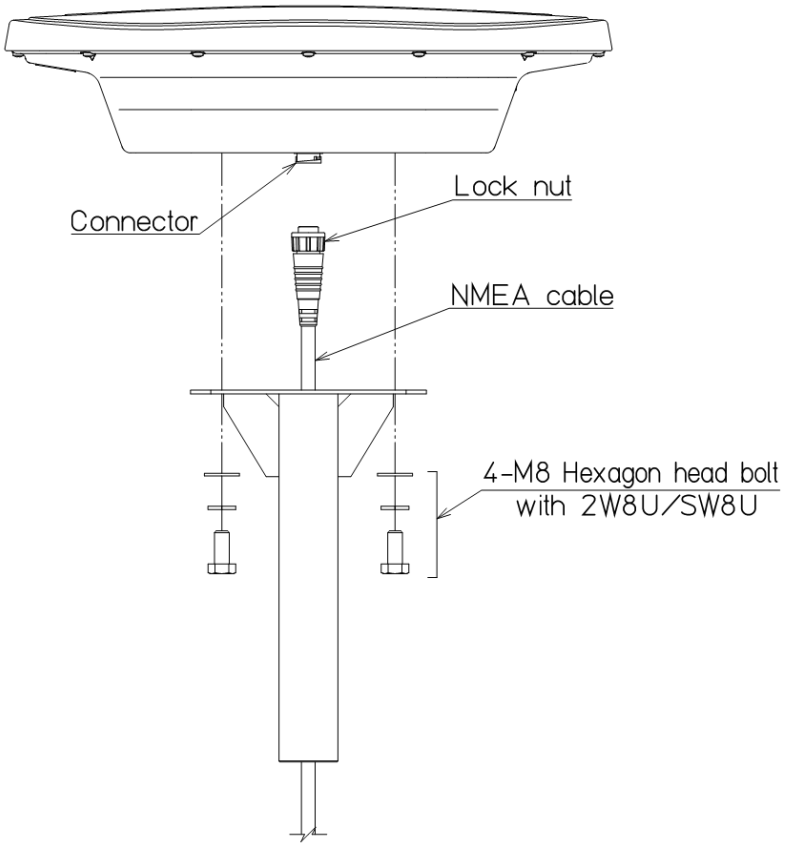
During installation, if the direction of the antenna and the heading of the ship are unavoidably misaligned, please correct the heading of the ship. If the deviation is clockwise with respect to the bow direction, enter "-θ", and if the deviation is counterclockwise, enter "+θ" to correct it. If correction is to be performed, adjustments must be made during installation.



1.3.5 Connector joining

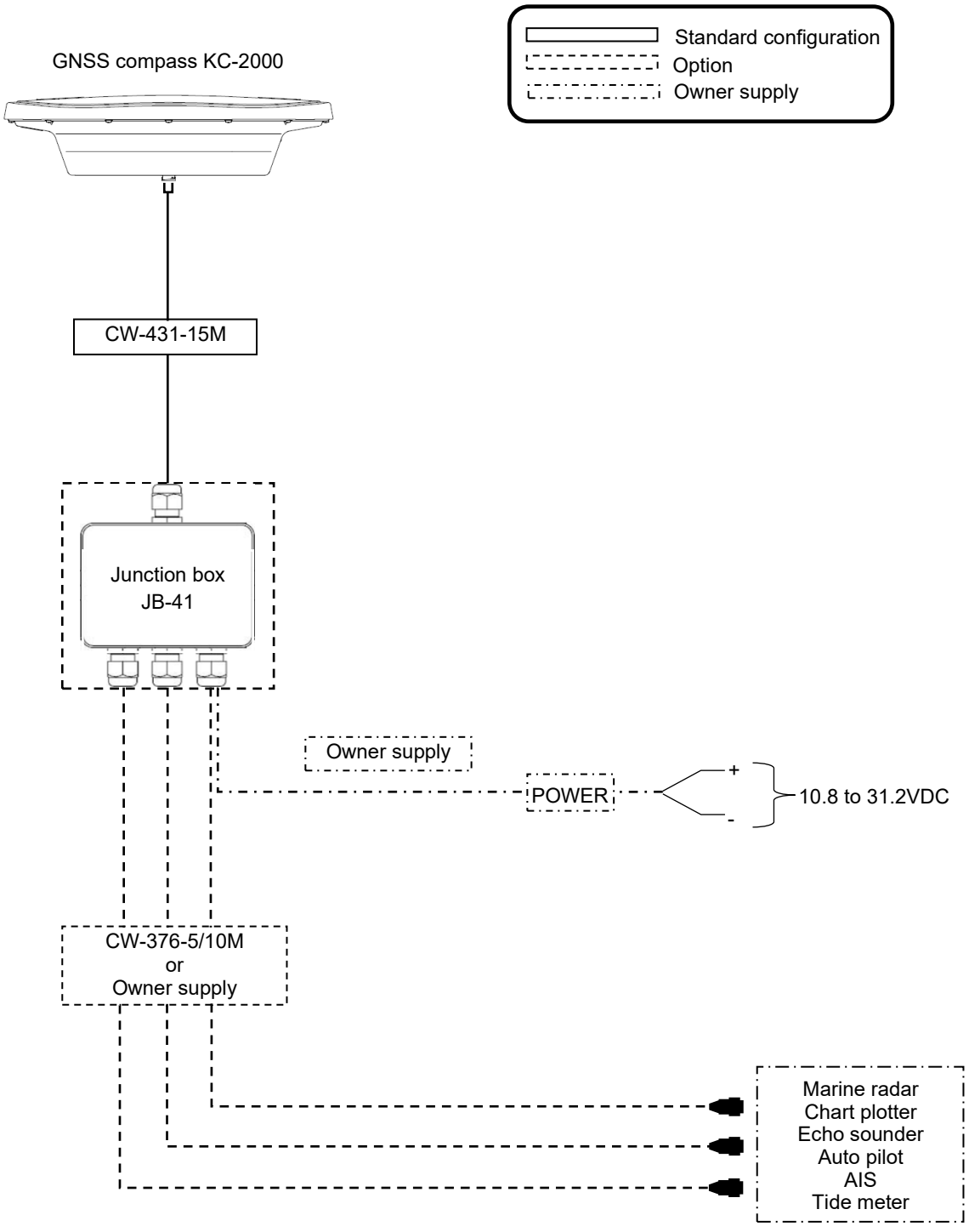
When connecting the GNSS compass and NMEA cable, connect the connector firmly to prevent rainwater/seawater from entering the connector.

Connect the NMEA cable to the connector coming out from the compass side. When connecting, firmly turn the lock nut on the NMEA cable side to secure it.

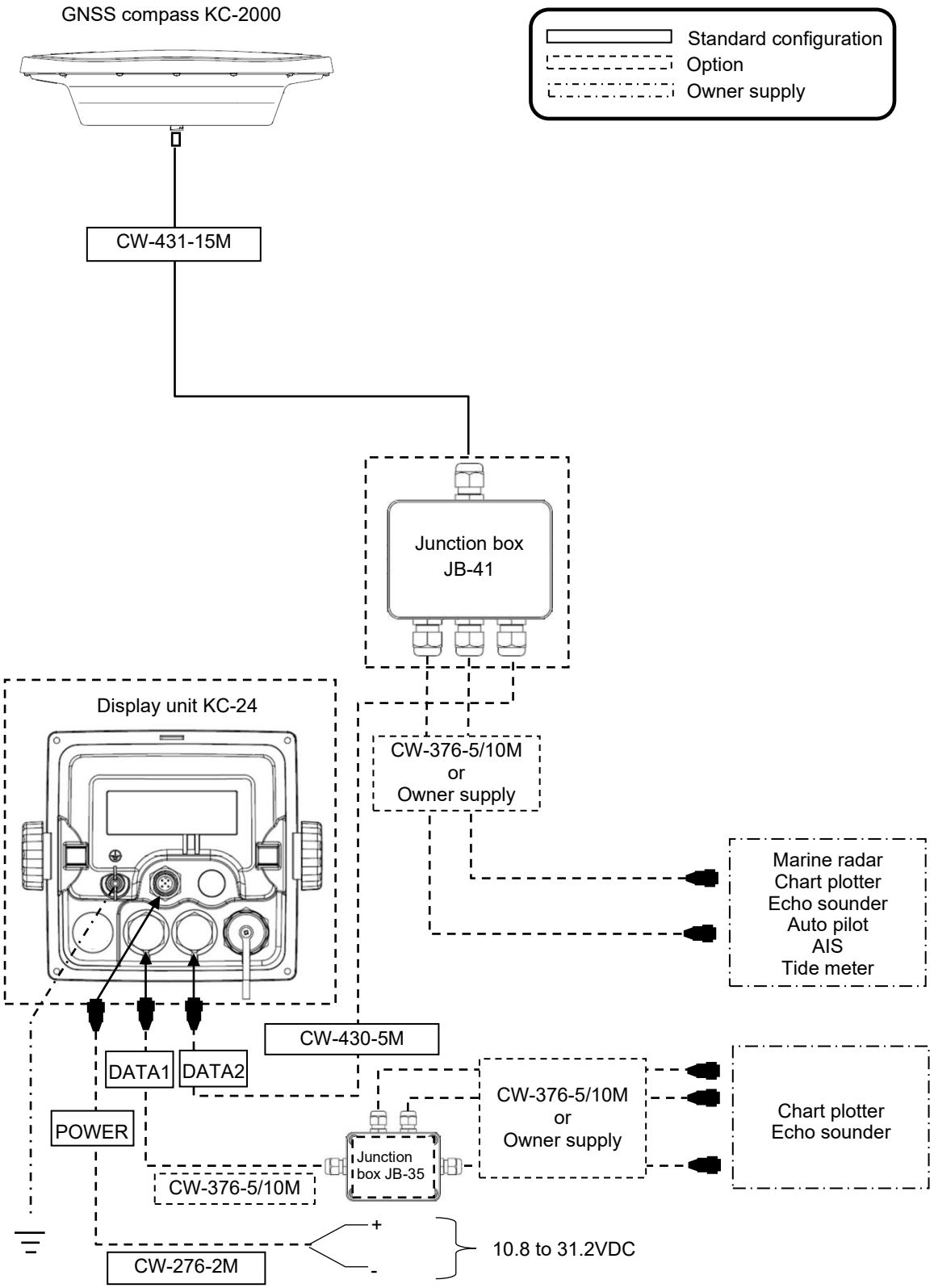


1.4 Inter-device connection diagram

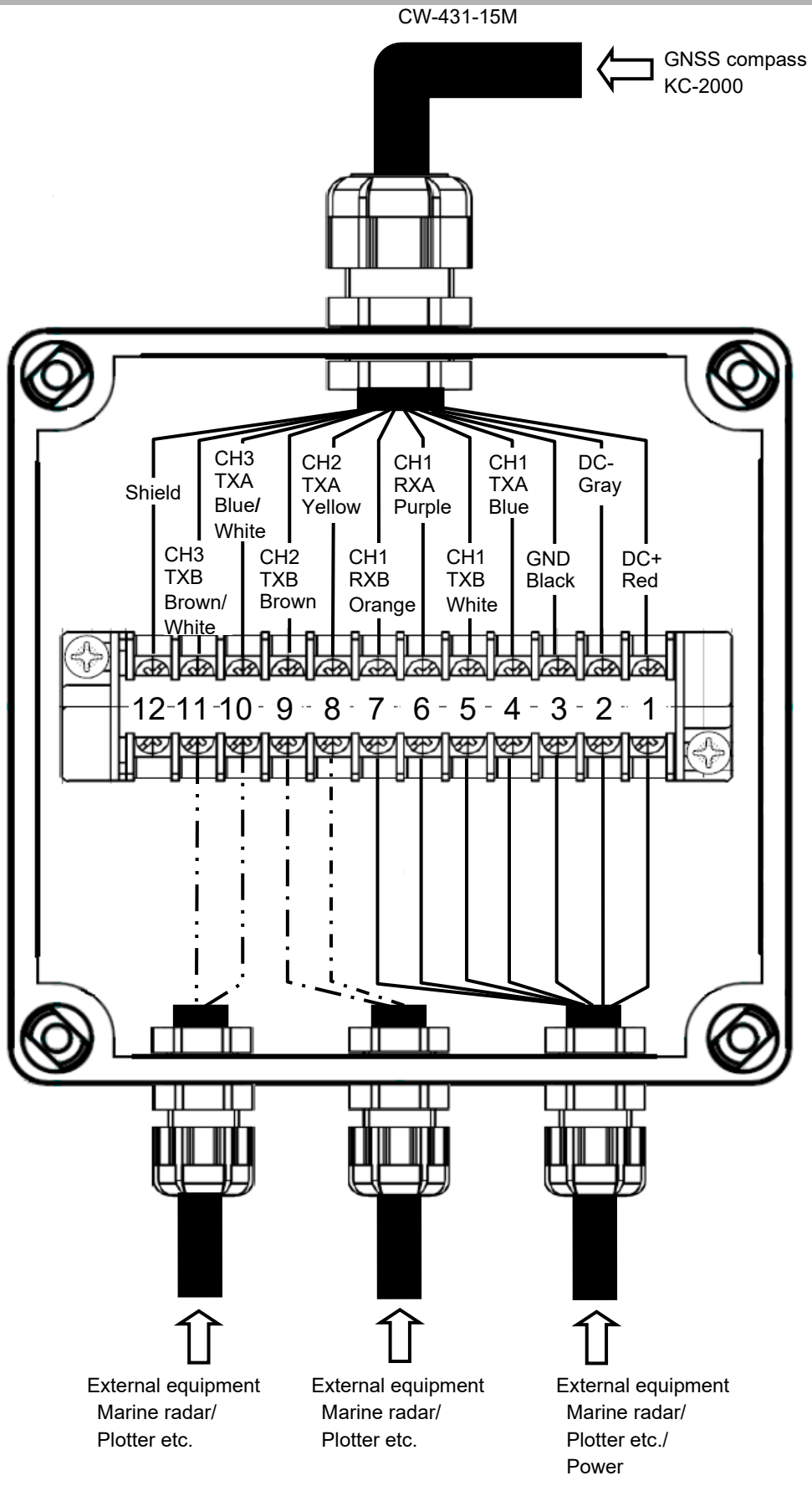
1.4.1 Standard connection



1.4.2 Multi connections



1.5 Connection with junction box JB-41

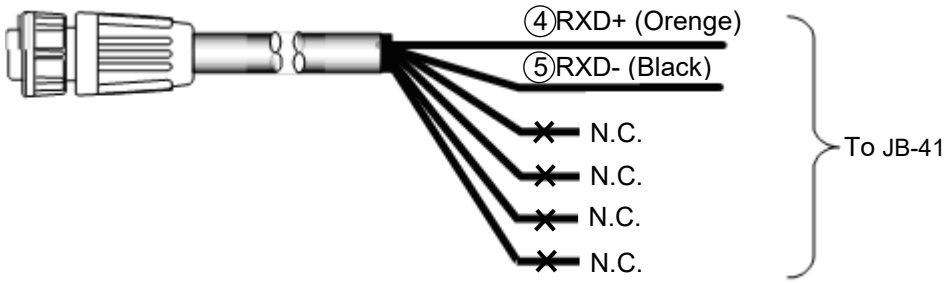


*This is an example connection of using junction box JB-41. Power must be supplied separately.

1.6 Connection with external equipment using CW-376-5/10M

When connecting to external equipment such as a radar/plotter using the optional cable CW-376-5/10M, please cut the unused blue/(GND+shield), white (TX+), red (TX-), and green (+12V) short and insulate it from the core wires of other cables and other wiring.

Structure of CW-376-5/10M



CAUTION

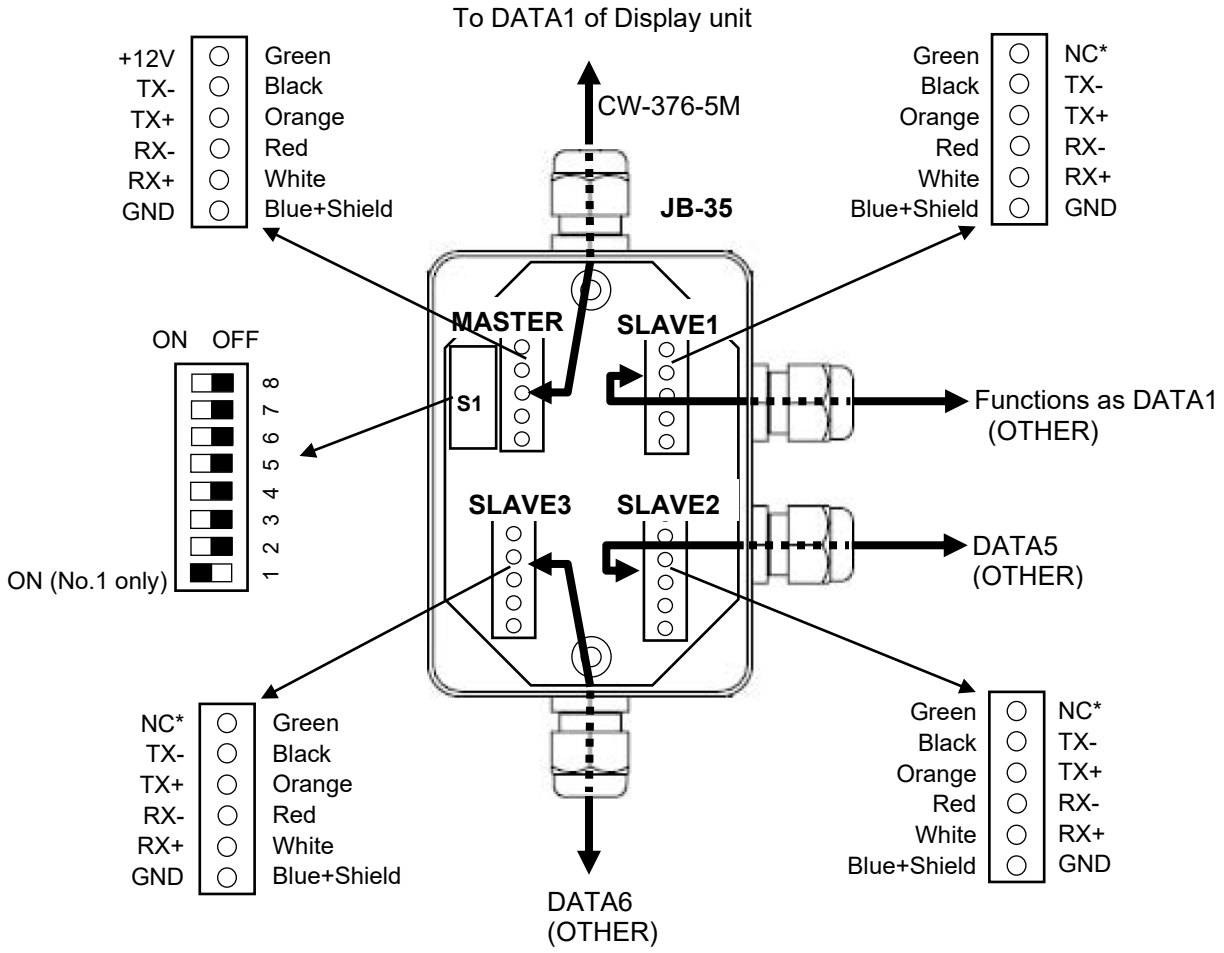
Wind the insulation tape around the un-used lead wire for core-wires not to contact each other.

1.7 How to use junction box JB-35

When connecting JB-35 and increasing the DATA connector, connect as shown below.

Set the DIP switch (S1) as shown below.

When connecting using the optional CW-376-5M, wire as shown in the color diagram below.



CAUTION

Make sure that the cable is not connected to the NC pin of SLAVE1, SLAVE2, and SLAVE3.

1.8 Inspection after installation

Before you turn the unit on, check the following points to make sure the system operates properly.

(1) Is the ship's supply voltage and current within the rated range?

Voltage range: 10.8 to 31.2 VDC measured at the power connector input

Power consumption: MAX 12 W

(2) Are the cables routed and connected properly?

Chapter 2 Specification

2.1 Specification

2.1.1 Specifications

Receiving frequency		1575.4200MHz / 1561.0980MHz / 1602.5625MHz		
Receiving channel		72 channels		
Received signal		GPS QZSS Galileo SBAS	1575.4200MHz	L1 C/A L1 C/A, L1 S E1 B/C L1 C/A
		BeiDou	1561.0980MHz	B1
		GLONASS	1602.5625MHz	L1 OF
Sensitivity		- 148 dBm or less		
Settling time		90 seconds or less (standard)		
Time to position fix		50 seconds or less (standard)		
Accuracy	Heading	1.5° rms or less		
	Position	GPS: 10m (2 drms, SA: OFF, PDOP: 3 or less) SBAS: 3m (2 drms, SA: OFF, PDOP: 3 or less)		
	Velocity	0.1m / sec (rms, SA: OFF, PDOP: 3 or less)		
Heading resolution		0.1° or less		
Maximum rate of turn		45°/sec or more		
Maximum role/pitch angle		30° or more		
Maximum follow-up acceleration		1g		
Base line length		0.2m		
Output data format and sentences		NMEA 0183 Ver.2.0, NMEA 0183 Ver.1.5, IEC 61162-1ed5 ATT, DTM, GBS, GGA, GLL, GNS, GSA, GSV, HDM, HDT, HVE, RMC, ROT, THS, VTG, ZDA, PKODG21, ALC, HBT		

Note: Accuracy is subject to change in accordance with DoD civil GNSS user policy.

2.1.2 Power specifications

Power supply voltage: 10.8 to 31.2 VDC

Power consumption: 12W or less (at 24VDC)

AC Operation: AC/DC rectifier PS-010 is required. (Power supply voltage: 115 VAC / 230 VAC)

2.1.3 Compass safe distance

Standard: 0.4m

Steering: 0.2m

2.1.4 Environmental conditions

(1) Temperature and humidity

Operating temperature	- 25°C to + 55°C
Humidity	93% (+40°C)

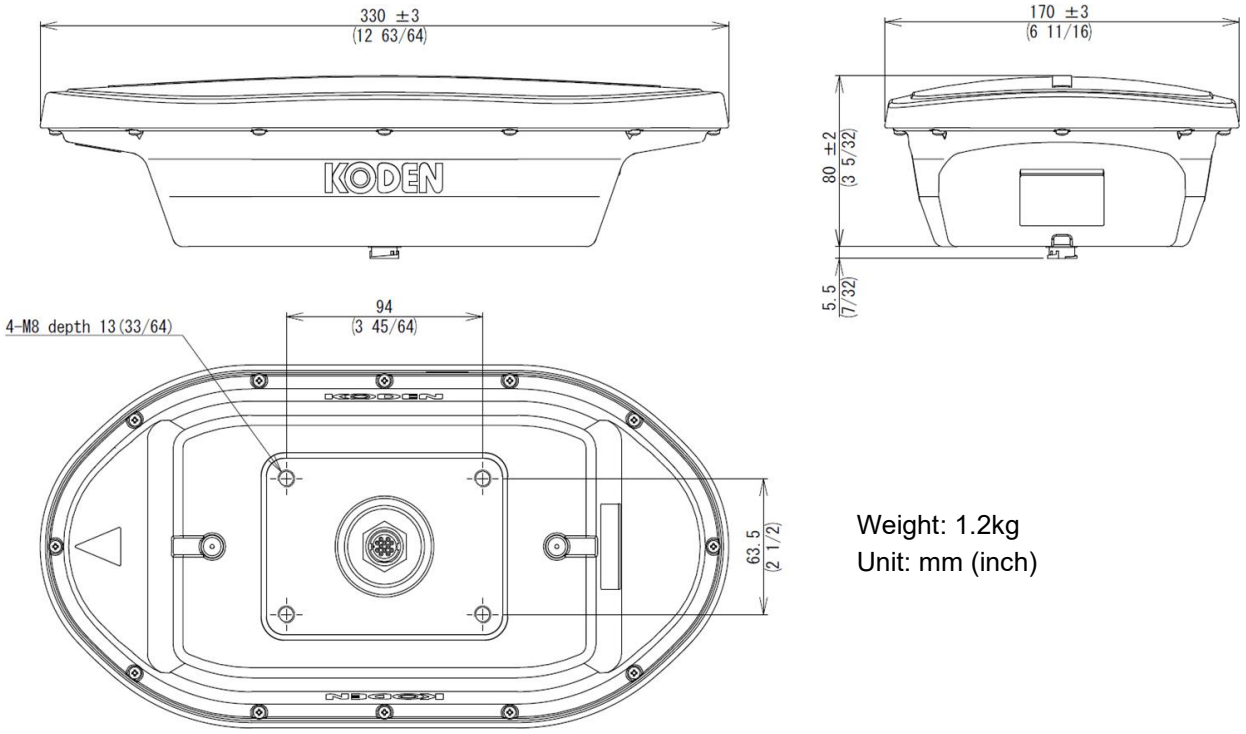
(2) Vibration

IEC 60945 ed.4

(3) Waterproof

IPX6 (water resistant)

2.2 External dimensions and weight



Weight: 1.2kg
Unit: mm (inch)

KODEN

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