

FURUNO

OPERATOR'S MANUAL

GPS RECEIVER

Model **GP-320B**

IMPORTANT NOTICES

General

- This manual has been authored with simplified grammar, to meet the needs of international users.
- The operator of this equipment must read and follow the descriptions in this manual. Wrong operation or maintenance can cancel the warranty or cause injury.
- Do not copy any part of this manual without written permission from FURUNO.
- If this manual is lost or worn, contact your dealer about replacement.
- The contents of this manual and equipment specifications can change without notice.
- The example screens (or illustrations) shown in this manual can be different from the screens you see on your display. The screens you see depend on your system configuration and equipment settings.
- Save this manual for future reference.
- Any modification of the equipment (including software) by persons not authorized by FURUNO will cancel the warranty.
- The following concern acts as our importer in Europe, as defined in DECISION No 768/2008/EC.
 - Name: FURUNO EUROPE B.V.
 - Address: Ridderhaven 19B, 2984 BT Ridderkerk, The Netherlands
- All brand and product names are trademarks, registered trademarks or service marks of their respective holders.

How to discard this product

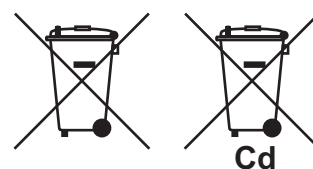
Discard this product according to local regulations for the disposal of industrial waste. For disposal in the USA, see the homepage of the Electronics Industries Alliance (<http://www.eiae.org/>) for the correct method of disposal.

How to discard a used battery

Some FURUNO products have a battery(ies). To see if your product has a battery, see the chapter on Maintenance. Follow the instructions below if a battery is used. Tape the + and - terminals of battery before disposal to prevent fire, heat generation caused by short circuit.

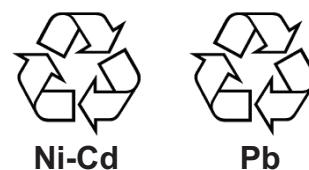
In the European Union

The crossed-out trash can symbol indicates that all types of batteries must not be discarded in standard trash, or at a trash site. Take the used batteries to a battery collection site according to your national legislation and the Batteries Directive 2006/66/EU.



In the USA

The Mobius loop symbol (three chasing arrows) indicates that Ni-Cd and lead-acid rechargeable batteries must be recycled. Take the used batteries to a battery collection site according to local laws.



In the other countries

There are no international standards for the battery recycle symbol. The number of symbols can increase when the other countries make their own recycling symbols in the future.



SAFETY INSTRUCTIONS



CAUTION

Confirm that the power supply voltage is compatible with the voltage rating of the equipment.

Connection to the wrong power supply can cause fire or damage the equipment.

NOTICE

No one navigation device should ever be solely relied upon for the navigation of a vessel.

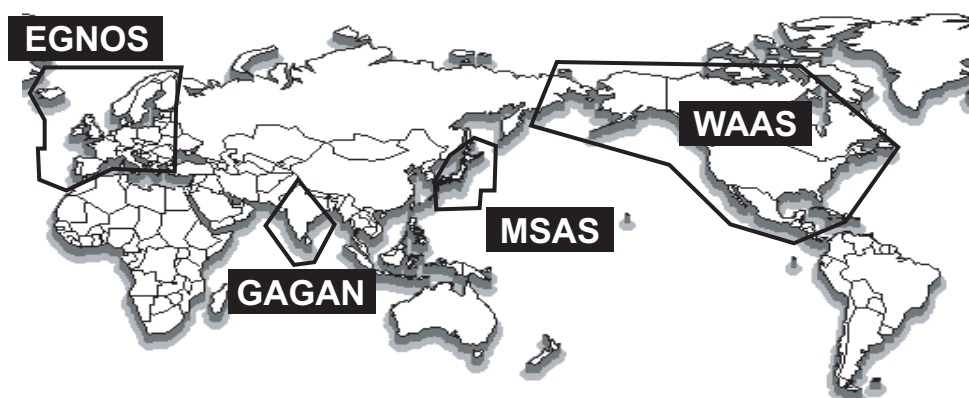
Always confirm position against all available aids to navigation, for safety of vessel and crew.

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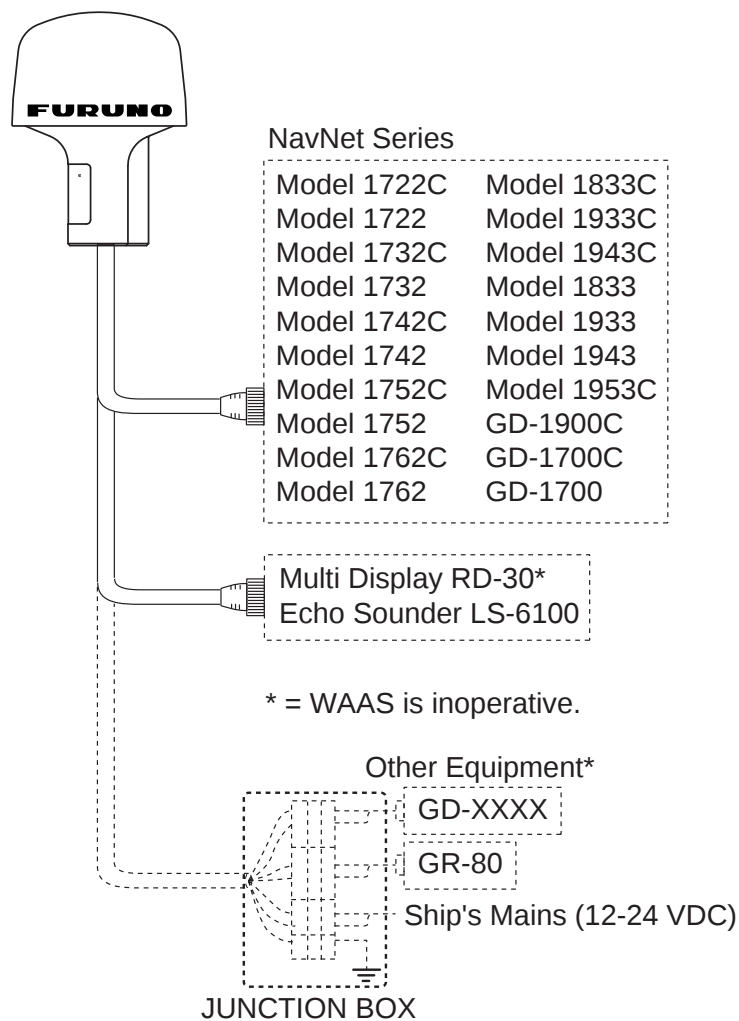
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SYSTEM OVERVIEW

The GP-320B is a GPS receiver with WAAS (Wide Area Augmentation System) capability. WAAS, available in North America, is a provider in the worldwide SBAS (Satellite Based Augmentation System) navigation system. This system provides GPS signal corrections to SBAS users, for even better position accuracy, typically better than three meters. There are three more SBAS providers, MSAS (Multi-Functional Satellite Augmentation System) for Japan, EGNOS (Euro Geostationary Navigation Overlay Service) for Europe and GAGAN (GPS And GEO Augmented Navigation) for India. The illustration below shows the coverage area. (Accuracy may be affected when using a GEO satellite not within your current location.) This manual uses “WAAS” for these three providers generically.



Provider	Satellite type	Longitude	Satellite No.
WAAS	Intelsat Galaxy XV	133°W	135
	TeleSat Anik F1R	107.3°	138
	Inmarsat-4-F3	98°W	133
EGNOS	Inmarsat-3-F2/AOR-E	15.5°W	120
	Artemis	21.5°E	124
	Inmarsat-4-F2	25°E	126
MSAS	MTSAT-1R	140°E	129
	MTSAT-2	145°E	137
GAGAN	Inmarsat-4-F1	64°E	127



This GPS receiver complies with Canadian standard RSS-210 (Low Power License-Exempt Radio communication Devices).
Operation is subject to the following two conditions:
(1) this device may not cause interference, and
(2) this device must accept any interference, including interference that may cause undesired operation of the device.

Program No.

4850264***

** denotes minor modifications.

EQUIPMENT LISTS

Standard supply

Name	Type	Code No.	Qty	Remarks
GPS Receiver	GP-320B	—	1	With 10 m cable

Optional equipment

Name	Type	Code No.	Qty	Remarks
Cable Assembly	MJ-A7SPF/SRMD-100	000-144-534	1	7P-7P, straight, 10 m
Mast Mounting Kit	CP20-01111	004-365-780	1	
Right Angle Antenna Base	NO.13-QA330	000-803-239	1	
L-angle Antenna Base	NO.13-QA310	000-803-240	1	
Handrail-mount Antenna Base	NO.13-RC5160	000-806-114	1	

1. MOUNTING

NOTICE

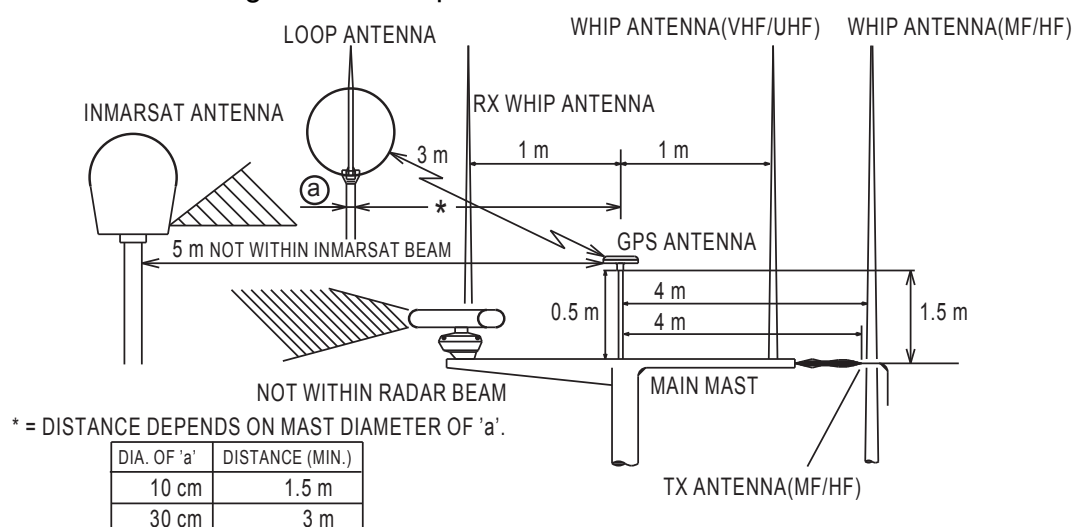
Do not apply paint, anti-corrosive sealant or contact spray to coating or plastic parts of the equipment.

Those items contain organic solvents that can damage coating and plastic parts, especially plastic connectors.

Mounting considerations

Follow the guidelines below to choose a suitable mounting location for the antenna unit.

- The antenna may be mounted three ways: screwed into a pipe (local supply), fixed to a post with the optional mast mounting kit, or screwed into an optional mounting base. For fixing by the post or pipe, it is recommended to use stays to prevent damage to the GPS receiver.
- Select a location out of the radar beam. The radar beam will obstruct or prevent reception of the GPS signal.
- The location should be well away from a VHF antenna. A GPS receiver is interfered by a harmonic wave of a VHF antenna.
- The location should be well away from an Inmarsat antenna. Inmarsat transmission will obstruct or prevent reception of the GPS signal.
- There should be no interfering object within the line-of-sight to the satellites. Objects within line-of-sight to a satellite, for example, a mast, may block reception or prolong acquisition time.
- Mount the antenna unit as high as possible to keep it free of interfering objects and water spray, which can obstruct reception of the GPS signal if the water freezes.
- Observe the following minimum separation distances from other antenna units.



Mounting procedure

Install the antenna unit by referring to the installation diagram on page D-1.

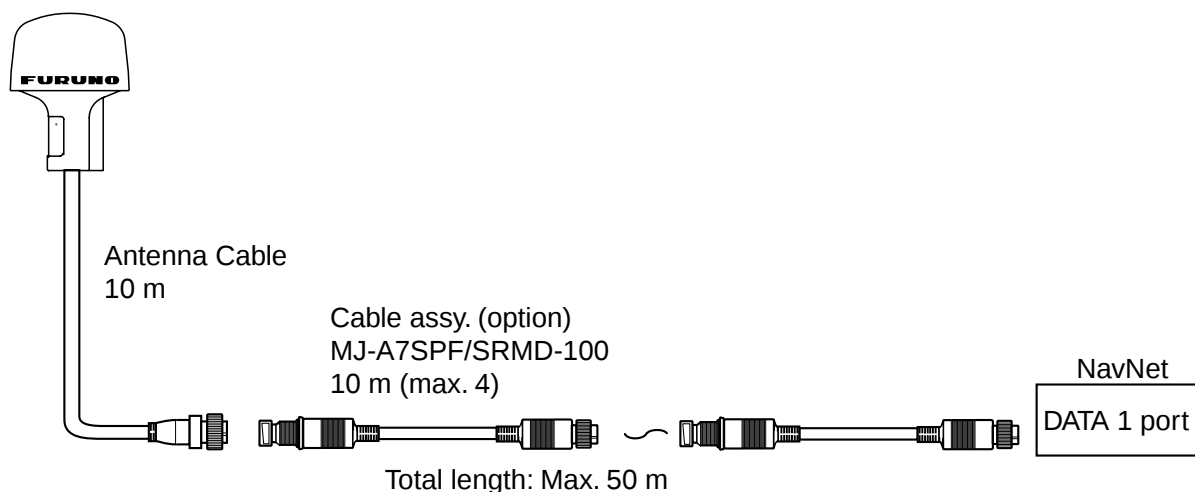
2. WIRING

This unit outputs position and speed to external equipment. NavNet equipment, Multi Display RD-30 and Echo Sounder LS-6100 can be connected directly. For connection to other equipment, use a junction box (local supply) which has seven terminals.

The antenna cable is 10 meters long. If the distance between the antenna unit and the display monitor is more than 10 meters, use the optional cable assy. (10 m). Up to four extension cables can be connected serially.

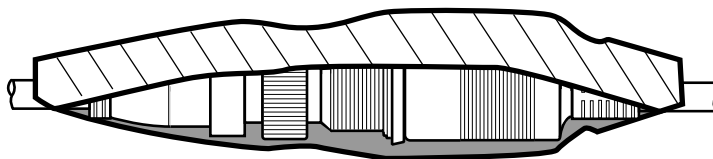
Connecting to FURUNO NavNet equipment

Connect the antenna cable to the DATA1 port on NavNet equipment.



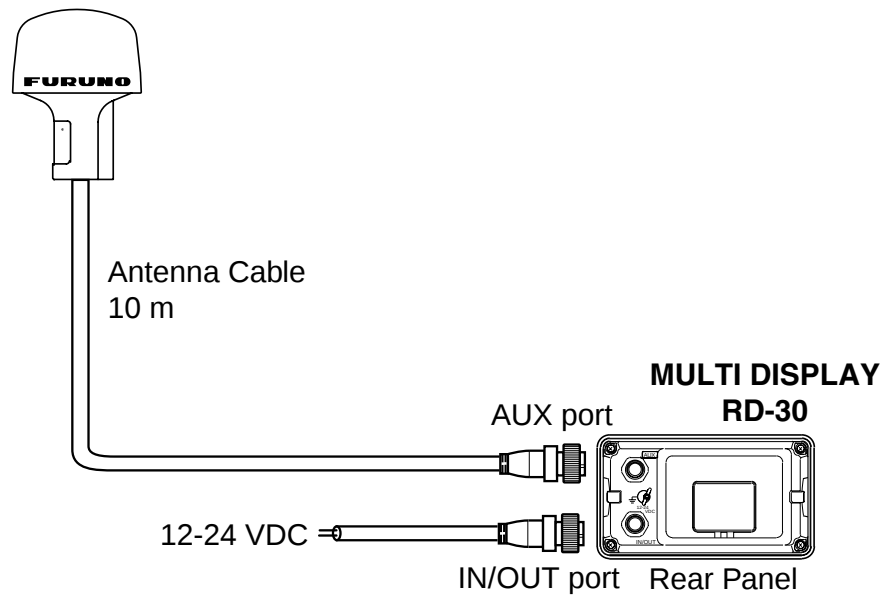
Waterproofing connectors

If you use the cable assy.(s), waterproof their connectors by wrapping them with vulcanizing tape and then vinyl tape. Bind tape ends with suitable cable-ties.

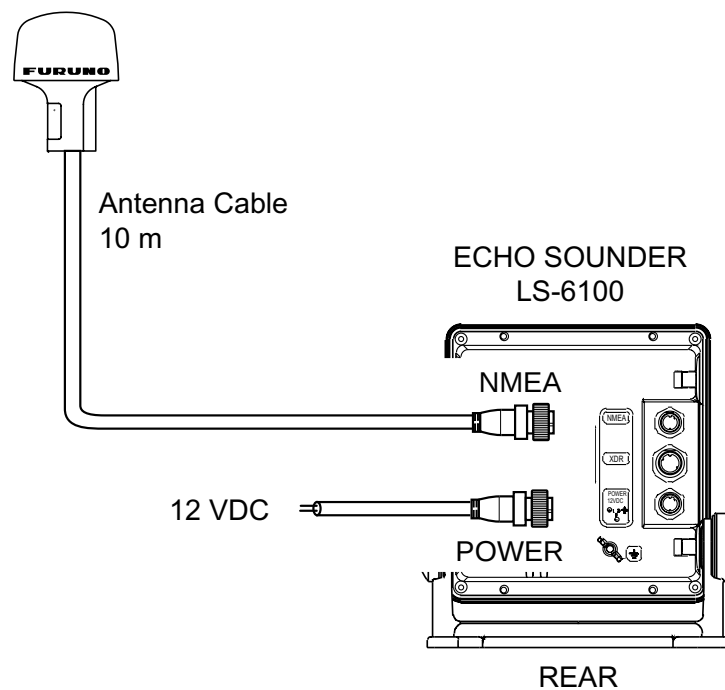


Connecting to Multi Display RD-30

WAAS is not operative in this installation.

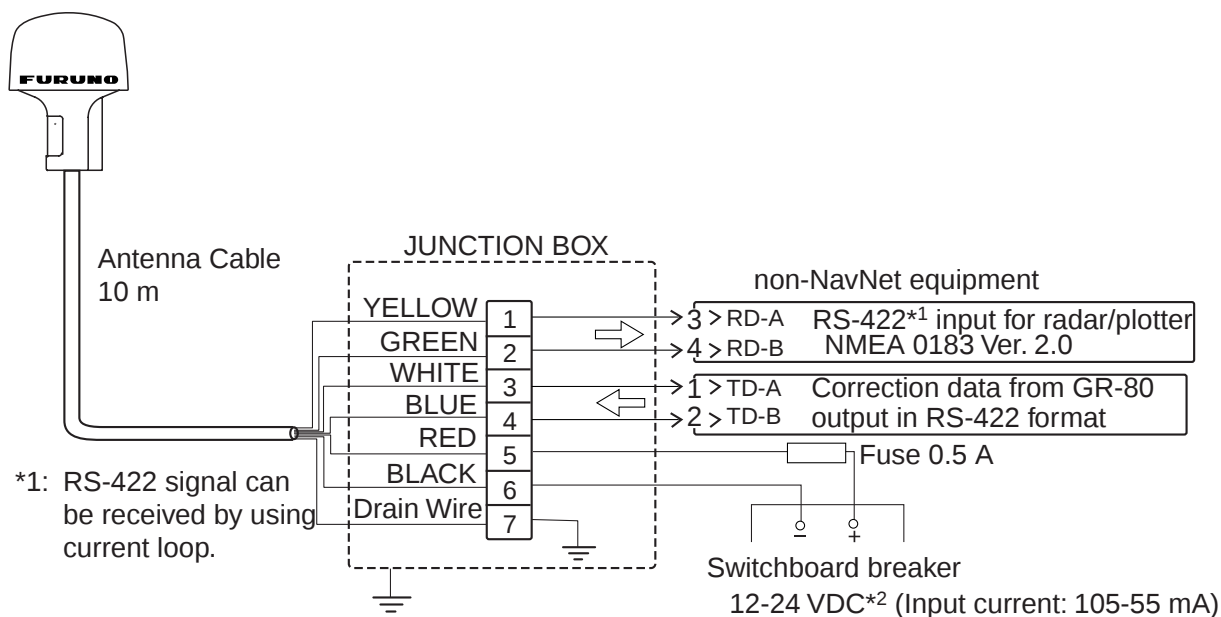


Connecting to Echo Sounder LS-6100



Connecting to other equipment

Remove the connector from the antenna cable and attach crimp-on lugs or similar terminals to the cable's cores. Connect the cores to the junction box as below.



Note 1: When connecting FURUNO DGPS beacon receiver GR-80 to this unit, set it as follows:

Byte Format, 8-6; First Bit, LSB; Parity Bit, None; Stop Bit, 1; Bit Rate, 8.

Note 2: The signal ground and frame ground are separated, however the power line is not isolated. Therefore, do not connect the signal ground to the frame ground when other equipment is connected to a positive ground battery.

Note 3: WAAS function is inoperative when wiring as shown above.

Output/Input data sentences

Priority	Input Data		Output Data		Settable Output Cycle	Default Output
High ↑			GPDTM	Geometric datum	Yes	Yes
	XXGGA	GPS position status (time of fix, latitude, longitude, receive status, satellite used)	GPGGA	GPS fix data	Yes	Yes
	XXZDA	UTC date (time in minutes and seconds, day, month, year, time)	GPZDA	UTC time and date	Yes	Yes
	XXGLL	Position (latitude, longitude)	GPGLL	Geographic position, latitude and longitude	Yes	Yes
			GPVTG	Course over ground and ground speed	Yes	Yes
	XXRMC	Navigation data (UTC time and latitude, longitude, ground speed, true course, year, month, day)	GPRMC	Recommended minimum specific GPS/TRANSIT data	Yes	Yes
↓ Low						

Note 1: Data output from high to low priority.

Note 2: GPDTM data is attached in front of GPGGA, GPGLL and GPRMC when those sentences are output.

Note 3: "XX" means talker ID.

3. DEFAULT SETTINGS

	Setting	Default setting	Backup
GPS	Initial Latitude/Longitude	North=34°44.0000, East=135°21.0000	Yes
	Date, Time	2001/1/1, 00:00:13	Yes
	Antenna Height	0 m	Yes
	Almanac Data	—	Yes
	Ephemeris Data	—	Yes
RECEIVER	Local Zone Time	+0	Yes
	PDOP	6	Yes
	Geometric Datum	WGS84	Yes
	Mask Elevation	5°	Yes
	Disable Satellite	None	No
	Smoothing Coefficient	2 (Standard)	No
	Dynamic Coefficient	2 (Standard)	No
	Data Output (Cycle)	DTM, GGA, ZDA, GLL, VTG, RMC (1 s)	Yes
	DGPS Setting Parameter	1 (LSB first)	Yes
WAAAS	GEO Satellite, Provider ID	Auto: from 120, in sequential order	No
	WAAS Availability	OFF	No
	Type 0 Message	0: Correct data not output for 60 s	Yes

4. TROUBLESHOOTING, BATTERY

Troubleshooting

If the message “No position data” appears on the display of NavNet equipment, there may be a problem with the GPS receiver. Turn off the power and then check the following points:

- 1) Check for objects around the antenna which may interfere with reception.
- 2) Check that the antenna cable is firmly fastened.
- 3) If extension cable(s) are used, check for water leakage at junction point(s).
- 4) Check the antenna cable for damage.
- 5) Check the antenna for damage.

If the problem seems to be with the antenna cable or antenna, contact your dealer.

Battery

The antenna unit contains a lithium battery which preserves data when the power is turned off, and its life is approximately 20 years (operating rate 70%) for large vessels and 10 years (operating rate 20%) for small vessels. The equipment can be used when the voltage of the battery is low, however data is not backed up and the unit starts up in the “cold start” condition.

SPECIFICATIONS OF GPS RECEIVER GP-320B

1 GENERAL

- | | | |
|-----|--------------------------|--|
| 1.1 | Receiving channels | |
| | GPS | 12 channels parallel, 12 satellites tracking |
| | WAAS | 1 channel |
| 1.2 | Rx frequency | 1575.42 MHz |
| 1.3 | Rx code | C/A code, WAAS |
| 1.4 | Position accuracy | |
| | GPS | 10 m (95% of the time, HDOP $\leq$ 4) |
| | DGPS | 5 m (95% of the time, external data required) |
| | WAAS | 3 m (95% of the time) |
| 1.5 | Tracking velocity | 999 kt |
| 1.6 | Position-fixing time | Warm start: 12 s approx., Cold start: 90 s approx. |
| 1.7 | Position update interval | 1 s |

2 INTERFACE

- | | | |
|-----|----------------|--|
| 2.1 | Data format | IEC 61162-1 (NMEA 0183 Ver 2.30) |
| 2.2 | Data sentences | |
| | Input | DGPS: RTCM SC-104, Control command |
| | Output | DTM, GGA, GLL, RMC, VTG, ZDA (default setting) |

3 POWER SUPPLY

12-24 VDC: 105-55 mA

4 ENVIRONMENTAL CONDITION

- | | | |
|-----|----------------------|----------------|
| 4.1 | Ambient temperature | -25°C to +70°C |
| 4.2 | Relative humidity | 95% at 40°C |
| 4.3 | Degree of protection | IPX6 |
| 4.4 | Vibration | IEC 60945 |

5 UNIT COLOR

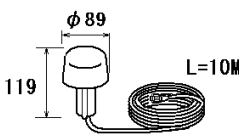
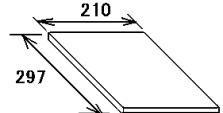
N9.5

PACKING LIST

20AW-X-9852 -1 1/1

GP-320B (E)

A-1

N A M E	O U T L I N E	DESCRIPTION/CODE No.	Q' TY
ユニット	UNIT		
GPS受信機 GPS RECEIVER		GP-320B (E) 004-367-500-00	1
図書	DOCUMENT		
取扱説明書 OPERATOR'S MANUAL		OME-44220-* 000-809-291-1*	1

型式/コード番号が2段の場合、下段より上段に代わる過渡期品であり、どちらかが入っています。なお、品質は変わりません。

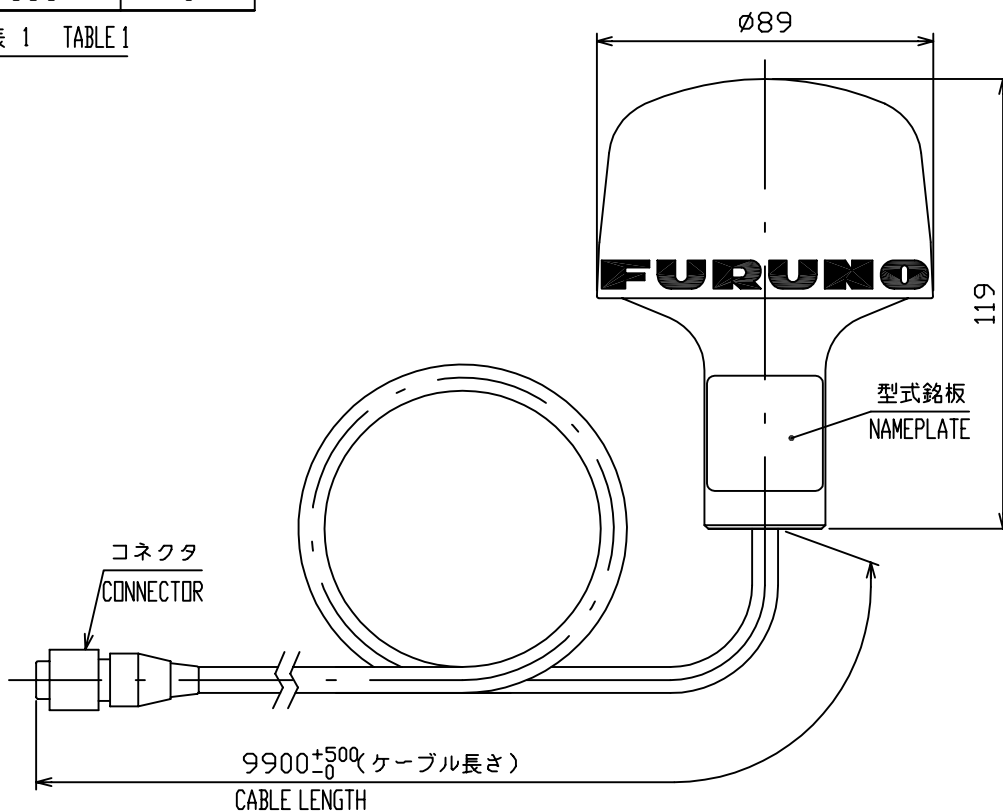
TWO TYPES AND CODES MAY BE LISTED FOR AN ITEM. THE LOWER PRODUCT MAY BE SHIPPED IN PLACE OF THE UPPER PRODUCT. QUALITY IS THE SAME.

(略図の寸法は、参考値です。DIMENSIONS IN DRAWING FOR REFERENCE ONLY.)

C4422-Z02-B

寸法区分(mm) DIMENSION	公差(mm) TOLERANCE
0 < L ≤ 50	±1.5
50 < L ≤ 100	±2.5
100 < L ≤ 500	±3

表 1 TABLE 1



1-14UNS1B

ねじ山数(25.4mmにつき): 14

ピッチ: 1.8143 mm

オネジ有効長さ: 15.17 mm

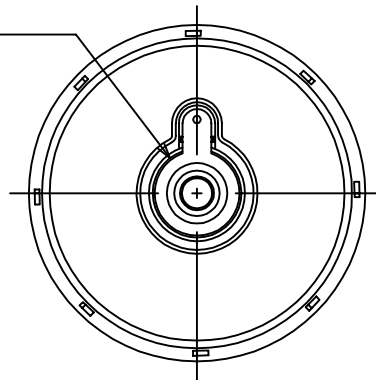
オネジ有効径: 24.17 mm

THREAD PER 25.4mm (1 INCH): 14

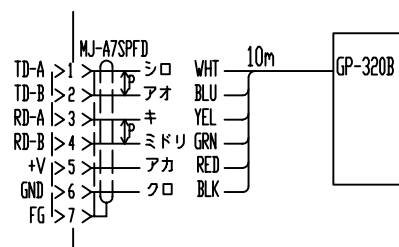
PITCH: 1.8143 mm

THREAD LENGTH: 15.17 mm

PITCH DIAMETER: 24.17 mm



機器との接続 CONNECTION TO EQUIPMENT



注記: 指定外の寸法公差は表 1 による

NOTE: TABLE 1 INDICATES TOLERANCE OF DIMENSIONS.

DRAWN Sep. 20 '02 T.YAMASAKI		TITLE GP-320B
CHECKED Sep. 20 '02 Y.KIMURA		名称 GPS受信機
APPROVED Sep. 20 '02 Y. Kimura		外寸図
SCALE MASS $\pm 10\%$ 0.80 kg	質量はケーブルを含む。 MASS W/ CABLE	NAME GPS RECEIVER
DWG No. C4422-G01-C	20-023-100G-1	OUTLINE DRAWING

FURUNO Worldwide Warranty for Pleasure Boats (Except North America)

This warranty is valid for products manufactured by Furuno Electric Co. (hereafter FURUNO) and installed on a pleasure boat. Any web based purchases that are imported into other countries by anyone other than a FURUNO certified dealer may not comply with local standards. FURUNO strongly recommends against importing these products from international websites as the imported product may not work correctly and may interfere with other electronic devices. The imported product may also be in breach of the local laws and mandated technical requirements. Products imported into other countries as described previously shall not be eligible for local warranty service.

For products purchased outside of your country please contact the national distributor of Furuno products in the country where purchased.

This warranty is in addition to the customer's statutory legal rights.

1. Terms and Conditions of Warranty

FURUNO guarantees that each new FURUNO product is the result of quality materials and workmanship. The warranty is valid for a period of 2 years (24 months) from the date of the invoice, or the date of commissioning of the product by the installing certified dealer.

2. FURUNO Standard Warranty

The FURUNO standard warranty covers spare parts and labour costs associated with a warranty claim, provided that the product is returned to a FURUNO national distributor by prepaid carrier.

The FURUNO standard warranty includes:

- Repair at a FURUNO national distributor
- All spare parts for the repair
- Cost for economical shipment to customer

3. FURUNO Onboard Warranty

If the product was installed/commissioned and registered by a certified FURUNO dealer, the customer has the right to the onboard warranty.

The FURUNO onboard warranty includes

- Free shipping of the necessary parts
- Labour: Normal working hours only
- Travel time: Up to a maximum of two (2) hours
- Travel distance: Up to a maximum of one hundred and sixty (160) KM by car for the complete journey

4. Warranty Registration

For the Standard Warranty - presentation of product with serial number (8 digits serial number, 1234-5678) is sufficient. Otherwise, the invoice with serial number, name and stamp of the dealer and date of purchase is shown.

For the Onboard Warranty your FURUNO certified dealer will take care of all registrations.

5. Warranty Claims

For the Standard Warranty - simply send the defective product together with the invoice to a FURUNO national distributor. For the Onboard Warranty – contact a FURUNO national distributor or a certified dealer. Give the product's serial number and describe the problem as accurately as possible.

Warranty repairs carried out by companies/persons other than a FURUNO national distributor or a certified dealer is not covered by this warranty.

6. Warranty Limitations

When a claim is made, FURUNO has a right to choose whether to repair the product or replace it.

The FURUNO warranty is only valid if the product was correctly installed and used. Therefore, it is necessary for the customer to comply with the instructions in the handbook. Problems which result from not complying with the instruction manual are not covered by the warranty.

FURUNO is not liable for any damage caused to the vessel by using a FURUNO product.

The following are excluded from this warranty:

- a. Second-hand product
- b. Underwater unit such as transducer and hull unit
- c. Routine maintenance, alignment and calibration services.
- d. Replacement of consumable parts such as fuses, lamps, recording papers, drive belts, cables, protective covers and batteries.
- e. Magnetron and MIC with more than 1000 transmitting hours or older than 12 months, whichever comes first.
- f. Costs associated with the replacement of a transducer (e.g. Crane, docking or diver etc.).
- g. Sea trial, test and evaluation or other demonstrations.
- h. Products repaired or altered by anyone other than the FURUNO national distributor or an authorized dealer.
- i. Products on which the serial number is altered, defaced or removed.
- j. Problems resulting from an accident, negligence, misuse, improper installation, vandalism or water penetration.
- k. Damage resulting from a force majeure or other natural catastrophe or calamity.
- l. Damage from shipping or transit.
- m. Software updates, except when deemed necessary and warrantable by FURUNO.
- n. Overtime, extra labour outside of normal hours such as weekend/holiday, and travel costs above the 160 KM allowance
- o. Operator familiarization and orientation.

FURUNO Electric Company, March 1, 2011

FURUNO Warranty for North America

FURUNO U.S.A., Limited Warranty provides a twenty-four (24) months LABOR and twenty-four (24) months PARTS warranty on products from the date of installation or purchase by the original owner. Products or components that are represented as being waterproof are guaranteed to be waterproof only for, and within the limits, of the warranty period stated above. The warranty start date may not exceed eighteen (18) months from the original date of purchase by dealer from Furuno USA and applies to new equipment installed and operated in accordance with Furuno USA's published instructions.

Magnetrons and Microwave devices will be warranted for a period of 12 months from date of original equipment installation.

Furuno U.S.A., Inc. warrants each new product to be of sound material and workmanship and through its authorized dealer will exchange any parts proven to be defective in material or workmanship under normal use at no charge for a period of 24 months from the date of installation or purchase.

Furuno U.S.A., Inc., through an authorized Furuno dealer will provide labor at no cost to replace defective parts, exclusive of routine maintenance or normal adjustments, for a period of 24 months from installation date provided the work is done by Furuno U.S.A., Inc. or an AUTHORIZED Furuno dealer during normal shop hours and within a radius of 50 miles of the shop location.

A suitable proof of purchase showing date of purchase, or installation certification must be available to Furuno U.S.A., Inc., or its authorized dealer at the time of request for warranty service.

This warranty is valid for installation of products manufactured by Furuno Electric Co. (hereafter FURUNO). Any purchases from brick and mortar or web-based resellers that are imported into other countries by anyone other than a FURUNO certified dealer, agent or subsidiary may not comply with local standards. FURUNO strongly recommends against importing these products from international websites or other resellers, as the imported product may not work correctly and may interfere with other electronic devices. The imported product may also be in breach of the local laws and mandated technical requirements. Products imported into other countries, as described previously, shall not be eligible for local warranty service.

For products purchased outside of your country please contact the national distributor of Furuno products in the country where purchased.

WARRANTY REGISTRATION AND INFORMATION

To register your product for warranty, as well as see the complete warranty guidelines and limitations, please visit www.furunousa.com and click on "Support". In order to expedite repairs, warranty service on Furuno equipment is provided through its authorized dealer network. If this is not possible or practical, please contact Furuno U.S.A., Inc. to arrange warranty service.

FURUNO U.S.A., INC.
Attention: Service Coordinator
4400 N.W. Pacific Rim Boulevard
Camas, WA 98607-9408
Telephone: (360) 834-9300
FAX: (360) 834-9400

Furuno U.S.A., Inc. is proud to supply you with the highest quality in Marine Electronics. We know you had several choices when making your selection of equipment, and from everyone at Furuno we thank you. Furuno takes great pride in customer service.

Declaration of ConformityWe **FURUNO ELECTRIC CO., LTD.**

(Manufacturer)

9-52 Ashihara-Cho, Nishinomiya City, 662-8580, Hyogo, Japan

(Address)

declare under our sole responsibility that the product

GPS RECEIVER GP-320B

(Model name, type number)

is in conformity with the essential requirements as described in the Directive 1999/5/EC of the European Parliament and of the Council of 9 March 1999 on radio equipment and telecommunications terminal equipment (R&TTE Directive) and satisfies all the technical regulations applicable to the product within this Directive

IEC 60945 Ed. 4.0: 2002 EMC related items
IEC 60950-1 Ed. 2.0: 2005 Safety related items
IEC 60950-1 Ed. 2.0 A1: 2009 Safety related items

(title and/or number and date of issue of the standard(s) or other normative document(s))

For assessment, see

- Statement of Opinion No. 11214046 issued by Telefication, The Netherlands.

On behalf of Furuno Electric Co., Ltd.


Takahiko Kusuda
Manager, QMS Secretariat
Quality Assurance DepartmentNishinomiya City, Japan
May 20, 2011

(Place and date of issue)

(name and signature or equivalent marking of authorized person)



(Elemental Chlorine Free)

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is elemental chlorine free.

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Nishinomiya, 662-8580, JAPAN

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