FURUNO

Installation Manual
GNSS NAVIGATOR
Model GP-170

FURUNO ELECTRIC CO., LTD.

www.furuno.com

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・FURUNO Authorized Distributor/Dealer

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(MIKU) GP-170

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⚠ SAFETY INSTRUCTIONS

The installer must read the appropriate safety instructions before attempting to install the equipment.

⚠ WARNING	Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.
⚠ CAUTION	Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

(Examples of symbols)

 Warning, Caution

 Prohibitive Action

 Mandatory Action

⚠ WARNING

Do not disassemble or modify the equipment.

Fire, electrical shock or serious injury can occur.

Turn off the power at the switchboard before beginning the installation.

Fire or electrical shock can result if the power is left on.

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

Connection of an incorrect power supply can cause fire or damage the equipment.

⚠ CAUTION

Ground the equipment to prevent electrical shock and mutual interference.

Use the proper fuse.

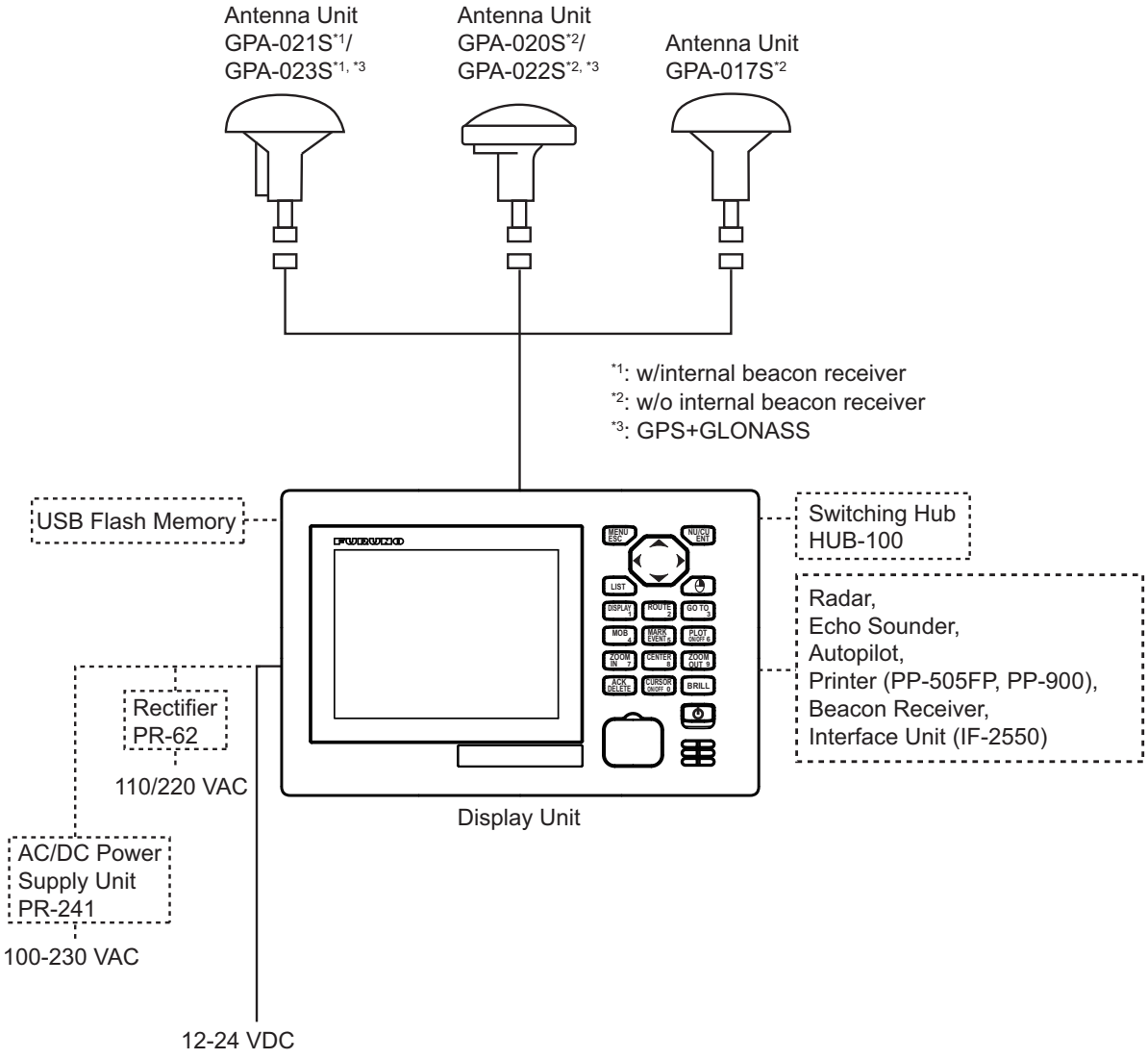
Use of an incorrect fuse may damage the equipment.

Observe the following compass safe distances to prevent interference to a magnetic compass:

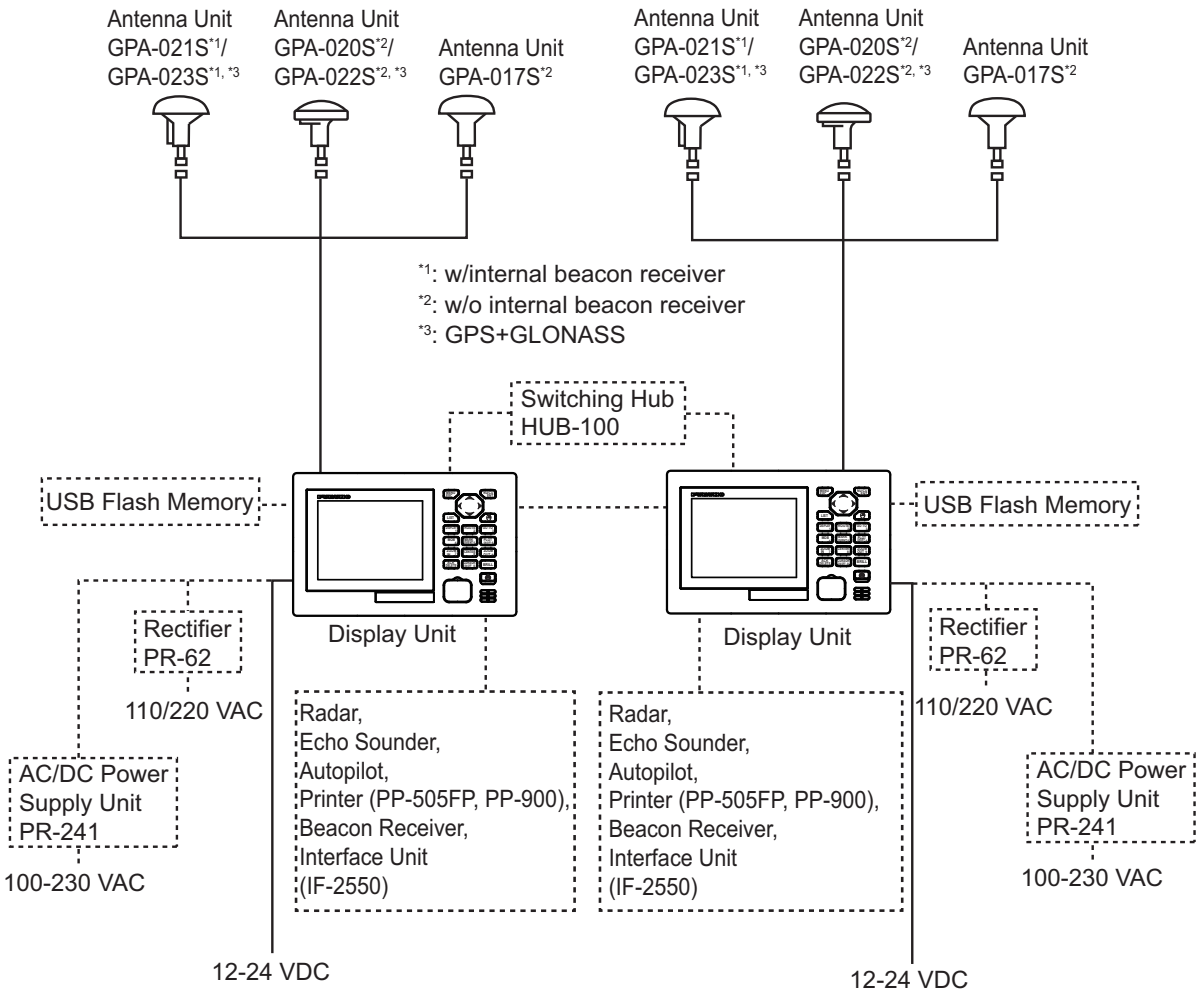
	Standard compass	Steering compass
Display unit	1.30 m	0.85 m
GPA-017S	0.30 m	0.30 m
GPA-020S	0.30 m	0.30 m
GPA-021S	0.30 m	0.30 m
GPA-022S	0.30 m	0.30 m
GPA-023S	0.30 m	0.30 m

SYSTEM CONFIGURATIONS

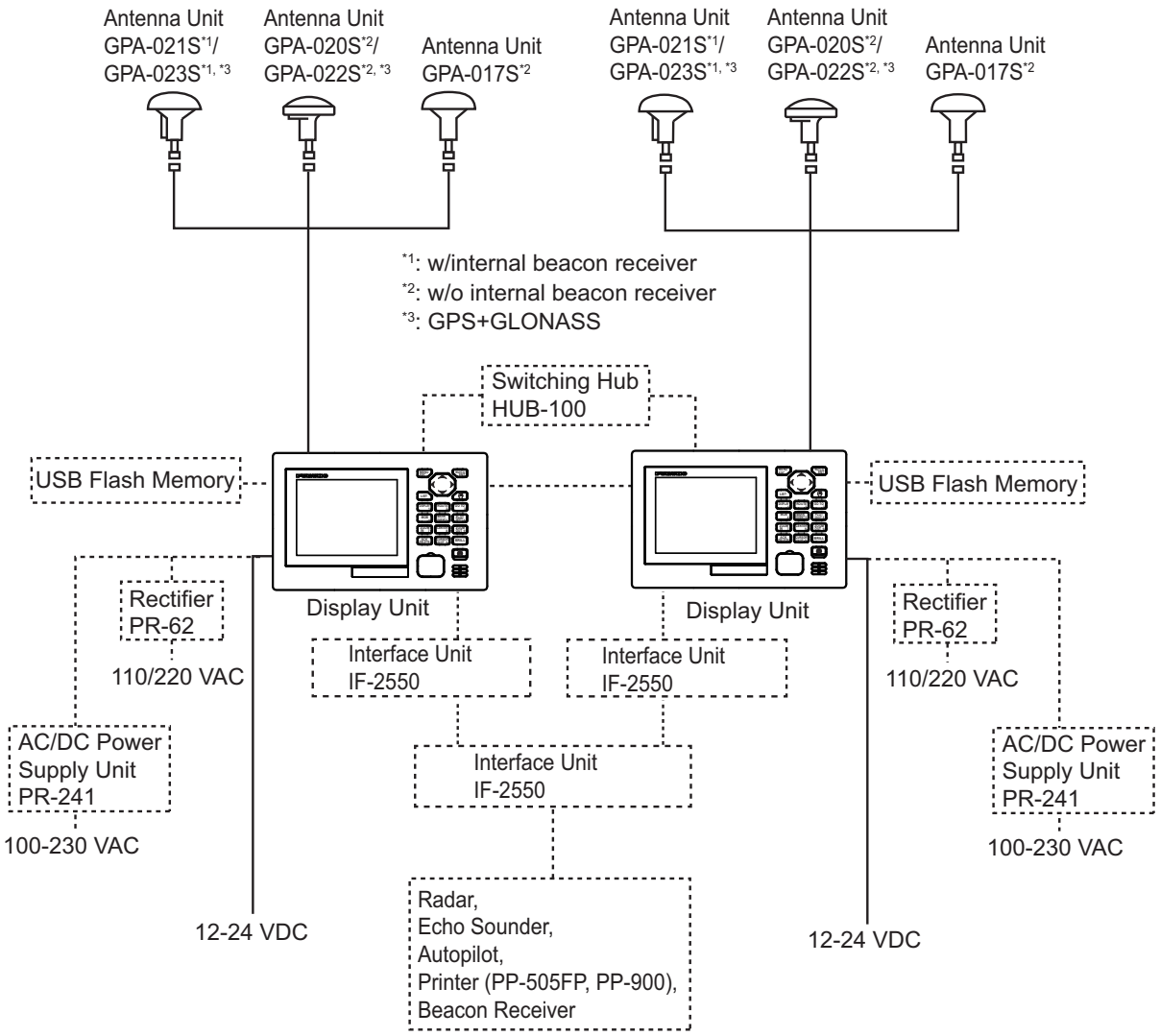
Single configuration



Dual configuration (No interface unit used)



Dual configuration (With IF-2550)



Environmental category

Units	Category
Antenna Unit	Exposed to the weather
Display Unit	Protected from the weather

EQUIPMENT LISTS

Standard Supply

Name	Type	Qty	Remarks
Antenna Unit	GPA-017S	1	For GPS, ϕ69
	GPA-020S*		For GPS, ϕ156
	GPA-021S*		For DGPS, ϕ156
	GPA-022S*		For GPS/GLONASS, ϕ157
	GPA-023S*		For DGPS/DGLONASS, ϕ157
Display Unit	GP170-EA	1	With DGPS/DGLONASS Beacon Receiver
	GP170-EN		Without DGPS/DGLONASS Beacon Receiver
Installation Materials	CP20-03400	1	With Mast Mount Kit With Antenna Cable Assy.
	CP20-03410		With Mast Mount Kit Without Antenna Cable Assy.
	CP20-03420		Without Mast Mount Kit With Antenna Cable Assy.
	CP20-03430		Without Mast Mount Kit Without Antenna Cable Assy.
	CP20-03470		Without Mast Mount Kit With Antenna Cable Assy. and Cable Assy.
Accessories	FP20-01100	1	LCD Cleaning Cloth (19-028-3125-5)
Spare Parts	SP20-01401	1	Fuse (FGBO-A 250V 2A PBF)

*: Improved resistance to multipath

Optional Supply

Name	Type	Remarks
Flush Mount Kit S	OP20-40	For display unit
Flush Mount Kit F	OP20-41	
Antenna Cable Set	CP20-01700	CP20-01701+30m cable Cable type: 8D-FB
	CP20-02700	CP20-02701+30m cable Cable type: 8D-FB
	CP20-01720	CP20-01701+40m cable Cable type: 8D-FB
	CP20-02720	CP20-02701+40m cable Cable type: 8D-FB
	CP20-01710	CP20-01701+50m cable Cable type: 8D-FB
	CP20-02710	CP20-02701+50m cable Cable type: 8D-FB
Antenna Cable Assy.	TNC-PS/PS-3D-L15M-R	15 m Cable type: 3D-2V
Mast Mount Kit	CP20-01111	For antenna unit

Name	Type	Remarks
Cable Assy.	MJ-A3SPF0013A-050C	For PP-900 power cable, 5m
	MJ-A6SPF0021B-020+	For connection between PP-900 and IF-2550, 2m
	MJ-A6SPF0021B-050+	For connection between PP-900 and IF-2550, 5m
	MJ-A6SPF0011-050C	Cross cable 5m, 6P-4P For DATA1, 2 or 3
	MJ-A6SPF0011-100C	Cross cable 10m, 6P-4P For DATA1, 2 or 3
	MJ-A6SPF0011-200C	Cross cable 20m, 6P-4P For DATA1, 2 or 3
	MJ-A7SPF0003-050C	w/connector, 5m, 7P For DATA4
	MJ-A6SPF0003-050C	w/connector, 5m, 6P For DATA1, 2 or 3
	MJ-A6SPF0012-050C	Cross cable 5m, 6p-6p For DATA1, 2 or 3
	MJ-A6SPF0012-100C	Cross cable 10m, 6p-6p For DATA1, 2 or 3
	MJ-A6SPF0012-200C	Cross cable 20m, 6p-6p For DATA1, 2 or 3
	MOD-WPAS0001-030+	3m, Waterproof
Beacon Receiver Set	OP20-42	For GPA-021S
	OP20-55	For GPA-023S
Rectifier	PR-62	For 100VAC
		For 220VAC
AC/DC Power Supply Unit	PR-241	For 100-230 VAC
Ferrite Core	OP86-11	For PR-241
Printer	PP-505FP	
	PP-900	IF-2550 required
Data Switch Box	MD-200	
Interface Unit	IF-2550	

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.

1.1 Display Unit

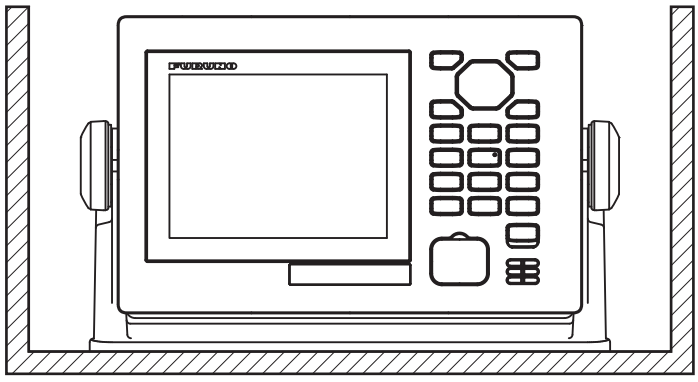
When selecting a mounting location for GP-170, keep in mind the following points.

- Keep the display unit out of direct sunlight.
- Locate the unit away from air-conditioner or heater.
- The temperature at the mounting location shall be between -15°C and +55°C.
- 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 (comply with IEC 60945 Ed.4).
- Keep the display unit away from equipment that generates electromagnetic fields, such as motor, generator.
- For maintenance and checking purposes, leave sufficient space around the unit and leave slack in cables. Minimum recommended space is shown in the outline drawing for the display unit.

The GP-170 can be flush mounted in a console or panel, or mounted on a desktop. Refer to the outline drawing at the end of manual.

1.1.1 Table top mounting

Mount the display unit on a desktop using the hanger.



1.1.2 Flush mounting, fixed at front

An optional flush mount kit type F is required. For details, see the outline drawing at end of this manual. (Name: Flush Mount Kit F, Type: OP20-41)

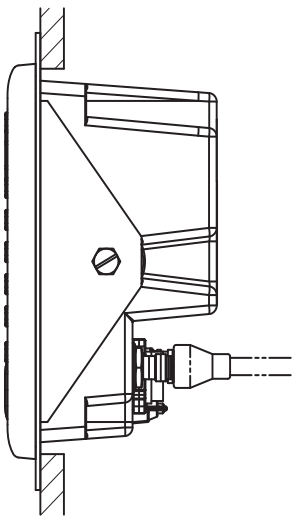
Name	Type	Qty
Self-tapping screw	5×20 SUS304	4
Hex.bolt	M6×12 SUS304	2
Spring washer	M6 SUS304	2
Cosmetic panel	20-035-1061	1

1.1.3 Flush mounting, fixed at rear

An optional flush mount kit type S is required. (Name: Flush Mount Kit S, Type: OP20-40)

Name	Type	Qty
Wing bolt	M4×30 YBSC2	4
Hex. bolt	M6×12 SUS304	2
Wing nut	M4 YBCS2	4
Spring washer	M6 SUS304	2
Flush mount metal	20-035-1062	2

1. Prepare a cutout in the mounting location whose dimensions are 242 (W) X 152 (H) mm.
2. Insert the unit to the cutout.
3. Attach two flush mount metals to the unit with two hex bolts (M6×12) and two spring washers
4. Screw four wing bolts to wing nut.
5. Fasten the unit with wing bolts assembled at step 4, and then tighten nuts.



1.2 Antenna Unit

1.2.1 Mounting

Install the antenna unit referring to the "INSTALLATION PROCEDURE" at end of manual. When selecting a mounting location for the antenna unit, keep in mind the following points.

- Select a location out of the radar and inmarsat beams. Those beams will obstruct or prevent reception of the GPS/GLONASS satellite signal.
- The location should be well away from a VHF/UHF antenna. A GPS/GLONASS receiver is interfered by a harmonic wave of a VHF/UHF antenna.
- The should be no interfering object within the line-of-sight to the satellites. An object within line-of-sight to satellites, for example, a mast, may block reception or prolong acquisition time.
- Mount the antenna unit as high as possible to keep it free from interfering objects and water spray. Freezing water can interrupt reception of the GPS/GLONASS satellite signal.

1.2.2 Extending antenna cable length

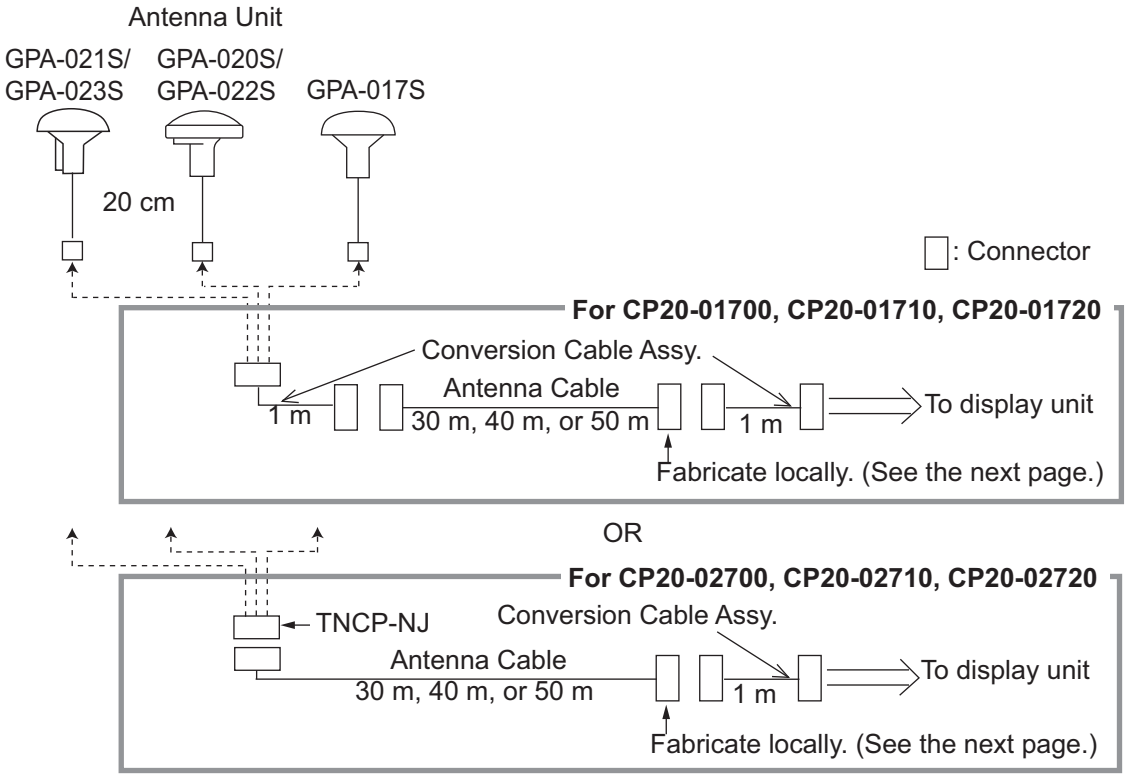
Extension cable line-up

The standard cable is 15 m long. 30 m, 40 m, and 50 m long extension cable sets are optionally available.

Cable length	Necessary parts
30 m	CP20-01700
	CP20-02700
40 m	CP20-01720
	CP20-02720
50 m	CP20-01710
	CP20-02710

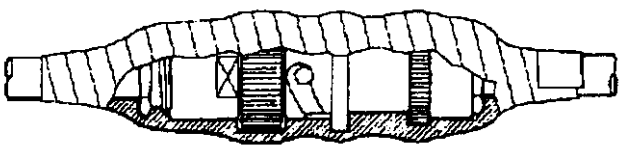
How to extend the antenna cable

Fabricate the end of antenna cable and attach the coaxial connector, then connect the antenna cable as shown below.



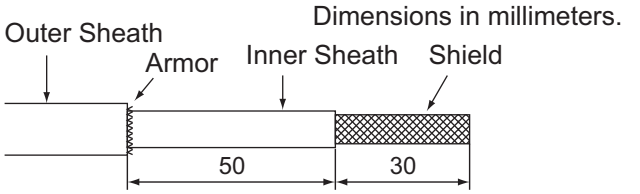
Waterproofing the connector

Wrap connector with vulcanizing tape and then with vinyl tape. Bind the tape end with cable-tie.

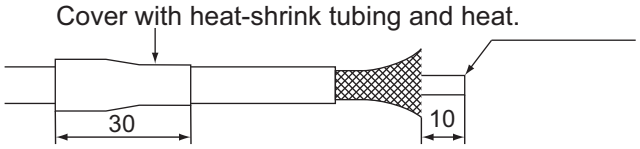


How to waterproof the connector of the antenna cable

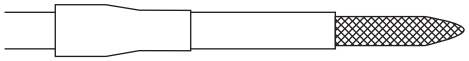
How to attach the N-P-8D-FB connector



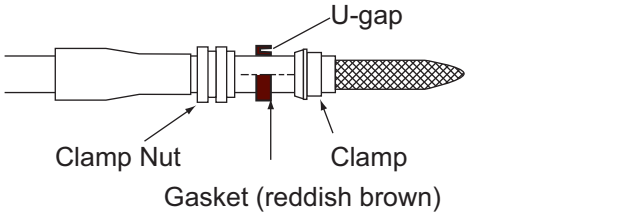
Remove outer sheath and armor by the dimensions shown left.
Expose inner sheath and shield by the dimensions shown left.



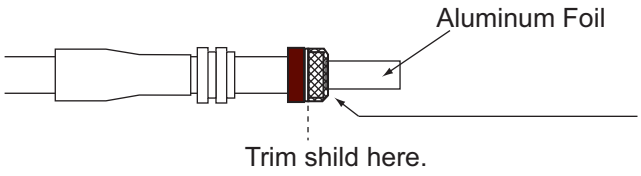
Remove insulator and core by 10 mm.



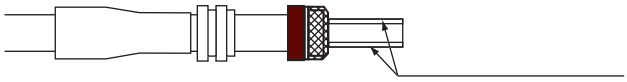
Twist shield end.



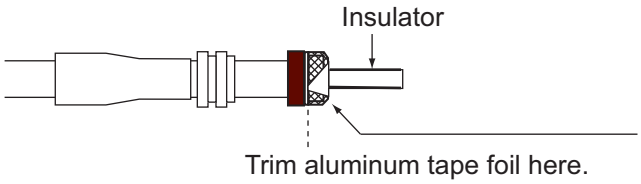
Slip on clamp nut, gasket and clamp as shown left.



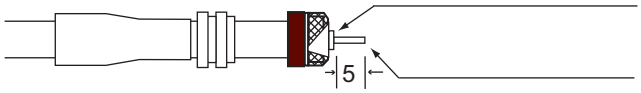
Fold back shield over clamp and trim.



Cut aluminum foil at four places, 90° from one another.

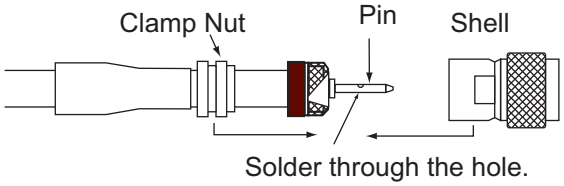


Fold back aluminum tape foil onto shield and trim.



Expose the insulator by 1 mm.

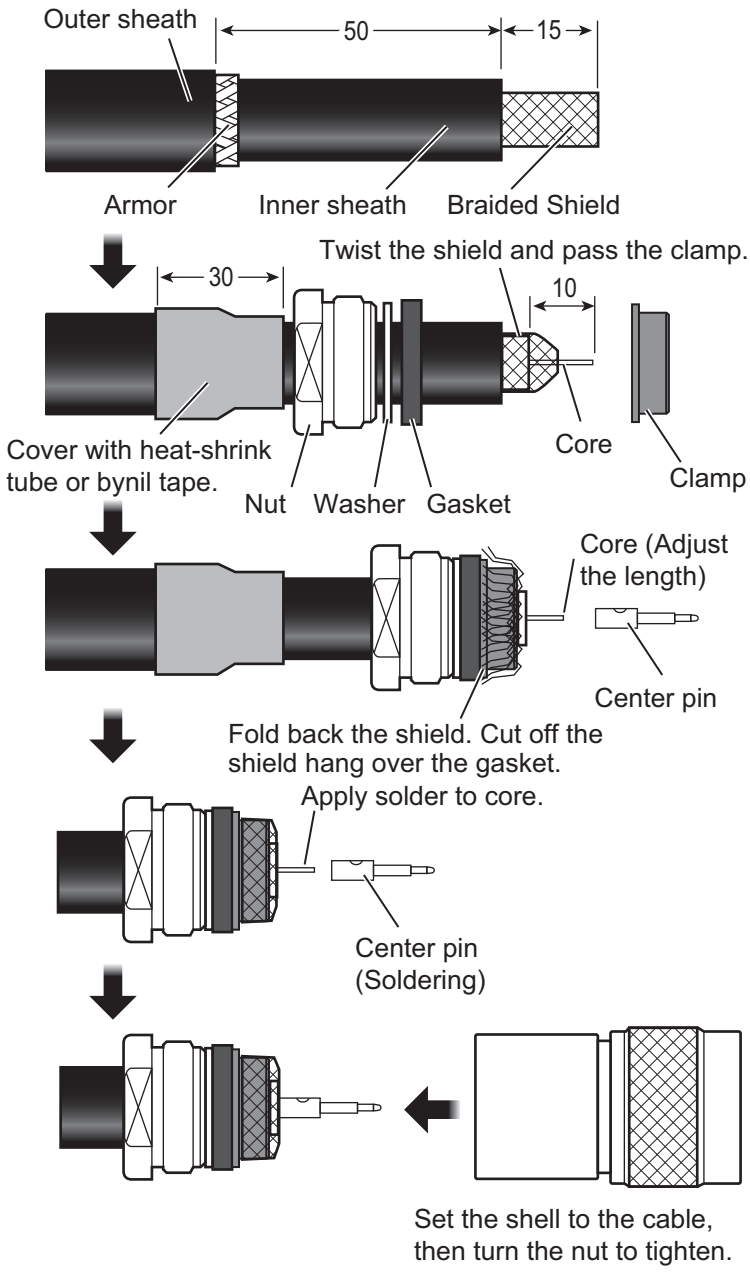
Expose the core by 5 mm.



Slip the pin onto the conductor. Solder them together through the hole on the pin.

Insert the pin into the shell. Screw the clamp nut into the shell.
(Tighten by turning the clamp nut. Do not tighten by turning the shell)

How to attach the N-P-8DSFA connector

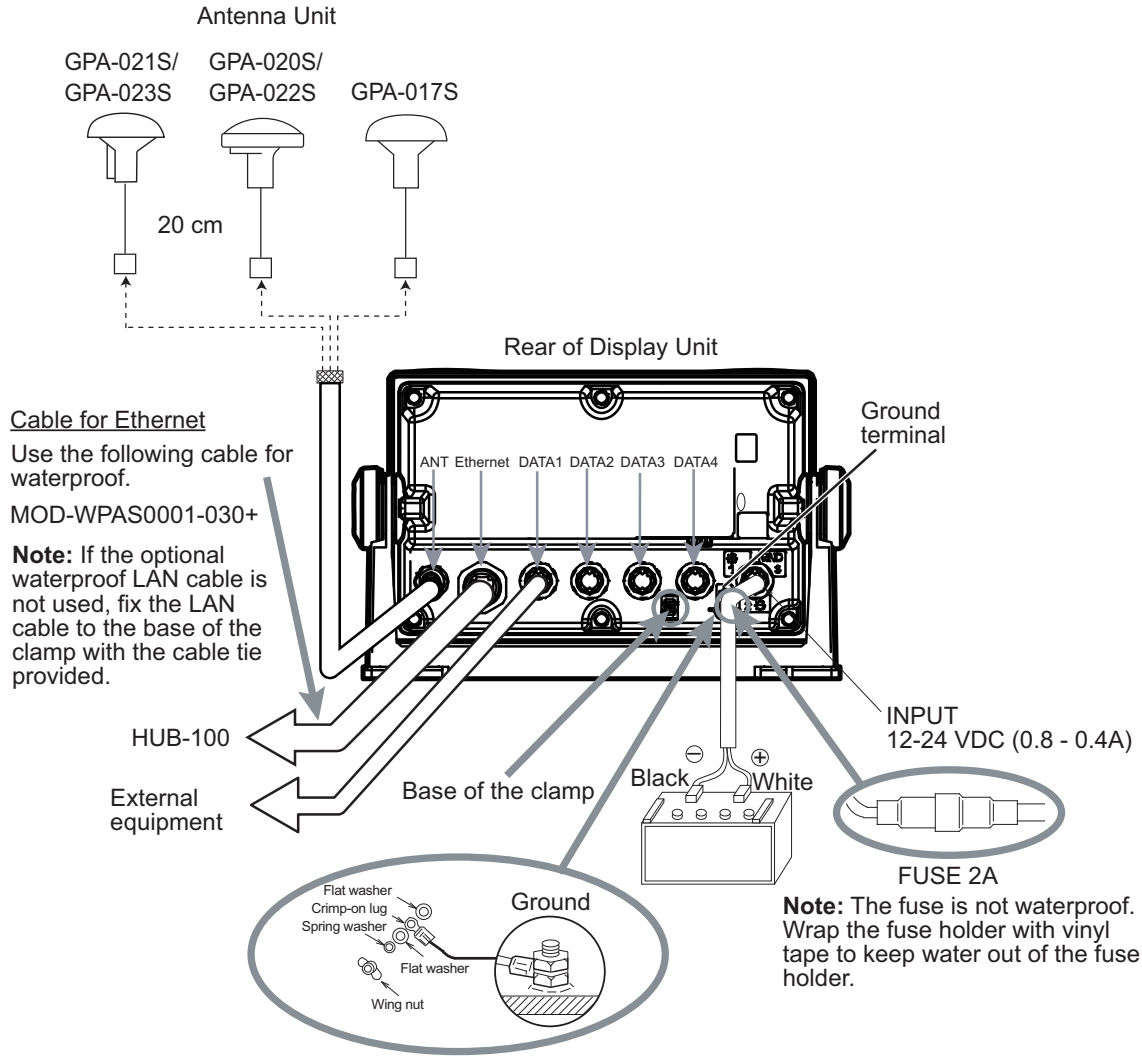


2. WIRING

⚠ CAUTION

Ground the display unit to prevent loss of sensitivity and mutual interference.

Connect the equipment, referring to the figure below and the interconnection diagram at the back this manual.



2.1 Grounding

The display unit contains several CPUs. While they are operating, they radiate noise, which can interfere with other radio equipment. Ground the unit as follows to prevent it.

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

2.2 External Equipment

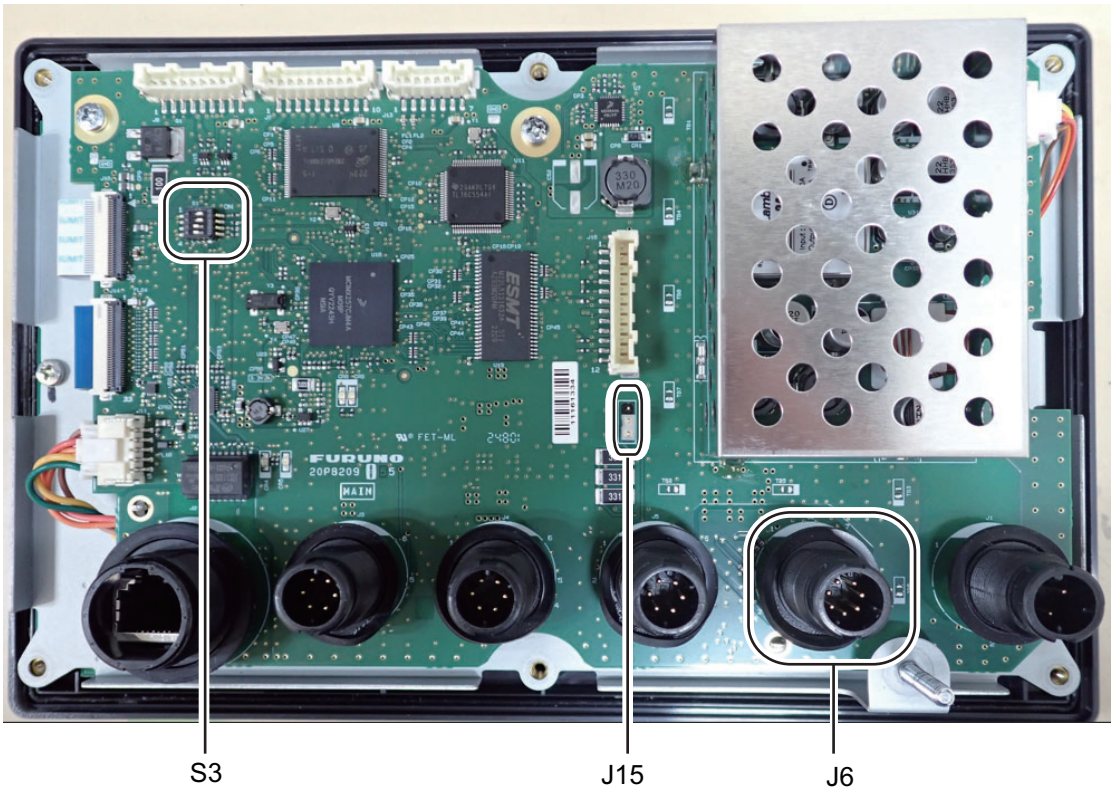
The DATA1, DATA2, DATA3, DATA4 and Ethernet ports are used to connect external equipment such as autopilot, remote display, navigation equipment, DGPS/DGLONASS beacon receiver.

2.3 MAIN Board

How to set the termination resistors on jumper blocks

Use the jumper block J15 on the MAIN Board (20P8209) to set the termination resistor J6 on or off. The default setting is termination resistor: on.

- When setting the starting/ending terminal for the multipoint connection, or multipoint is not connected: termination resistor ON
- When not setting the starting/ending terminal for the multipoint connection: termination resistor OFF



MAIN BOARD 20P8209

Jumper block J15		Connector J6
1-2	SHORT	Termination resistor: ON (default setting)
2-3	SHORT	Termination resistor: OFF

Factory default setting on DIP switch

DIP switch S3				
No.	1	2	3	4
Factory default setting	ON	ON	OFF	OFF

3. ADJUSTMENTS

Note that the service menu remains enabled until the system power is turned off. If authentication is performed (logged in as a service technician) to enable the service menu, be sure to turn off the power after the setup is complete.

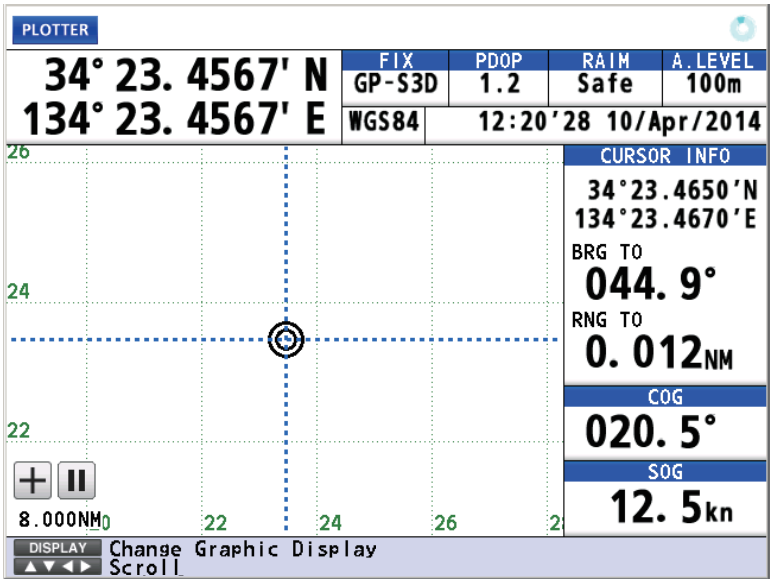
3.1 Checking Operation

1. Turn on GP-170.
   The following display appears.

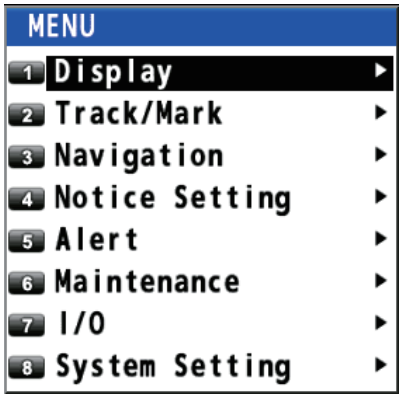
Self-test display at equipment start up

2. Confirm “OK” on the self-test display.
   Note: The display related to BEACON appears at the bottom of the start-up screen when DGPS/DGLONASS beacon receiver is built in the GP-170.

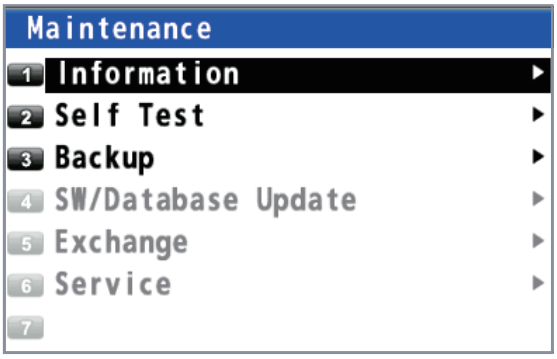
The following display appears. Your display may look slightly different from the one shown here depending on the devices connected to your product.



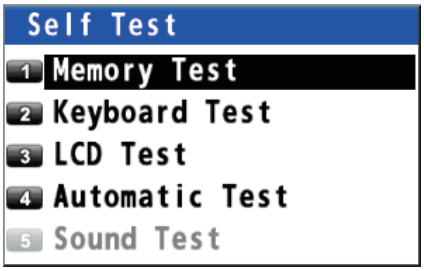
3. Press the **MENU/ESC** key to open the main menu.



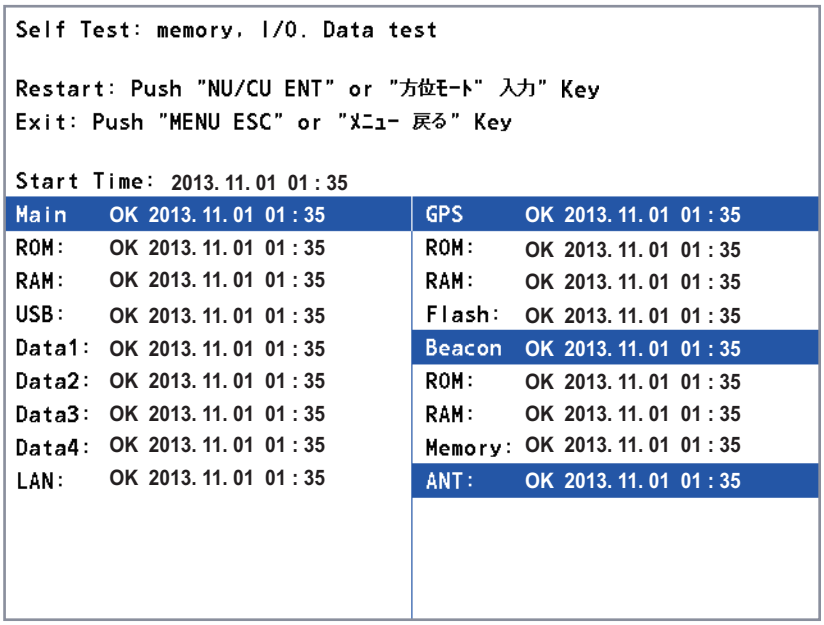
4. Select [6 Maintenance].



5. Select [2 Self Test].



6. Select [1 Memory Test].
   Confirm “OK” for all items except for Data1, Data2, Data3, Data4 and LAN on the self-test display.
   Note 1: "BEACON" is displayed when DGPS/DGLONASS function is provided.
   Note 2: "OK" is displayed in the "USB" field when a USB flash memory is connected to the GP-170.



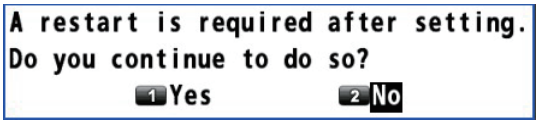
7. Press the **MENU/ESC** key to close the main menu.

3.2 How to Set Russian Mode

You can set the Russian mode in the [Type Approval Mode] menu.

1. Log in as a service technician.
2. Press the **MENU/ESC** key to open the main menu.
3. Select [6 Maintenance], then [6 Service].
4. Select [3 Type Approval Mode].

5. Select [2 Russia]. The confirmation message appears.



6. Select [1 Yes]. The GP-170 restarts.

3.3 Beacon Setup

The default setting is "automatic".

GP-170 can automatically select optimum DGPS/DGLONASS beacon station.

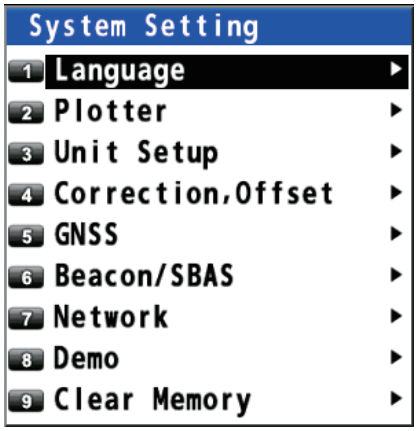
Note: Use the manual mode for the following cases.

- It takes more than five (5) minutes to fix DGPS/DGLONASS position.
- The external beacon receiver cannot select a beacon station automatically.

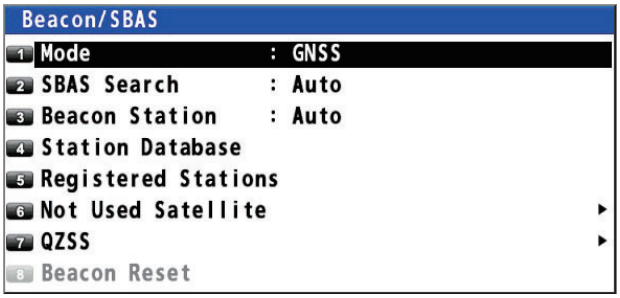
3.3.1 Manual beacon setup

How to set the differential corrections to use

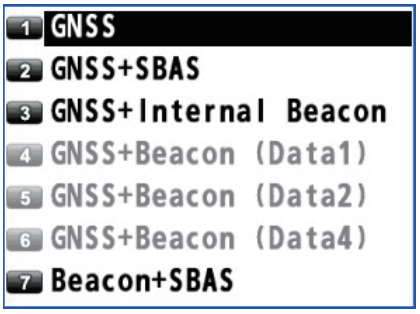
1. Press the **MENU/ESC** key open the main menu.
2. Select [8 System Setting].



3. Select [6 Beacon/SBAS].



4. Select [1 Mode].



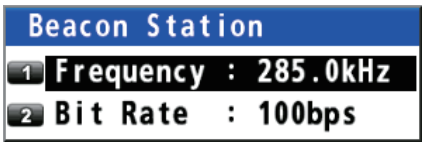
5. Select an option.
   [GNSS+Internal Beacon]: Uses internal beacon.
   [GNSS+Beacon (Data1, Data2 or Data4)]: Uses external beacon.

Menu item	With internal DGPS/DGLONASS beacon receiver	Without internal DGPS/DGLONASS beacon receiver
GNSS+Internal Beacon	Selectable	Not selectable
GNSS+Beacon (Data1, Data2 or Data4)	Not selectable	Selectable

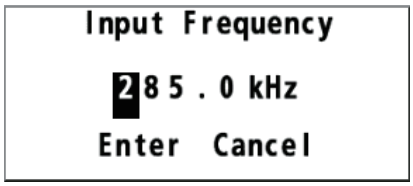
How to set the beacon station

1. Press the **MENU/ESC** key open the main menu.
2. Select [8 System Setting], then [6 Beacon/SBAS].
3. Select [3 Beacon Station].

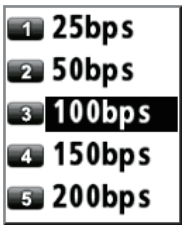
4. Select [2 Set Parameter].



5. Select [1 Frequency].



6. Enter frequency in four digits (283.5 kHz to 325.0 kHz).
7. Move the cursor to select [Enter].
8. Press the **NU/CU ENT** key.
9. Select [2 Bit Rate].



10. Press the cursorpad (▲ or ▼) to select baud rate; 25, 50, 100, 150 or 200 bps.
11. Press the **NU/CU ENT** key.
12. Press the **MENU/ESC** key to close the main menu.

3.3.2 Automatic beacon setup

How to set the differential corrections to use

1. Press the **MENU/ESC** key open the main menu.
2. Select [8 System Setting], then [6 Beacon/SBAS].
3. Select [1 Mode].

4. Select an option.
   [GNSS+Internal Beacon]: Uses internal beacon.
   [GNSS+Beacon (Data1, Data2 or Data4)]: Uses external beacon.

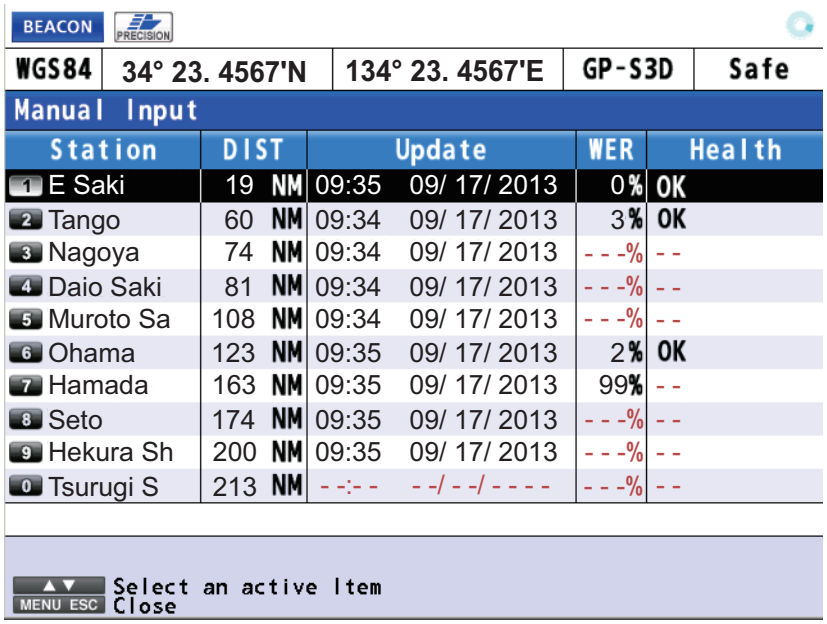
How to set the beacon station

1. Press the **MENU/ESC** key open the main menu.
2. Select [8 System Setting], then [6 Beacon/SBAS].
3. Select [3 Beacon Station].
4. Select [1 Auto].
5. Press the **MENU/ESC** key to close the main menu.

3.3.3 Beacon station

The beacon station list shows the 10 closest beacon stations, including user-programmed stations. For user-programmed stations, see the Operator's Manual.

1. Press the **MENU/ESC** key open the main menu.
2. Select [8 System Setting], then [6 Beacon/SBAS].
3. Select [3 Beacon Station].
4. Select [3 Select Station ID].

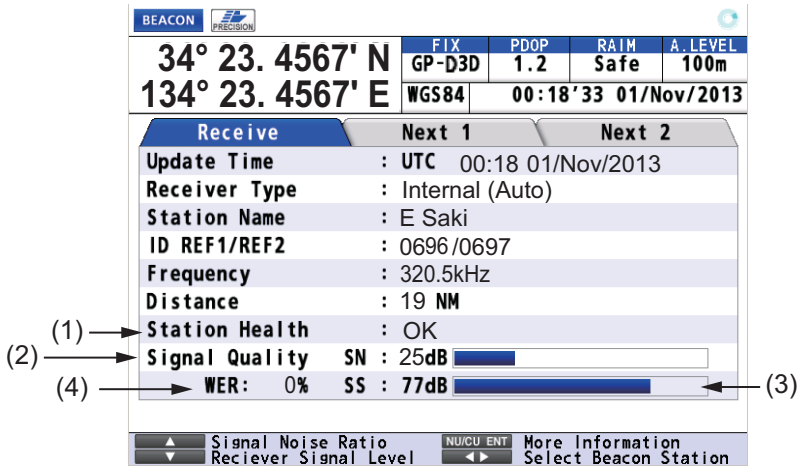


Note: When [1 Method] in the [5 GNSS] menu is set to [2 GLONASS], the information of the GLONASS differential stations is displayed in blue.

5. Press the cursorpad (▲ or ▼) to select a beacon station.
6. Press the **NU/CU ENT** key.
7. Press the **MENU/ESC** key to close the main menu.

3.4 DGPS/DGLONASS Operation Checking

1. Press the **DISPLAY 1** key several times to select the integrity display.
2. Press the cursor-pad (▲ or ▼) to select the beacon display.



(1) Station Health
The message "OK" is shown when beacon is working properly. If the correction data sent from the beacon reference station has an error, the message "Unmonitored" or "Don't use" is shown.
- Unmonitored: The status of the receiving beacon station is unmonitored.
- Don't use: The status of the receiving beacon station is unhealthy.

(2) Signal Quality SN (Signal Noise)
Shows the signal-to-noise ratio of the received beacon signal. This value is between 0 and 50. The higher the value the better the signal. The value is normally 25dB.

(3) SS (Signal Strength)
Shows the electric field intensity of the beacon signal. This value is between 0 and 100. The higher the value the stronger the signal.

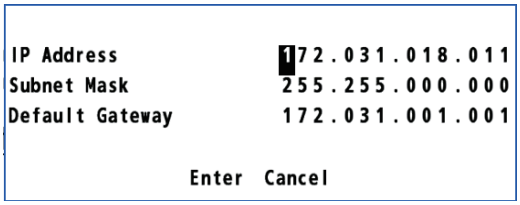
(4) WER (Word Error Rate)
Shows error ratio. This value is between 0% and 100%. 0% indicates the correction data has no error.
Note: When SN (Signal Noise) is less than 7 or WER (Word Error Rate) shows 100%, check the following:
- Check the grounding.
- Check for radar interference.
- Check for noise from the ship's mains.

3.5 Ethernet Setup

The settings described in this section are done in the service menu, which the user cannot access.

3.5.1 How to set the IP address

1. Log in as a service technician.
2. Press the **MENU/ESC** key to open the main menu.
3. Select [8 System Setting], then [7 Network].
4. Select [2 Ethernet].

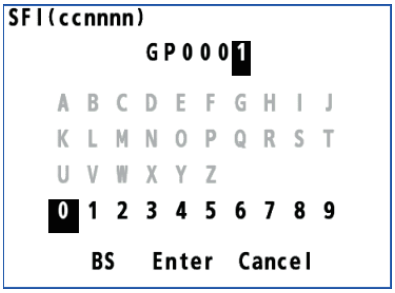


5. Enter the IP addresses for your equipment (setting range: 172.16.0.1 to 172.31.255.254), subnet mask and default gateway with the numeric keys.
   Note: Be sure the IP address is not the same as other equipment on the network.
6. Move the cursor to [Enter], then press the **NU/CU ENT** key.

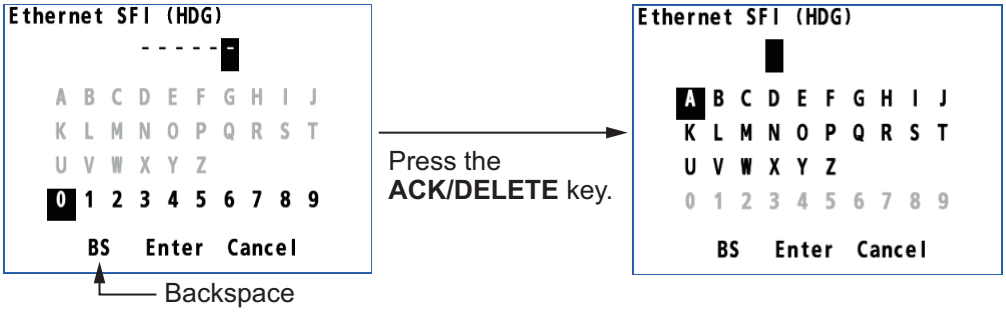
3.5.2 SFI setup

SFI (System Function ID) is an identification code used by the system.

1. Log in as a service technician.
2. Press the **MENU/ESC** key to open the main menu.
3. Select [8 System Setting], then [7 Network].
4. Select [4 SFI].



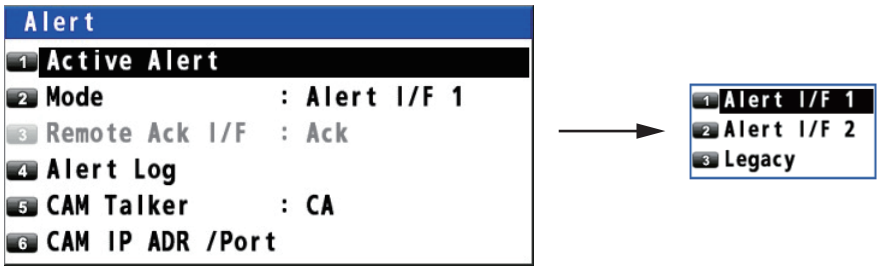
5. Do the following to set the Ethernet SFI:
   1) Press the **ACK/DELETE** key to move the cursor to the leftmost of the input position.



   2) Enter the Ethernet SFI with the cursor-pad and the numeric keys (combination of two alphabets and four numerals).
   Note: Set the SFI to eliminate overlap with other ones.
6. Move the cursor to [Enter], then press the **NU/CU ENT** key.
7. Press the **MENU/ESC** key to close the main menu.

3.5.3 Alert Mode

1. Log in as a service technician.
2. Press the **MENU/ESC** key to open the main menu.
3. Select [5 Alert], then [2 Mode].



Note: [3 Remote Ack I/F] is available when selecting [3 Legacy] in [2 Mode].

4. Select what sentences to use to manage alerts. For [1 Alert I/F 1] or [2 Alert I/F 2],go to step 7. For [3 Legacy], go to step 5.
   [1 Alert I/F 1]: Use ALR and ACK sentences.
   [2 Alert I/F 2]: Use ALC, ALF and ACN sentences.
   [3 Legacy]: Use IIalr and IIals sentences.
5. Select [3 Remote Ack I/F].

6. Select [1 Ack] or [2 BuzzerStop].
   [Ack]: Acknowledge an alert and stop the buzzer.
   [BuzzerStop]: Stop the buzzer.
7. Press the **MENU/ESC** key to close the main menu.

3.6 Input/Output Signal

The GP-170 can receive or output various navigation data.

Before selecting data to output, confirm what data the external equipment requires. Output necessary data only. Outputting unnecessary data can cause receiving problems at the external equipment.

3.6.1 Talker

All data transmitted by marine electronics equipment is prefixed with a two-character code which tells external equipment what equipment is transmitting data. This two-character code is called the talker. The GP-170 contains the talkers GP, GL and GN.

3.6.2 Input/Output sentence

Output sentence of IEC 61162-1 Ed.3/4/5 and NMEA 0183 Ver. 1.5/2.0

Sentence	Description
AAM	Waypoint arrival alarm
ALC	Cyclic alert list
ALF	Alert sentence
ALR	Set alarm state
APA*	Autopilot sentence A Magnitude of cross track error, direction to steer, arrival alarm, bearing origin to destination
APB	Autopilot sentence B Magnitude of cross track error, direction to steer, arrival alarm, bearing to waypoint ("Heading to steer to destination waypoint data" not used)
ARC	Alert command refused
BOD	Bearing origin to destination
BWC	Bearing and distance to waypoint - great circle
BWR	Bearing and distance to waypoint - rhumb line
BWW	Bearing waypoint to waypoint
DTM	Datum reference

Sentence	Description
GBS	GNSS satellite fault detection
GGA**	Global positioning system (GPS) fix data Time of fix, latitude, longitude, quality indicator, number of satellites in use, DOP, altitude, geoidal separation ("age of dgps data" and "differential reference station ID")
GLL	Geographic position - latitude/longitude
GNS	GNSS fix data
GRS	GNSS range residuals
GSA	GNSS DOP and active satellites
GST	GNSS pseudorange noise statistics
GSV	GNSS satellites in view
HBT	Heartbeat supervision sentence
MSK	MSK receiver interface
MSS	MSK receiver signal status
POS	Device position and ship dimensions report or configuration command
QSM	QZSS satellite message
RMB	Recommended minimum navigation information cross track error, direction to steer, origin and destination waypoint ID, destination waypoint latitude and longitude, range and bearing of destination waypoint, destination closing velocity, arrival alarm
RMC	Recommended minimum specific GPS/TRANSIT data UTC of position fix, latitude and longitude, ground speed and course, date, magnetic variation
Rnn*	Routes
RTE	Routes
VDR	Set (direction towards which a current flows) and drift (speed of a current)
VTG	Course over ground and ground speed
WCV	Waypoint closure velocity
WNC	Distance waypoint to waypoint
WNR	Waypoint-to-waypoint distance, rhumb line
WPL	Waypoint location
XTE	Cross-track error, measured (direction to steer to return to track)
ZDA	Time and date

*: not used on SOLAS ships.

**: only for GPS mode.

Output sentence of Furuno proprietary sentence

Sentence	Description
$PFEC, IIalr	Contact signal
$PFEC, pidat	Product information
$PFEC, GPals	Alarm status
$PFEC, GPxfr	End code

Input sentence of IEC 61162-1 Ed.3/4/5 and NMEA 0183 Ver. 1.5/2.0

Checksum is checked if attached, and if any errors are found, the sentence becomes invalid. Talker ID is not distinguished.

Sentence	Description
ACK	Acknowledge alarm
ACN	Alert command
CRQ	Query sentence
DBT	Depth below transducer
DPT	Depth
HBT	Heartbeat supervision sentence
HDG	Heading, deviation and variation
HDM*	Heading, magnetic
HDT*	Heading true
MSK	MSK receiver interface
MSS	MSK receiver signal status
MTW	Water temperature
THS	True heading and status
TLL	Target latitude and longitude
VBW	Dual ground/water speed
VHW	Water speed and heading

*: not used on SOLAS ships.

Input sentence of Furuno proprietary sentence

Sentence	Description
$PFEC, AGFPA	Autopilot information from FURUNO autopilot equipment
$PFEC, GPatt	Pitch and roll
$PFEC, GPhve	Heaving
$PFEC, Ialsl	Contact signal
$PFEC, pireq	Product information

Others

Sentence	Description
RTCM sc104	Data for DGPS/DGLONASS
GPX	Data for waypoint, route and track

Port	Input	Output
DATA1 DATA2	RTCM sc104 or the following sentence selected by menu IEC 61162-1 Ed.3/4/5 and NMEA 0183 Ver. 1.5/2.0 ACK, ACN, CRQ, DBT, DPT, HBT, HDG, HDM*, HDT*, MSK, MSS, MTW, THS, TLL, VBW, VHW, $PFEC, AGFPA, $PFEC, GPatt, $PFEC, GPhve, $PFEC, IIals, $PFEC, pireq	RTCM sc104 or the following sentence selected by menu IEC 61162-1 Ed.3/4/5 and NMEA 0183 Ver. 1.5/2.0 AAM, ALC, ALF, ALR, APA*, APB, ARC, BOD, BWC, BWR, BWW, DTM, GBS, GGA***, GLL, GNS, GRS, GSA, GST, GSV, HBT, MSK, MSS, POS, QSM, RMB, RMC, Rnn*, RTE, VDR, VTG, WCV, WNC, WNR, WPL, XTE, ZDA, $PFEC, IIalr, $PFEC, pidat, $PFEC, GPals, $PFEC, GPxfr
DATA3	External MOB	
DATA4**	RTCM sc104 or the following sentence selected by menu IEC 61162-1 Ed.3/4/5 and NMEA 0183 Ver. 1.5/2.0 ACK, ACN, CRQ, DBT, DPT, HBT, HDG, HDM*, HDT*, MSK, MSS, MTW, THS, TLL, VBW, VHW, $PFEC, AGFPA, $PFEC, GPatt, $PFEC, GPhve, $PFEC, IIals, $PFEC, pireq	
Ethernet	RTCM sc104 or the following sentence selected by menu IEC 61162-1 Ed.3/4/5 and NMEA 0183 Ver. 1.5/2.0 ACK, ACN, DBT, DPT, HBT, HDG, HDM*, HDT*, MTW, THS, TLL, VBW, VHW, $PFEC, AGFPA, $PFEC, GPatt, $PFEC, GPhve, $PFEC, IIals, $PFEC, pireq	RTCM sc104 or the following sentence selected by menu IEC 61162-1 Ed.3/4/5 and NMEA 0183 Ver. 1.5/2.0 AAM, ALC, ALF, ALR, APB, ARC, BOD, BWC, BWR, BWW, DTM, GBS, GGA***, GLL, GNS, GRS, GSA, GST, GSV, HBT, POS, QSM, RMB, RMC, RTE, VDR, VTG, WCV, WNC, WPL, XTE, ZDA, $PFEC, IIalr, $PFEC, pidat, $PFEC, GPals, $PFEC, GPxfr
USB	GPX	GPX

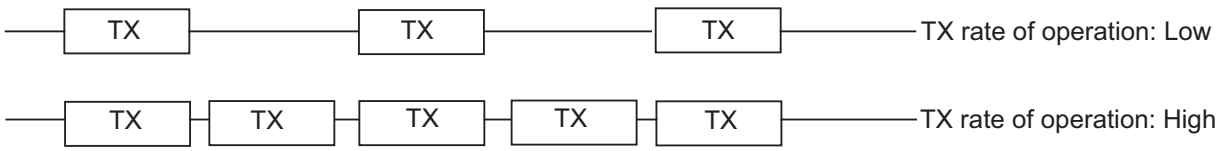
*: not used on SOLAS ships. **: for IEC61162-2 high speed transmission.
***: only for GPS mode.

Note 1: BWC, BWR, GGA***, GLL, RMB, RMC or WPL is required to output DTM.

Note 2: The settings and registered data can be saved to or loaded from a USB flash memory. For details, refer to the Operator's Manual. You can edit the settings and registered data with a text editor on your PC.

3.6.3 TX Rate of operation

The TX rate of operation is the percentage of data output in one second, and it appears on the screen. If short intervals are assigned to many sentences, the rate of operation increases as illustrated below.

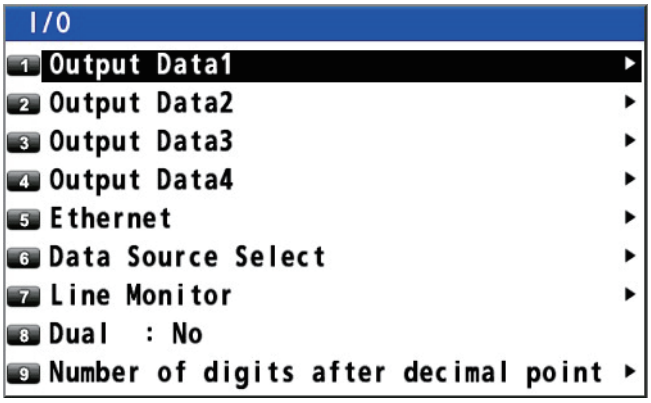


Note 1: When outputting data without rest intervals between data, TX rate of operation is 100%. In this case, wrong data may be shown on the receiver because it cannot recognize intervals between data. Thus, do not output unnecessary data or set TX interval to large value so that TX rate of operation becomes small.

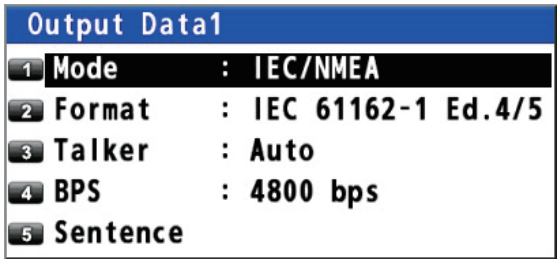
Note 2: The GP-170 may not be able to display data from external equipment correctly when the volume of TX data exceeds the GP-170's data handling capability. If this occurs, lower the TX rate. Set the TX rate to 60% for the Temperature Indicator TI-20 and other equipment. This will create a gap between each data transmission to compensate for occasions when data is not output regularly.

3.6.4 DATA1, 2, 3 or 4 output setting

1. Log in as a service technician.
2. Press the **MENU/ESC** key to open the main menu.
3. Select [7 I/O].

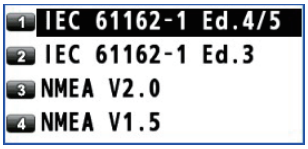


4. Select [1 Output Data1].



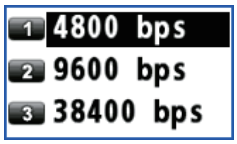
5. Select [1 Mode].

6. Select [1 IEC/NMEA] or [2 RTCM].
   [IEC/NMEA]: NMEA sentence output
   [RTCM]: Binary output (It is for outputting the beacon binary information to external equipment.)
7. Select [2 Format].

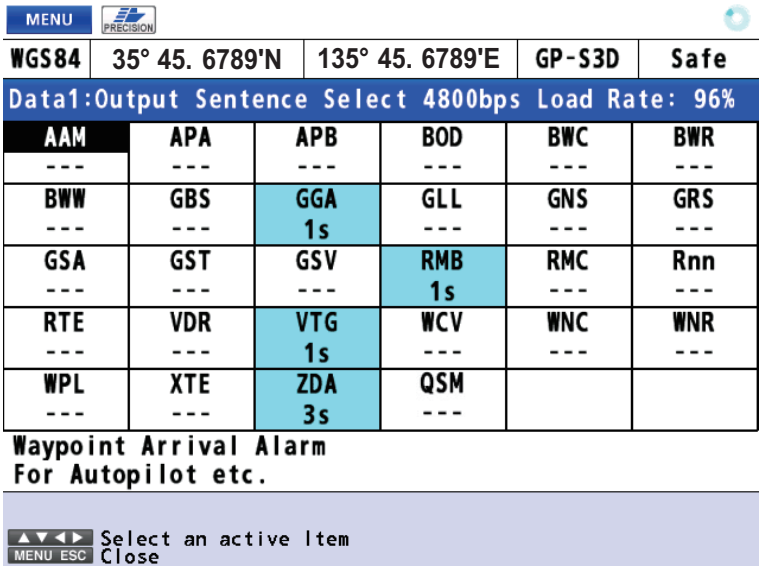


8. Select [1 IEC 61162-1 Ed.4/5], [2 IEC 61162-1 Ed.3], [NMEA V2.0] or [NMEA V1.5].
9. Select [3 Talker].

10. Select [1 Auto]*, [2 GP] or [4 GN].
    *: Select [1 Auto] for SOLAS ships.
11. Select [4 BPS].



12. Select [1 4800 bps], [2 9600 bps] or [3 38400 bps].
13. Select [5 Sentence].

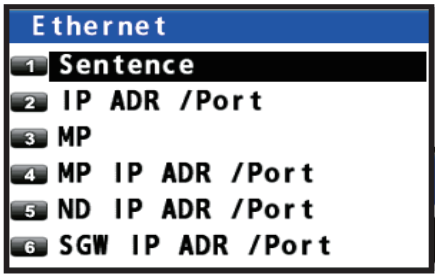


14. Press the cursorpad to select the sentence, then press the **NU/CU ENT** key.
15. Press the cursorpad (◀ or ▶) to select the TX interval.
    TX interval: [---], [0.1s]*, [0.2s]*, [1s], [2s], [3s], [4s], [5s], [6s], [10s], [15s], [20s], [30s], [60s], [90s]
    *: Only for GGA**, GLL, GNS, RMC and VTG when selecting [38400 bps] at step 12.
    **: Only for GPS mode.
    Note 1: Keep the "Load Rate" below 100% when setting the TX interval. The TX interval for other than the ZDA sentence cannot be guaranteed if the rate exceeds 100%.
    Note 2: For the TX interval of [0.1s] or [0.2s], set the positioning cycle (Refer to the Operator's Manual) as follows:
    - For [0.1s], set the positioning cycle at 10Hz.
    - For [0.2s], set the positioning cycle at 5Hz or 10Hz.
16. Press the **NU/CU ENT** key.

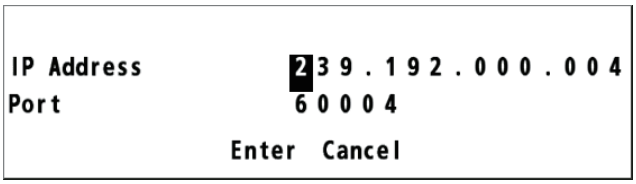
17. Set [2 Output Data2], [3 Output Data3] and [4 Output Data4] as well.
18. Press the **MENU/ESC** key to close the main menu.

3.6.5 Ethernet output setting

1. Press the **MENU/ESC** key to open the main menu.
2. Select [7 I/0], then [5 Ethernet].



3. Select [1 Sentence].
4. Press the cursorpad to select the sentence, then press the **NU/CU ENT** key.
5. Press the cursorpad (◀ or ▶) to select the TX interval. TX interval is available in [---], [0.1s]*, [0.2s]*, [1sec], [2sec], [3sec], [4sec], [5sec], [6sec], [10sec], [15sec], [20sec], [30sec], [60sec] and [90sec].
   *: Only for GGA**, GLL, GNS, RMC and VTG.
   **: Only for GPS mode.
   Note: For the TX interval of [0.1s] or [0.2s], set the positioning cycle (Refer to Operator's Manual) as follows:
   - For [0.1s], set the positioning cycle at 10Hz.
   - For [0.2s], set the positioning cycle at 5Hz or 10Hz.
6. Press the **NU/CU ENT** key.
7. Press the **MENU/ESC** key.
8. Select [2 IP ADR/Port].



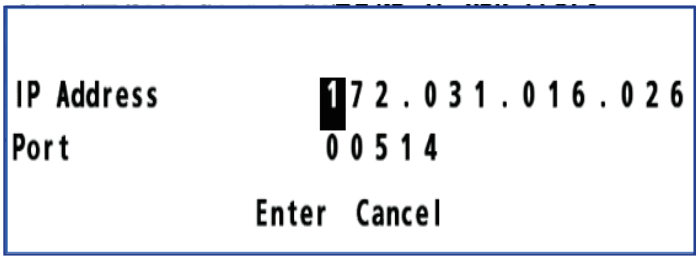
9. Enter the IP address and port (setting value: 49152 to 65535) for the output destination with the numeric keys. When setting dual configuration (see section 3.8), set "239.192.000.004" for IP address and "60004" for port.
10. Move the cursor to select [Enter], then press the **NU/CU ENT** key.
11. Press the **MENU/ESC** key to close the main menu.

3.6.6 How to set audit log IP address and port number

You can set the IP address and port number for the destination of the audit log.

1. Press the **MENU/ESC** key to open the main menu.
2. Select [7 I/0], then [5 Ethernet].

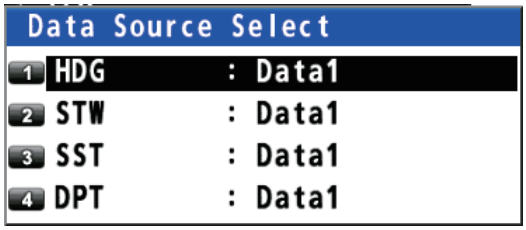
3. Select [6 SGW IP ADR/Port].



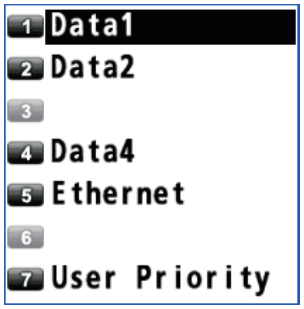
4. Enter the IP address and port number for the destination of the audit log with the numeric key.
5. Move the cursor to select [Enter], then press the **NU/CU ENT** key.
6. Press the **MENU/ESC** key to close the main menu.

3.6.7 DATA1, 2 or 4 input setting

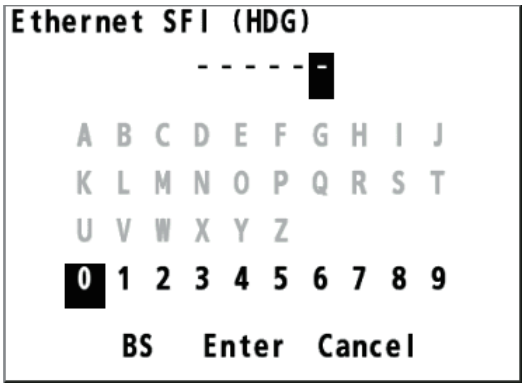
1. Press the **MENU/ESC** key to open the main menu.
2. Select [7 I/O], then [6 Data Source Select].



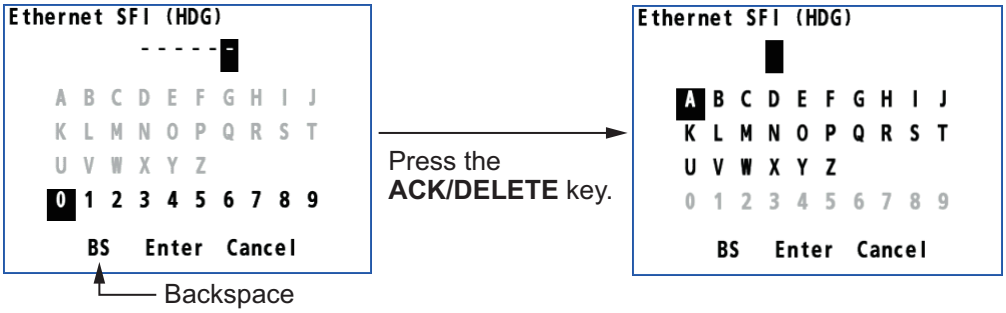
3. Select [1 HDG].



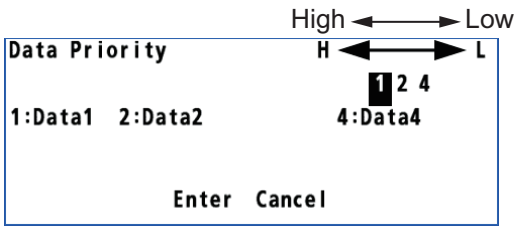
4. Select the port for heading data.
   For [5 Ethernet], go to step 5. For [7 User Priority], go to step 6.



5. When selecting [5 Ethernet], do the following:
   1) Press the **ACK/DELETE** key to move the cursor to the leftmost of the input position.



   2) Enter the Ethernet SFI with the cursorpad and the numeric keys (combination-of two alphabets and four numerals). SFI (System Function ID) is an identification code used by the system.
   Note: Set the SFI to eliminate overlap with other ones.
   3) Move the cursor to [Enter], then press the **NU/CU ENT** key. Go to step 9.
6. Select [1 HDG].
7. Select [7 User Priority].



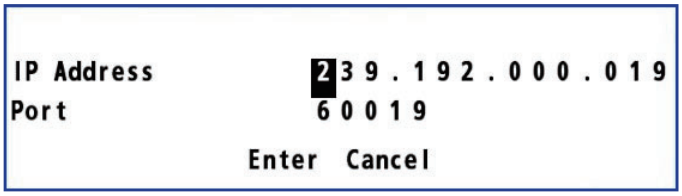
8. Enter the priority for heading data among [1] (Data1), [2] (Data2) or [4] (Data4) with the numeric keys.
9. Set the input data for [2 STW] (speed through water), [3 SST] (sea surface temperature) and [4 DPT] (water depth) as well.
10. Press the **MENU/ESC** key to close the main menu.

3.6.8 CAM reception setting

1. Log in as a service technician.
2. Press the **MENU/ESC** key to open the main menu.
3. Select [5 Alert], then [5 CAM Talker].

4. Select the talker receiving from CAM among [CA], [IN] or [II] with the numeric keys.

5. Select [6 CAM IP ADR/Port].

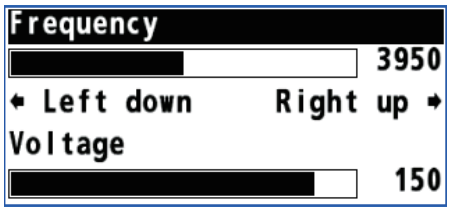


6. Enter the IP address and port (setting value: 49152 to 65535) for the transmission group receiving from CAM with the numeric keys.
7. Move the cursor to select [Enter], then press the **NU/CU ENT** key.
8. Press the **MENU/ESC** key to close the main menu.

3.7 Sound Test

Note: It is recommended to keep the default setting. Do not change the setting unless absolutely necessary.

1. Log in as a service technician.
2. Press the **MENU/ESC** key to open the main menu.
3. Select [6 Maintenance], then [2 Self Test].
4. Select [5 Sound Test].



5. Press the cursorpad (▲ or ▼) to select [Frequency] or [Voltage].
6. Press the cursorpad (◀ or ▶) to set the value.
7. Press the **MENU/ESC** key to close the main menu.

3.8 How to Set Dual Configuration

You can configurate two dual differential GPS/GLONASS navigator systems and an interface unit.

1. Press the **MENU/ESC** key to open the main menu.
2. Select [7 I/O], then [8 Dual].

3. Select [1 No], [2 Serial (Port2)] or [3 Ethernet].
   [No]: Not set dual configuration.
   [Serial (Data2)]: Sets dual configuration using data2.
   [Ethernet]: Sets dual configuration using Ethernet.
4. Press the **MENU/ESC** key to close the main menu.

3.9 How to Set Route Start Position

You can set the route start position when setting a destination.

1. Access the service menu (Refer to section 3.5).
2. Press the **MENU/ESC** key to open the main menu.
3. Select [6 Maintenance], then [6 Service].
4. Select [4 RTE start POSN].

5. Select [1 Waypoint] or [2 Own Ship].
   [Waypoint]: Sets the first waypoint of the route as start position.
   [Own Ship]: Sets the own ship position at the time when setting a destination as start position.
   Note: Select [Waypoint] when using the GP-170 as type-approved equipment.
6. Press the **MENU/ESC** key to close the main menu.

3.10 Checking the Operation of Security Functions

To set up security and to check that the security functions are working properly, do as instructed below.

3.10.1 Check the network connection

Check that the Ethernet cable is correctly connected to the LAN port at the back of the unit. For the Ethernet cable connection, see chapter 2 or the Interconnection diagram at the back of this manual. If there is any unused port, make sure to attach a port blocker to the port to prevent them from being connected to unauthorized cables, etc.

3.10.2 Check the software version

For details, see the Operator's Manual (OME-44820).

3.10.3 How to set the IP address

For details, see section 3.6.5, "Ethernet output setting".

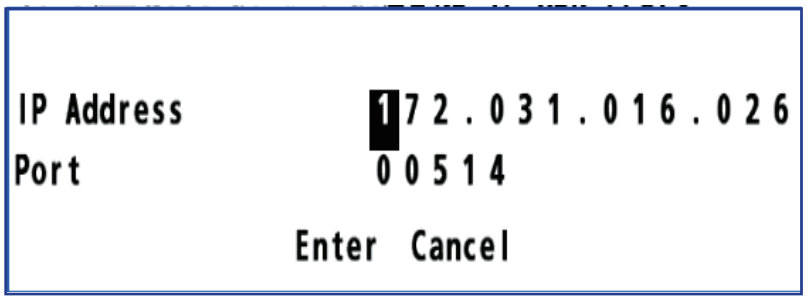
3.10.4 Password policy setting

To strengthen security, you can set the required conditions for creating an administrator password here. To change the password policy setting, you need to log in as a service technician.

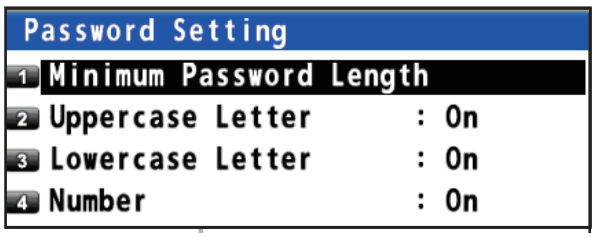
How to set the password policy

1. Log in as a service technician.
2. Press the **MENU/ESC** key to open the main menu.

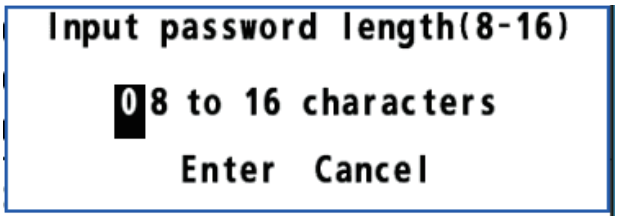
3. Select [6 Maintenance], then [6 Service] to show the following window.



4. Select [8 Password Setting]
   The [Password Setting] menu appears.



5. Select [1 Minimum Password Length].



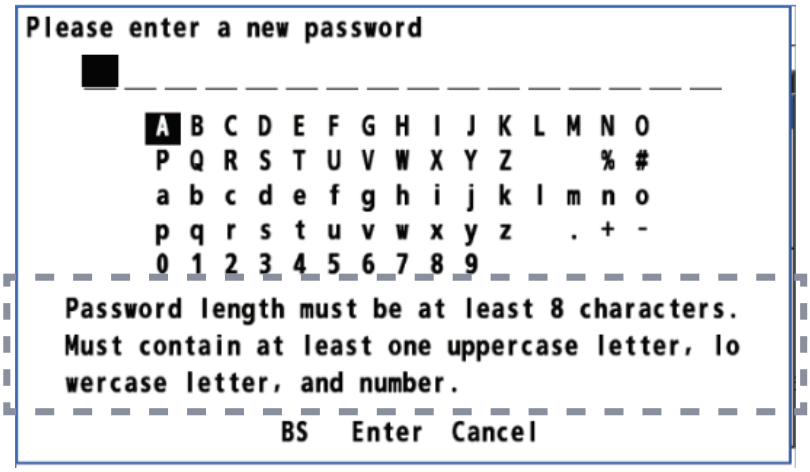
6. Enter the number with numeric key to set the minimum number of characters for the password (setting range 8 to 16 characters).
7. Select [Enter] to confirm.
8. Select [2 Uppercase Letter].

9. Select [On] or [Off] as appropriate.
   - [On]: The password must include at least one uppercase letter.
   - [Off]: The use of uppercase letters is not required.
10. Select [3 Lowercase Letter], then select [On] or [Off] as appropriate.
   - [On]: The password must include at least one lowercase letter.
   - [Off]: The use of lowercase letters is not required.
11. Select [4 Number], then select [On] or [Off] as appropriate.
   - [On]: The password must include at least one number.
   - [Off]: The use of numbers is not required.
12. The password settings are now completed. Press the **MENU/ESC** key to close the main menu.

How to check the current password policy setting

1. Press the **MENU/ESC** key to open the main menu.
2. Select [8 System Setting], then [2 Plotter].
3. Select [9 Password].

4. Select [1 Change password] to show the following window.
   The message at the bottom of the window indicates the current password policy setting.

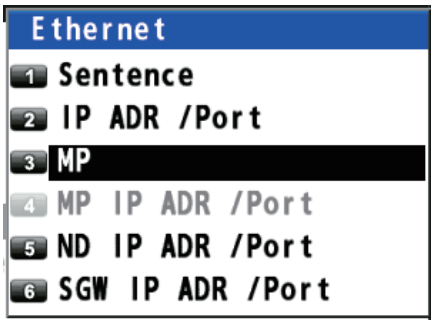


5. Press the **MENU/ESC** key to close the main menu.

3.10.5 Remote maintenance function settings

Do as follows to enable the remote maintenance from an external equipment.

1. Log in as a service technician.
2. Press the **MENU/ESC** key to open the main menu.
3. Select [7 I/O], then [5 Ethernet].



4. Select [3 MP].

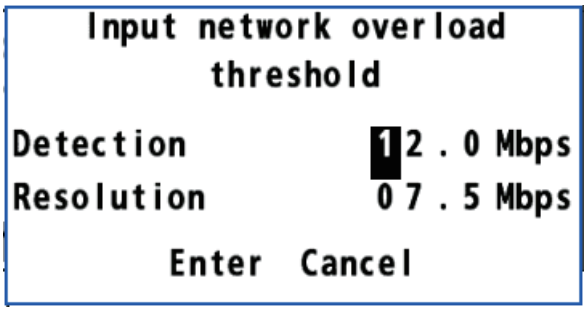
5. Select [Enable] to enable remote maintenance.
   - [Enable]: Enables the remote maintenance from external equipment and operate the GP-170 remotely.
   - [Disable]: Disables the remote maintenance from external equipment.
6. Press the **MENU/ESC** key to close the main menu.

3.10.6 Network overload detection settings

This device displays a “Network Overload” alert when the network load exceeds the threshold. This alert is used to detect network overload early and maintain system stability. Follow the instructions below to set the network overload threshold.

1. Press the **MENU/ESC**key to open the main menu.
2. Select [5 Alert], then [7 Alert Setting].

3. Select [1 Network Overload Setting] to show the following window.



4. Enter the number using the numeric key to set the threshold values for the “Network Overload” alert.
   - [Detection]: When network load exceeds the threshold, a “Network overload” alert will be displayed.
   - [Resolution]: When the network load falls below the threshold, the “Network overload” alert will be canceled.
5. Select [Enter] to confirm.
6. Press the **MENU/ESC** key to close the main menu.

3.11 Remedy for Cyber Incidents

In the event of a security incident, see the Operator’s Manual (OME-44820) for instructions.

3.12 Network and Security Configuration Settings

This equipment has been provided with the least functionalities and services, accordingly security hardening is NOT necessary. The menu items, recommended settings, and defaults settings related to security functions are shown in the table below.

Configuration	Menu No. (Setup Procedure)	Recommended Settings	Default Setting
CAM IP address setting	[5 Alert] - [6 CAM IP ADR Port]	IP: 239.192.0.19Port: 60019	IP: 239.192.0.19Port: 60019
Network overload detection setting	[5 Alert] - [7 Alert Setting] - [1 Network Overload Setting]	Detection: 12.0 Resolution: 7.5	Detection: 12.0 Resolution: 7.5
Minimum password length setting	[6 Maintenance] - [6 Service] - [8 Password Setting] - [1 Minimum Password Length]	8	8
Required character setting (Upper case letters)	[6 Maintenance] - [6 Service] - [8 Password Setting] - [2 Uppercase Letter]	On	On
Required character setting (Lower case letters)	[6 Maintenance] - [6 Service] - [8 Password Setting] - [3 Lowercase Letter]	On	On
Required character settings (Numbers)	[6 Maintenance] - [6 Service] - [8 Password Setting] - [4 Number]	On	On
IEC61162-450 destination IP address settings	[7 I/O] - [5 Ethernet] - [2 IP ADR Port]	IP: 239.192.0.4Port: 6004	IP: 239.192.0.4Port: 6004
Remote maintenance function enable / disable settings	[7 I/O] - [5 Ethernet] - [3 MP]	Disable	Disable
Maintenance communication IP address settings	[7 I/O] - [5 Ethernet] - [4 MP IP ADR / Port]	*1	IP: 172.31.1.254 Port : 28001
IEC61162-450 SFI conflict detection IP address settings	[7 I/O] - [5 Ethernet] - [5 ND IP ADR / Port]	IP: 239.192.0.56 Port: 60056	IP: 239.192.0.56 Port: 60056
SGW port settings	[7 I/O] - [5 Ethernet] - [6 SGW IP ADR / Port]	*1	IP: 172.31.16.26 Port: 514
Local IP address settings	[8 System Setting] - [7 Network] - [2 Ethenet]	*1	IP: 172.31.18.11 Subnet Mask: 255.25.0.0 Default Gateway: 172.31.1.1

*1: Set the setting appropriately according to the usage environment.

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APPX. 1 DIGITAL INTERFACE (IEC 61162-1 EDITION 5 (2016))

Output sentences

DATA 1, DATA 2, DATA 3, DATA 4

AAM, ALC, ALF, ALR, APA*, APB, ARC, BOD, BWC, BWR, BWW, DTM, GBS, GGA**, GLL, GNS, GRS, GSA, GST, GSV, HBT, MSK***, MSS****, POS, QSM, RMB, RMC, Rnn*, RTE, VDR, VTG, WCV, WNC, WNR, WPL, XTE, ZDA

*: Not used for SOLAS ships
**: Only for GPS mode.
***: When using an internal or external beacon
****: When using an internal beacon

Ethernet

AAM, ALC, ALF, ALR, APB, ARC,BOD, BWC, BWR, BWW, DTM, GBS, GGA*, GLL, GNS, GRS, GSA, GST, GSV, HBT, POS, QSM, RMB, RMC, RTE, SRP, VDR, VTG, WCV, WNC, WPL, XTE, ZDA

*: Only for GPS mode.

Input sentences

DATA 1, DATA 2, DATA 4 (CAM can connect)

ACK, ACN, CRQ, DBT, DPT, HBT, HDG, HDM*, HDT*, MSK**, MSS***, MTW, THS, TLL, VBW, VHW

*: Not used for SOLAS ships
**: When using an internal or external beacon
***: When using an internal beacon

Ethernet (CAM can connect)

ACK, ACN, DBT, DPT, HBT, HDG, HDM*, HDT*, MTW, THS, TLL, VBW, VHW

*: Not used for SOLAS ships

FURUNO proprietary sentences

DATA 1, DATA 2, DATA 4 Input

PFEC (AGFPA, IIals, pireq, GPatt, GPhve)

DATA 1, DATA 2, DATA 3, DATA 4 Output

PFEC (IIalr, pidat, GPals)

DATA 2 Input/Output (DUAL mode only)

PFEC (GPalm, GPasc, GPdst, GPmr2, GPmsk, GPreq, GPrt2, GPtrp, GPrai, GPxfr)

Ethernet Input

PFEC (AGFPA, pireq, GPatt, GPhve)

Ethernet Output

PFEC (pidat, rminf)

Ethernet Input/Output (DUAL mode only)

PFEC (GPasc, GPdst, GPmr2, GPmsk, GPreq, GPrt2, GPtrp, GPalm, GPrai)

Transmission interval

All sentences except ALR and HBT output at the interval selected (00 - 90 s).

Load requirements as listener

Isolation: Photo coupler
Input impedance: 470 ohms
Max. voltage: ±15V
Threshold: 3 mA (in case of connection of FURUNO device talker)

Data transmission

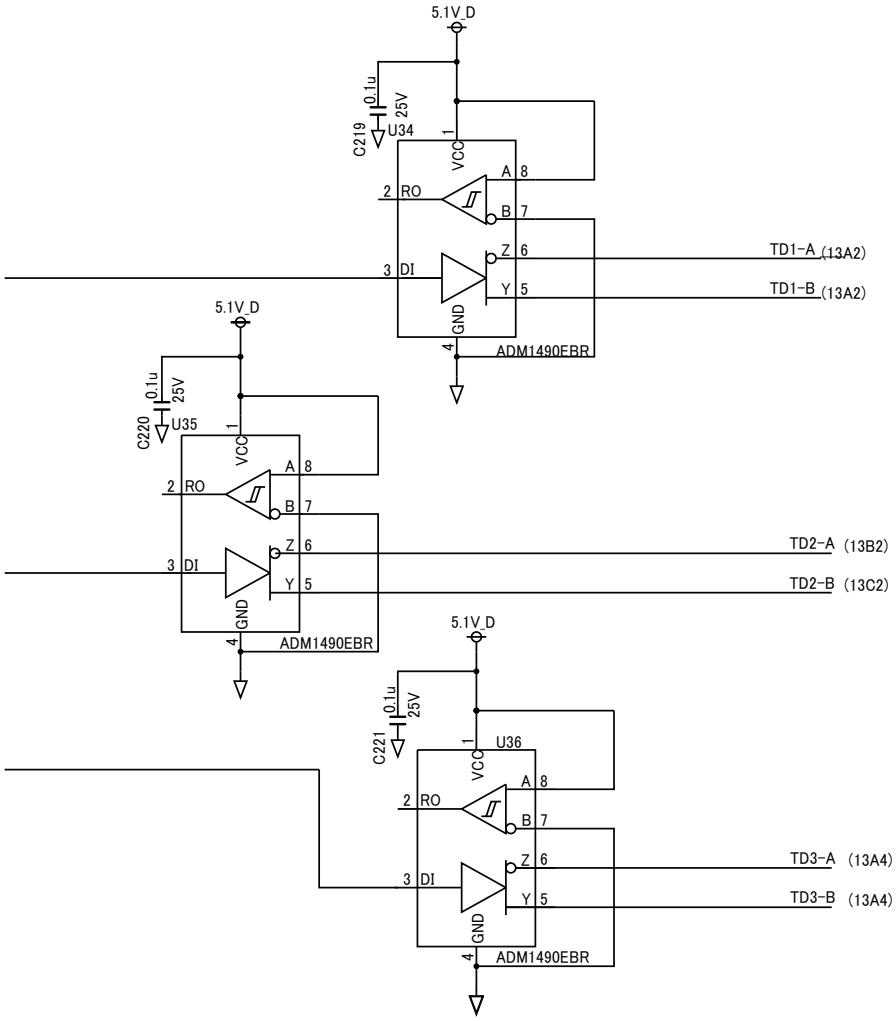
Data is transmitted in serial asynchronous form in accordance with the standard referenced in IEC 61162-1 and IEC 61162-2. The first bit is a start bit and is followed by data bits.

The following parameters are used:
Baud rate: 4800 for IEC61162-1, 38400 for IEC-61162-2
Data bits: 8 (D7 = 0), parity none
Stop bits: 1datagram type and IGMP protocol.

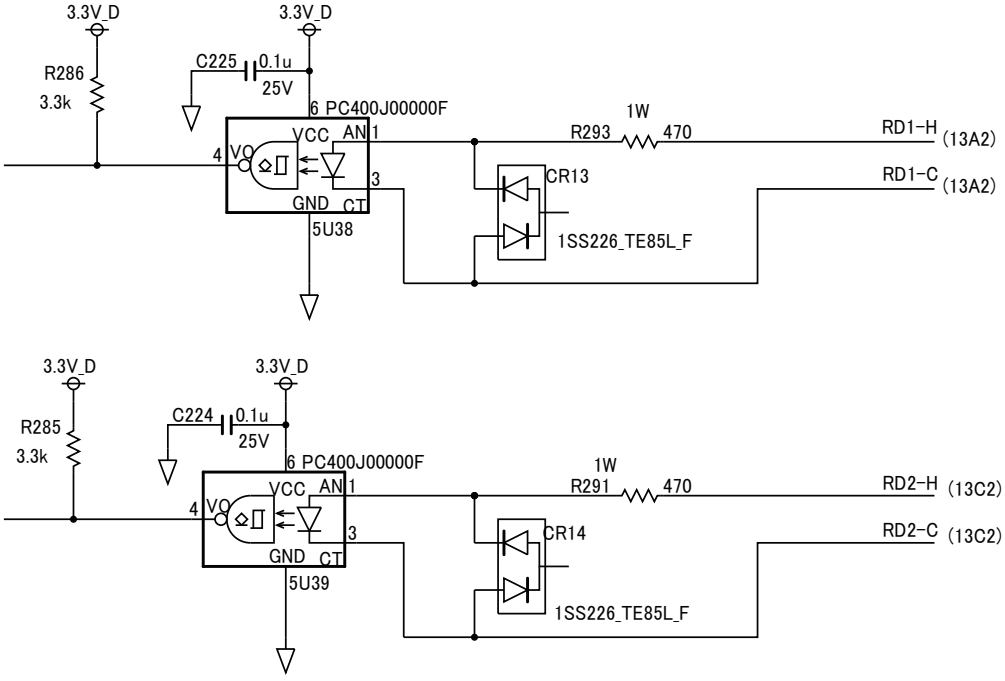
IEC61162-1: Edition 5.0 2016, Edition 4.0 2010-11, Third edition 2007-04
IEC61162-2: First Edition 1998-09
IEC61162-450: Edition 2.0 2018-05, Datagram type: UdPbC
IGMP protocol: IGMPv2

Schematic diagrams

DATA 1, 2, or 3 port (output)

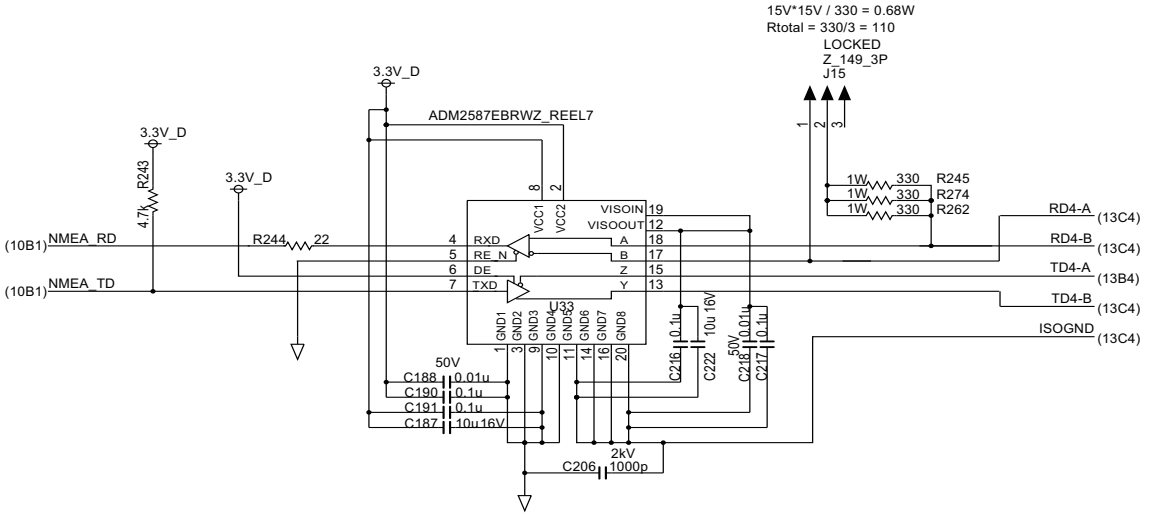


DATA 1 or 2 port (input)

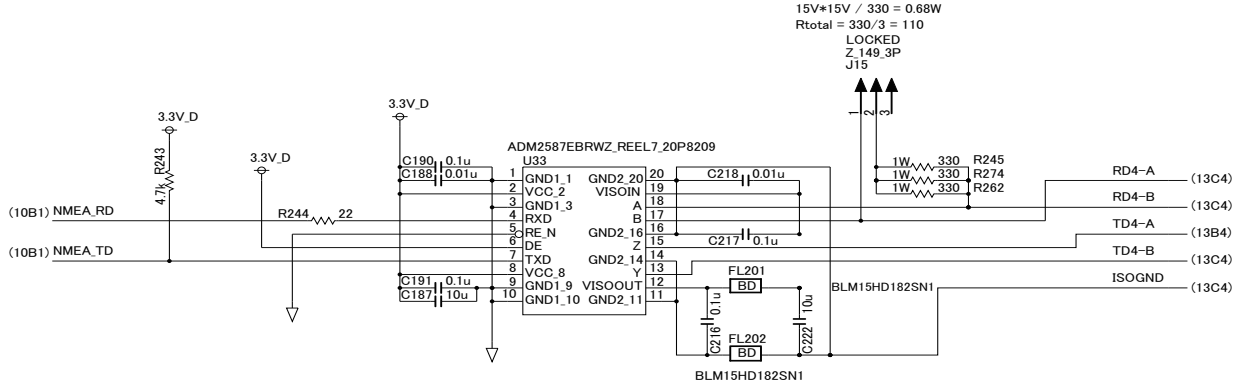


DATA 4 port

●For LCD NL6448BC18-01F

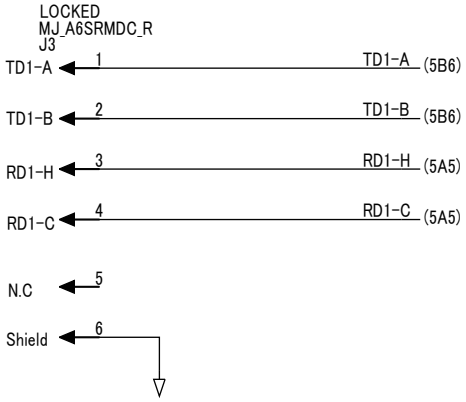


●For LCD COM57H5N32XSC

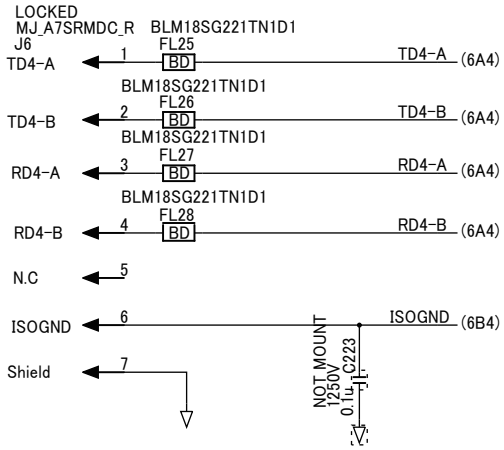


DATA 1, 2, 3 or 4 port (external output)

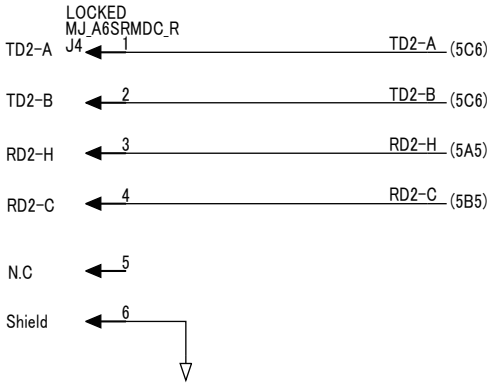
DATA1



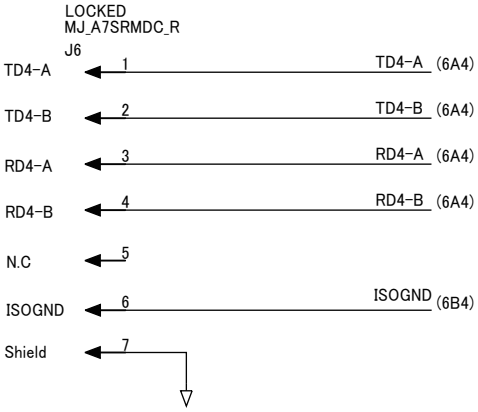
DATA4 For LCD NL6448BC-01



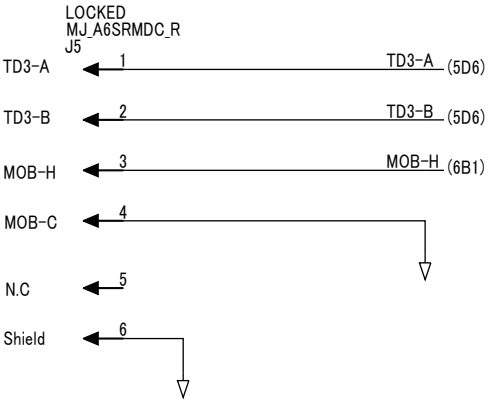
DATA2



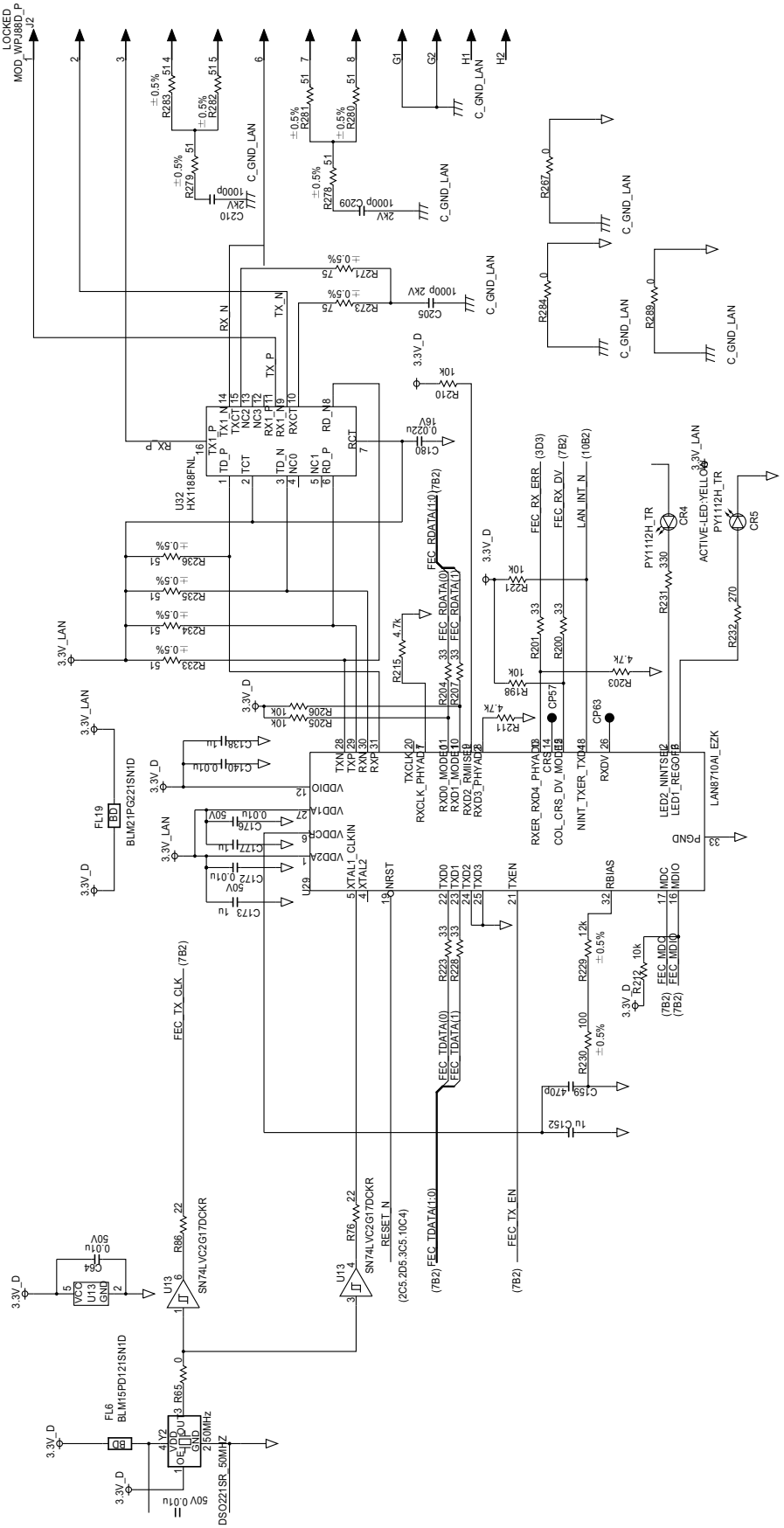
DATA4 For LCD COM57H5N32XSC



DATA3



Ethernet


LOCKED
MOD_WP/J8D_P
J2
C_GND_LAN
3.3V_D
3.3V_LAN
U32
HX1188FNL
TX_P
TX_N
RX_P
RX_N
U29
LAN8710AI_EZK
U13
SN74LVC2G17DCKR
Y2
250MHz
DSO221SR_50MHz
FEC_TX_CLK (7B2)
FEC_TDATA(1:0) (7B2)
FEC_TX_EN (7B2)
FEC_RDATA(1:0) (7B2)
FEC_RX_ERR (3D3)
FEC_RX_DV (7B2)
LAN_INT_N (10B2)
FEC_MDC (7B2)
FEC_MDIO (7B2)
ACTIVE-LED:YELLOW
PY1112H_TR
CR4
CR5

Note: For layout purposes and to prevent miswiring, the TX and RX lines on HX1188NLT are connected reversely of shown here. The TX and RX lines share the same transformer structure so there is no problem.

Sentence description

AAM-Waypoint arrival alarm

$GPAAM,A,A,x.x,N,c--c*hh<CR><LF>
1 2 3 4 5
1. Status (A=Arrival circle entered V=Not arrived)
2. Status (A=Perpendicular passed at waypoint, V=Not arrived)
3. Arrival circle radius, nm (0.000 to 9.999)
4. Units of radius (nautical miles)
5. Waypoint ID

ACK-Acknowledge alarm

$**ACK,xxx*hh<CR><LF>
1
1. Local alarm number (identifier) (000 to 999)

ACN-Alert command

$**ACN,hhmmss.ss,aaa,x.x,x.x,c,a*hh<CR><LF>
1 2 3 4 5 6
1. Time (hh=00 to 23, mm=00 to 59, ss.ss=00.00 to 59.99), null
2. Manufacturer mnemonic code (3 digit alphanumeric code), null
3. Alert identifier (0 to 10322)
4. Alert instance (1 to 999999), null
5. Alert command (A=ACK from ext. equipment, Q=Request from ext. equipment, O=Responsibility transfer, S=Silence from ext. equipment)
6. Sentence status flag (C should not be null field. Sentence without C is not a command.)

ALC-Cyclic alert list

$**ALC,xx,xx,xx,x.x, aaa,x.x,x.x,x.x,’’’’’’*hh<CR><LF>
1 2 3 4 5 6 7 8 9
1. Total number of sentences this message (01 to 99)
2. Sentence number (01 to 99)
3. Sequential message identifier (00 to 99)
4. Number of alert entries (0 to 3)
5. Manufacturer mnemonic code (FEC, null)
6. Alert identifier (999 or 10001 to 10999)
7. Alert instance (null)
8. Revision counter (1 to 99)
9. Additional alert entries (same as 5 and 8)

ALF-Alert sentence

$**ALF,x,x,x,hhmmss.ss,a,a,a,aaa,x.x,x.x,x.x,x,c--c*hh<CR><LF>
1 2 3 4 5 6 7 8 9 10 11 12 13

1. Total number of ALF sentences this message (1, 2)
2. Sentence number (1, 2)
3. Sequential message identifier (0 to 9)
4. Time of last change (hh=00 to 23, mm=00 to 59, ss.ss=00.00 to 60.99), null
5. Alert category (A=Alert category A, B=Alert category B, C=Alert category C), null
6. Alert priority (A=Alarm, W=Warning, C=Caution), null when #2 is 2.
7. Alert state (V=Not ACKed, S=Silence, A=ACked, O/U=Resolved, Not ACKed, N=Normal state), null when #2 is 2.
8. Manufacturer mnemonic code (FEC, null)
9. Alert identifier (999 or 10001 to 10999)
10. Alert instance (null)
11. Revision counter (1 to 99)
12. Escalation counter (0 to 2)
13. Alert text (max. 18 characters)

ALR-Set alarm state

$**ALR,hhmmss.ss,xxx,A,A,c—c*hh<CR><LF>
1 2 3 4 5

1. Time of alarm condition change, UTC (000000.00 to 240001.00)
2. Unique alarm number (identifier) at alarm source (000 to 999)
3. Alarm condition (A=threshold exceeded, V=not exceeded)
4. Alarm acknowledge state (A=acknowledged, V=not acknowledged)
5. Alarm description text (alphanumeric)

APA-Autopilot Sentence A

$--APA,A,A,x.xx,L,N,A,A,xxx,M,c---c*hh<CR><LF>
1 2 3 4 5 6 7 8 9 10

1. and 2. A for correct position, V for error
3. XTE value (0.00 to 9.99)
4. Direction to steer, L/R
5. XTE units, nautical miles
6. Status (A=arrival circle entered V=arrival circle not passed)
7. Status (A=perpendicular passed at waypoint V=perpendicular not entered)
8. Bearing origin to destination
9. M=Magnetic, or T=True
10. Destination waypoint number (0001-1930)

APB-Heading/track controller (autopilot) sentence B

$--APB,A,A,x.x,a,N,A,A,x.x,a,c--c,x.x,a,x.x,a,A*hh<CR><LF>
1 2 3 4 5 6 7 8 9 10 11 12131415

1. Status (A=Data valid V=LORAN-C blink or SNR warning
   V=General warning flag for other navigation systems
   when a reliable fix is not available)
2. Status (A=OK or no use V=LORAN-C cycle lock warning flag)
3. XTE (cross-track-error) Magnitiude (0.000 - 99999.999)
4. Direction to steer, L or R
5. XTE units, N=nautical miles
6. Status (A=arrival circle entered V=arrival circle not passed)
7. Status (A=perpendicular passed at waypoint V=perpendicular not entered)
8. Bearing origin to destination (0.0 - 360.0)
9. M=Magnetic, T=True
10. Destination waypoint ID
11. Bearing, present position to destination
12. M=Magnetic, T=True
13. Heading to steer to destination waypoint
14. M=Magnetic, T=True
15. Mode indicator (A=Autonomous mode D=differential mode S=Simulator mode)

ARC-Alert command refused

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

1. Release time of the Alert Command Refused(UTC)
2. Used for proprietary alerts, defined by the manufacturer
3. The alert identifier(1 - 9999999)
4. The alert instance(1 to -99)
5. Refused Alert Command(A, Q, O, S)
   A=acknowledge: A
   Q=request/repeat information
   O=responsibility transfer
   S=silence

BOD-Bearing origin to destination

$**BOD,x.x,T,x.x,M,c--c,c--c*hh<CR><LF>
1 2 3 4 5 6

1. Bearing, degrees (0.00 to 360.0)
2. True
3. Bearing, degrees (0.00 to 360.0)
4. Magnetic
5. Destination waypoint ID (Max. 13 characters)
6. Origin waypoint ID (Max. 13 characters)

BWC-Bearing and distance to waypoint - Great circle

$ **BWC,hhmmss.ss,llll.ll, a,IIIII.II,a,yyy.y,T, yyy.y,M,yyy.y,N,c--c,A*hh<CR><LF>
1 2 3 4 5 6 7 8 9 10 11 12 13
1. UTC of observation (000000.00 to 240001.00)
2. Waypoint latitude (0.00000 to 9000.00000)
3. N/S
4. Waypoint longitude (0.00000 to 18000.00000)
5. E/W
6. Bearing, degrees true (0.00 to 360.00)
7. Unit, True
8. Bearing, degrees (0.00 to 360.00)
9. Unit, Magnetic
10. Distance, nautical miles (0.000 to 10000)
11. Unit, N
12. Waypoint ID (Max. 13 characters)
13. Mode Indicator (A=Autonomous D=Differential S=Simulator)

BWR-Bearing and distance to waypoint - Rhumb line

$ **BWR,hhmmss.ss,llll.ll,a,IIIII.II,a,yyy.y,T,yyy.y,M,yyy.y,N,c--c,A*hh<CR><LF>
1 2 3 4 5 6 7 8 9 10 11 12 13
1. UTC of observation (000000.00 to 240001.00)
2. Waypoint latitude (0.00000 to 9000.00000)
3. N/S
4. Waypoint longitude (0.00000 to 18000.00000)
5. E/W
6. Bearing, degrees true (0.00 to 360.00)
7. Unit, True
8. Bearing, degrees (0.00 to 360.00)
9. Unit, Magnetic
10. Distance, nautical miles (0.000 to 10000)
11. Unit, N
12. Waypoint ID (Max. 13 characters)
13. Mode Indicator (A=Autonomous D=Differential S=Simulator)

BWW-Bearing waypoint to waypoint

$--BWW,x.x,T,x.x,M,c--c,c--c*hh<CR><LF>
1 2 3 4 5
1. Bearing, degrees true
2. Bearing, degrees magnetic
3. TO waypoint ID
4. FROM waypoint ID
5. Checksum

DBT-Depth below transducer

$**DBT,xxxx.x,f,xxxx.x,M,xxxx.x,F*hh<CR><LF>
1 2 3 4 5 6
1. Water depth (0.00 to 99999.99)
2. feet
3. Water depth (0.00 to 99999.99)
4. Meters
5. Water depth (0.00 to 99999.99)
6. Fathoms

DPT-Depth

$**DPT,x.x,x.x,x.x*hh<CR><LF>
1 2 3
1. Water depth relative to the transducer, meters (0.00 to 99999.99)
2. Offset from transducer, meters (-99.99 to 99.99)
3. Minimum range scale in use (unused)

DTM-Datum reference

$**DTM,ccc,a,x.x,a,x.x,a,x.x,ccc*hh<CR><LF>
1 2 3 4 5 6 7 8
1. Local datum (W84=WGS84 W72=WGS72 S85=SGS85, P90=PE90
User defined=999, IHO datum code
2. Local datum subdivision code (null or one character)
3. Lat offset, min (-59.99999 to 59.59999)
4. N/S
5. Lon offset, min (no use)
6. E/W
7. Altitude offset, meters (no use)
8. Reference datum (W84=WGS84 W72=WGS72 S85=SGS85, P90=PE90)

GBS-GNSS satellite fault detection

$**GBS, hhmmss.ss, x.x, x.x, x.x, xx, x.x, x.x, x.x,h,h*hh<CR><LF>
1 2 3 4 5 6 7 8 9 10
1. UTC time of GGA or GNS fix associated with this sentence
2. Expected error in latitude
3. Expected error in longitude
4. Expected error in altitude (no use)
5. ID number of most likely failed satellite (no use)
6. Probability of missed detection for most likely failed satellite (no use)
7. Estimate of bias in meters on most likely failed satellite (no use)
8. Standard deviation of bias estimate (no use)
9. GNSS System ID
10. GNSS Signal ID

GGA-Global positioning system (GPS) fix data

$**GGA,hhmmss.ss,llll.lll,a,yyyyy.yyy,a,x,xx,x.x,x.x,M,x.x,M,x.x,xxxx*hh<CR><LF>
1 2 3 4 5 6 7 8 9 10 11 12 13 14
1. UTC of position (no use)
2. Latitude (0.00000 to 9000.00000)
3. N/S
4. Longitude (0.00000 to 18000.00000)
5. E/W
6. GPS quality indicator (1 to 5, 8)
7. Number of satllite in use (00 to 99)
8. Horizontal dilution of precision (0.00 to 999.99)
9. Antenna altitude above/below mean sea level (-999.99 to 9999.99)
10. Unit, m
11. Geoidal separation (-999.99 to 9999.99)
12. Unit, m
13. Age of differential GPS data (0 to 99)
14. Differential reference station ID (0000 to 1023)

GLL-Geographic position - Latitude/longitude

$**GLL,llll.lll,a,yyyyy.yyy,a,hhmmss.ss,a,x*hh<CR><LF>
1 2 3 4 5 6 7
1. Latitude (0.00000 to 9000.00000)
2. N/S
3. Longitude (0.00000 to 18000.00000)
4. E/W
5. UTC of position (no use)
6. Status (A=data valid V=data invalid)
7. Mode indicator (A=Autonomous D=Differential S=Simulator)

GNS-GNSS fix data

$**GNS,hhmmss.ss,llll.lll,a,IIIII.III,a,c--c,xx,x.x,x.x,x.x,x.x,x.x,x.x,a*hh<CR><LF>
1 2 3 4 5 6 7 8 9 10 11 12 13
1. UTC of position (no use)
2. Latitude
3. N/S
4. Longitude
5. E/W
6. Mode indicator
N=No fix A=Autonomous D=Differential P=Precise R=Real Time Kinematic
F=Float RTK E=Estimated Mode M=Manual Input Mode S=Simulator Mode
7. Total number of satellites in use
8. HDOP
9. Antenna altitude, meters
10. Geoidal separation
11. Age of differential data
12. Differential reference station ID
13. Naivgational status indicator

GRS-GNSS range residuals

$**GRS,hhmmss.ss,x,x.x,x.x,x.x,x.x,x.x,x.x,x.x,x.x,x.x,x.x,x.x,x.x,x.x,x.x,h,h*hh<CR><LF>
1 2 3 4 5
1. UTC time of the GGA or GNS fix associated with this sentence
2. Mode: 0=residuals were used to calculate the position given in the matching GGA or GNS sentence
1=residuals were re-computed after the GGA or GNS position was computed
3. Range residuals for satellites used in the navigation solution.
Order should match order of satellite ID numbers in GSA.
When GRS is used, GSA and GSV aregenerally required. Null for unused fields.
4. GNSS System ID
5. Signal ID

GSA-GNSS DOP and active satellites

$--GSA,a,x,xx,xx,xx,xx,xx,xx,xx,xx,xx,xx,xx,xx,x.x,x.x,x.x,h*hh<CR><LF>
1 2 3 4 5 6 7
1. Mode (M=manual, forced to operate in 2=2D 3=3D mode
A=automatic, allowed to automatically switch 2D/3D)
2. Mode (1=fix not available 2=2D 3=3D)
3. ID number of satellites used in solution
4. PDOP
5. HDOP
6. VDOP
7. GNSS System ID

GST-GNSS pseudorange noise satistics

$**GST,hhmmss.ss,x.x,x.x,x.x,x.x,x.x,x.x,x.x,x.x*hh<CR><LF>
1 2 3 4 5 6 7 8

1. UTC time of the GGA or GNS fix associated with this sentence
2. RMS value of the standard deviation of the range inputs to the navigation process. Range inputs include pseudoranges and DGPS corrections.
3. Standard deviation of semi-major axis of error ellipse, (m)
4. Standard deviation of semi-minor axis of error ellipse (m)
5. Orientation of semi-major axis of error ellipse (degrees from true north)
6. Standard deviation of latitude error, (m)
7. Standard deviation of longitude error, (m)
8. Standard deviation of altitude error, (m)

GSV-GNSS satellites in view

$**GSV,x,x,xx,xx,xx,xxx,xx.....,xx,xx,xxx,xx,h*hh<CR><LF>
1 2 3 4 5 6 7 8 9 10

1. Total number of messages (1 - 9)
2. Message number (1 - 9)
3. Total number of satellites in view
4. Satellite ID number
5. Elevation, degrees
6. Azimuth, degrees true
7. SNR(C/No) (NULL when not tracking)
8. Second and third SVs
9. Fourth SV
10. Signal ID

HBT-Heartbeat supervision sentence

$**HBT,x.x,A,x*hh<CR><LF>
1 2 3

1. Configured repeat interval (00.0 to 99.9(s))
2. Equipment status (A=Normal V=System fail)
3. Sequential sequence identifier (0 to 9)

HDG-Heading, deviation and variation

$**HDG,x.x,x.x,a,x.x,a*hh<CR><LF>
1 2 3 4 5

1. Magnetic sensor heading, degrees
2. Magnetic deviation, degrees
3. E/W
4. Magnetic variation, degrees
5. E/W

HDM-Heading, Magnetic

$**HDM,x.x,M*hh<CR><LF>
1 2

1. Heading, degrees
2. Magnetic (M)

HDT-Heading true

$**HDT,xxx.x,T*hh<CR><LF>
1 2
1. Heading, degrees
2. True (T)

MSK-MSK receiver interface

$**MSK,x.x,a,x.x,a,x.x,x,a*hh<CR><LF>
1 2 3 4 5 6 7
1. Beacon frequency (283.5 - 325.0 kHz)
2. Auto/manual frequency, A/M
3. Beacon bit rate (25, 50, 100, 200), bit/s
4. Auto/manual bit rate A/M
5. Interval for sending $--MSS (status) in seconds
6. Channel number
7. Sentence status Flag

MSS-MSK receiver signal status

$CRMSS,32.1,43.2,312.5,100,1*hh<CR><LF>
1 2 3 4 5
1. Signal strength
2. Signal-to-noise ratio (SN), db
3. Beacon frequency, kHz
4. Beacon bit rate, bits/s
5. Channel number (equal to “1” or NULL for single channel receivers)

MTW-Water temperature

$**MTW,x.x,C<CR><LF>
1
1. Water temperature, degrees C

POS-Device position and ship dimensions report or configuration command

$**POS,cc,xx,a,x.x,x.x,x.x,a,x.x,x.x,a*hh<CR><LF>
1 2 3 4 5 6 7 8 9 10
1. Equipment ID (IEC 61162-1 Ed.4)
2. Equipment number
3. Position validity flag (A=valid V=invalid)
4. Position X-coordinate
5. Position Y-coordinate
6. Position Z-coordinate
7. Ship’s width and length (A=valid V=invalid)
8. Ship’s width
9. Ship’s length
10. Sentence status flag (R=sentence is status report of current settings
C=sentence is a configuration command to change settings

QSM-QZSS satellite message

$**QSM,xx,c--c*hh<CR><LF>
1 2
1. Satellite ID (00 to 63)
2. DC-Report Message (63 characters)

RMB-Recommended minimum navigation information

$GPRMB,A,x.x,L,CCCC,CCCC,xxxx.xx,a,xxxxxx.xx,a,xxx.x,xxx,xx.x,A,a*hh <CR><LF>
1 2 3 4 5 6 7 8 9 10 11 12 1314
1. Data status (A=data valid, V=navigation receiver warning)
2. Cross track error (NM)
3. Direction to steer (L/R)
4. Origin waypoint ID
5. Destination waypoint ID
6. Destination waypoint latitude
7. N/S
8. Destination waypoint longitude
9. E/W
10. Range to destination, nautical miles
11. Bearing to destination, degrees true
12. Destination closing velocity, knots
13. Arrival status (A=Arrival circle entered or perpendicular passed, V=not entered/passed)
14. Mode indicator (A= Autonomous D= Differential mode E=Estimated (dead reckoning mode)
M=Manual input mode S= Simulator N=Data not valid)

RMC-Recommended minimum specific GNSS data

$GPRMC,hhmmss.ss,A,llll.ll,a,yyyyy.yy,a,x.x,x.x,ddmmyy,x.x,a,a,a*hh<CR><LF>
1 2 3 4 5 6 7 8 9 10 11 1213
1. UTC of position fix
2. Status (A=data valid, V=navigation receiver warning)
3. Latitude
4. N/S
5. Longitude
6. E/W
7. Speed over ground, knots
8. Course over ground, degrees true
9. Date
10. Magnetic variation, degrees E/W
11. E/W
12. Mode indicator (A= Autonomous D= Differential mode E=Estimated (dead reckoning) mode)
M=Manual input mode S= Simulator N=Data not valid)
13. Navigational status indication

Rnn-Routes

$**Rnn,c--c,c--c,c--c,• •,c--c*hh <CR><LF>
1 2 3 4 • • 15
1. nn=route number
2. Origin waypoint identifier
3. Destination waypoint identifier
4. Waypoint identifier
• • Additional waypoint identifiers
15. Waypoint “n” identifier

RTE-Routes

$**RTE,x.x,x.x,a,c--c,c--c,• •,c--c*hh <CR><LF>
1 2 3 4 5 • • 6
1. Total number of messages being transmitted
2. Message number
3. Message mode (C=complete route w=working route, first listed)
4. Route identifier
5. Waypoint identifier
• • Additional waypoint indentifiers
6. Waypoint “n” identifier

SRP-System function ID resolution protocol

$--SRP,x,hhhhhhhhhhhh,c--c*hh<CR><LF>
1 2 3
1. Instance number for interface redundancy (i.e. number of physical port for identical SFI), null if interface redundancy not in use. The instance numbers shall be ordinal with no skipping (1, 2, 3,…).
2. Reported MAC address used by SFI, 48bit hexadecimal number, for

THS-True heading and status

$**THS,xxx.x,a*hh<CR><LF>
1 2
1. Heading, degrees True
2. Mode indicator (A=autonomous E=estimated M=manual input S=simulator V=data not valid)

TLL-Target latitude and longitude

$GPTLL,xx,llll.ll,a,yyyyy.yy,a,c--c,hhmmss.ss,a,a*hh<CR><LF>
1 2 3 4 5 6 7 8 9
1. Target number, NULL
2. Latitude
3. N/S
4. Longitude
5. E/W
6. Target name, NULL
7. UTC of data
8. Target status, NULL
L=lost, tracked target has been lost Q=query, target in the process of acquisition T=tracking
9. Reference target=R, NULL otherwise

VBW-Dual ground/water speed

$**VBW,x.x,x.x,x,x.x,x.x,x,x.x,x,x.x,x*hh<CR><LF>
1 2 3 4 5 6 7 8 9 10
1. Longitudinal water speed, knots (-9999.99 to 9999.99)
2. Transverse water speed, knots (-9999.99 to 9999.99)
3. Status: water speed, A=Data valid V=Data invalid
4. Longitudinal ground speed, knots (-9999.99 to 9999.99)
5. Transverse ground speed, knots (-9999.99 to 9999.99)
6. Status: ground speed, A=Data valid V=Data invalid
7. Stern transverse water speed, knots (-9999.99 to 9999.99)
8. Status: stern water speed, A=Data valid V=Data invalid
9. Stern transverse ground speed, knots (-9999.99 to 9999.99)
10. Status: stern ground speed, A=Data valid V=Data invalid

VDR-Set and drift

$**VDR,x.x,T,x.x,M,x.x,N*hh <CR><LF>
1 2 3 4 5 6
1. Direction, degrees (0.0 to 360.0)
2. T=True (fixed)
3. Direction, degrees (0.0 to 360.0)
4. M=Magnetic (fixed)
5. Current speed (0 to 99.99)
6. N=Knots (fixed)

VHW-Water speed and heading

$GPVHW,x.x,T,x.x,M,x.x,N,x.x,K*hh <CR><LF>
1 2 3 4 5 6 7 8
1. Heading, degrees (0.0 to 359.9, null)
2. T=True (fixed)
3. Heading, degrees (0.0 to 359.9, null)
4. M=Magnetic (fixed)
5. Speed, knots (0.0 to 9999.9)
6. N=Knots (fixed)
7. Speed, knots (0.0 to 9999.9)
8. K=km/hr (fixed)

VTG-Course over ground and ground speed

$GPVTG,x.x,T,x.x,M,x.x,N,x.x,K,a*hh <CR><LF>
1 2 3 4 5 6 7 8 9
1. Course over ground, degrees (0.0 to 359.9)
2. T=True (fixed)
3. Course over ground, degrees (0.0 to 359.9)
4. M=Magnetic (fixed)
5. Speed over ground, knots (0.00 to 9999.9)
6. N=Knots (fixed)
7. Speed over ground (0.00 to 9999.9)
8. K=km/h (fixed)
9. Mode indicator (A=Autonomous, D=Differential E=Estimated (dead reckoning)
M=Manual input S=Simulator N=Data not valid)

WCV-Waypoint closure velocity

$**WCV,x.x,N,c--c,a*hh<CR><LF>
1 2 3
1. Velocity component, knots
2. Waypoint identifier
3. Mode indicator (A=Autonomous, D=Differential, S=Simulator, N=Data not valid)

WNC-Distance waypoint to waypoint

$**WNC,x.x,N,x.x,K,c--c,c--c*hh<CR><LF>
1 2 3 4
1. Distance, nautcal miles
2. Distance, km
3. To waypoint identifier
4. FROM waypoint identifier

WNR-Waypoint to waypoint distance, Rhumb line

$**WNR,x.x,N,x.x,K,c--c,c--c*hh<CR><LF>
1 2 3 4 5 6
1. Distance, nautcal miles
2. N (fixed)
3. Distance, km
4. K (fixed)
5. To waypoint identifier
6. FROM waypoint identifier

WPL-Waypoint location

$**WPL,llll.ll,a,yyyyy.yy,a,c--c*hh<CR><LF>
1 2 3 4 5
1. Waypoint latitude
2. N/S
3. Waypoint longitude
4. E/W
5. Waypoint identifier (No use)

XTE-Cross-track error, measured

$**XTE,A,A,x.x,a,N,a*hh<CR><LF>
1 2 3 4 5 6
1. Status: A=data valid V=LORAN C blink or SNR warning
2. Status: V=LORAN C blink or SNR warning
3. Magnitude of cross-track error (0.0000 - 9.9999)
4. Direction to steer, L/R
5. Units, nautical miles (fixed)
6. Mode indicator (A=Autonomous mode D=Differential mode S=Simulator mode)

ZDA-Time and date

$--ZDA,hhmmss.ss,xx,xx,xxxx,xx,xx*hh<CR><LF>
1 2 3 4 5 6
1. UTC (000000 to 235959)
2. Day (01 to 31, UTC)
3. Month (01 to 12, UTC)
4. Year (0000 to 9999, UTC)
5. Local zone, hours (-13 to ±13)
6. Local zone, minutes (00 to ±59)

APPX. 2 ALERT LIST

The table below shows the alert no., alert title (only for Alert I/F 2), alert text, priority, meaning and remedy for each alert.

Note: The BAM function type for the GP-170 is “P”.

Alert I/F 2

All warnings have responsibility transfer function.

No.	Inst.	Alert title	Alert description text	Priority	Meaning	Remedy
3056	0	HDOP exceeded	HDOP exceeded.	Caution/B	The value of HDOP (Horizontal Dilution of Precision) is 4 or above. HDOP threshold being permanently set to 4.	If the same state continues for five minutes, contact your dealer.
3008	1	Loss of position	GNSS core fault.	Warning/B	The signal from GNSS core is not received for three seconds.	Restart the GP-170. If the alert occurs again, contact your dealer.
	2		Too few tracking Satellites.		No positioning data.	If the same state continues for five minutes, contact your dealer.
	3		Antenna short-circuited.		The antenna has shorted out.	If this condition frequently occurs, contact your dealer.
	4		First fix fault (for Russian mode)		No positioning data for five minutes after startup.	If the same state continues over five minutes, contact your dealer.
3055	0	Lost DIF Signal	Loss of differential signal.	• Russian mode: Warning/B • Others: Caution/B	More than 10 seconds have passed since the last beacon message is received.	DGPS/DGLONASS fix use If this condition frequently occurs in the service area of the Beacon stations, contact your dealer.
3012	0	Doubt DIF Signal	Beacon status unhealthy.		The beacon station selected automatically is unhealthy.	Change the Beacon station to another available.
		For Russian mode: Doubtful DIF Sig				
401903	0	Audit log fail	Check the Audit log	Caution/B	Logs could not be saved in the audit log.	Restart the GP-170 and contact your dealer for advice.

No.	Inst.	Alert title	Alert description text	Priority	Meaning	Remedy
401906	0	Network overload	Check other devices in the network	Caution/B	Network overload detected.	Check network status and devices in network.

Note: "Inst." denotes "Instance number" for the alert.

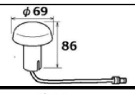
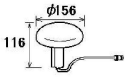
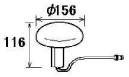
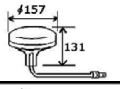
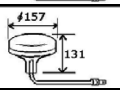
Alert I/F 1, Legacy

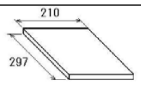
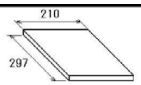
No.	Alert description text	Priority	Meaning	Remedy
009	Antenna short-circuited.	Warning/B	The antenna has shorted out.	If this condition frequently occurs, contact your dealer.
010	• D3D turned to 3D. • D3D turned to 2D. • D2D turned to 3D. • D2D turned to 2D. • S3D turned to 3D. • S3D turned to 2D. • S2D turned to 3D. • S2D turned to 2D. • Q3D turned to 3D. • Q3D turned to 2D. • Q2D turned to 3D. • Q2D turned to 2D. • D3D turned to “No Fix”. • D2D turned to “No Fix”. • S3D turned to “No Fix”. • S2D turned to “No Fix”. • Q3D turned to “No Fix”. • Q2D turned to “No Fix”.	Caution/B	The positioning system turns from DGPS/DGLONASS to GPS/GLONASS.	• DGPS/DGLONASS fix use If this condition frequently occurs in the service area of the Beacon stations, contact your dealer. • SBAS fix use If this condition frequently occurs in the service area of the SBAS satellites, contact your dealer. • QZSS fix use If this condition frequently occurs in the service area of the QZSS satellites, contact your dealer.
210	HDOP exceeded.	Caution/B	The value of HDOP (Horizontal Dilution of Precision) is 4 or above. HDOP threshold being permanently set to 4.	If the same state continues for five minutes, contact your dealer.
211	No calculation of position.	Warning/B	The signal from GNSS core is not received for three seconds.	Restart the GP-170. If the alert occurs again, contact your dealer.
212	Loss of position.	Warning/B	No positioning data.	If the same state continues for five minutes, contact your dealer.
213	Loss of differential signal.	Caution/B	More than 10 seconds have passed since the last beacon message is received.	DGPS/DGLONASS fix use If this condition frequently occurs in the service area of the Beacon stations, contact your dealer.
215	Beacon status unhealthy.	Caution/B	The beacon station selected automatically is unhealthy.	Change the Beacon station to another available.

PACKING LIST GP170-**115***/HK

20BF-X-9861-12 1/1

A-1

NAME	OUTLINE	DESCRIPTION/CODE No.	Q'TY
ユニット UNIT			
空中線部 ANTENNA ASSEMBLY		GPA-017S 000-040-537-00	1 (*1)
空中線部 ANTENNA ASSEMBLY		GPA-020S 000-026-988-00	1 (*1)
空中線部 ANTENNA ASSEMBLY		GPA-021S 000-026-989-00	1 (*1)
空中線部 ANTENNA ASSEMBLY		GPA-022S 000-037-837-00	1 (*1)
空中線部 ANTENNA ASSEMBLY		GPA-023S 000-037-838-00	1 (*1)
受信演算部 DISPLAY UNIT		GP170-* 000-026-990-00 **	1
予備品 SPARE PARTS			
予備品 SPARE PARTS		SP20-01401 001-327-980-00	1
工事材料 INSTALLATION MATERIALS			
ｹｰﾌﾞﾙ(ｸﾐﾋﾝ)MJ CABLE ASSEMBLY		MJ-A3SPF0013A-035C 000-176-666-10	1

NAME	OUTLINE	DESCRIPTION/CODE No.	Q'TY
ｹｰﾌﾞﾙ組品 CABLE ASSEMBLY		TNC-PS/PS-3D-L15M-R 001-173-110-10	1
ﾏｽﾄ取付金具袋詰品 MAST MOUNTING KIT		CP20-01111 004-368-920-00	1
工事材料 INSTALLATION MATERIALS		CP20-03401 001-321-400-00	1
図書 DOCUMENT			
取扱説明書 OPERATOR'S MANUAL		OM*-44820-* 000-100-173-2* **	1
装備要領書 INSTALLATION MANUAL		IM*-44820-* 000-100-169-2* **	1

1.ｺｰﾄﾞ番号末尾の[**]は、選択品の代表ｺｰﾄﾞを表します。
1.CODE NUMBER ENDING WITH "**" INDICATES THE CODE NUMBER OF REPRESENTATIVE MATERIAL.

2.(*1)の空中線部は仕様により決定されます。
2.ANTENNA UNIT HAS BEEN DETERMINED BY SPECIFICATION.

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

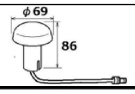
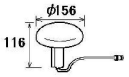
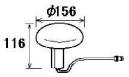
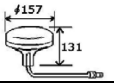
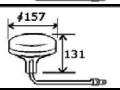
CN

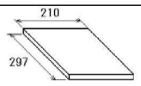
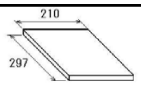
C4482-Z10-L

PACKING LIST GP170-**1N***/HK

20BF-X-9862-12 1/1

A-2

NAME	OUTLINE	DESCRIPTION/CODE No.	Q'TY
ユニット UNIT			
空中線部 ANTENNA ASSEMBLY		GPA-017S 000-040-537-00	1 (*1)
空中線部 ANTENNA ASSEMBLY		GPA-020S 000-026-988-00	1 (*1)
空中線部 ANTENNA ASSEMBLY		GPA-021S 000-026-989-00	1 (*1)
空中線部 ANTENNA ASSEMBLY		GPA-022S 000-037-837-00	1 (*1)
空中線部 ANTENNA ASSEMBLY		GPA-023S 000-037-838-00	1 (*1)
受信演算部 DISPLAY UNIT		GP170-* 000-026-990-00 **	1
予備品 SPARE PARTS			
予備品 SPARE PARTS		SP20-01401 001-327-980-00	1
工事材料 INSTALLATION MATERIALS			
ｹｰﾌﾞﾙ(ｸﾐﾋﾝ)MJ CABLE ASSEMBLY		MJ-A3SPF0013A-035C 000-176-666-10	1

NAME	OUTLINE	DESCRIPTION/CODE No.	Q'TY
ﾏｽﾄ取付金具袋詰品 MAST MOUNTING KIT		CP20-01111 004-368-920-00	1
工事材料 INSTALLATION MATERIALS		CP20-03401 001-321-400-00	1
図書 DOCUMENT			
取扱説明書 OPERATOR'S MANUAL		OM*-44820-* 000-100-173-2* **	1
装備要領書 INSTALLATION MANUAL		IM*-44820-* 000-100-169-2* **	1

1.ｺｰﾄﾞ番号末尾の[**]は、選択品の代表ｺｰﾄﾞを表します。
1.CODE NUMBER ENDING WITH "**" INDICATES THE CODE NUMBER OF REPRESENTATIVE MATERIAL.

2.(*1)の空中線部は仕様により決定されます。
2.ANTENNA UNIT HAS BEEN DETERMINED BY SPECIFICATION.

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

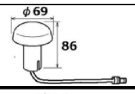
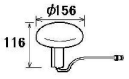
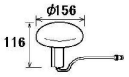
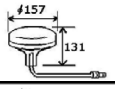
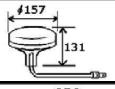
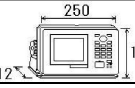
CN

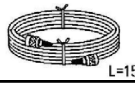
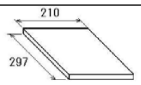
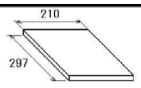
C4482-Z11-M

PACKING LIST GP170-**015***/HK

20BF-X-9863-13 1/1

A-3

NAME	OUTLINE	DESCRIPTION/CODE No.	Q'TY
ユニット UNIT			
空中線部 ANTENNA ASSEMBLY		GPA-017S 000-040-537-00	1 (*1)
空中線部 ANTENNA ASSEMBLY		GPA-020S 000-026-988-00	1 (*1)
空中線部 ANTENNA ASSEMBLY		GPA-021S 000-026-989-00	1 (*1)
空中線部 ANTENNA ASSEMBLY		GPA-022S 000-037-837-00	1 (*1)
空中線部 ANTENNA ASSEMBLY		GPA-023S 000-037-838-00	1 (*1)
受信演算部 DISPLAY UNIT		GP170-* 000-026-990-00 **	1
予備品 SPARE PARTS			
予備品 SPARE PARTS		SP20-01401 001-327-980-00	1
工事材料 INSTALLATION MATERIALS			
ｹｰﾌﾞﾙ(ｸﾐﾋﾝ)MJ CABLE ASSEMBLY		MJ-A3SPF0013A-035C 000-176-666-10	1

NAME	OUTLINE	DESCRIPTION/CODE No.	Q'TY
ｹｰﾌﾞﾙ組品 CABLE ASSEMBLY		TNC-PS/PS-3D-L15M-R 001-173-110-10	1
ｹｰﾌﾞﾙ組品MJ CABLE ASSEMBLY		MJ-A6SPF0003-050C 000-154-054-10	1 (*2)
工事材料 INSTALLATION MATERIALS		CP20-03401 001-321-400-00	1
図書 DOCUMENT			
取扱説明書 OPERATOR'S MANUAL		OM*-44820-* 000-100-173-2* **	1
装備要領書 INSTALLATION MANUAL		IM*-44820-* 000-100-169-2* **	1

1.ｺｰﾄﾞ番号末尾の[**]は、選択品の代表ｺｰﾄﾞを表します。
1.CODE NUMBER ENDING WITH "**" INDICATES THE CODE NUMBER OF REPRESENTATIVE MATERIAL.

2.(*1)の空中線部は仕様により決定されます。
2.ANTENNA UNIT HAS BEEN DETERMINED BY SPECIFICATION.

(*2)印のｹｰﾌﾞﾙ組品は仕様により決定されます。
(*2) MARKED CABLES ARE SELECTABLE.

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

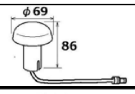
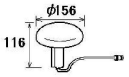
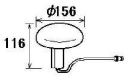
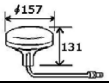
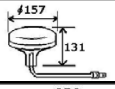
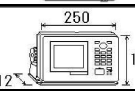
CN

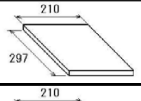
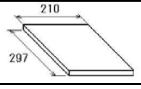
C4482-Z12-K

PACKING LIST GP170-**0N***/HK

20BF-X-9864-12 1/1

A-4

NAME	OUTLINE	DESCRIPTION/CODE No.	Q'TY
ユニット UNIT			
空中線部 ANTENNA ASSEMBLY		GPA-017S 000-040-537-00	1 (*1)
空中線部 ANTENNA ASSEMBLY		GPA-020S 000-026-988-00	1 (*1)
空中線部 ANTENNA ASSEMBLY		GPA-021S 000-026-989-00	1 (*1)
空中線部 ANTENNA ASSEMBLY		GPA-022S 000-037-837-00	1 (*1)
空中線部 ANTENNA ASSEMBLY		GPA-023S 000-037-838-00	1 (*1)
受信演算部 DISPLAY UNIT		GP170-* 000-026-990-00 **	1
予備品 SPARE PARTS			
予備品 SPARE PARTS		SP20-01401 001-327-980-00	1
工事材料 INSTALLATION MATERIALS			
ｹｰﾌﾞﾙ(ｸﾐﾋﾝ)MJ CABLE ASSEMBLY		MJ-A3SPF0013A-035C 000-176-666-10	1

NAME	OUTLINE	DESCRIPTION/CODE No.	Q'TY
工事材料 INSTALLATION MATERIALS		CP20-03401 001-321-400-00	1
図書 DOCUMENT			
取扱説明書 OPERATOR'S MANUAL		OM*-44820-* 000-100-173-2* **	1
装備要領書 INSTALLATION MANUAL		IM*-44820-* 000-100-169-2* **	1

1.ｺｰﾄﾞ番号末尾の[**]は、選択品の代表ｺｰﾄﾞを表します。
1.CODE NUMBER ENDING WITH "**" INDICATES THE CODE NUMBER OF REPRESENTATIVE MATERIAL.

2.(*1)の空中線部は仕様により決定されます。
2.ANTENNA UNIT HAS BEEN DETERMINED BY SPECIFICATION.

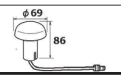
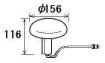
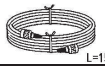
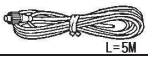
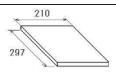
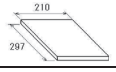
(略図の寸法は、参考値です。DIMENSIONS IN DRAWING FOR REFERENCE ONLY.)

CN

C4482-Z13-M

PACKING LIST

GP170-EA01521S6-MIJ、GP170-EN01517S6-MIJ

NAME	OUTLINE	DESCRIPTION/CODE No.	Q'TY
ユニット UNIT			
空中線部 ANTENNA UNIT		GPA-017S 000-039-241-00	1 (*1)
空中線部 ANTENNA UNIT		GPA-021S-MIJ 000-029-200-00	1 (*2)
受信演算部 DISPLAY UNIT		GP170-E*-MIJ 000-029-202-00 **	1
予備品 SPARE PARTS			
予備品 SPARE PARTS		SP20-01401 001-243-840-00	1
工事材料 INSTALLATION MATERIALS			
ｹｰﾌﾞﾙ(ｸﾐﾐﾝ)MJ CABLE ASSEMBLY		MJ-A3SPF0013A-035C 000-176-666-10	1
ｹｰﾌﾞﾙ組品 CABLE ASSEMBLY		TNC-PS/PS-3D-L15M-R 001-173-110-10	1
ｹｰﾌﾞﾙ組品MJ CABLE ASSEMBLY		MJ-A6SPF0003-050C 000-154-054-10	1
工事材料 INSTALLATION MATERIALS		CP20-03401 001-243-920-00	1
図書 DOCUMENT			
取扱説明書 OPERATOR'S MUNUAL		OME-44820-* 000-201-682-1*	1
装備要領書 INSTALLATION MANUAL		IME-44820-* 000-201-680-1*	1

1.*1:FOR GP170-EN01517S6-MIJ
2.*1:FOR GP170-EA01521S6-MIJ
3.CODE NUMBER ENDING WITH "**" INDICATES THE CODE NUMBER OF REPRESENTATIVE MATERIAL.

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

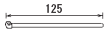
C4482-Z25-F

FURUNO

CODE NO.	001-321-400-00	20BF-X-9403 -0
TYPE	CP20-03401	1/1

工事材料表

INSTALLATION MATERIALS

番号 NO.	名称 NAME	略図 OUTLINE	型名／規格 DESCRIPTIONS	数量 Q'TY	用途／備考 REMARKS
1	ﾅﾄﾗｽﾀｯﾋﾟﾝﾈｼﾞ 1ｼｭ SELF-TAPPING SCREW		5X20 SUS304 CODE NO. 000-162-608-10	4	
2	ｺﾝﾍﾞｯｸｽ CONVEX		CV-125N CODE NO. 000-172-164-10	1	

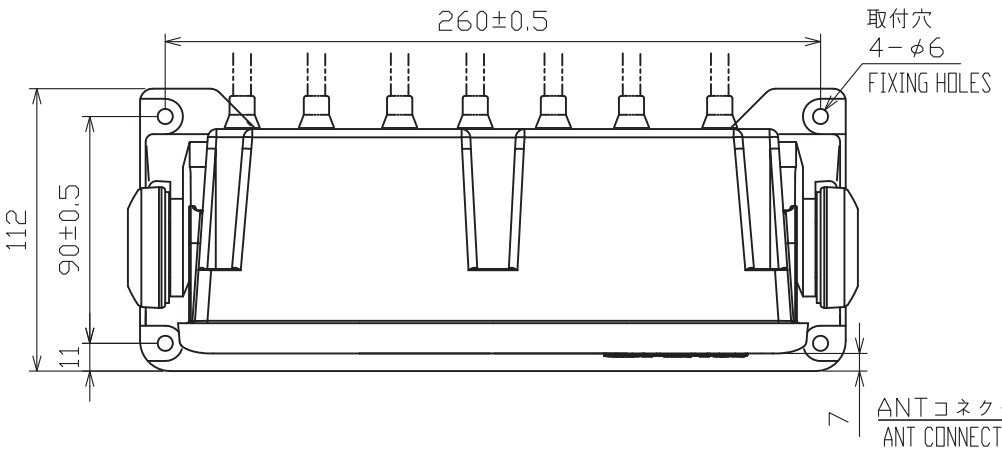
型式/ｺｰﾄﾞ番号が２段の場合、下段より上段に代わる過渡期品であり、どちらかが入っています。 なお、品質は変わりません。

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.）

FURUNO ELECTRIC CO ., LTD. CN

C4482-M03-A

FURUNO



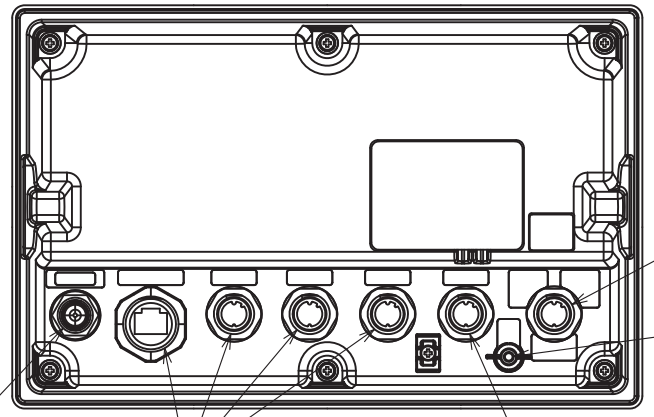
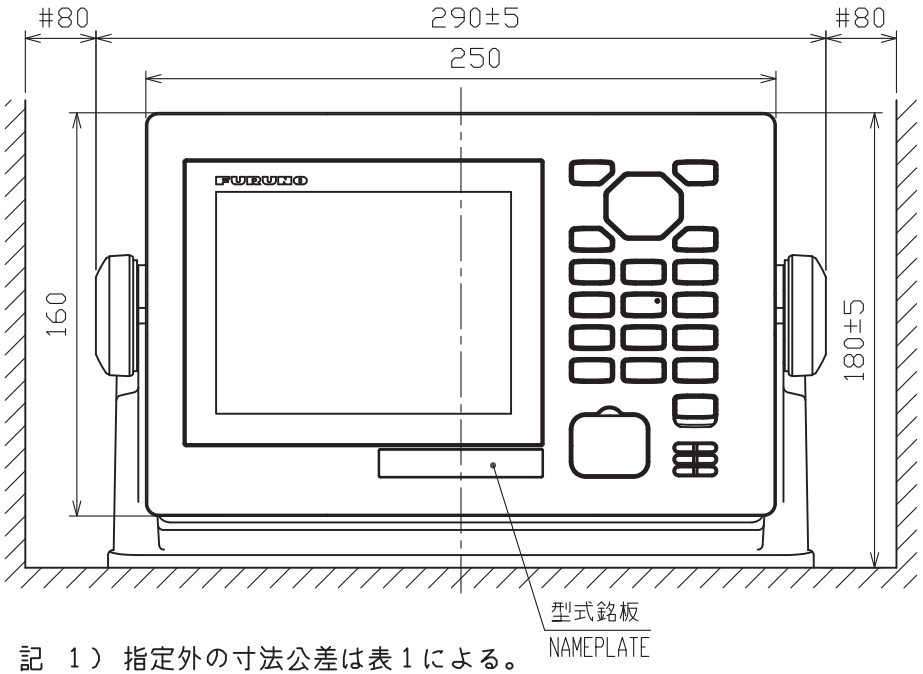


表1 TABLE 1

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



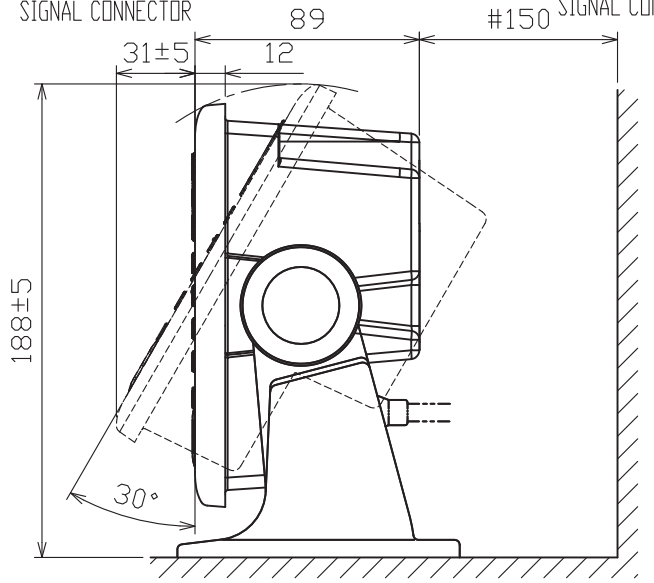


表2 TABLE 2

DGPSビーコン DGPS BEACON	質　量 MASS (kg±10%)
あり　YES	1．8
なし　NO	1．6

注　記　1）指定外の寸法公差は表1による。
　　2）＃印寸法は最小サービス空間寸法とする。
　　3）取付用ネジは＋トラスタッピンネジ呼び径５×２０を使用のこと。

NOTE　1. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS WHICH IS NOT SPECIFIED.
　　2. #: MINIMUM SERVICE CLEARANCE.
　　3. USE TAPPING SCREWS ø5x20 FOR FIXING THE UNIT.

DRAWN 5/Apr/2021 T.YAMASAKI		TITLE	GP-170
CHECKED 5/Apr/2021 H.MAKI		名称	受信演算部（卓上装備）
APPROVED 31/May/2021 H.MAKI			外寸図
SCALE 1/3	MASS 表2参照 SEE TABLE 2	NAME	DISPLAY UNIT (TABLETOP MOUNT)
DWG.No. C4482-G01- B	REF.No. 20-035-100G-3		OUTLINE DRAWING

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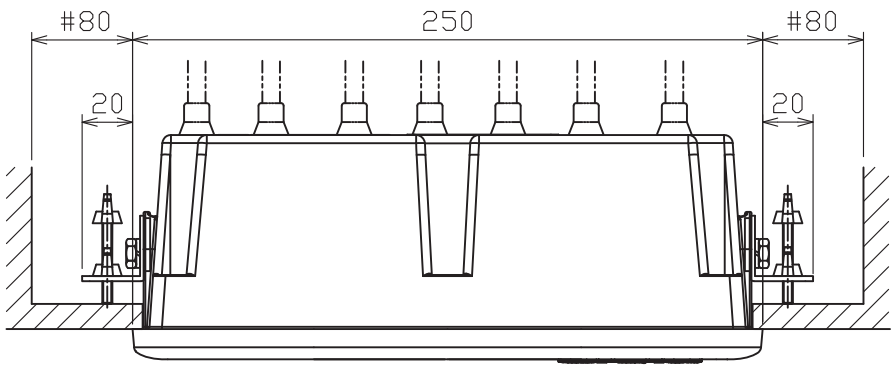
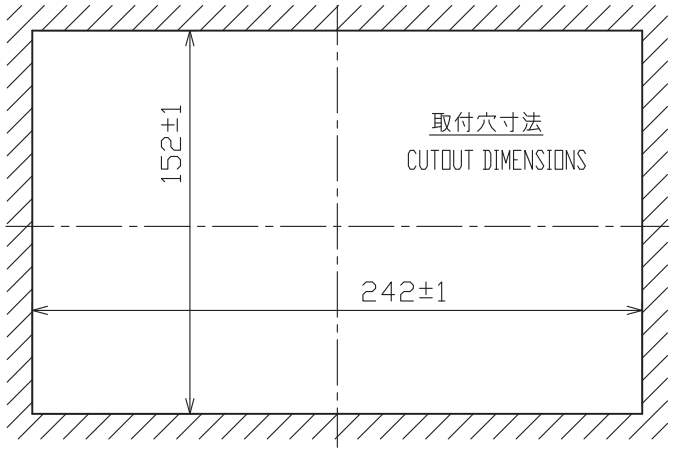


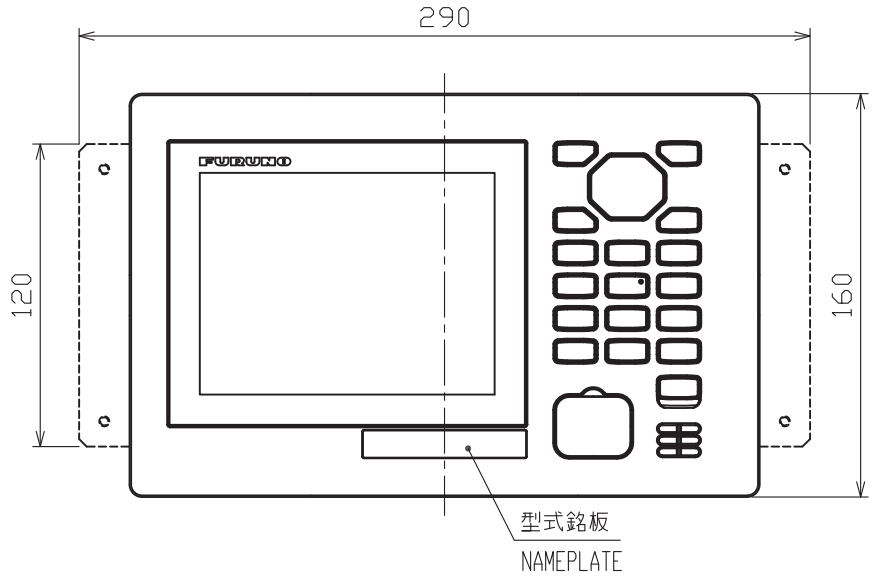
表1 TABLE 1

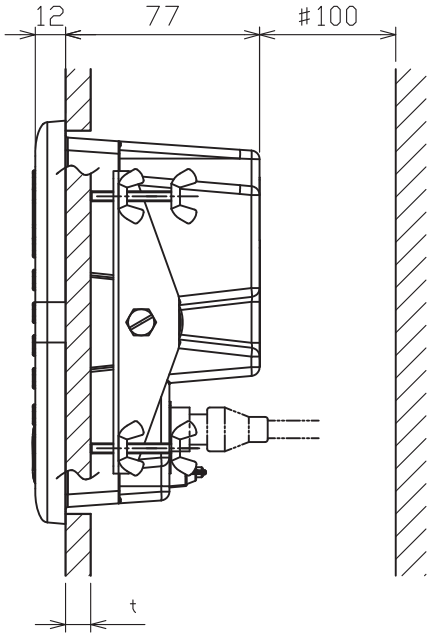
寸法区分（mm） DIMENSION	公差（mm） TOLERANCE
L≦50	±1.5
50<L≦100	±2.5
100<L≦500	±3

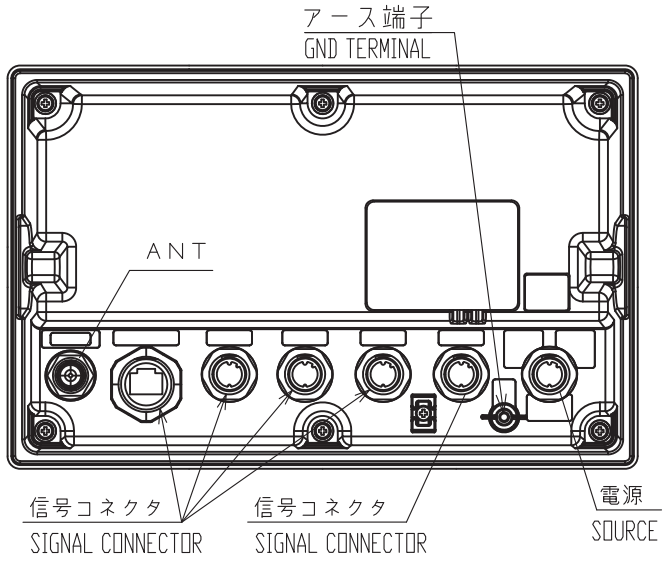
表2 TABLE 2

DGPSビーコン DGPS BEACON	質量 MASS(kg±10%)
あり YES	1．7
なし NO	1．5









注 記 1） 指定外の寸法公差は表1による。
2） #印寸法は最小サービス空間寸法とする。
3） 壁の厚さ（t）は、3以上15以下とする。

NOTE 1. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS WHICH IS NOT SPECIFIED.
2. #: MINIMUM SERVICE CLEARANCE.
3. BULKHEAD THICKNESS (t): 3≦t≦15.

DRAWN 5/Apr/2021 T.YAMASAKI		TITLE	GP-170
CHECKED 5/Apr/2021 H.MAKI		名称	受信演算部（埋込装備S）
APPROVED 31/May/2021 H.MAKI			外寸図
SCALE 1/3 MASS 表2参照 SEE TABLE 2		NAME	DISPLAY UNIT (FLUSH MOUNT S)
DWG.No. C4482-G02- B	REF.No. 20-035-200G-4		OUTLINE DRAWING

FURUNO ELECTRIC CO., LTD.

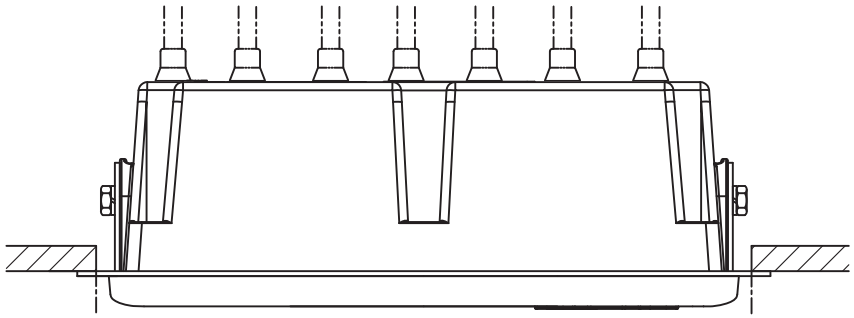
FURUNO

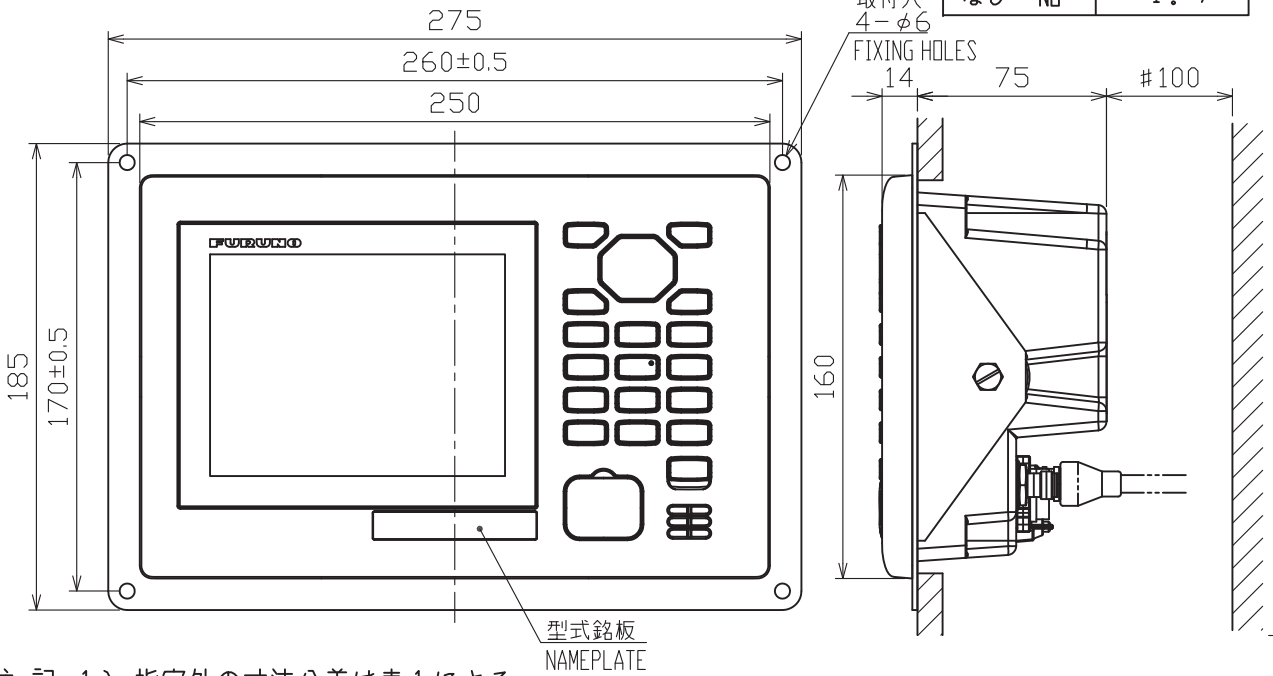
表1 TABLE 1

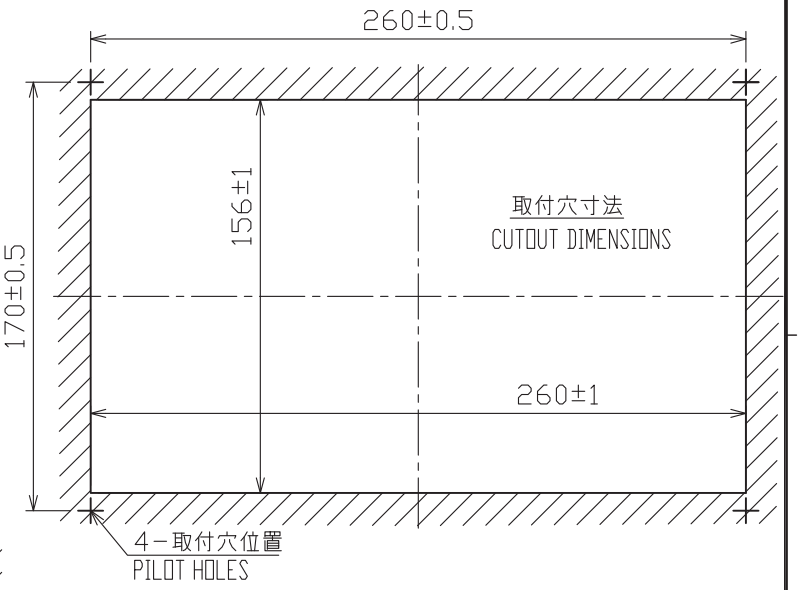
寸法区分 (mm) DIMENSION	公差 (mm) TOLERANCE
L≦50	±1.5
50<L≦100	±2.5
100<L≦500	±3

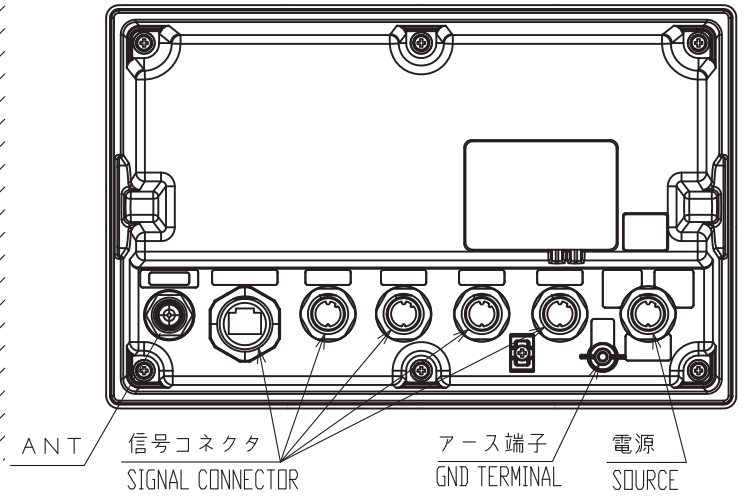
表2 TABLE 2

DGPSビーコン DGPS BEACON	質量 MASS(kg±10%)
あり YES	1.9
なし NO	1.7









注 記 1) 指定外の寸法公差は表1による。
2) #印寸法は最小サービス空間寸法とする。
3) 取付用ネジは+トラスタッピンネジ呼び径5×20を使用のこと。

NOTE 1. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS WHICH IS NOT SPECIFIED.
2. #: MINIMUM SERVICE CLEARANCE.
3. USE TAPPING SCREWS ø5x20 FOR FIXING THE UNIT.

DRAWN 5/Apr/2021 T.YAMASAKI		TITLE	GP-170
CHECKED 5/Apr/2021 H.MAKI		名称	受信演算部（埋込装備F）
APPROVED 31/May/2021 H.MAKI			外寸図
SCALE 1/3	MASS 表2参照 SEE TABLE 2	NAME	DISPLAY UNIT (FLUSH MOUNT F)
DWG.No. C4482-G03- B	REF.No. 20-035-300G-3		OUTLINE DRAWING

FURUNO ELECTRIC CO., LTD.

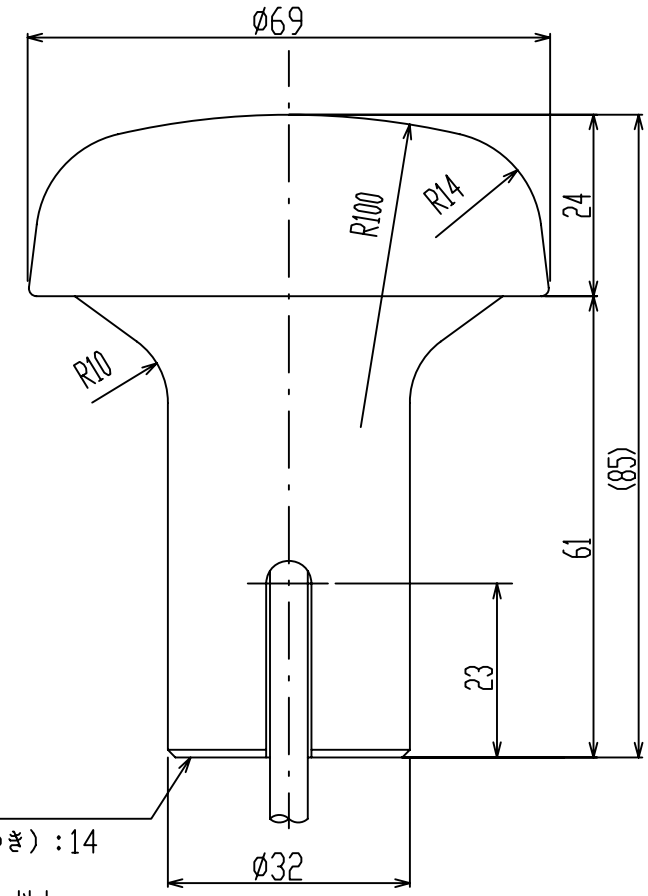


表1 TABLE 1

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

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:19 mm以上
オネジ有効径:24.17mm

THREAD PER 25.4mm (1 INCH): 14
PITCH: 1.8143 mm
THREAD LENGTH: 19 mm OR MORE
PITCH DIAMETER: 24.17mm

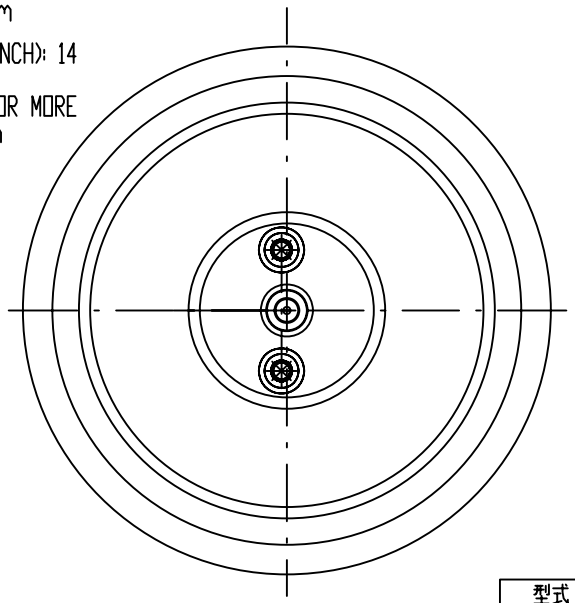


表2 TABLE 2

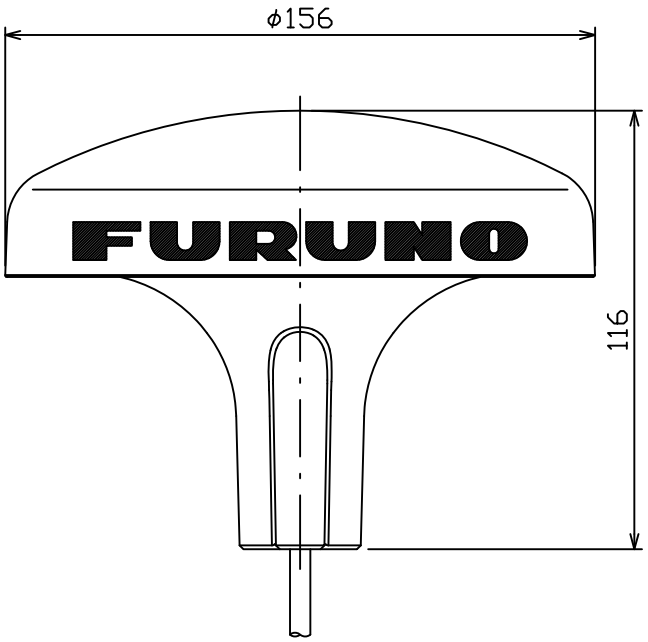
型式 TYPE	ケーブル長(m) CABLE LENGTH	プラグ PLAG	質量(kg±10%) MASS
GPA-017	10	TNC-P-3	0.6
GPA-017S	0.2	TNC-J-3	0.15

注記
指定外の寸法公差は表1による。

NOTE
TABLE 1 INDICATES TOLERANCE OF DIMENSIONS WHICH IS NOT SPECIFIED.

DRAWN Mar. 27 '07 T.YAMASAKI		TITLE GPA-017/017S
CHECKED Mar. 27 '07 T.TAKENO		名称 空中線部
APPROVED Mar.27'07 R.Esumi		外寸図
SCALE 1/1 MASS TABLE 2 表2参照		NAME ANTENNA UNIT
DWG.No. C4384-G04- L		OUTLINE DRAWING

FURUNO ELECTRIC CO., LTD.



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

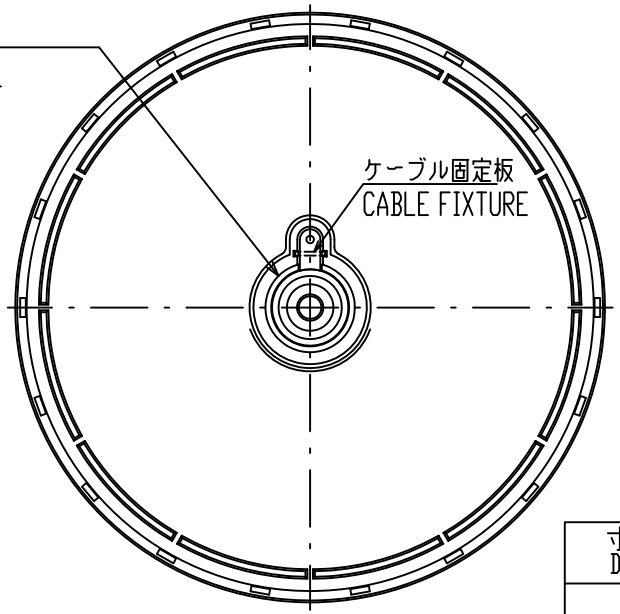


表1 TABLE 1

寸法区分(mm) DIMENSION	公差(mm) TOLERANCE
L≦50	±1．5
50<L≦100	±2．5
100<L≦500	±3

表2 TABLE 2

型式 TYPE	ケーブル長(m) CABLE LENGTH	プラグ PLAG	質量 (kg±10%) MASS
GPA-019	10	TNC-P-3	0.98
GPA-019S	0.2	TNC-J-3	0.54
GPA-020S	0.2	TNC-J-3	0.32
GPA-021S	0.2	TNC-J-3	0.52

注記
1）指定外の寸法公差は表1による。

NOTE
1. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS WHICH IS NOT SPECIFIED.

DRAWN 14/May/2013 T.YAMASAKI		TITLE	GPA-019/019S/020S/021S
CHECKED 14/May/2013 H.MAKI		名称	空中線部
APPROVED 17/May/2013 H.MAKI			外寸図
SCALE 1/2 MASS TABLE 2 表2参照		NAME	ANTENNA UNIT
DWG. No. C4400-G01- G	REF. No. 20-016-210G-4		OUTLINE DRAWING

FURUNO ELECTRIC CO., LTD.

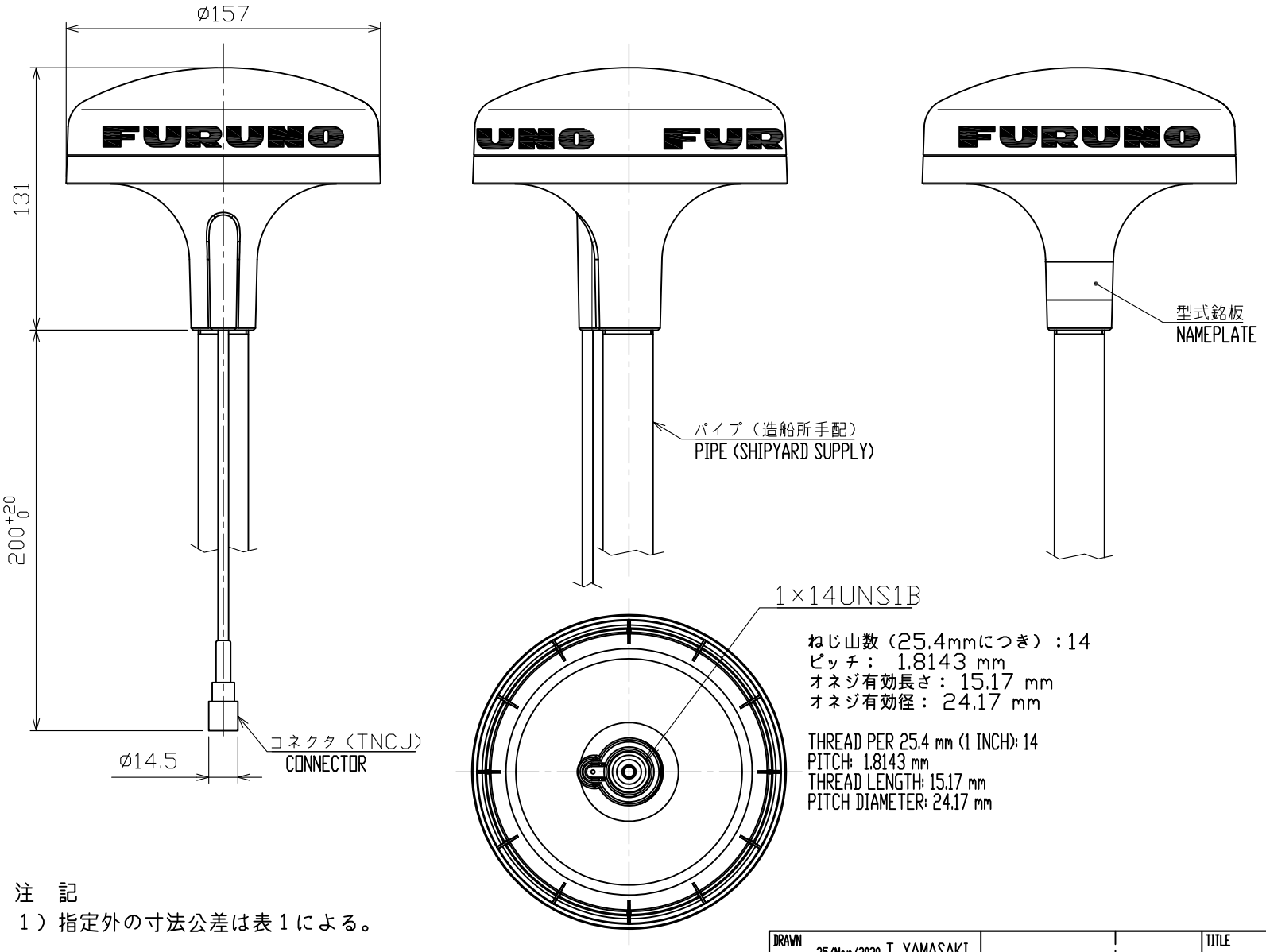


表1 TABLE 1

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

表2 TABLE 2

型式 MODEL	質量(kg±10%) MASS
GPA-022S	0.47
GPA-023S	0.65

注　記

1）指定外の寸法公差は表1による。

NOTE

1. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS WHICH IS NOT SPECIFIED.

DRAWN 25/Mar/2020 T. YAMASAKI		TITLE	GPA-022S/023S
CHECKED 25/Mar/2020 H. MAKI		名称	空中線部（パイプ固定）
APPROVED 13/May/2020 MAKI			外寸図
SCALE 1/3	MASS 表2参照 TABLE 2	質量はパイプを含まず。 MASS DOES NOT INCLUDE PIPE.	NAME ANTENNA UNIT (PIPE MOUNT)
DWG. No. C4482-G04- A	REF. No. 20-035-500G-2		OUTLINE DRAWING

FURUNO

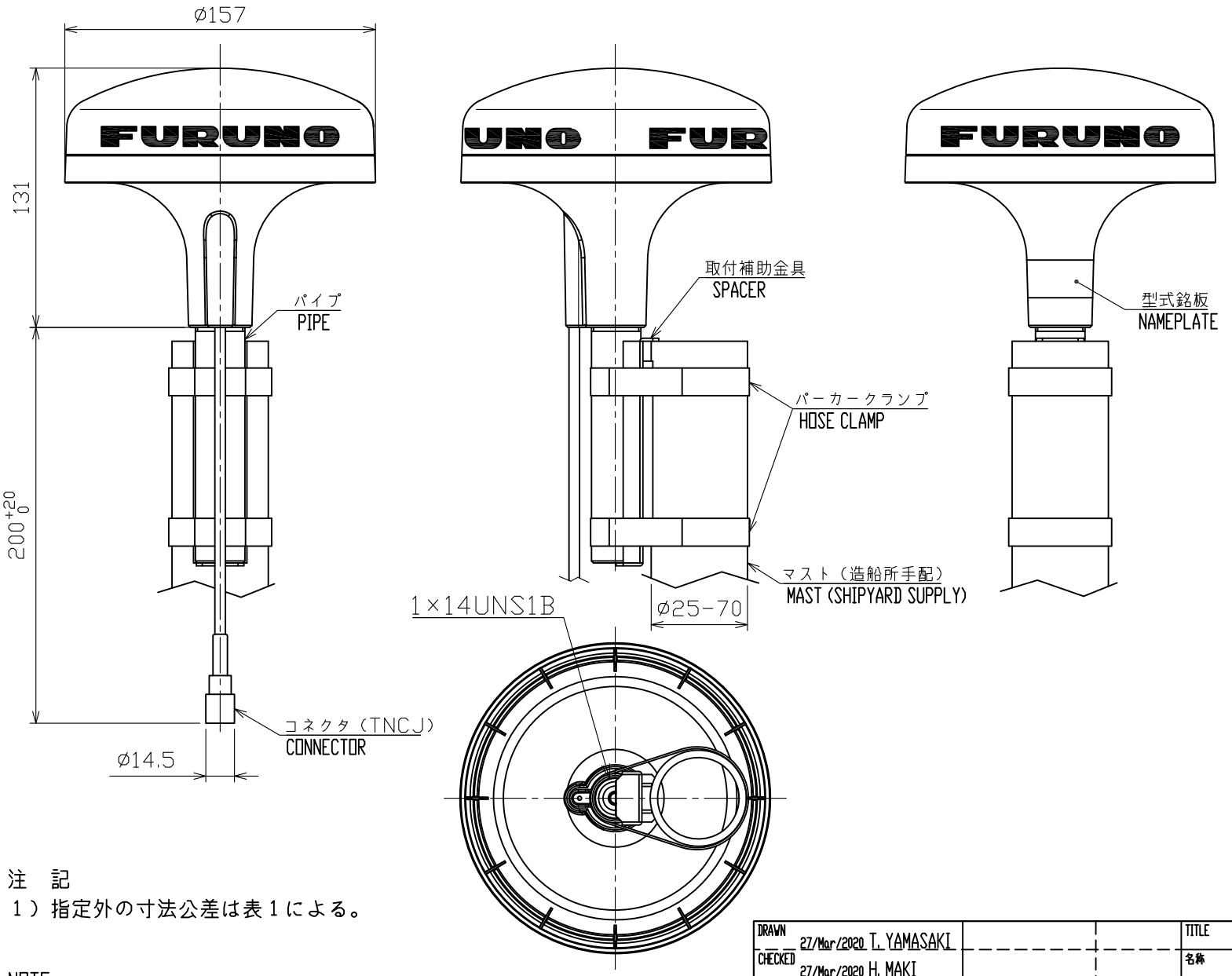


表1 TABLE 1

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

表2 TABLE 2

型式 MODEL	質量(kg±10%) MASS
GPA-022S	0.47
GPA-023S	0.65

注　記

1）指定外の寸法公差は表1による。

NOTE

1. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS WHICH IS NOT SPECIFIED.

DRAWN 27/Mar/2020 T. YAMASAKI		TITLE	GPA-022S/023S
CHECKED 27/Mar/2020 H. MAKI		名称	空中線部（金具取付）
APPROVED 13/May/2020 H.MAKI			外寸図
SCALE 1/3 MASS 表2参照 TABLE 2	質量は金具類を含まず。 MASS DOES NOT INCLUDE FIXTURES.	NAME	ANTENNA UNIT (FIXTURE MOUNT)
DWG. No. C4482-G05- A	REF. No. 20-035-501G-0		OUTLINE DRAWING

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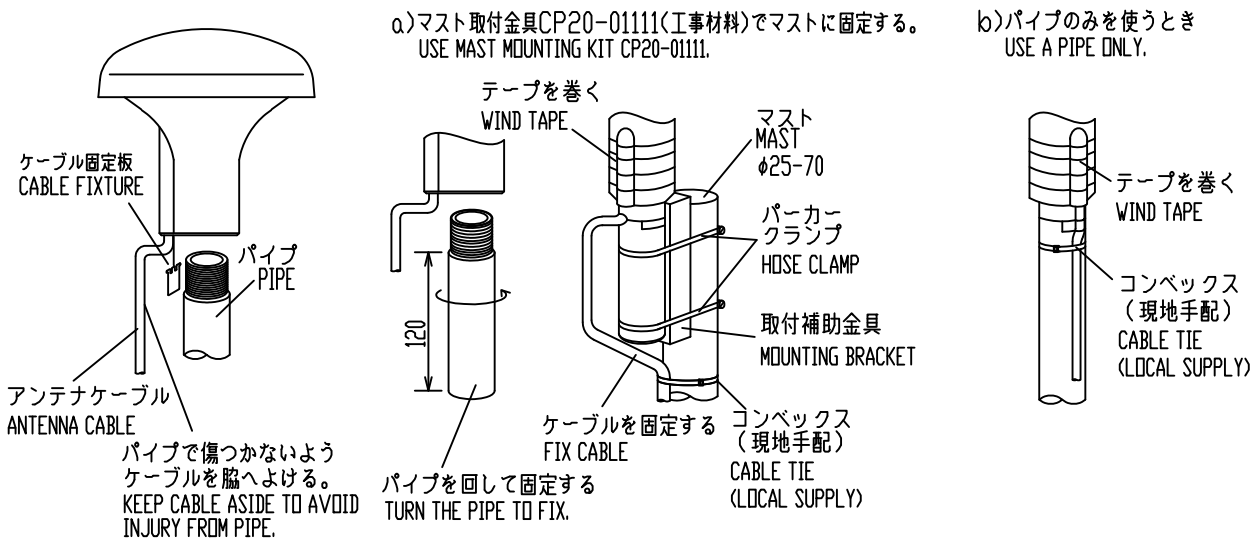
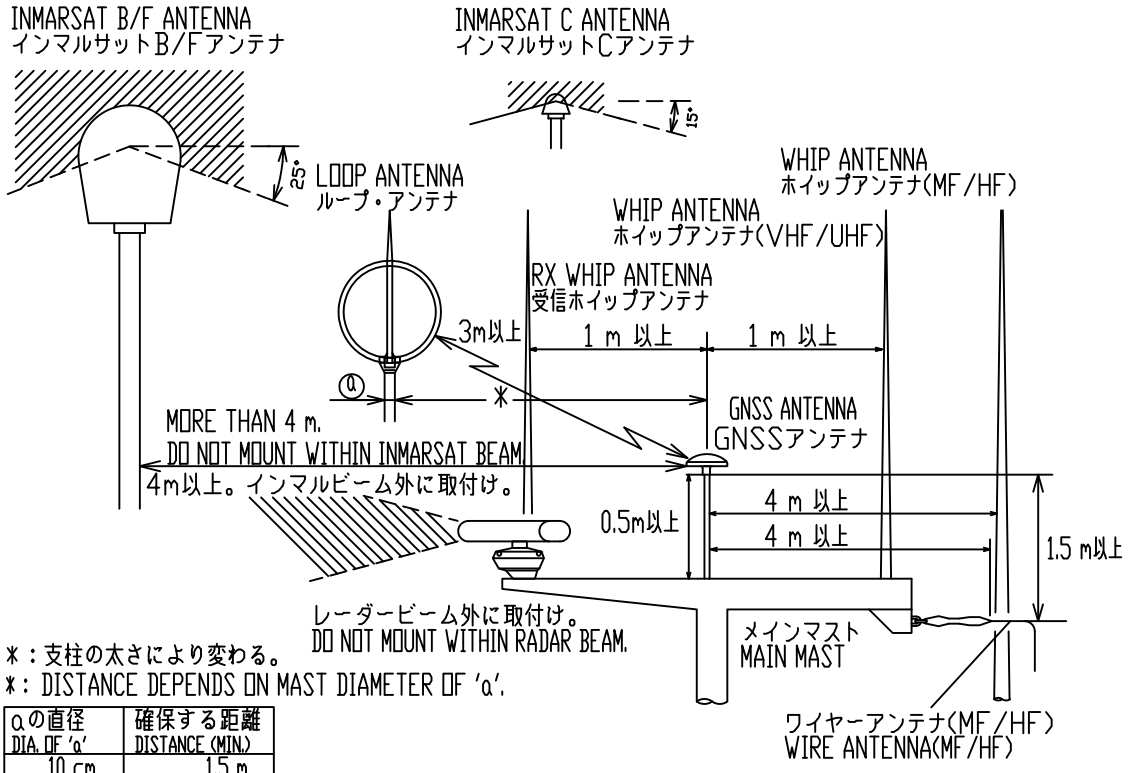
マストへの取付け　MAST MOUNTING



取付位置　MOUNTING LOCATION

他の機器のアンテナから下の図の距離以上離す。
THIS FIGURE SHOWS THE SEPARATION DISTANCES FROM OTHER ANTENNAS TO AVOID MUTUAL INTERFERENCE.

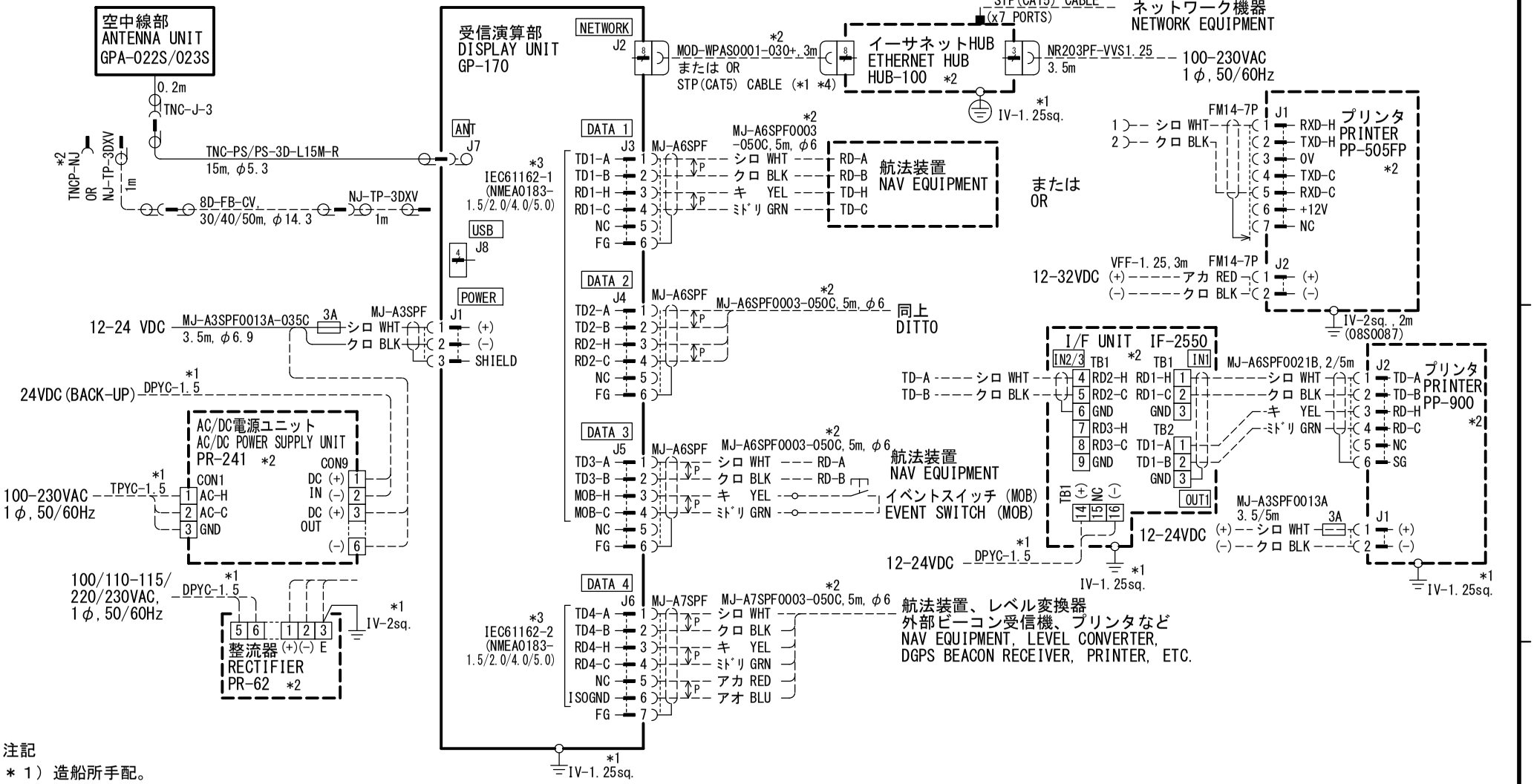


*：支柱の太さにより変わる。
*: DISTANCE DEPENDS ON MAST DIAMETER OF 'a'.

aの直径 DIA. OF 'a'	確保する距離 DISTANCE (MIN.)
10 cm	1.5 m
30 cm	3 m

DRAWN 24/Mar/2020 T.YAMASAKI			TITLE GPA-022S/023S
CHECKED 24/Mar/2020 H.MAKI			名称 空中線部
APPROVED 13/May/2020 H.MAKI		GP-170	装備要領図
SCALE –	MASS – ±10% kg		NAME ANTENNA UNIT
DWG. No. C4482-Y01- A		REF. No.	INSTALLATION PROCEDURE

FURUNO



注記
＊１）造船所手配。
＊２）オプション。
＊３）メニューにて選択。
＊４）標準ケーブル使用時、背面防水は無効。

NOTE
*1: SHIPYARD SUPPLY.
*2: OPTION.
*3: SELECT FROM MENU.
*4: WATERPROOF AT CONNECTOR PANEL IS INVALID WHEN A STANDARD LAN CABLE USED.

DRAWN 5/Sep/2023 S.HAN			TITLE GP-170
CHECKED 5/Sep/2023 T.YAMASAKI			名称 衛星航法装置
APPROVED 5/Sep/2023 H.MAKI			相互結線図
SCALE	MASS kg		NAME GNSS NAVIGATOR
DWG.No. C4482-C01- J	REF.No. 20-035-6001-2		INTERCONNECTION DIAGRAM

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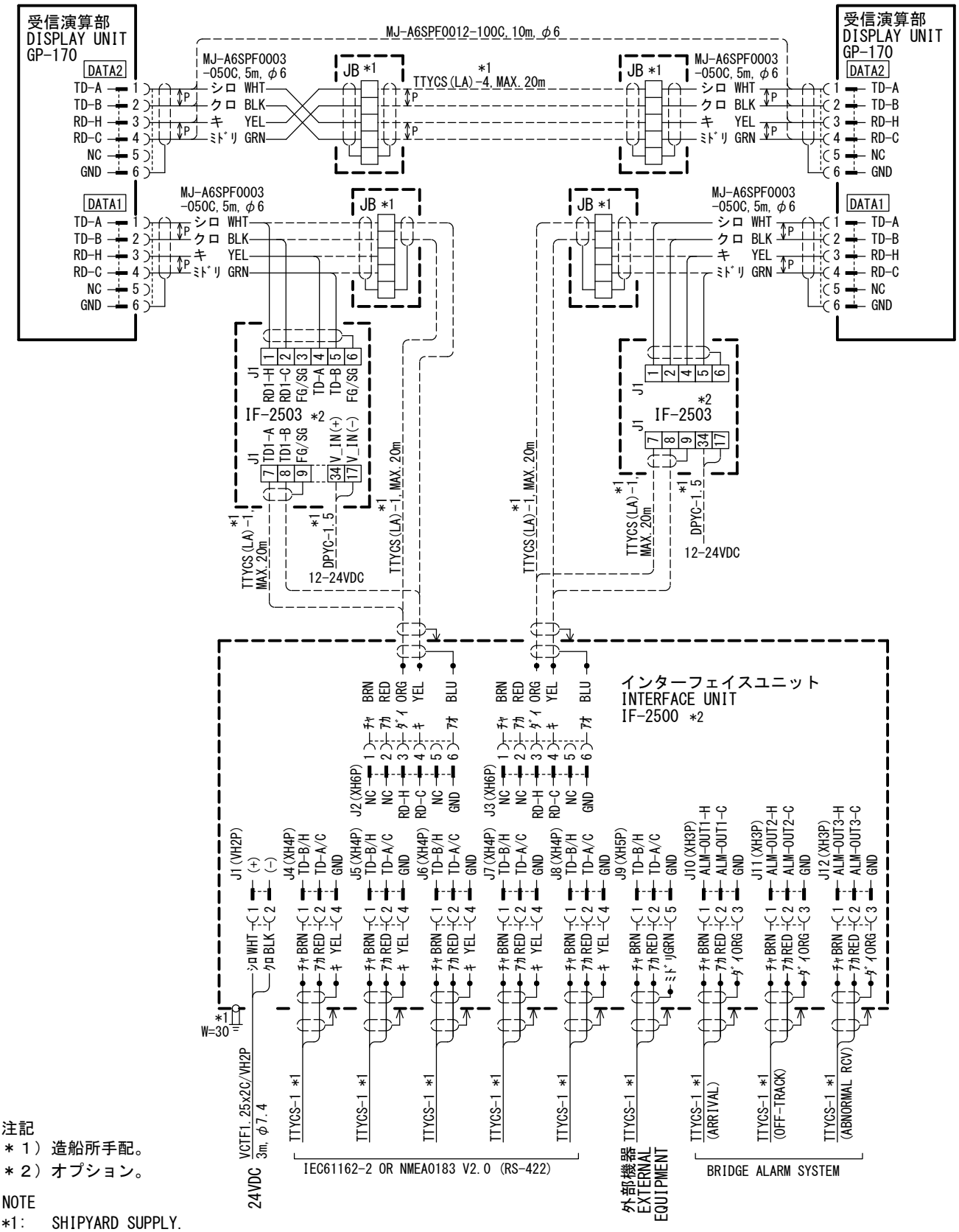
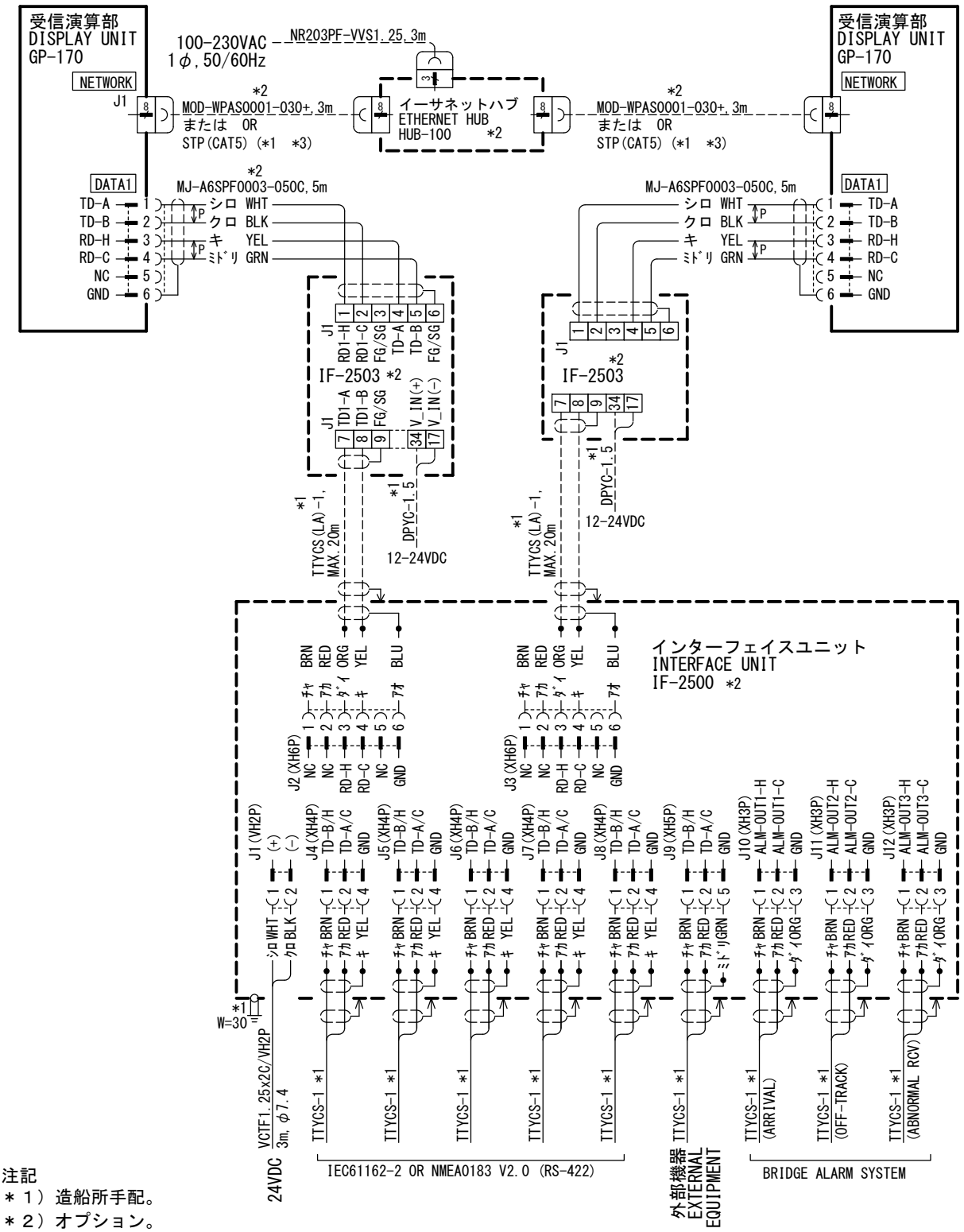
S-1



注記
＊1）造船所手配。
＊2）オプション。

NOTE
*1: SHIPYARD SUPPLY.
*2: OPTION.

DRAWN 26/Sep/2022 T.YAMASAKI		TYPE	GP-170(DUAL/SERIAL)
CHECKED 26/Sep/2022 H.MAKI		名称	衛星航法装置（二重化/シリアル接続）
APPROVED 13/Oct/2022 H.MAKI			相互結線図
SCALE / MASS kg		NAME	GNSS NAVIGATOR (DUAL/SERIAL CONNECTION)
DWG. No. C4482-C03- C			INTERCONNECTION DIAGRAM



注記
＊１）造船所手配。
＊２）オプション。
＊３）標準ケーブル使用時、背面防水は無効。

NOTE
*1: SHIPYARD SUPPLY.
*2: OPTION.
*3: WATERPROOF AT CONNECTOR PANEL IS INVALID WHEN A STANDARD LAN CABLE USED.

DRAWN 26/Sep/2022 T.YAMASAKI		TYPE	GP-170(DUAL/ETHERNET)
CHECKED 26/Sep/2022 H.MAKI		名称	衛星航法装置（二重化/イーサネット接続）
APPROVED 13/Oct/2022 H.MAKI			相互結線図
SCALE / MASS kg		NAME	GNSS NAVIGATOR (DUAL/ETHERNET CONNECTION)
DWG. No. C4482-C02- K			INTERCONNECTION DIAGRAM