FURUNO

Installation Manual
GPS/WAAS COLOR CHART PLOTTER with FISH FINDER
Model GP-3700F

(Product Name: GPS PLOTTER/SOUNDER)

FURUNO ELECTRIC CO., LTD.

www.furuno.com

(Elemental Chlorine Free)

The paper used in this manual
is elemental chlorine free.

FURUNO ELECTRIC CO., LTD.

9-52 Ashihara-cho,
Nishinomiya, 662-8580, JAPAN

・FURUNO Authorized Distributor/Dealer

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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 open the equipment unless totally familiar with electrical circuits and service manual.

Only qualified personnel can work inside the equipment.

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 no water leaks in at the transducer mounting location.

Water leakage can sink the vessel. Also, confirm that vibrations will not lossen the transducer. The installer of the equipment is solely responsible for the proper installation of the equipment. FURUNO will assume no responsibility for any damage associated with improper installation.

CAUTION

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

	Standard compass	Steering compass
Display Unit GP-3700F	1.05 m	0.70 m
Trackball Control Unit RCU-030	0.50 m	0.30 m

CAUTION

Ground the equipment to prevent electrical shock and mutual interference.

Use only the specified power and signal cable.

Fire or damage to the equipment can result if a different cable is used.

Use the proper fuse.

Use of an incorrect fuse may damage the equipment.

Do not turn the equipment on with the transducer out of water.

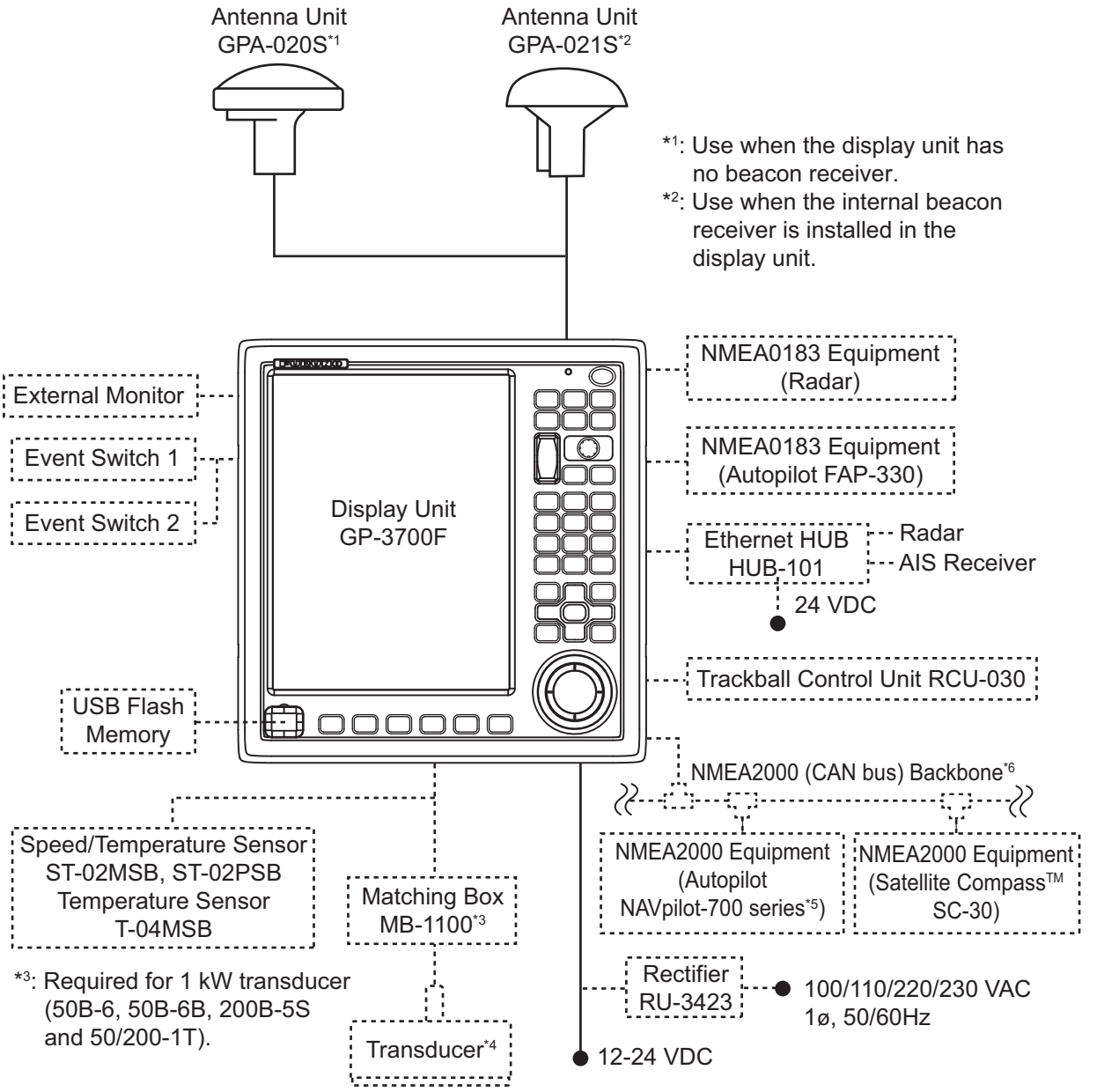
The transducer can be damaged.

The transducer cable must handled carefully, following the guidelines below.

- Keep fuels and oils away from the cable.
- Locate the cable where it will not be damaged.
- Do not paint the cable.

The cable sheath is made of chlorophrane or polychloride vinyl, which are easily damaged by plastic solvents such as toluene. Locate the cables away from plastic solvents.

SYSTEM CONFIGURATION



*5: When connected to a NAVpilot-700 series which is set to NAV mode, only one of either GP-3700 or GP-3700F can be connected.

*6: Turn the GP-3700F power off before connecting to the NMEA2000 network.

Environmental category

Units	Category
Antenna Unit	Exposed to the weather
Transducer	Submerged or in continuous contact with sea water
Other Units	Protected from the weather

EQUIPMENT LISTS

Standard Supply

Name	Type	Code No.	Qty	Remarks
Display Unit	GP-3700F	-	1	With hard cover
Antenna Unit	GPA-020S	-	1*	For GPS. Use when the display unit has no beacon receiver.
	GPA-021S	-		For DGPS. Use when the internal beacon receiver is installed to the display unit.
Installation Materials	CP14-08200	000-029-328	1	With antenna cable assy and mast mount kit
	CP14-08210	000-029-329		With antenna cable assy Without mast mount kit
	CP14-08220	000-029-330		Without antenna cable assy and mast mount kit
Accessories	FP14-03400	000-029-327	1	
Spare Parts	SP14-03601	001-246-900	1	

*: Not supplied depending on configuration purchased.

Optional Supply

Name	Type	Code No.	Remarks	
Trackball Control Unit	RCU-030	-		
Beacon Receiver Set	OP14-80	000-029-392		
Monitor Option	OP14-82	000-029-467		
Flush Mount	OP14-83	000-029-394	For display unit	
FM Fixture Assembly	OP24-38	001-263-190	For trackball control unit	
Antenna Unit	GPA-020S	-	For GPS	
	GPA-021S	-	For DGPS	
Antenna Cable Assembly	CP20-01700	004-372-110	30 m antenna extension cable, w/CP20-01701	
	CP20-01720	001-207-980	40 m antenna extension cable, w/CP20-01701	
	CP20-01710	004-372-120	50 m antenna extension cable, w/CP20-01701	
	CP20-02700	004-381-160	30 m antenna extension cable, w/CP20-02701	
	CP20-02720	001-207-990	40 m antenna extension cable, w/CP20-02701	
	CP20-02710	004-381-170	50 m antenna extension cable, w/CP20-02701	
Joint Box	TL-CAT-012	000-167-140-10	For LAN cable extension	
Transducer	520-5PSD*	-	Thru-hull mount, plastic	600 W
	520-PLD*	-	Thru-hull mount, plastic	
	520-5MSD*	-	Thru-hull mount, metal	

Name	Type	Code No.	Remarks	
Transducer	525-5PWD*	-	Transom mount, plastic	600 W
	50/200-1T*	-	10 m	1 kW
	50B-6	-	10 m	
	50B-6B	-	15 m	
	200B-5S	-	10 m	
Triducer	525T-PWD*	-	Transom mount, plastic	600 W
	525T-BSD*	-	Thru-hull mount, metal	
	525STID-MSD*	-	Thru-hull mount, metal	
	525STID-PWD*	-	Transom mount, plastic	
	525T-LTD/12*	-	12° tilt, thru-hull mount, metal	
	525T-LTD/20*	-	20° tilt, thru-hull mount, metal	
	SS60-SLTD/12*	-	12° tilt, thru-hull mount, stainless steel	
	SS60-SLTD/20*	-	20° tilt, thru-hull mount, stainless steel	
	526TID-HDD*	-	Thru-hull mount, metal, not required MB-1100	1 kW
Matching Box	MB-1100	-	For 1 kW transducer	
Rectifier	RU-3423	-		
Temperature Sensor	T-04MSB	-	Thru-hull mount	
Speed/Temperature Sensor	ST-02MSB	-	Thru-hull mount, metal	
	ST-02PSB	-	Thru-hull mount, plastic	
Inner Hull Mounting Kit	22S0191	-	Not compatible with bottom discrimination display	
Right Angle Mounting Base	NO.13-QA330	001-111-910-10	For antenna unit	
L-Angle Mounting Base	NO.13-QA310	001-111-900-10		
Handrail Mounting Base	NO.13-RC5160	001-111-920-10		
Mast Mounting Kit	CP20-01111	004-365-780		
Installation Materials	CP03-28920	000-082-660	30 m LAN cable, w/armor	
	CP03-28930	000-084-368	50 m LAN cable, w/armor	
LAN Cable Assembly	MOD-WPAS0001-030+	000-164-609-10	LAN cable with waterproofing modular plug, 3 m	
	MOD-Z072-020+	001-167-880-10	2 m	
	MOD-Z072-050+	001-167-890-10	5 m	
	MOD-Z072-100+	001-167-900-10	10 m	
Cable Assembly	02S4147-2	001-258-330	For temperature and speed/temperature sensor	
	TNC-PS/PS-3D-L15M-R	001-173-110-10	15 m antenna cable	

Name	Type	Code No.	Remarks	
Cable Assembly	M12-05BM+05BF-010	001-105-750-10	w/micro type connectors, 1 m	For NMEA 2000 connection
	M12-05BM+05BF-020	001-105-760-10	w/micro type connectors, 2 m	
	M12-05BM+05BF-060	001-105-770-10	w/micro type connectors, 6 m	
	M12-05BFFM-010	001-105-780-10	w/micro type connector, 1 m	
	M12-05BFFM-020	001-105-790-10	w/micro type connector, 2 m	
	M12-05BFFM-060	001-105-800-10	w/micro type connector, 6 m	
	CB-05PM+05BF-010	000-167-968-11	w/mini type connectors, 1 m	
	CB-05PM+05BF-020	000-167-969-11	w/mini type connectors, 2 m	
	CB-05PM+05BF-060	000-167-970-11	w/mini type connectors, 6 m	
	CB-05BFFM-010	000-167-971-11	w/mini type connector, 1 m	
	CB-05BFFM-020	000-167-972-11	w/mini type connector, 2 m	
	CB-05BFFM-060	000-167-973-11	w/mini type connector, 6 m	
	3COX-2P-6C 5M	001-077-230-10	For external monitor, 5 m	
	3COX-2P-6C 10M	001-077-220-10	For external monitor, 10 m	
	MJ-A6SPF0012-050C	000-154-053-10	w/MJ connectors, 5 m	For NMEA 0183 connection
	MJ-A6SPF0012-100C	000-154-037-10	w/MJ connectors, 10 m	
	MJ-A6SPF0012-150C	000-161-513-10	w/MJ connectors, 15 m	
	MJ-A6SPF0003-020C	000-154-029-10	w/MJ connector, 2 m	
	MJ-A6SPF0003-050C	000-154-054-10	w/MJ connector, 5 m	
	MJ-A6SPF0003-100C	000-168-924-10	w/MJ connector, 10 m	
	MJ-A6SPF0003-150C	000-159-643-10	w/MJ connector, 15 m	
Extension Cable**	C332 10M	001-464-120	10 m transducer extension cable	

*: Compatible with ACCU-FISH™ and bottom discrimination display

**: Use of the extension cable may cause the following problems:

- Reduced detection ability
- Wrong ACCU-FISH™ information (fish length smaller than actual length, fewer fish detections, error in individual fish detection)/
- Wrong speed data
- No TD-ID recognition

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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

The display unit can be installed on a desktop, overhead or flush mounted in a console (option kit is required).

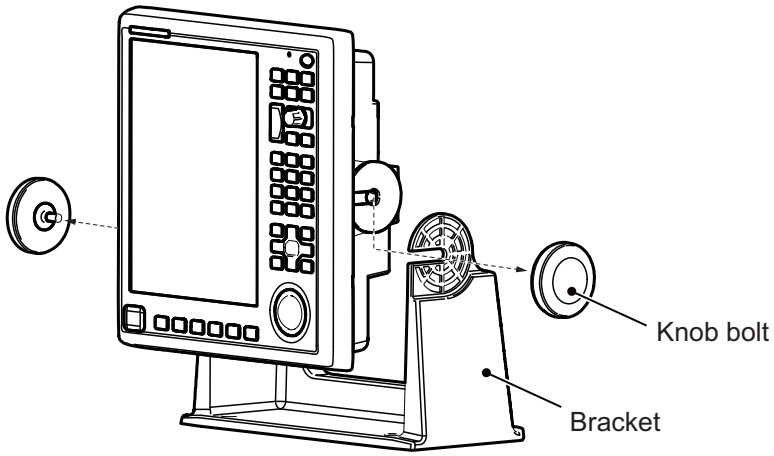
Mounting consideration

Select a mounting location, keeping in mind the following points:

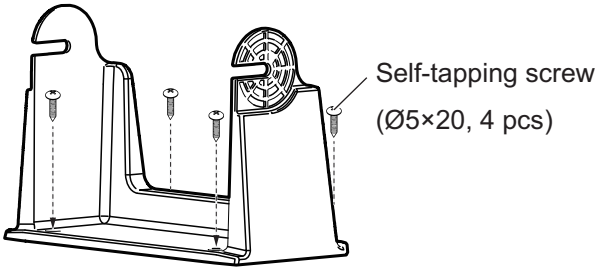
- Select a location where the unit can easily be operated.
- Keep the unit out of direct sunlight.
  The LCD can blackout if the unit is exposed to direct sunlight for a long time.
- Locate the unit way from places subject to water splash and rain.
- The temperature at the mounting location shall be between -15°C and +55°C.
- Locate the unit away from exhaust pipes and vents.
- The mounting location should be well ventilated.
- Select a location where shock and vibration are minimal.
- Referring to the outline drawings at the back of this manual, allow sufficient space for maintenance and service.
- Select a mounting location considering the length of the cables to be connected to the unit.
- Do not place items which should not get wet near the display unit.
  There is the drain hole on the bottom of this unit. If water enters the unit from the clearance around the trackball, water is drained from the drain hole.
- A magnetic compass will be affected if the unit is placed too close to the magnetic compass. Observe the compass safe distances at the front of this manual to prevent interference to a magnetic compass.

1.1.1 Desktop or overhead mounting

1. Unfasten the knob bolts and remove the display unit from the bracket.



2. Secure the bracket to the mounting location with four self-tapping screws (ϕ5×20, supplied).



3. Connect all necessary cables, referring section 2.1.
   Note: Place the display unit face-down on a soft, clean surface to prevent damage to the LCD.
4. Set the display unit in the bracket, then fasten the knob bolts.

1.1.2 Flush mounting in a console (option)

Use the optional flush mount kit OP14-83, for flush mounting the display unit.

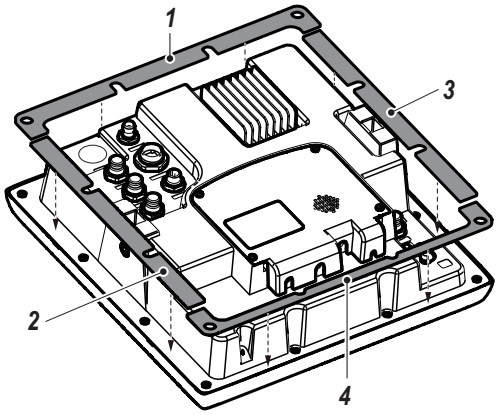
Type: OP14-83, Code No.: 000-029-394

Name	Type	Code No.	Qty
F Mount Sponge TOP	14-083-1091-0	100-401-120-10	1
F Mount Sponge SIDE	14-083-1092-0	100-401-130-10	2
F Mount Sponge BOT	14-083-1093-1	100-401-141-10	1
Flush Mount Fixture	OP03-228-1	001-258-040	1
Hexagonal Head Slot Bolt	M8×15	000-162-916-10	2
Flat Washer	M8	000-167-464-10	2
Front Fixing Plate	14-083-1094-0	100-401-150-10	1

Note: Ensure the mounting location is flat, with no indents or protrusions, to allow a secure fit.

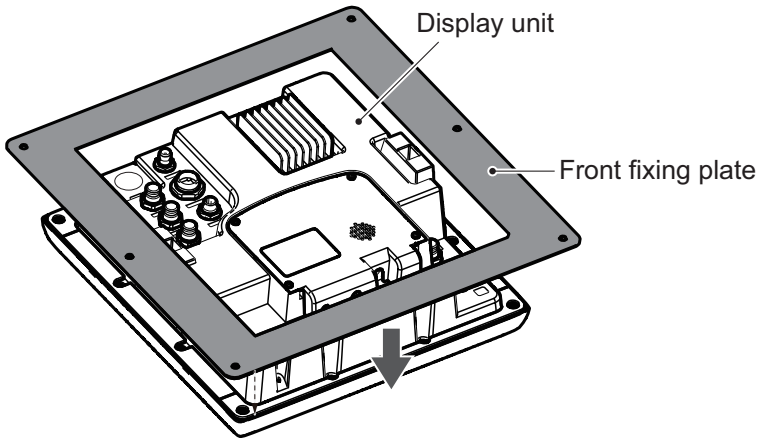
1. Prepare a mounting hole in the installation location, using the supplied mounting template.
2. Unfasten the two knob bolts to remove the display unit from the bracket.

3. Attach the F mount sponge TOP, F mount sponge SIDE and F mount sponge BOT, referring to the following figure.
   Note 1: Place the display unit face-down on a soft, clean surface to prevent damage to the LCD.
   Note 2: Take care not to cover the screw holes with the F mount sponges.
   Note 3: Ensure there are no gaps between the sponges at their joining points.

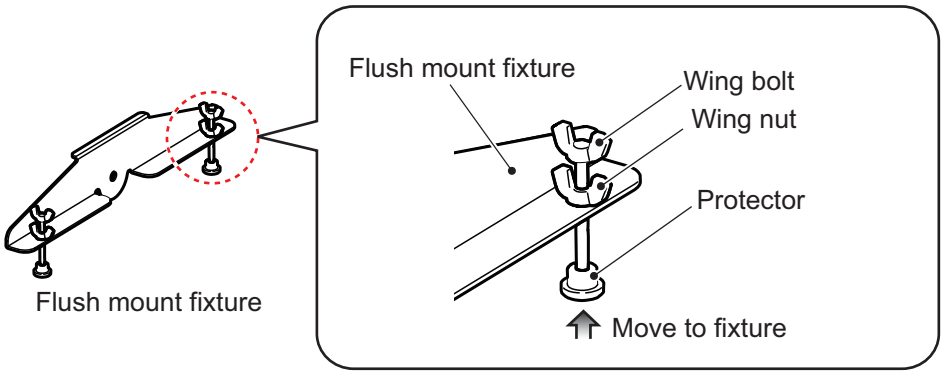


1: F mount sponge TOP (thick)
2, 3: F mount sponge SIDE
4: F mount sponge BOT (thin)

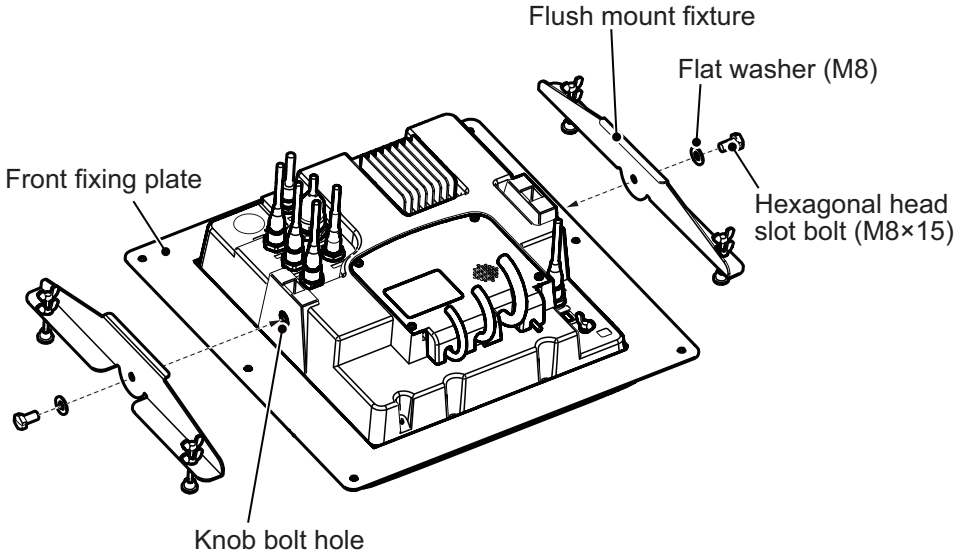
4. Set the front fixing plate to the display unit from the rear side.



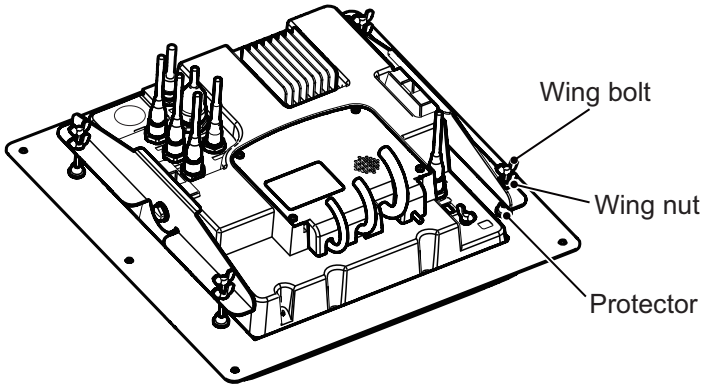
5. Connect all necessary cables, referring section 2.1.
6. Loosen the wing nuts and wing bolts of the flush mount fixture to move the protector to the fixture.



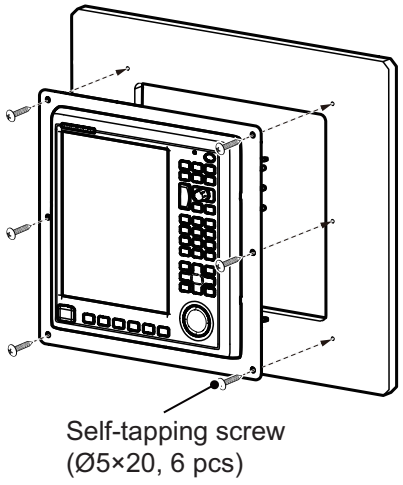
7. Attach the two flush mount fixtures to the unit, using flat washers (M8) and hexagonal head slot bolts (M8×15).
   Use the knob bolt holes to fasten hexagonal head slot bolts.



8. Tighten the four wing bolts on the flush mount fixture until the protector contacts the front fixing plate and the flush mounting fixture is firmly secured.
9. Tighten four wing nuts on the flush mount fixture.



10. Set the display unit to the mounting hole.
    Note: Take care that cables connected to the unit are not pinched between the unit and console.
11. Fasten the display unit with six self-tapping screws (ϕ5×20, supplied).



1.2 Antenna Unit

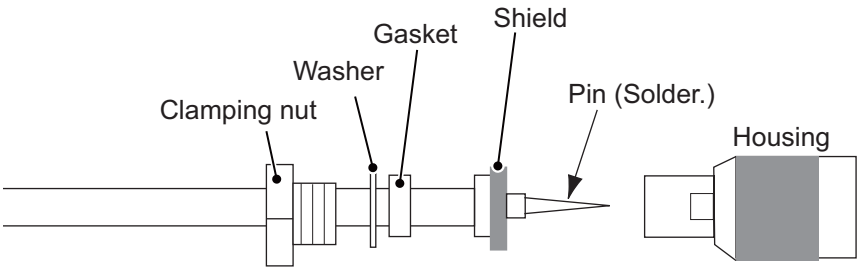
1.2.1 Mounting

Install the antenna unit referring to the "INSTALLATION PROCEDURE" at end of manual.

Mounting considerations

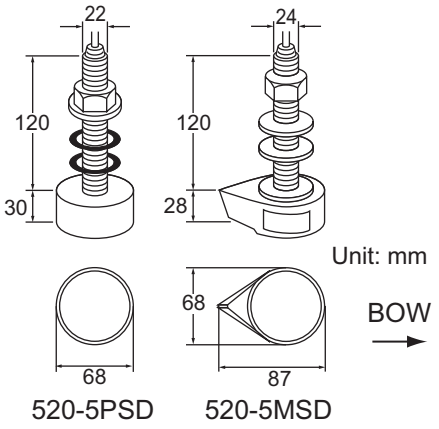
Select a mounting location, keeping in mind the following points:

- Select a location out of the radar and inmarsat beams. Those beams will obstruct or prevent reception of the GPS satellite signal.
- The location should be well away from a VHF/UHF antenna. Harmonic waves from a VHF/UHF antenna interfere with the GPS receiver.
- There should be no interfering objects 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 satellite signal.
- If the antenna cable is to be passed through a hole in a bulkhead which is too small to pass the connector, disassemble the connector with radio pincers and a monkey wrench. After passing the cable through the hole, assemble the connector as below.



1.3 Installation of Transducers (Option)

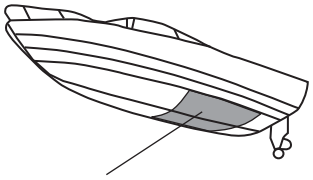
This equipment can use thru-hull, transom or inner hull mounted transducers. Select a transducer mounting type according to the ship's type. The optional inner hull mounting kit (type: 22S0191) is required for inner hull mounting. For details about inner hull mounting, see the installation instructions supplied with the inner hull mounting kit.



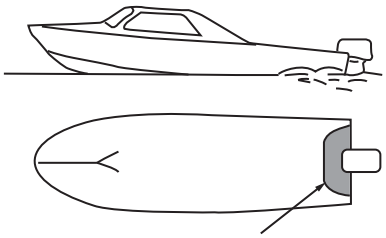
Transducer mounting location

The performance of this fish finder is directly related to the mounting location of the transducer. The installation should be planned in advance, keeping the length of the transducer cable and the following factors in mind:

- Air bubbles and turbulence caused by movement of the boat seriously degrade the sounding capability of the transducer. The transducer should, therefore, be located in a position where water flow is the smoothest.
- Noise from the propellers adversely affects performance and the transducer should not be mounted nearby. The lifting strakes are notorious for creating acoustic noise, and these must be avoided by keeping the transducer inboard of them.
- The transducer must always remain submerged, even when the boat is rolling, pitching or up on a plane at high speed.
- A practical choice would be somewhere between 1/3 and 1/2 of your boat's length from the stern. For planing hulls, a practical location is generally rather far astern, so that the transducer is always in water regardless of the planing attitude.



- Position 1/2 to 1/3 of the hull from stern.
- 15 to 30 cm off center line (inside first lifting strakes.)

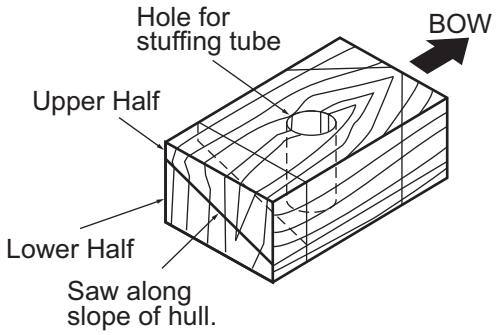


- Within the wetted bottom area
- Deadrise angle within 15°

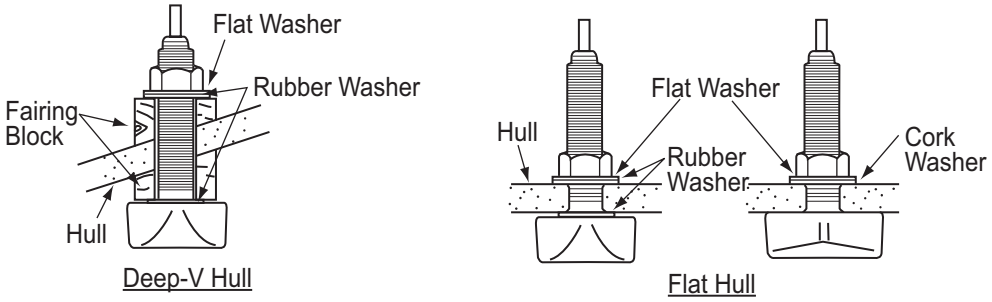
1.3.1 Thru-hull mount transducer

The thru-hull mount transducer provides the best performance of all, since the transducer protrudes from the hull and the effect of air bubbles and turbulence near the hull skin is reduced. If your boat has a keel, the transducer should be at least 30 cm away from it.

1. With the boat hauled out of the water, mark the location selected for mounting the transducer on the bottom of the hull.
2. If the hull is not level within 15° in any direction, fairing blocks made out of teak should be used between the transducer and hull, both inside and outside, to keep the transducer face parallel with the water line. Fabricate the fairing block as shown below and make the entire surface as smooth as possible to provide an undisturbed flow of water around the transducer. The fairing block should be smaller than the transducer itself to provide a channel to divert turbulent water around the sides of the transducer rather than over its face.



3. Drill a hole just large enough to pass the threaded stuffing tube of the transducer through the hull, making sure it is drilled vertically.
4. Apply a sufficient amount of high quality caulking compound to the top surface of the transducer, around the threads of the stuffing tube and inside the mounting hole (and fairing blocks if used) to ensure watertight mounting.
5. Mount the transducer and fairing blocks and tighten the locknut. Be sure that the transducer is properly oriented and its working face is parallel to the waterline. The wood block will swell when the boat is placed in the water. It is suggested that the nut be tightened lightly at installation and re-tightened several days after the boat has been launched.



Note: Do not over-stress the stuffing tube and locknut through excessive tightening (maximum torque: 39 N•m), the plastic screw may damaged.

Transducer preparation

Before putting your boat in water, wipe the face of the transducer thoroughly with a detergent liquid soap. This will lessen the time necessary for the transducer to have

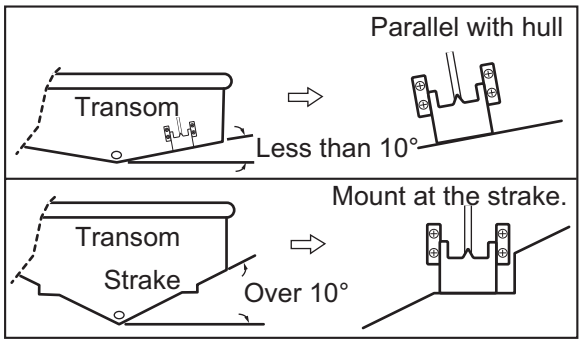
good contact with the water. Otherwise the time required for complete "saturation" will be lengthened and performance will be reduced.

Note: DO NOT paint the transducer. Performance will be affected.

1.3.2 Transom mount transducer

The transom mount transducer is very commonly employed, usually on relatively small outboard boats. Do not use this method on an inboard motor boat because turbulence is created by the propeller ahead of the transducer.

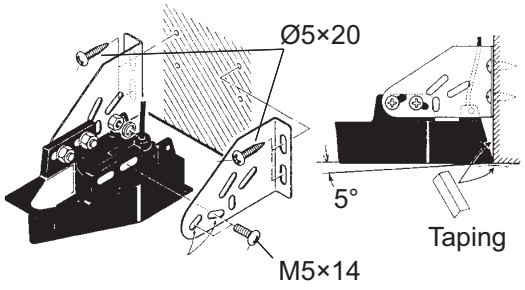
A suitable mounting location is at least 50 cm away from the engine and where the water flow is smooth.



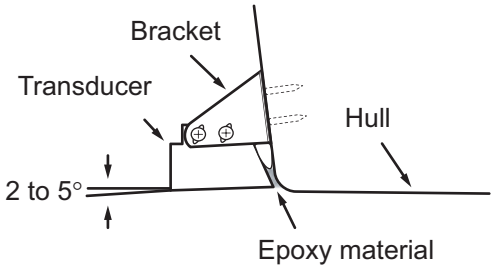
Installation for flat hulls

When the deadrise angle is less than 10°, install the transducer parallel with hull.

1. Drill four pilot holes for self-tapping screw (5×20) in the mounting location.
2. Coat the threads of the self-tapping screws (5x14) for the transducer with marine sealant for waterproofing. Attach the transducer to the mounting location with the self-tapping screws.
3. Adjust the transducer position so the transducer faces right to the bottom. If necessary, to improve water flow and minimize air bubbles staying on the transducer face, incline the transducer about 5° at the rear. This may require a certain amount of experimentation for fine tuning at high cruising speeds.



4. Tape the location shown in the figure at step 3, then fill the gap between the wedge front of the transducer and transom with epoxy material to eliminate any air spaces.



5. After the epoxy hardens, remove the tape.

Installation for deep-V hulls

This method is employed on deep-V hulls and provides good performance because the effects of air bubbles are minimal. Install the transducer parallel with water surface; not flush with hull (Do not install the transducer parallel with hull). If the boat is placed on a trailer care must be taken not to damage the transducer when the boat is hauled out of the water and put on the trailer.

1.3.3 Inside hull mount

The transducer may also be installed inside the hull on FRP boats. However, this installation method affects the ability to detect the bottom, fish and other objects because the ultrasound pulse is weakened when it passes through the hull.

NOTICE

This mounting method should not be used to mount the transducer that supports the ACCU-FISH™ and bottom discrimination display, since performance is greatly degraded.

Necessary tools

The following tools are required:

- Sandpaper (#100)
- Marine sealant
- Water-filled plastic bag

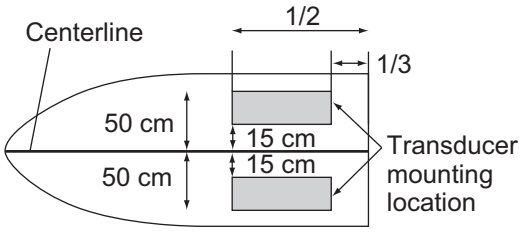
Remarks on installation

- Do the installation with the ship moored at a dock, etc. The water depth should be 6.5 to 32 feet (2 to 10 meters).
- Install the transducer on the hull plate in the engine room.
- Turn off the engine while installing the equipment.
- Do not power the unit with the transducer in the air, to prevent damage to the transducer.
- Do not use this method on a double layer hull.

Mounting location

Select 2-3 locations considering the four points mentioned below.

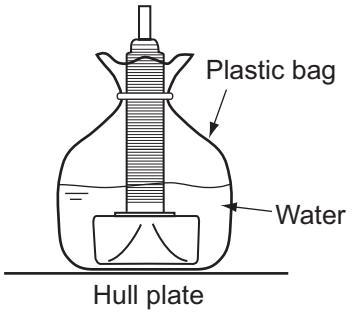
- Mount the transducer at a location 1/2 to 1/3 of the length of your boat from the stern.
- The mounting location is between 15 to 50 cm from the centerline of the hull.
- Do not place the transducer over hull struts or ribs which run under the hull.
- Avoid a location where the rising angle of the hull exceeds 15°, to minimize the effect of the boat's rolling.



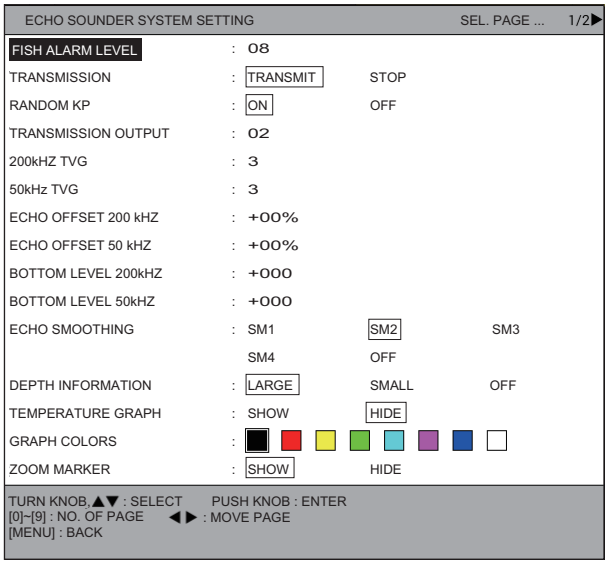
Deciding the mounting location

The attenuation of the ultrasound pulse varies with the thickness of the hull. Select a location where attenuation is the lowest. Decide the most suitable site from the locations selected.

1. Put the transducer into water-filled plastic bag. Press the transducer against the chosen site.
2. Press ⏻/**BRILL** key to turn the power on.
3. Select the transducer on the menu, referring section 3.2.1.
   See page 3-1 for how to use the menu.
4. Press the **MENU** key to go back to the [ECHO SOUNDER INITIAL SETTING] menu.



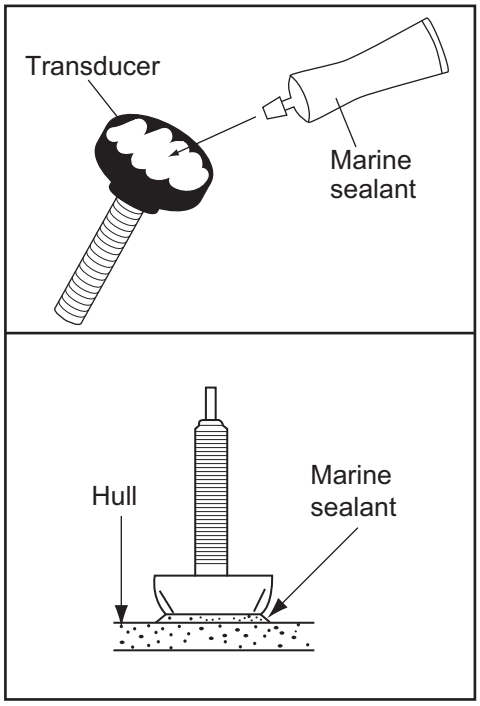
5. Select [1. ECHO SOUNDER SYSTEM SETTING] on the [ECHO SOUNDER INITIAL SETTING] menu.
   The [ECHO SOUNDER SYSTEM SETTING] menu has two pages. When the page 2 is displayed, press the **1** key to open page 1.



6. Select [TRANSMISSION OUTPUT].
7. Press the appropriate numeric key to set the transmission power to a level of “02”.
8. Press the **MENU** key several times or press the **DISP** key to close the menu.
9. Press the **DISP** key several times to show the echo sounder display.
   Check if the bottom echo appears on the right side of the screen, in the display area. If no bottom echo appears, repeat the procedure unit a suitable location is found.
10. Turn the power off and remove the transducer from the plastic bag after deciding the mounting location.

Attaching the transducer

1. Wipe the face of transducer with a cloth to remove water and any foreign material. Lightly roughen the face with #100 sandpaper. Also, use the sandpaper to roughen the inside of the hull where the transducer is to be mounted.
2. Dry the face of the transducer and the hull, then coat the transducer face and mounting location with marine sealant. Hardening begins in approx. 15 to 20 minutes so do this step without delay.
3. Attach the transducer to the hull.
   Press the transducer firmly down on the hull and gently twist it back and forth to remove any air which may be trapped in the marine sealant.
4. Support the transducer with a piece of wood to keep it in place while the sealant is drying. It takes 24 to 72 hours to harden completely.



5. Turn the power on and change the menu setting as shown below.
   1) Press the **MENU** key to open the main menu.
   2) Select [0. SYSTEM SETTING].
   3) Select [8. ECHO SOUNDER INITIAL SETTING].
   4) Select [1. ECHO SOUNDER SYSTEM SETTING], then press the **1** key to open page 1.
   5) Adjust the transmission output, echo offset and bottom level settings as shown in the table below.

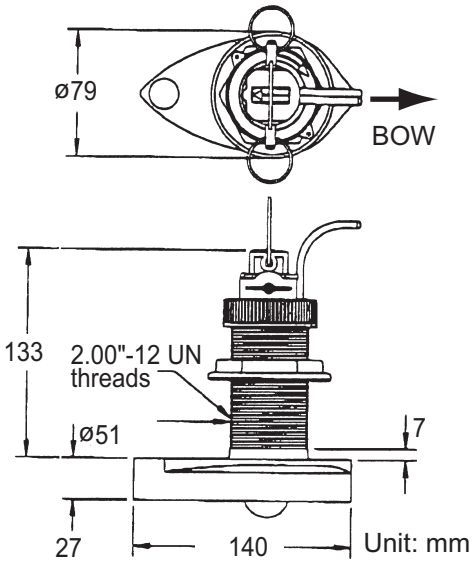
Menu Item	Setting
TRANSMISSION OUTPUT	10
ECHO OFFSET 200 kHZ	+20%
ECHO OFFSET 50 kHZ	+20%
BOTTOM LEVEL 200 kHZ	-40
BOTTOM LEVEL 50 kHZ	-40

6. Press the **DISP** key to close the menu.

1.3.4 Triducer

Thru-hull mount triducer

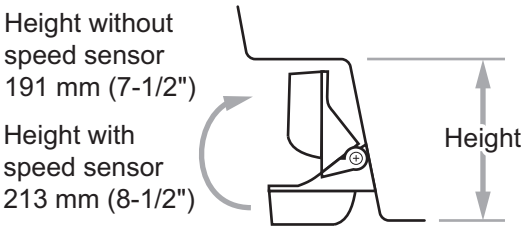
The optional triducer 525STID-MSD is designed for thru-hull mounting. See section 1.3.1 for how to install the 525STID-MSD.



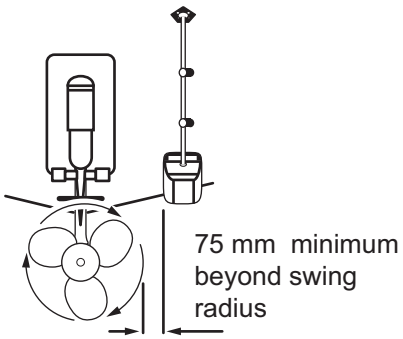
Transom mount triducer

Mounting location

The optional transom mount triducer 525STID-PWD can be installed to the inboard or outboard boats. To ensure the best performance, the sensor must be submerged in aeration-free and turbulence-free water.



Mount the sensor close to the centerline of your boat. On slower heavier displacement hulls, positioning it farther from the centerline is acceptable. Mount on the starboard side at least 75 mm beyond the swing radius of the propeller, as shown in the following figure.



NOTICE

Do not mount the sensor in an area of turbulence or bubbles:
- near water intake or discharge openings
- behind strakes, struts, fittings, or hull irregularities
- behind eroding paint (an indication of turbulance)

NOTICE

Avoid mounting the sensor where the boat may be supported during trailering, launching, hauling, and storage.

Pretest for speed and temperature

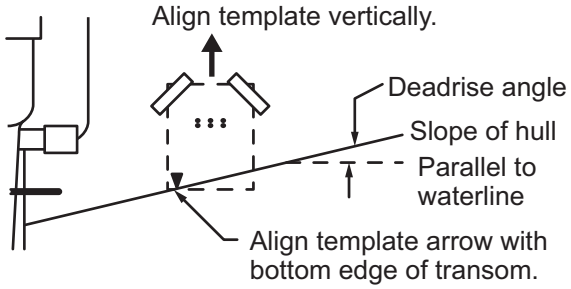
Connect the sensor to the instrument and spin the paddlewheel. Check for a speed reading and the approximate air temperature. If there is no reading, return the sensor to your place of purchase.

Tools and materials required

- Scissors
- Safety goggles
- Electric drill
- Drill bit:
  For bracket holes: 4 mm, #23, or 9/64”
  For fiberglass hull: chamfer bit (preferred), 6 mm, or 1/4”
  For transom hole: 9 mm or 3/4” (optional)
  For cable clamp holes: 3 mm or 1/8”
- Straight edge
- Pencil
- Water-based anti-fouling paint (mandatory in salt water)
- Masking tape
- Dust mask
- Screwdrivers
- Marine sealant
- Cable ties

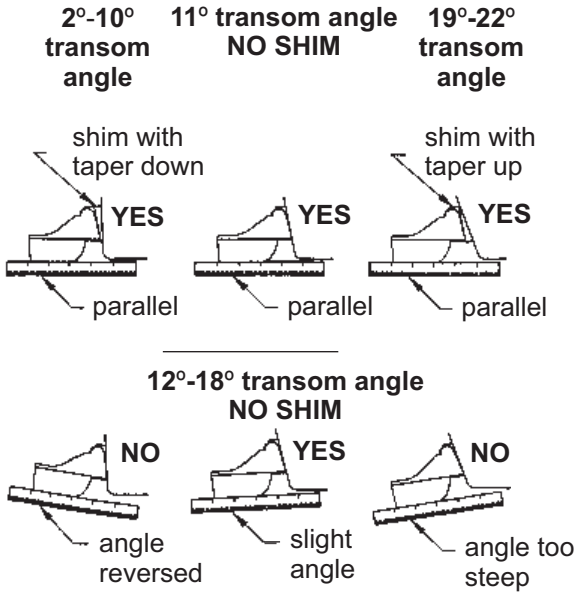
How to install the bracket

1. Cut out the installation template (enclosed with transducer) along the dotted line.
2. At the selected location, position the template, so the arrow at the bottom is aligned with the bottom edge of the transom. Make sure the template is parallel to the waterline, then tape it in place.



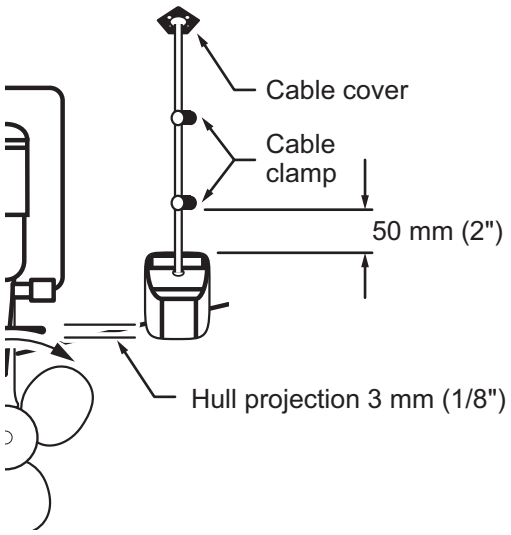
Note: Always wear safety goggles and a dust mask.

3. Using a 4 mm, #23, or 9/64” bit, drill three holes 22 mm (7/8”) deep at the locations indicated. To prevent drilling too deeply, wrap masking tape around the bit at 22 mm (7/8”) from the point.
   Fiberglass hull: Minimize surface cracking by chamfering the gelcoat. If a chamfer bit or countersink bit is not available, start drilling with a 6mm or 1/4” bit to a depth of 1 mm (1/16”).
4. Using the three #10 x 1-1/4” self-tapping screws, temporarily screw the bracket to the hull.
5. Using a straight edge, sight the underside of the sensor relative to the underside of the hull. The stern of the sensor should be 1-3 mm (1/16-1/8”) below the bow of the sensor or parallel to the bottom of the hull.
   Note: Do not position the bow of the sensor lower than the stern because aeration will occur.
6. To adjust the sensor's angle relative to the hull, use the tapered plastic shim provided. If the bracket has been temporarily fastened to the transom, remove it. Key the shim in place on the back of the bracket.
   2°-10° transom angle (stepped transom and jet boats): Position the shim with the tapered end down.
   19°-22° transom angle (small aluminum and fiberglass boats): Position the shim with the tapered end up.



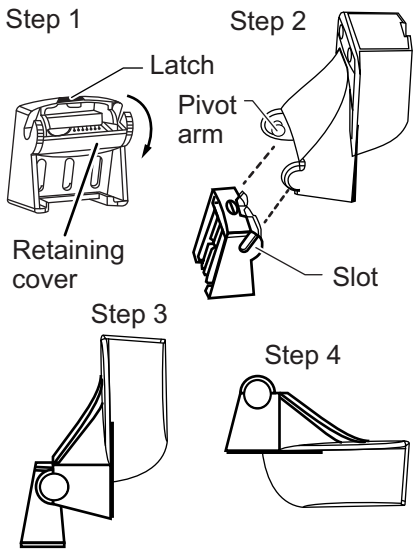
7. If you know your transom angle, the bracket is designed for a standard 13° transom angle.
   11°-18° angle: No shim is required. Skip to step 3 in "Adjustments".
   Other angles: The shim is required. Skip to step 2 of "Adjustments".
   If you do not know the transom angle, temporarily attach the bracket and sensor to the transom to determine if the plastic shim is needed.
8. Repeat step 5 to ensure that the angle of the sensor is correct.
   Note: Do not position the sensor farther into the water than necessary to avoid increasing drag, spray, and water noise and reducing boat speed.

9. Using the vertical adjustment space on the bracket slots, slide the sensor up or down to provide a projection of 3 mm (1/8”). Tighten the screws.
10. Fasten three self-tapping screws tightly.



How to attach the sensor to the bracket

1. If the retaining cover near the top of the bracket is closed, open it by depressing the latch and rotating the cover downward.
2. Insert the sensor's pivot arms into the slots near the top of the bracket.
3. Maintain pressure until the pivot arms click into place.
4. Rotate the sensor downward until the bottom snaps into the bracket.
5. Close the retaining cover to prevent the accidental release of the sensor when your boat is underway.



How to route the cable

Route the sensor cable over the transom, through a drain hole, or through a new hole drilled in the transom above the waterline.

Never cut the cable or remote the connector; this will void the warranty. Always wear safety goggles and a dust mask.

1. If a hole must be drilled, choose a location well above the waterline. Check for obstructions such as trim tabs, pumps, or wiring inside the hull. Mark the location with a pencil. Drill a hole through the transom using a 19 mm or 3/4” bit (to accommodate the connector).
2. Route the cable over or through the transom.
3. On the outside of the hull secure the cable against the transom using the cable clamps. Position a cable clamp 50 mm (2") above the bracket and mark the mounting hole with a pencil.
4. Position the second cable clamp halfway between the first clamp and the cable hole. Mark this mounting hole.

5. If a hole has been drilled in the transom, open the appropriate slot in the transom cable cover. Position the cover over the cable where it enters the hull. Mark the two mounting holes.
6. At each of the marked locations, use a 3 mm or 1/8” bit to drill a hole 10 mm (3/8”) deep. The prevent drilling too deeply, wrap masking tape around the bit 10 mm (3/8”) from the point.
7. Apply marine sealant to the threads of the #6 x 1/2” self-tapping screw to prevent water from seeping into the transom. If you have drilled a hole through the transom, apply marine sealant to the space around the cable where it passes through the transom.
8. Position the two cable clamps and fasten them in place. If used, push the cable cover over the cable and screw it in place.
9. Route the cable to the display unit being careful not to tear the cable jacket when passing it though the bulkhead(s) and other parts of the boat. To reduce electrical interference, separate the sensor cable from other electrical wiring and "noise" sources. Coil any excess cable and secure it in place with zip-ties to prevent damage.

1.4 Installation of Sensors (Option)

1.4.1 Speed/temperature sensors ST-02MSB, ST-02PSB

The speed/temperature sensors (ST-02MSB, ST-02PSB) are designed for thru-hull mounting. Install them as shown in this section.

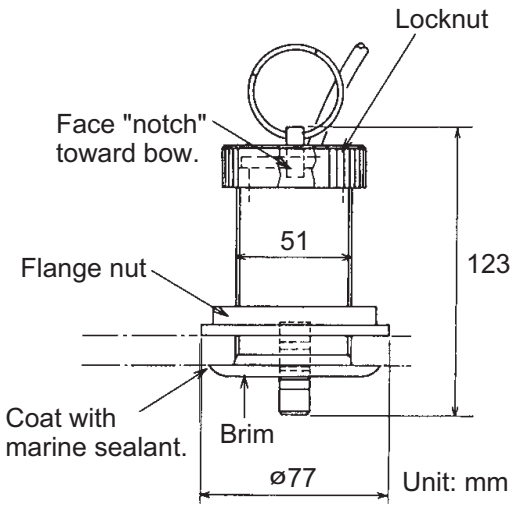
Mounting considerations

Select a suitable mounting location, considering the following:

- Select a mid-boat flat position. The sensor does not have to be installed perfectly perpendicular.
- Select a location where the transducer will not be damaged in trailering, launching, hauling, and storage.
- Select a location in the forward direction viewing from the drain hole, to allow for circulation of cooling water.
- Locate the sensor away from heat sources.
- Select a location where the shock and vibration are minimal.
- Select a location away from water flow from keel, water discharge pipe, etc.
- Do not install fore of the transducer of a fish finder, to prevent disturbance (and loss of performance) to the fish finder.

Mounting procedure

1. Dry-dock the boat.
2. Make a hole of approx. 51 mm diameter in the mounting location.
3. Unfasten the locknut and remove the sensor section.
4. Apply marine sealant to the flange of the sensor. The height of the coat should be approx. 6 mm.
5. Pass the sensor casing through the hole.
6. Face the notch on the sensor toward boat's bow and tighten the flange.
7. Set the sensor section to the sensor casing and tighten the locknut.
8. Launch your boat and check for water leakage around the sensor.



1.4.2 Temperature sensors T-04MSB

For installation instructions for T-04MSB sensor, see "INSTALLATION OF TEMPERATURE SENSORS" on page AP-6.

1.5 Trackball Control Unit (Option)

The trackball control unit can be mounted on a desktop or flush mounted in a console (option).

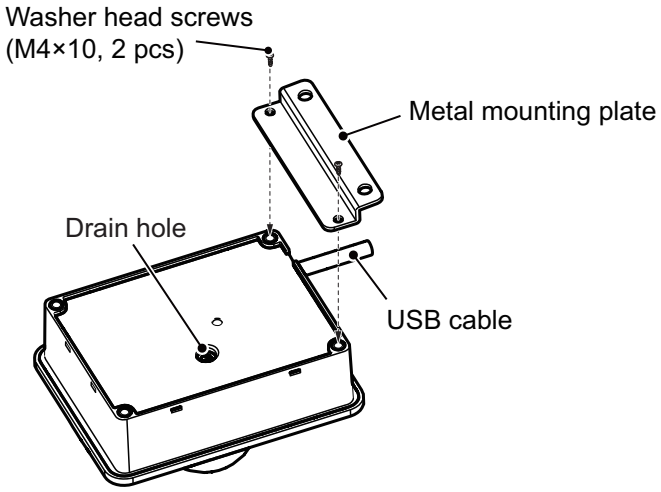
Mounting considerations

When selecting a mounting location for the trackball control unit, keep in mind the following points.

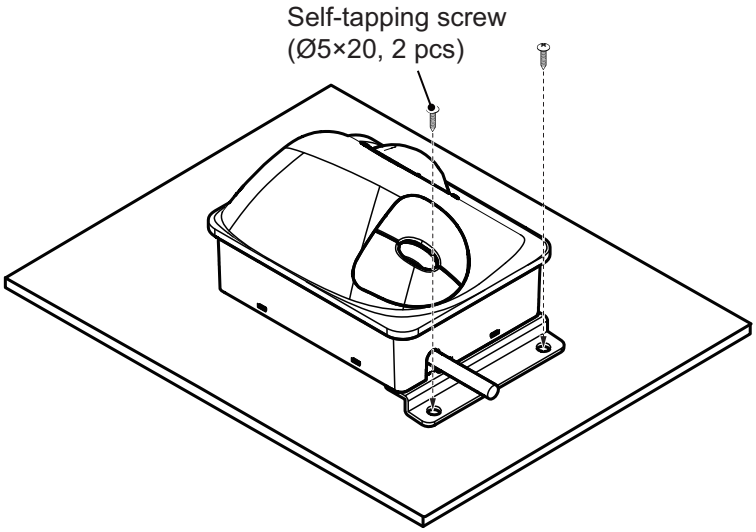
- Select a location where the controls can be easily operated.
- Locate the unit away from heat sources.
- Locate the unit away from places subject to water splash and rain.
- Referring to the outline drawings at the back of this manual, allow room for maintenance and service.
- Select a mounting location considering the length of the cable.
- Do not place items which should not get wet near the display unit.
  There is the drain hole on the bottom of this unit. If water enters the unit from the clearance around the trackball, water is drained from the drain hole.
- A magnetic compass will be affected if the unit is placed too close to the magnetic compass. Observe the compass safe distances at the front of this manual to prevent interference to a magnetic compass.

1.5.1 How to install the unit on a desktop

1. Secure the metal mounting plate to the bottom of the unit using two washer head screws (M4×10), both supplied with the trackball control unit, referring to the following figure.



2. Secure the unit to the mounting location using two self-tapping screws (ϕ5×20, supplied).



1.5.2 How to install the unit in a console (option)

Use the optional FM (flush mount) fixture assembly OP24-38, for flush mounting the trackball control unit.

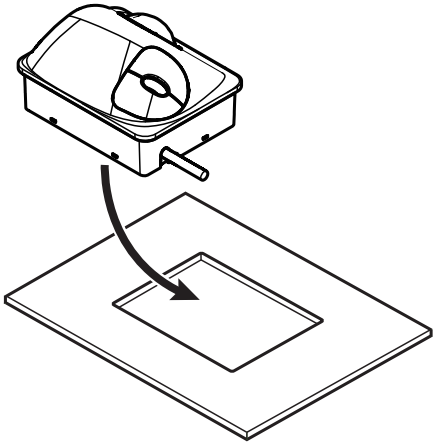
Type: OP24-38, Code No.: 001-263-190

Name	Type	Code No.	Qty
FM Fixture Assembly	OP24-38-1	001-263-200	2
Washer Head Screw	M4×10	000-163-836-10	4

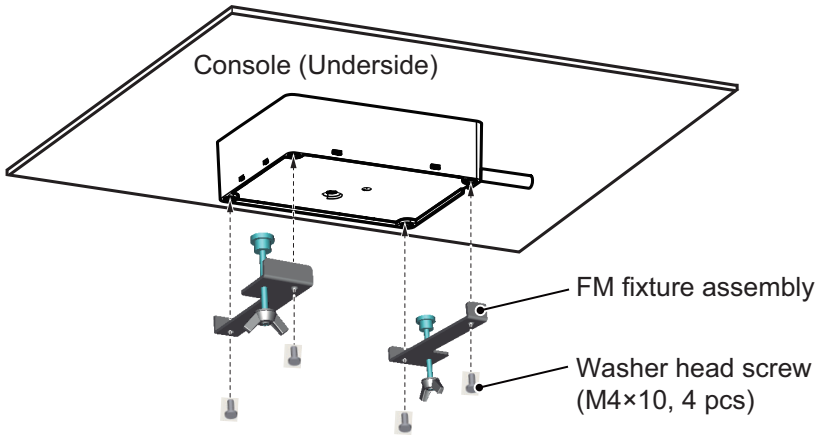
Note: The flush mount location must have a thickness of at least 10 mm, with a maximum thickness of 20 mm.

1. Prepare a mounting hole in the installation location, referring the outline drawing at the back of the manual.

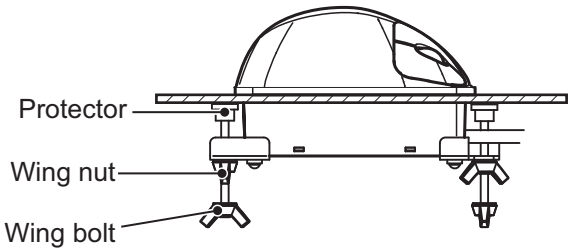
2. Set the unit to the mounting hole.



3. Attach the two FM fixture assemblies to the unit's under side using four washer head screws (M4×10), both included in the kit.



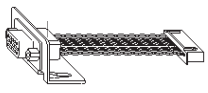
4. Fasten the two wing bolts until the protector contacts the console (underside).



5. Tighten the wing nuts until the unit is firmly secured.

1.6 External Monitor (Locally Supplied)

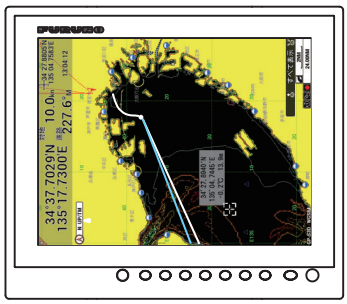
Prepare the monitor option (type: OP14-82, option) to connect an external monitor. You can connect a MU-150HD or a commercial monitor as an external monitor. The external monitor must have the following specifications.


Monitor option

- Video signal: Analog VGA
- Resolution: SVGA (800×600)

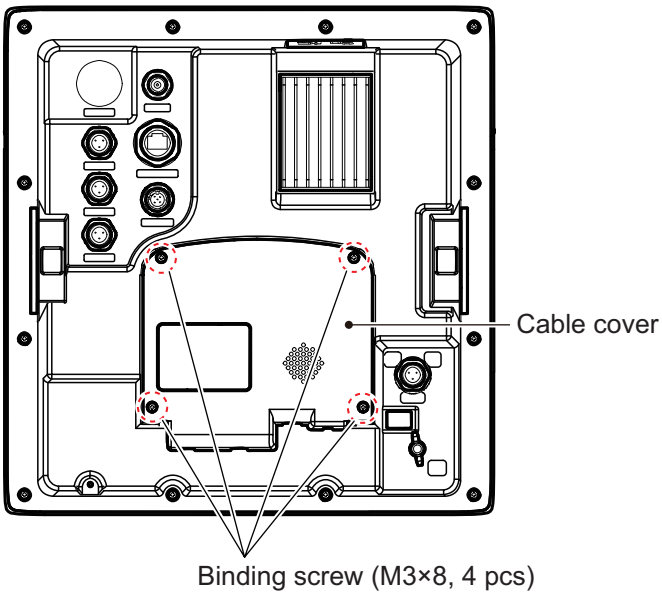
Note 1: Use an external monitor whose aspect ratio is "4:3". If other monitors are used, the screen on the display is zoomed in or zoomed out.

Note 2: When the MU-150HD is used, the screen rotates 90° to the left as shown in the following figure.

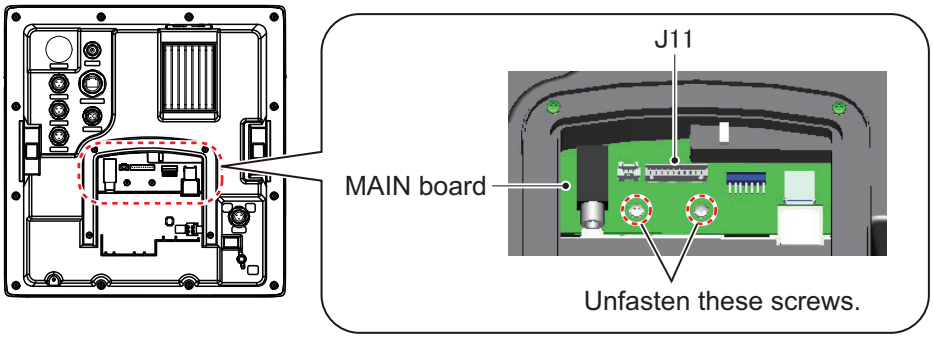


Install the monitor option as follows:

1. Unfasten four binding screws (M3×8) to remove the cable cover at the back of the display unit.
   The internal speaker cable is connected between the MAIN board and cable cover. If the internal speaker cable prevents your work, disconnect it from the MAIN board.

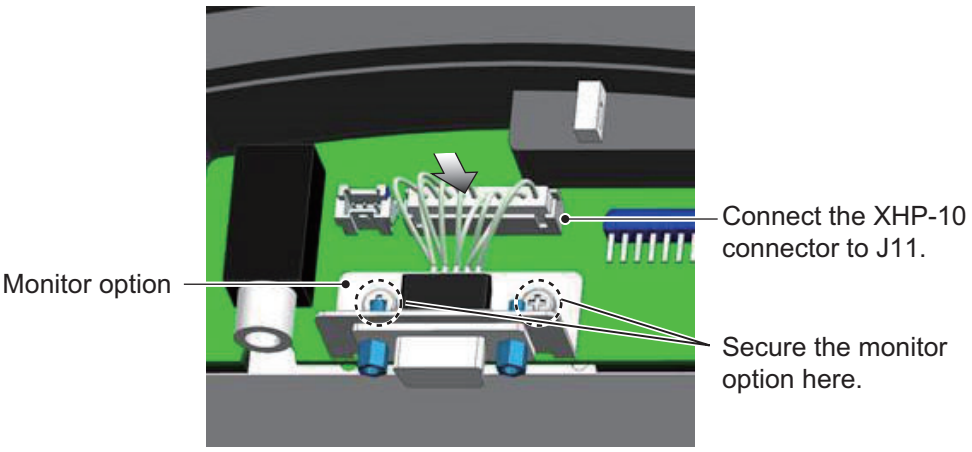


2. Unfasten the two screws indicated on the following figure.



3. Connect the XHP-10 connector of the monitor option to J11 on the MAIN board.

4. Secure the monitor option to the MAIN board, using the two screws removed at step 2.



5. Reattach the cable cover with four binding screws (M3×8).
   Note: When attaching the cable cover, take care that the internal speaker cable is not pinched between the unit and the cable cover.

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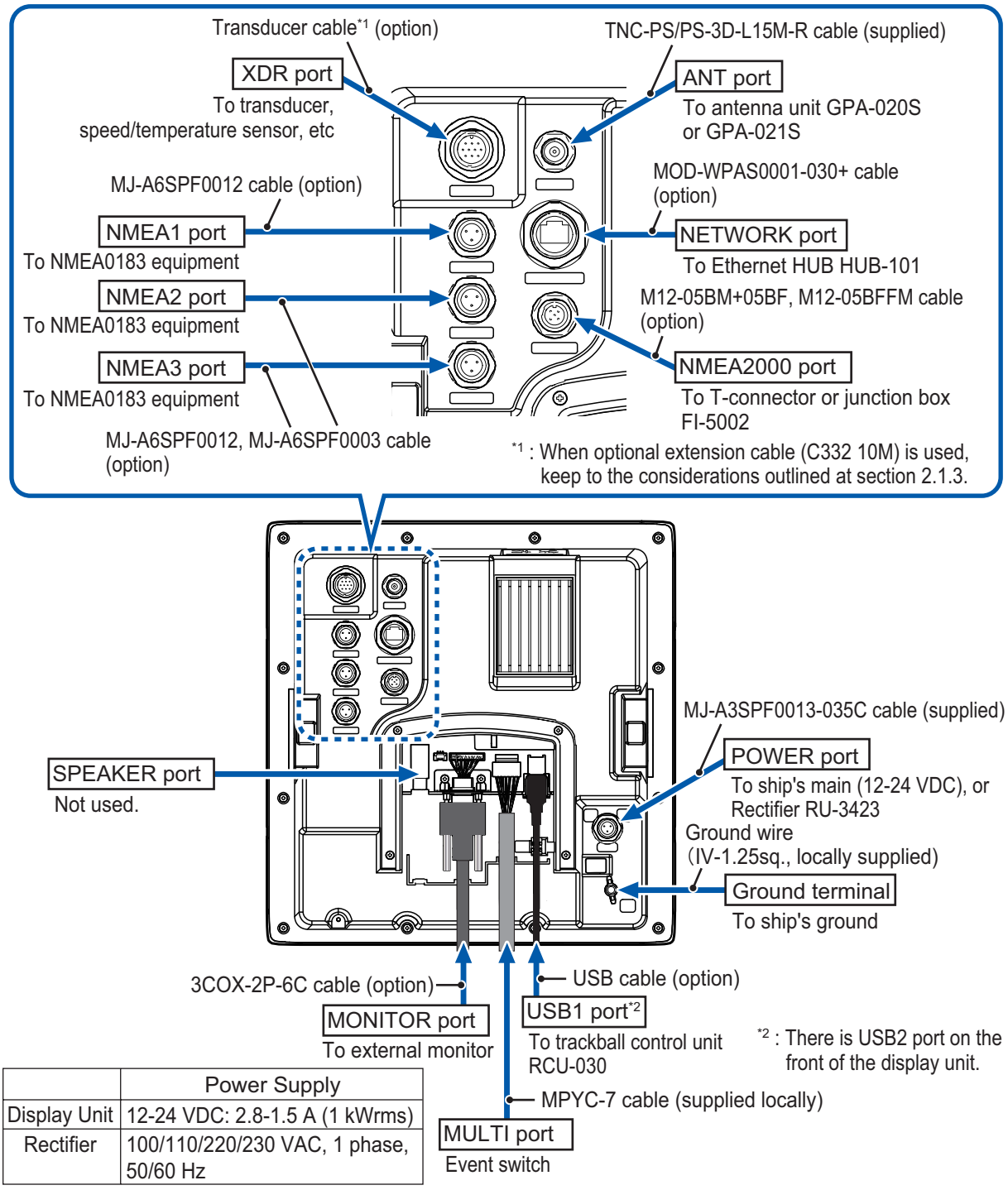
2. WIRING

2.1 How to Connect the Unit

Connect the equipment, referring to the figure below and the interconnection diagram at the back this manual. Do not remove the waterproofing cap from unused connectors.



	Power Supply
Display Unit	12-24 VDC: 2.8-1.5 A (1 kWrms)
Rectifier	100/110/220/230 VAC, 1 phase, 50/60 Hz

2.1.1 POWER port and grounding

Connect the ship's supply to the POWER port, using the supplied MJ-A3SPF0013-035C cable (3.5 m, one end connector).

Fasten the ground wire (locally supplied) to the ground terminal. The ground wire should be 1.25 sq or larger.

Note: The fuse holder on the MJ-A3SPF0013-035C cable is not waterproof. Waterproof the fuse holder when the cable is run through places subject to water splash and rain.

2.1.2 ANT port

Connect the antenna unit to the ANT port, using the TNC-PS/PS-3D-L15M-R cable (15 m). The TNC-PS/PS-3D-L15M-R cable is supplied with the antenna unit.

Prepare the optional antenna cable assembly (30 m, 40 m and 50 m) to extend the distance between the display unit and antenna unit.

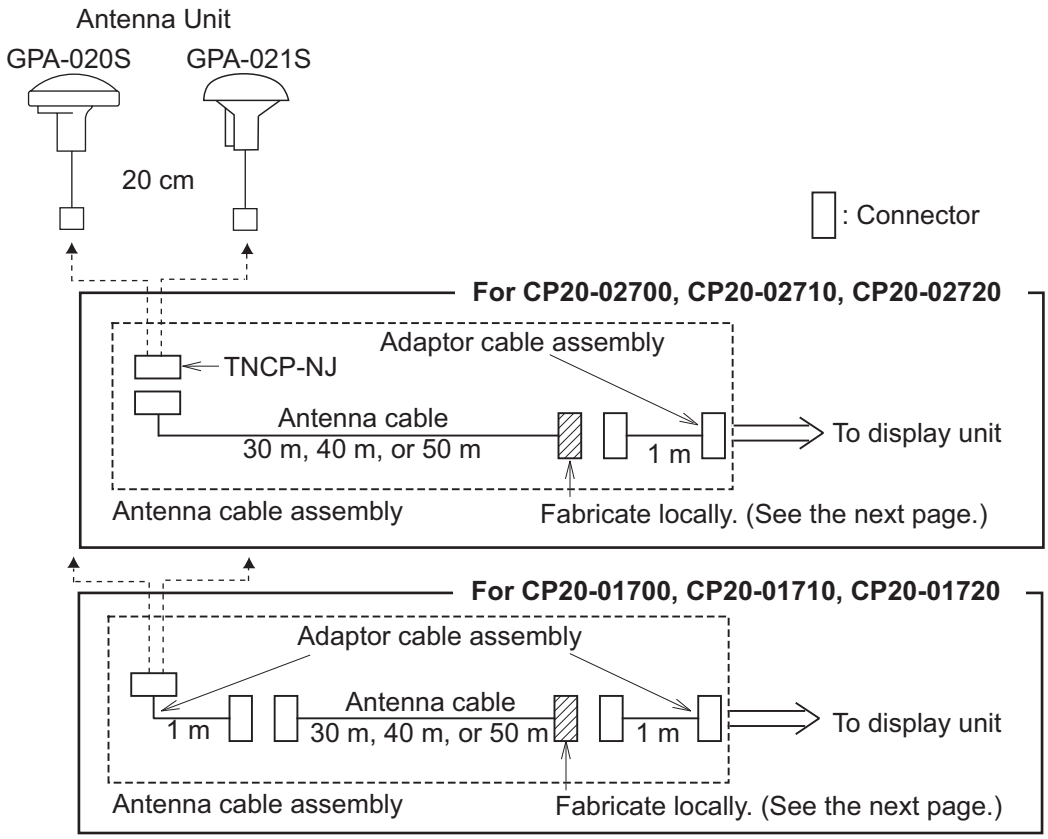
Antenna cable assembly

Type	Code No.	Remarks
CP20-01700	004-372-110	• 30 m antenna cable (type: 8D-FB-CV, qty: 1) • 1 m adapter cable assembly (type: NJ-TP-3DXV-1, qty: 2)
CP20-02700	004-381-160	• 30 m antenna cable (type: 8D-FB-CV, qty: 1) • 1 m adapter cable assembly (type: NJ-TP-3DXV-1, qty: 1) • Coaxial connector adapter (type: TNCP-NJ, qty: 1)
CP20-01720	001-207-980	• 40 m antenna cable (type: 8D-FB-CV, qty: 1) • 1 m adapter cable assembly (type: NJ-TP-3DXV-1, qty: 2)
CP20-02720	001-207-990	• 40 m antenna cable (type: 8D-FB-CV, qty: 1) • 1 m adapter cable assembly (type: NJ-TP-3DXV-1, qty: 1) • Coaxial connector adapter (type: TNCP-NJ, qty: 1)
CP20-01710	004-372-120	• 50 m antenna cable (type: 8D-FB-CV, qty: 1) • 1 m adapter cable assembly (type: NJ-TP-3DXV-1, qty: 2)
CP20-02710	004-381-170	• 50 m antenna cable (type: 8D-FB-CV, qty: 1) • 1 m adapter cable assembly (type: NJ-TP-3DXV-1, qty: 1) • Coaxial connector adapter (type: TNCP-NJ, qty: 1)

The coaxial connector (type: N-P-8DFB-1-CF, qty: 1), insulation tape (type: U-TAPE 0.5X19X5M, qty: 1) and vinyl tape (type: V360K01, qty: 1) are included in the antenna cable assembly indicated on the table above.

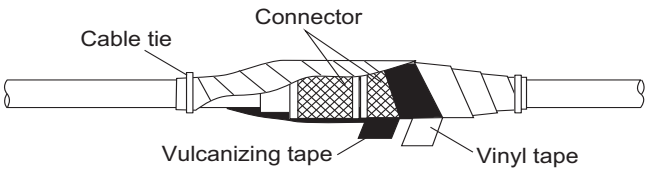
How to extend the antenna cable

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

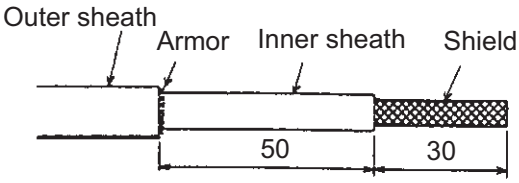


Waterproofing the connector

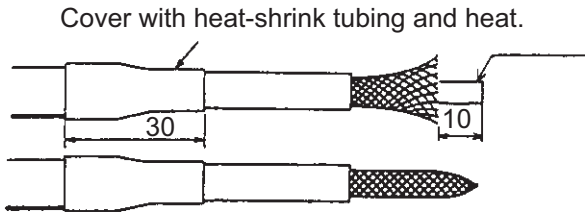
Wrap the connector with vulcanizing tape, then vinyl tape. Bind the tape ends with cable ties.



How to attach the N-P-8DFB connector

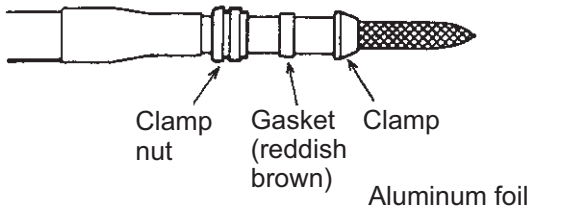


Remove outer sheath and armor by the dimensions shown left.
Expose inner sheath and shield by the dimensions shown left.

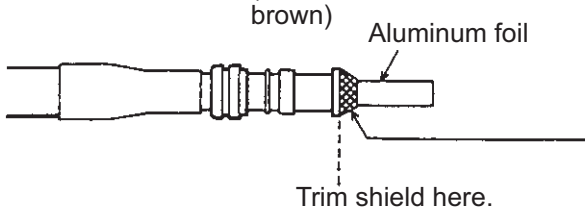


Cut off insulator and core by 10 mm.

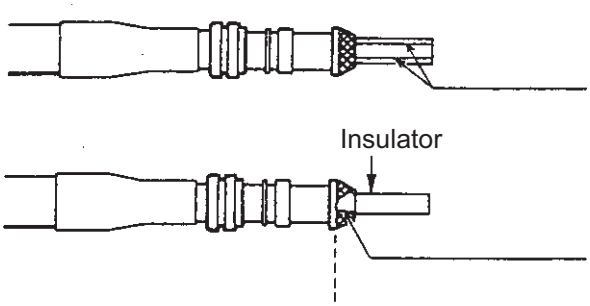
Twist shield end.



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

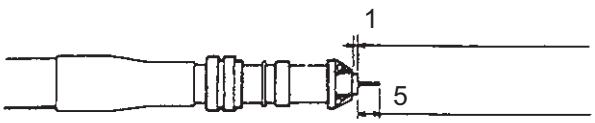


Fold back shield over clamp and trim.



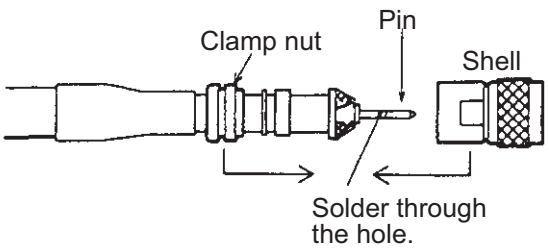
Cut aluminum foil at four places, 90° from one another.

Fold back aluminum foil onto shield and trim.



Expose the insulator by 1 mm.

Expose the core by 5 mm.

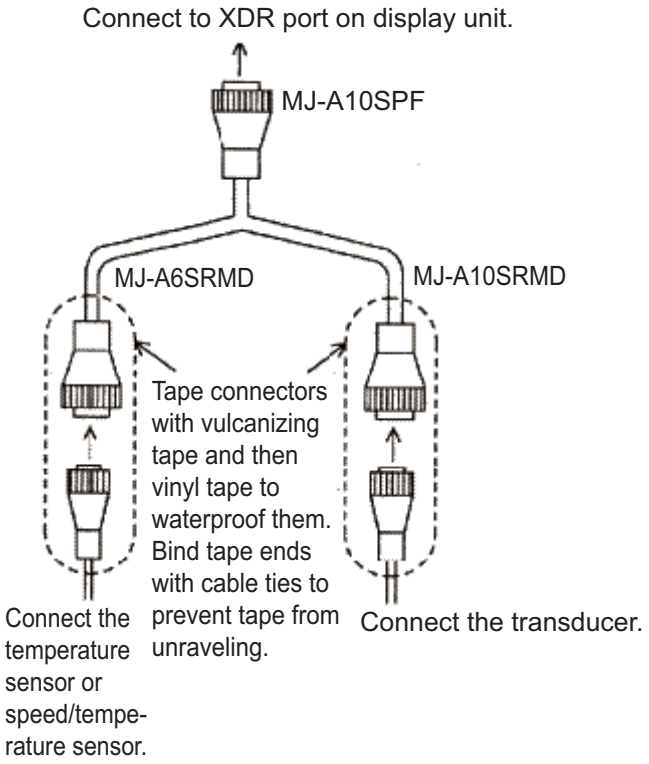


Slip the pin onto the core. Solder them together through the hole on the pin.

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.)

2.1.3 XDR port

Connect the transducer to the XDR port on the rear of the display unit. If the optional speed/temperature sensor is connected, connect the transducer with the optional cable assembly (type: 02S4147).



Note: Use of the optional extension cable (type: C332 10M) may cause the following problems:

- Reduced detection ability
- Wrong ACCU-FISH™ information (fish length smaller than actual length, fewer fish detections, error in individual fish detection)/
- Wrong speed data
- No TD-ID recognition

Matching box for optional transducer

The optional matching box (type: MB-1100) is required to connect the optional transducers 50B-6, 50B-6B, 200B-5S and 50/200-1T.

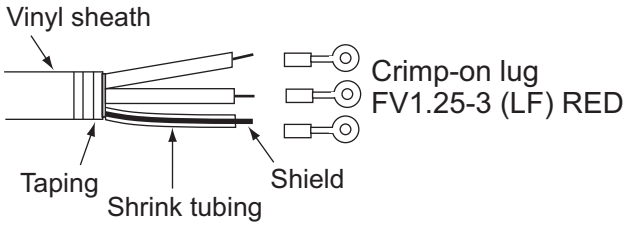
Included items in MB-1100

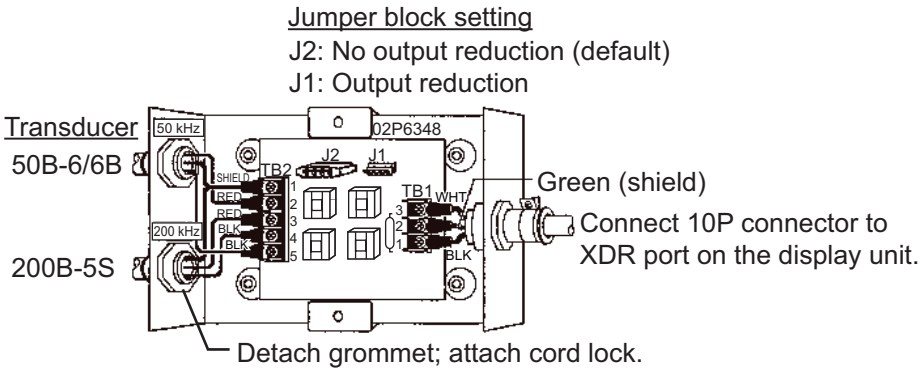
Name	Type	Code No.	Qty
Matching Box*1	MB-1100	000-027-226	1
Crimp-on Lug	FV1.25-3 (LF) RED	000-166-756-10	6
Cord Lock*2	NC-1	000-168-230-10	1

*1: With 10P connector cable

*2: For connecting two transducers

Fabricate the transducer cable to connect with the MB-1100, referring the following figure.





Matching box MB-1100, cover removed

2.1.4 NMEA1/NMEA2/NMEA3 port

When you use NMEA0183 equipment (radar, autopilot, etc.), connect it to the NMEA1, NMEA2 or NMEA3 ports, using the following optional cable.

- MJ-A6SPF0012 cable (5 m, 10 m and 15 m): connectors at both ends
- MJ-A6SPF0003 cable (2 m, 5 m, 10 m and 15 m): single connector (Cable fabrication on the NMEA0183 equipment side is required.)

2.1.5 NETWORK port

To connect an AIS receiver or a radar, the Ethernet HUB HUB-101 (local supply) and the optional MOD-WPAS0001-030+ cable (3 m, w/waterproof modular plug) are required. Connect the Ethernet HUB to the NETWORK port (100Base-TX) on the Display Unit.

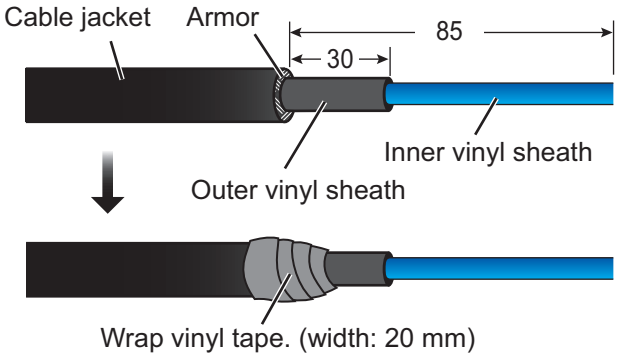
For LAN cable extension, prepare the optional joint box TL-CAT-012 and following LAN cable:

- MOD-Z072 cable (2 m, 5 m and 10 m): A modular plug is attached to each end of the cable (Cable fabrication is not required).
- FR-FTPC-CY cable (30 m: CP03-28920, 50 m: CP03-28930): LAN cable with armor. Fabricate the cable and attach the modular plugs, referring to the procedure on the following page.

Note: Do not connect equipment other than AIS receiver, radar and HUB-101 to the NETWORK port.

How to fabricate the LAN cable

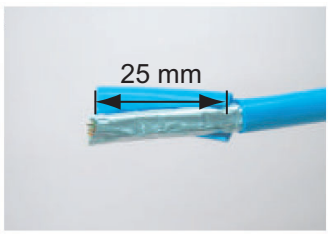
Fabricate the LAN cable (FR-FTPC-CY) as shown in the following figure. Wrap both edges of the armor with vinyl tape. Confirm that the shield of the cable touches to the shell of the modular plug.



1

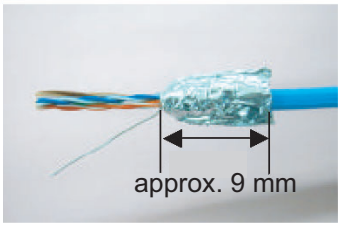
Expose inner vinyl sheath.

2



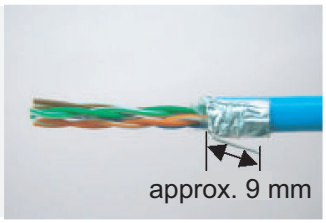
Remove the inner vinyl sheath by approx. 25 mm. Be careful not to damage inner shield and cores.

3



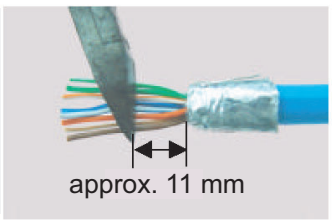
Fold back the shield, wrap it onto the inner vinyl sheath and cut it, leaving approx. 9 mm.

4



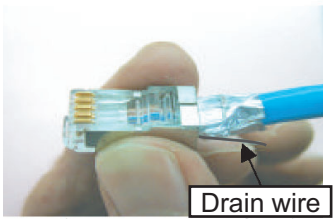
Fold back drain wire and cut it, leaving approx. 9 mm.

5



Straighten and flatten the cores in colored order and cut them, leaving approx. 11 mm.

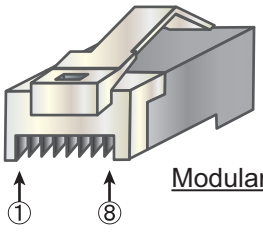
6



Insert the cable into the modular plug so that the folded part of the shield enters into the plug housing. The drain wire should be located on the tab side of the jack.

7

Using special crimping tool MPT5-8AS (PANDUIT CORP.), crimp the modular plug. Finally, check the plug visually.



[Crossover cable]

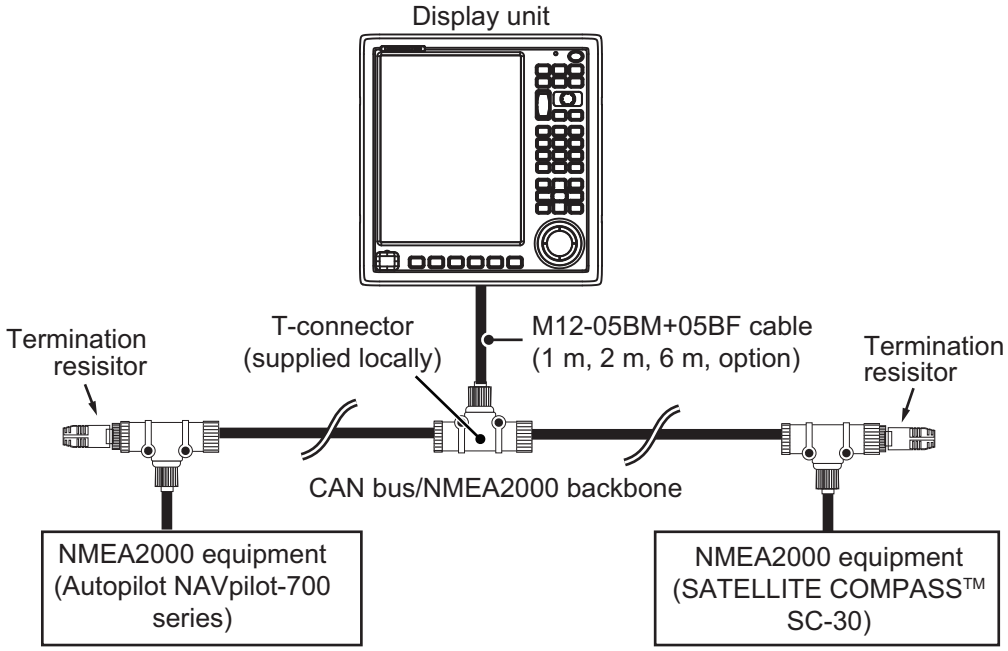
①WHT/GRN	WHT/ORG①
② GRN	ORG ②
③WHT/ORG	WHT/GRN③
④ BLU	BLU ④
⑤WHT/BLU	WHT/BLU⑤
⑥ ORG	GRN ⑥
⑦WHT/BRN	WHT/BRN⑦
⑧ BRN	BRN ⑧

[Straight cable]

①WHT/ORG	WHT/ORG①
② ORG	ORG ②
③WHT/GRN	WHT/GRN③
④ BLU	BLU ④
⑤WHT/BLU	WHT/BLU⑤
⑥ GRN	GRN ⑥
⑦WHT/BRN	WHT/BRN⑦
⑧ BRN	BRN ⑧

2.1.6 NMEA2000 port

Use the optional M12-05BM+05BF cable (1 m, 2 m and 6 m, w/connectors) to connect the display unit to the NMEA2000 (CAN bus) network backbone. The display unit must be on the same network as NMEA2000 equipment used as data sources (autopilot, SATELLITE COMPASS™).



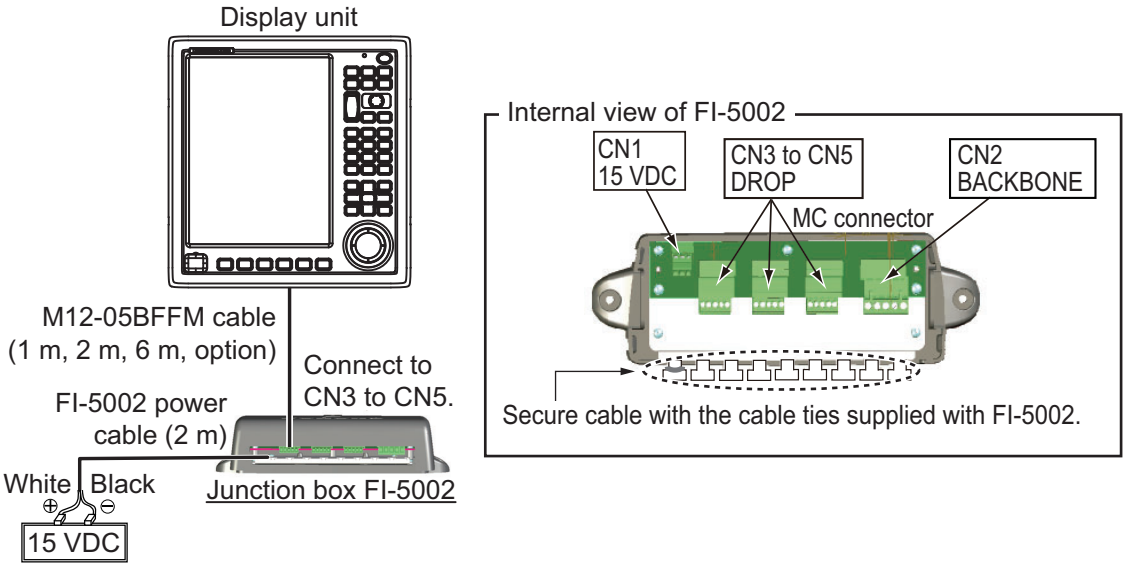
Note 1: The CAN bus is NMEA2000 compliant. Therefore, CAN bus equipment is available for GP-3700F.

Note 2: The NMEA2000 (CAN bus) network requires a dedicated power supply. Turn the NMEA2000 network power on before you turn this equipment on.

Note 3: Termination resistors are required to close off the NMEA2000 (CAN bus) network ends, completing the network.

How to connect to the Junction box FI-5002 (supplied locally)

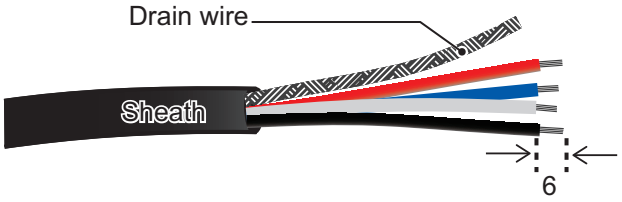
When using the FI-5002, connect the NMEA2000 port of the display unit to the FI-5002 internal MC connectors (CN3 to CN5), using the optional M12-05BFFM cable (1 m, 2 m and 6 m, one end connector).



How to fabricate the M12-05BFFM cable

To connect the M12-05BFFM cable to FI-5002, fabricate the cable and attach the MC connector as shown in the following figure.

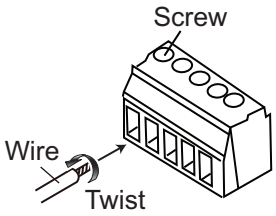
• How to fabricate the cable



• How to attach the MC connector

CN3 to CN5

Pin No.	Signal	Wire
1	SHIELD	Drain
2	NET-S	Red
3	NET-C	Black
4	NET-H	White
5	NET-L	Blue

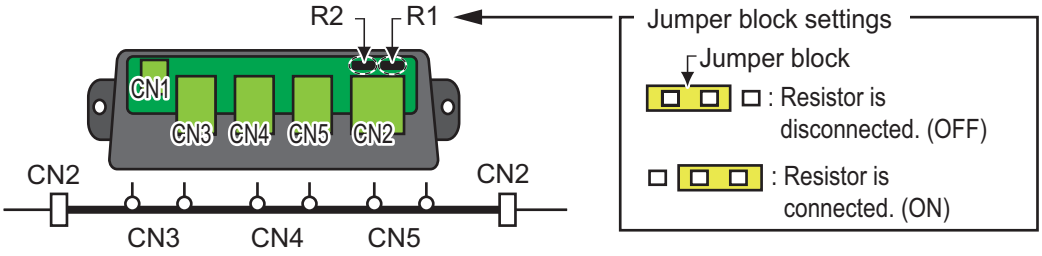


How to insert cores
1. Twist the cores.
2. Unfasten the screw with slotted screwdriver.
3. Insert the core to hole.
4. Tighten the screw with slotted screwdriver.
5. Pull the wire to confirm connection.

Termination resistor in the FI-5002

The FI-5002 has two termination resistors (R1 and R2). The resistors are set in the following manner:

- When no backbone cable is connected, R1 and R2 are set to ON position.
- When one backbone cable is connected, either R1 or R2 is set to ON position.
- When two backbone cables are connected, R1 and R2 are set to OFF position.

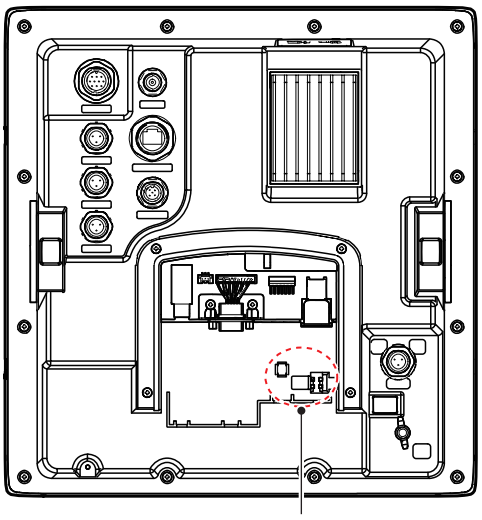


2.1.7 MONITOR, MULTI, USB1 port

How to connect the cable

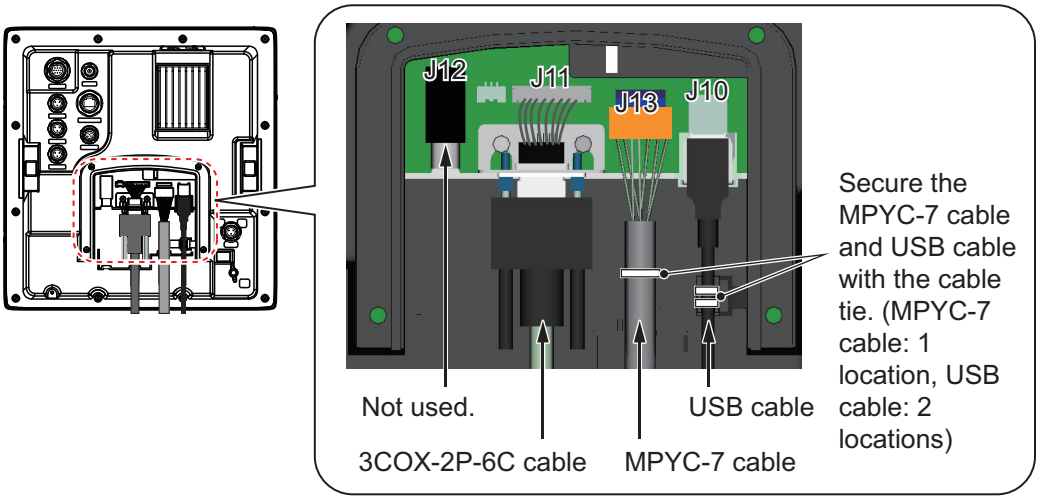
The MONITOR, MULTI and USB1 ports are located inside the cable cover. Remove the cable cover and connect the cables as follows:

1. Unfasten four binding screws (M3×8) to remove the cable cover at the back of the display unit.
   The internal speaker cable is connected between the MAIN board and cable cover. If the internal speaker cable prevents your work, disconnect the cable from the MAIN board.



Secure the MPYC-7 and USB cable, using the cable tie.

2. Connect the cables to the appropriate port.
3. Secure the MPYC cable and USB cable to the cable clamp, using the supplied cable tie.



4. Reattach the cable cover with four binding screws (M3×8).
   Note: When attaching the cable cover, take care that the internal speaker cable is not pinched between the unit and the cable cover.

MONITOR port (J11)

You can connect a MU-150HD or a commercial monitor (resolution: SVGA) as an external monitor. The monitor option (type: OP14-82, option) and 3COX-2P-6C cable (5 m, 10 m, option) are required to use the MONITOR port (J11). Attach the monitor option (see section 1.6), then connect the external monitor with the 3COX-2P-6C cable.

MULTI port (J13)

The MPYC-7 cable and NH connector, both supplied locally, are required to use the MULTI port (J13). Connect an event switch to the MULTI port (J13), referring the in-

terconnection diagram at the back this manual. Fabricate the MPYC-7 cable appropriately, according to the NH connector.

USB1 port (J10)

Connect the optional trackball control unit RCU-030 (w/2 m cable) to the USB1 port (J10).

Note 1: There is USB2 port on the front on the display unit. Use the USB2 port to import/export data.

Note 2: Do NOT cut the USB cable for the trackball control unit.

2.2 DIP Switch Settings

There are two DIP switches (S1 and S2) on the MAIN board (14P0441) in the display unit. Keep the default setting.

Factory default setting on DIP switch S1

1	2	3	4
OFF			

Factory default setting on DIP switch S2

1	2	3	4
OFF			

2.3 Input/Output Data

The display unit can input/output NMEA0183 and NMEA2000 format data.

2.3.1 NMEA0183 format data

The display unit has three NMEA0183 ports (NMEA1/NMEA2/NMEA3). Input and output sentences change according to the [CONNECTED DEVICE] setting on the [PORT 1 (2 or 3) SETTING] menu (see the following tables). For how to set [CONNECTED DEVICE], see section 3.6.1.

Input sentences

[CONNECTED DEVICE] is set to [NORMAL]

Sentence	Data
CUR	Water Current Layer
DBK	Depth Below Keel
DBS	Depth Below Surface
DBT	Depth Below Transducer
DPT	Depth
GGA	Global Positioning System Fix Data
GLL	Geographic Position
GNS	GNSS Fix Data
HDG	Heading, Deviation & Variation

Sentence	Data
HDM	Heading, Magnetic
HDT	Heading True
MTW	Water Temperature
MWV	Wind Speed and Angle
RMA	Recommended Minimum Specific Loran-C Data
RMB	Recommended Minimum Specific Navigation Information
RMC	Recommended Minimum Specific GNSS Data
THS	True Heading and Status
TLL	Target Latitude and Longitude
TTM	Tracked Target Message
VDR	Set & Drift
VHW	Water Speed and Heading
VTG	Course Over Ground & Ground Speed
VWR	Wind relative Bearing and Velocity
VWT	True Wind Speed and Angle
ZDA	Time & Date

[CONNECTED DEVICE] is set to [RADIO EQUIPMENT]

Sentence	Data
TTM	Tracked Target Message
TLL	Target Latitude and Longitude

[CONNECTED DEVICE] is set to [AIS]

Sentence	Data
ALR	Set alarm state
VDM	AIS VHF Data-link Message

[CONNECTED DEVICE] is set to [GPS BUOY]

Sentence	Data
When using a GPS buoy	
BLV	GPS Buoy Location
GLL	GPS Buoy Location (II, OM, LA, LC, DE)
TLL	GPS Buoy Location
When using a GPS buoy as a sub ship	
GGA, RMC, RMA, GLL	GPS Buoy Location (CV, other than II, OM, LA, LC, and DE)

[CONNECTED DEVICE] is set to [AUTO PILOT]

Sentence	Data
Furuno proprietary sentence	Autopilot information

[CONNECTED DEVICE] is set to [RTCM]

Sentence	Data
MSK	Receiver Interface Command
CRQ	Query Sentence

Output sentences

Sentence	Data	[CONNECTED DEVICE] setting					
		NORMAL	RADIO EQUIPMENT	AIS	GPS BUOY	AUOT PILOT	RTCM
AAM	Waypoint Arrival Alarm	✓	✓	✓	✓	✓	-
APB	Autopilot Sentence B	✓	✓	✓	✓	✓	-
BOD	Bearing Origin to Destination	✓	✓	✓	✓	✓	-
BWC	Bearing & Distance to Waypoint-Great Circle	✓	✓	✓	✓	✓	-
BWR	Bearing & Distance to Waypoint - Rhumb Line	✓	✓	✓	✓	✓	-
DBT	Depth Below Transducer	✓	✓	✓	✓	-	-
DPT	Depth	✓	✓	✓	✓	-	-
DTM	Datum Reference	✓	✓	✓	✓	-	-
GGA	Global Positioning System Fix Data	✓	✓	✓	✓	-	-
GLL	Geographic Position - Latitude/ Longitude	✓	✓	✓	✓	-	-
GNS	GNSS Fix Data	✓	✓	✓	✓	-	-
GSA	GNSS DOP and Active Satellites	✓	✓	✓	✓	-	-
GSV	GNSS Satellites in View	✓	✓	✓	✓	-	-
GTD	Geographical Position, Loran-C TDs	✓	✓	✓	✓	-	-
HDG	Heading, deviation and variation	✓	✓	✓	✓	-	-
HDT	Heading True	✓	✓	✓	✓	-	-
MSK	Receiver Interface Command	-	-	-	-	-	✓
MSS	MSK receiver signal status	-	-	-	-	-	✓
MTW	Water temperature	✓	✓	✓	✓	-	-
MWV	Wind speed and angle	✓	✓	✓	✓	-	-
RMA	Recommended minimum specific LORAN-C data	✓	✓	✓	✓	-	-

Sentence	Data	[CONNECTED DEVICE] setting					
		NORMAL	RADIO EQUIPMENT	AIS	GPS BUOY	AUOT PILOT	RTCM
RMB	Recommended Minimum Navigation Information	✓	✓	✓	✓	✓	-
RMC	Recommended Minimum Specific GNSS Data	✓	✓	✓	✓	-	-
RTE	Routes RTE - Routes	✓	✓	✓	✓	✓	-
THS	True heading & status	✓	✓	✓	✓	-	-
TLL	Target Latitude and Longitude	✓	✓	✓	✓	-	-
TTM	Tracked target message	✓	✓	✓	✓	-	-
VHW	Water speed and heading	✓	✓	✓	✓	-	-
VTG	Course over ground & ground speed	✓	✓	✓	✓	✓	-
WPL	Waypoint Location	✓	✓	✓	✓	✓	-
XTE	Cross-Track Error, Measured	✓	✓	✓	✓	✓	-
ZDA	Time and date	✓	✓	✓	✓	-	-
pidat*	Product information	✓	✓	✓	✓	-	-
drcmd*	Sentence output control command	-	✓	-	-	-	-

*: Furuno proprietary sentence

2.3.2 NMEA2000 format data

Input PGN

PGN	Data	Remarks
059392	ISO Acknowledgement	
059904	ISO Request	
060928	ISO Address Claim	
061184	Self Test Group Function	Proprietary PGN
126208	NMEA - Request group function	
	NMEA - Command group function	
	NMEA - Acknowledge group function	
126464	PGN List - Transmit PGN's group function	
126720	Memory Clear Group Function	Proprietary PGN
	Reset Group Function	Proprietary PGN
	Other Setting (Steering mode)	Proprietary PGN
126996	Product Information	
127237	Heading/Track Control	

PGN	Data	Remarks
127250	Vessel Heading	
129538	GNSS Control Status	
130577	Direction Data	
130816	Self Test Report	Proprietary PGN
130817	Furuno GNSS Control Group Function	Proprietary PGN
130818	Heading & Attitude Sensor Control Status	Proprietary PGN
130819	Motion Sensor Control Status	Proprietary PGN
130820	Motion Sensor Status	Proprietary PGN
130821	NAV Source Select	
130827	NAVpilot Display Data (High Speed)	

Output PGN

PGN	Data	Remarks	Output cycle (msec)
059392	ISO Acknowledgement	For Certification Level A/B, Refusing output requirement	—
059904	ISO Request	For Certification Level A/B, Requiring output	—
060928	ISO Address Claim	For Certification Level A/B • Address autonomy • Receiving output requirement	—
061184	Self Test Group Function	Proprietary PGN Receiving output requirement	—
126208	NMEA - Request group function	For Certification Level A/+ α Receiving output requirement	—
	NMEA - Command group function	For Certification Level A/+ α • Changing the setting of SC-30 • Changing the setting of NAVpilot-700	—
	NMEA - Acknowledge group function	For Certification Level A/+ α Sending the confirmation for NMEA-Request group function and NMEA-Command group function	—
126464	PGN List - Transmit PGN's group function	For Certification Level A/+ α Receiving output requirement	—
	PGN List - Received PGN's group function	For Certification Level A/+ α Receiving output requirement	—
126720	Memory Clear Group Function	Proprietary PGN Receiving output requirement	—
	Reset Group Function	Proprietary PGN Receiving output requirement	—
126992	System Time		1000
126993	Heartbeat		30000
126996	Product Information	For Certification Level A/B Receiving output requirement	—
127258	Magnetic Variation		1000
128267	Water Depth		1000
128275	Distance Log		1000
129025	Position, Rapid Update		100

PGN	Data	Remarks	Output cycle (msec)
129026	COG & SOG, Rapid Update		250
129029	GNSS Position Data		1000
129033	Local Time Offset	• Receiving output requirement • Changing the setting of Local Offset	—
129283	Cross Track Error		1000
129284	Navigation Data		1000
129285	Navigation - Route/WP Information	• Outputs when waypoint is set/changed (own ship's position is required) • Receiving output requirement	—
129538	GNSS Control Status	Receiving output requirement	—
129539	GNSS DOPs		1000
130822	Unit Division Code	Proprietary PGN Fast packet (For FURUNO Product) Receiving output requirement	—
130823	Browser Control Status	Proprietary PGN Fast packet (For FURUNO Product) Receiving output requirement	—
130827	NAVpilot General Message) I AM NAV4 SERVER) (#4=02)	Proprietary PGN	5000

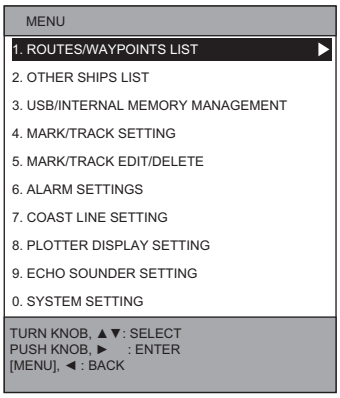
3. SETTING UP THE EQUIPMENT

This chapter shows you how to set up your system according to the equipment you have connected.

Menu operation description

The basic operations to use during the installation setup are as follows:

1. Press ⏻/**BRILL** key to turn the power on.
2. Press the **MENU** key to open the main menu.



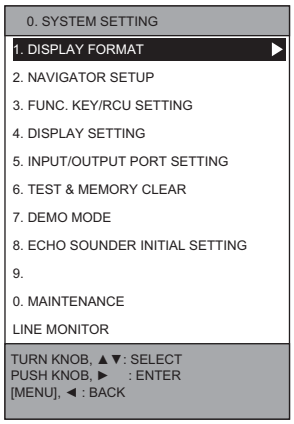
3. Select the menu item.
   There are three methods to select a menu item:
   - Press the appropriate numeric key (only for the numbered menu items).
   - Rotate the **ENTER** knob to move the cursor, then push the **ENTER** knob or press ▶.
   - Press ▲ or ▼ to move the cursor, then push the **ENTER** knob or press ▶.
4. Repeat step 3 to open the desired menu.
5. Select the menu item to change the setting value.
6. Change the setting value.
   There are two methods to change the setting value:
   - Rotate the **ENTER** knob to select the setting item, then push the **ENTER** knob.
   - Press ◀ or ▶ to select the setting item, then push the **ENTER** knob.
7. Press the **MENU** key several times or press the **DISP** key to close the menu.

Note: Unless noted otherwise, “select” means place the cursor on the desired menu item, then push the **ENTER** knob.

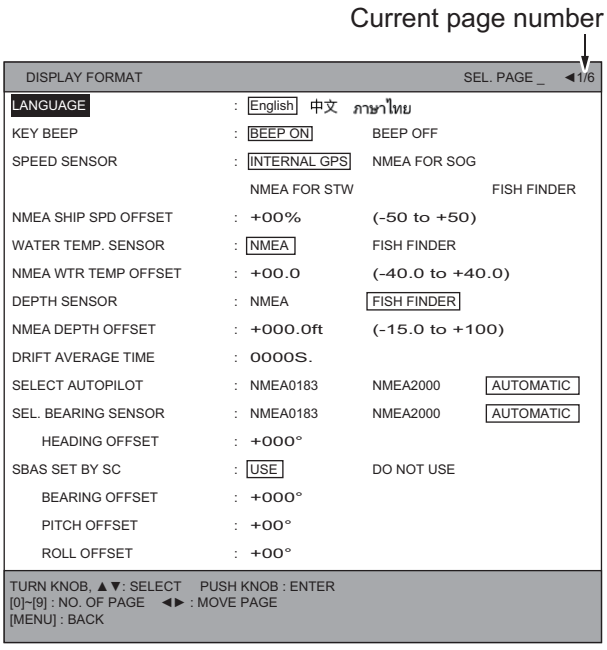
3.1 Language Setting

Select the language to use on your equipment as follows:

1. Press the **MENU** key to open the main menu.
2. Select [0. SYSTEM SETTING].



3. Select [1. DISPLAY FORMAT].
   The [DISPLAY FORMAT] menu has six pages. When the page 1 is not displayed, press the **1** key (or ◄, ►) to open page 1.



[DISPLAY FORMAT] menu, page 1

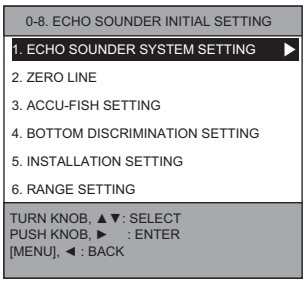
4. Select [LANGUAGE].
5. Select the appropriate language to use.
6. Press the **DISP** key to close the menu.

3.2 Echo Sounder Setting

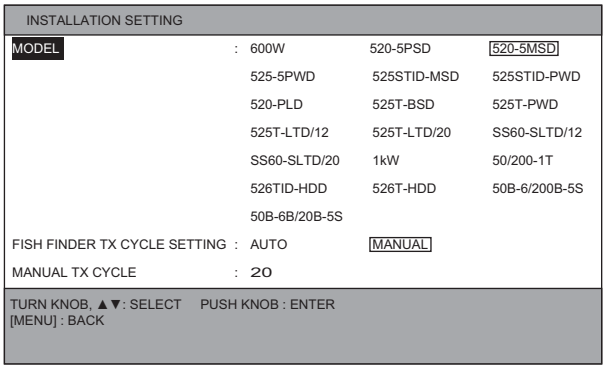
3.2.1 Transducer setting

Setup the transducer connected to this equipment as follows:

1. Press the **MENU** key to open the main menu.
2. Select [0. SYSTEM SETTING].
3. Select [8. ECHO SOUNDER INITIAL SETTING].



4. Select [5. INSTALLATION SETTING].



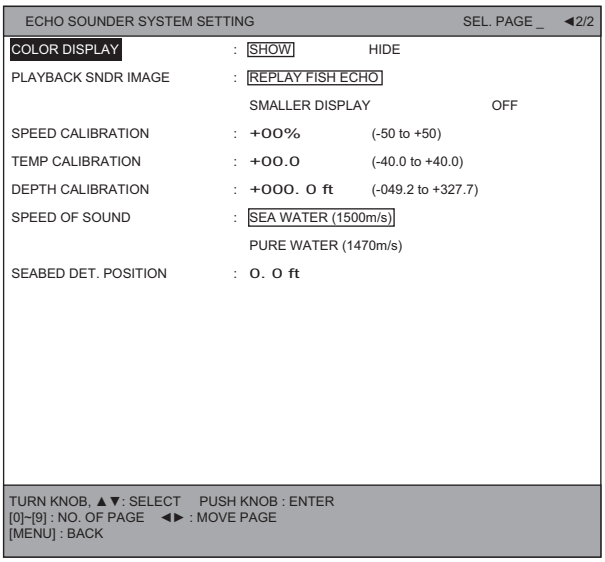
5. Select [MODEL].
6. Select the transducer connected to the display unit.
   If your transducer is not shown on the menu, select [600W] or [1kW] according to the transducer transmission power.
   Note: Select the appropriate setting item according to the transducer transmission power. If not, the transducer may be damaged.
7. Select [FISH FINDER TX CYCLE SETTING].
8. Select [AUTO] or [MANUAL]. When [AUTO] is selected. go to step 11.
9. When [MANUAL] is selected at step 8, select [MANUAL TX CYCLE].
10. Press the appropriate numeric key to set the transmission cycle.
11. Press the **DISP** key to close the menu.

3.2.2 Sensor offset

You can offset the ship's speed, water temperature and depth data from the transducer and optional sensor (temperature and speed/temperature sensor). When data is input from NMEA equipment, see the next section.

1. Press the **MENU** key to open the main menu.
2. Select [0. SYSTEM SETTING].
3. Select [8. ECHO SOUNDER INITIAL SETTING].

4. Select [1. ECHO SOUNDER SYSTEM SETTING].
   The [ECHO SOUNDER SYSTEM SETTING] menu has two pages. When the page 2 is not displayed, press the **2** key (or ◀, ▶) to open page 2.



[ECHO SOUNDER SYSTEM SETTING] menu, page 2

5. Offset the ship's speed value.
   1) Select [SPEED CALIBRATION].
   2) Press the appropriate numeric key to enter the offset value.
      For example, if the speed indication is 10% lower than actual speed, enter "+10".
6. Offset the water temperature value.
   Set the [TEMP CALIBRATION] value, referring to step 5.
7. Select [DEPTH CALIBRATION] and change the setting value as necessary.
   The default depth indication shows the distance from the transducer bottom. If you would rather show the distance from the sea surface, enter your ship's draft.
8. Select [SPEED OF SOUND], then select the water type with which to use the equipment, from [SEA WATER] or [PURE WATER].
   Select the correct water type to get accurate depth data.
9. Press the **DISP** key to close the menu.

3.3 Sensor and NMEA Equipment Setting

Setup the transducer, optional sensor (temperature, speed/temperature sensor) and NMEA equipment connected to this equipment as follow:

1. Press the **MENU** key to open the main menu.
2. Select [0. SYSTEM SETTING].
3. Select [1. DISPLAY FORMAT].
   The [DISPLAY FORMAT] menu has six pages. When the page 1 is not displayed, press the **1** key (or ◀, ▶) to open page 1.
4. Select [SPEED SENSOR].
5. Select the ship's speed data source.
   - [INTERNAL GPS]: Use the internal GPS data.

- [NMEA FOR SOG]: Use the VTG, RMC or RMA sentence data from the NMEA0183 equipment.
- [NMEA FOR STW]: Use the VHW sentence data from the NMEA0183 equipment.
- [FISH FINDER]: Use the data from the triducer or speed/temperature sensor.

6. When a setting item other than [FISH FINDER] is selected at step 5, offset the ship's speed value.
   Note: Normally, offset the value from the equipment used as the data source. If the data source does not have an offset function, enter the offset value from this equipment.
   1) Select [NMEA SHIP SPD OFFSET].
   2) Press the appropriate numeric key to enter the offset value.
      For example, if the speed indication is 10% lower than actual speed, enter "+10".
7. Select [WATER TEMP. SENSOR].
8. Select the water temperature data source.
   - [NMEA]: Use the MTW sentence data from the NMEA0183 equipment.
   - [FISH FINDER]: Use the data from the triducer or speed/temperature sensor.
9. When [NMEA] is selected at step 8, offset the water temperature value on [NMEA WTR TEMP OFFSET], referring to step 6.
10. Select [DEPTH SENSOR].
11. Select the depth data source.
    - [NMEA]: Use the DPT, DBT, DBK or DBS sentence data from the NMEA0183 equipment.
    - [FISH FINDER]: Use the data from the transducer or triducer.
12. When [NMEA] is selected at step 11, offset the depth value on [NMEA DEPTH OFFSET], referring to step 6.
13. Select [AUTOPILOT] when an autopilot is connected to the display unit.
14. Select the data format of the autopilot.
    - [NMEA0183]: Use the NMEA0183 sentences to communicate with the autopilot.
    - [NMEA2000]: Use the NMEA2000 PGNs to communicate with the autopilot.
    - [AUTOMATIC]: Switch the data automatically in specified priority. For the priority, see the table at step 16.
15. Select [SEL. BEARING SENSOR] when a heading sensor is connected to the display unit.
16. Select the heading data format.
    - [NMEA0183]: Use the NMEA0183 sentences to communicate with the heading sensor.
    - [NMEA2000]: Use the NMEA2000 PGNs to communicate with the heading sensor.
    - [AUTOMATIC]: Switch the data automatically in specified priority. For the priority, see the following table.

Priority	Equipment
1 (High priority)	Main heading sensor or autopilot set on the [SHOW NMEA2000 DEVICES] menu (see section 3.6.3).
2	Heading sensor or autopilot which is not set as main equipment on the [SHOW NMEA2000 DEVICES] menu.
3	Heading sensor or autopilot connected to the NMEA1 port.
4	Heading sensor or autopilot connected to the NMEA2 port.
5 (Low priority)	Heading sensor or autopilot connected to the NMEA3 port.

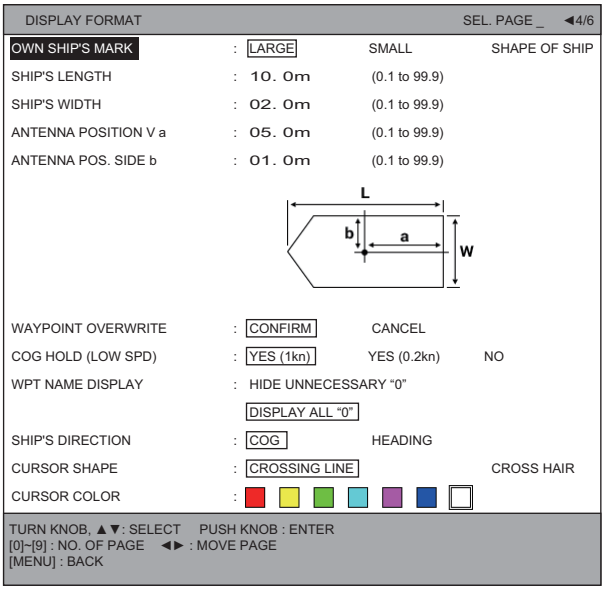
17. Offset the heading data on [HEADING OFFSET], referring step 6.
18. Select [SBAS SET BY SC] when a SATELLITE COMPASS™ is connected to NMEA2000 (CAN bus) backbone.
19. Select [USE] to use the SBAS satellites which are used by the SATELLITE COMPASS™.
20. Adjust [BEARING OFFSET], [PITCH OFFSET] and [ROLL OFFSET] as necessary, to offset the heading, pitch and roll value from SATELLITE COMPASS™.
21. Press the **DISP** key to close the menu.

3.4 Own Ship Information Setting

Enter own ship information (ship's width/length, antenna position, etc) as follows:

Setting on the [DISPLAY FORMAT] menu

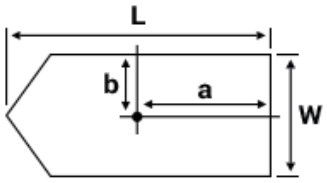
1. Press the **MENU** key to open the main menu.
2. Select [0. SYSTEM SETTING].
3. Select [1. DISPLAY FORMAT].
   The [DISPLAY FORMAT] menu has six pages. Press the **4** key (or ◀, ▶) to open page 4.



[DISPLAY FORMAT] menu, page 4

4. Select [SHIP'S LENGTH].

5. Press the appropriate numeric key to enter the ship's length ("L" indicated in the figure shown to the right).
6. Select [SHIP'S WIDTH].
7. Press the appropriate numeric key to enter the ship's width ("W" indicated in the figure at step 5).



8. Select [ANTENNA POSITION V a].
9. Press the appropriate numeric key to enter the antenna position ("a" indicated in the figure at step 5).
10. Select [ANTENNA POS. SIDE b].
11. Press the appropriate numeric key to enter the antenna position ("b" indicated in the figure at step 5).
12. Press the **DISP** key to close the menu.

Setting on the [NAVIGATOR SETUP] menu

1. Press the **MENU** key to open the main menu.
2. Select [0. SYSTEM SETTING].
3. Select [2. NAVIGATOR SETUP].
   The [NAVIGATOR SETUP] menu has two pages. Press the **1** key (or ◀, ▶) to open page 1.

NAVIGATOR SETUP SEL. PAGE _ ◄1/2

SELECT NAV SOURCE	:	[INTERNAL]	GPS	LORAN C
		ALL		
TIME DIFFERENCE	:	+9 : 00		
NMEA TIME DIFFERENCE	:	+00 : 00		
DATUM	:	[WGS-84]	TOKYO	
POSITION SMOOTHING	:	000		
SPEED SMOOTHING	:	000		
SPEED AVERAGING	:	060		
NMEA SPEED AVERAGING	:	060		
LATITUDE OFFSET	:	0.000' N		
LONGITUDE OFFSET	:	0.000' E		
DISABLE SATELLITE(GPS)	:	___ ___ ___		
ANTENNA HEIGHT	:	05m		
GPS FIX MODE	:	2D	[2D/3D]	
DGPS/SBAS	:	DGPS	SBAS	AUTOMATIC
		[NO]		
DGPS/SBAS ALARM	:	ON	[OFF]	

TURN KNOB, ▲▼: SELECT PUSH KNOB : ENTER
[0]~[9] : NO. OF PAGE ◄► : MOVE PAGE
[MENU] : BACK

[NAVIGATOR SETUP] menu, page 1

NAVIGATOR SETUP SEL. PAGE _ ◄2/2

DGPS BEACON STATION	:	[AUTOMATIC]	MANUAL	
FREQUENCY SETTINGS	:	320. 5kHz		
DGPS BAUD RATE	:	50	100	[200]
SBAS SATELLITE SEL.	:	[AUTOMATIC]	MANUAL	
SBAS MAN. SAT. SET.	:	134		
DISABLE SATELLITE(SBAS)	:	___ ___ ___		
DISABLE SATELLITE(QZSS)	:	___ ___ ___		
COURSE UP REDRAW ANGLE	:	22.5°	(20.0 to 60.0)	
FREE UP ANGLE	:	000°		
COURSE SMOOTHING	:	000		
ROLLOVER	:	2015		
RTE SENTENCE *	:	[LEGACY]	DNV	

TURN KNOB, ▲▼: SELECT PUSH KNOB : ENTER
[0]~[9] : NO. OF PAGE ◄► : MOVE PAGE
[MENU] : BACK

[NAVIGATOR SETUP] menu, page 2

*: Normally, select [LEGACY].
- [LEGACY]: Own ship's position data is included in the RTE sentence.
- [DNV]: Own ship's position data is not included in the RTE sentence.

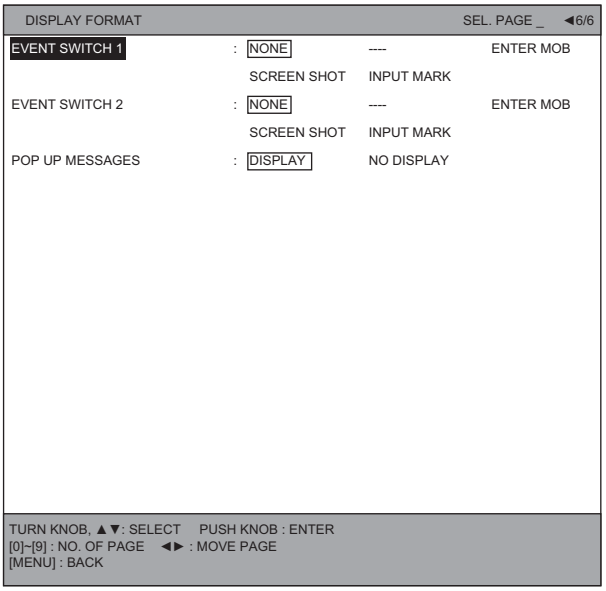
4. Select [SELECT NAV SOURCE].
5. Select the position data source.
   - [INTERNAL]: Use the internal GPS data.
   - [GPS]: Use the NMEA0183 sentences.
   - [LORAN C]: Use the Loran C navigator data.
   - [ALL]: Select this option when you have multiple EPFS devices in your configuration (NMEA0183 sentences). The equipment having highest accuracy has priority.

6. Select [ANTENNA HEIGHT].
7. Press the appropriate numeric key to enter the distance between the waterline and antenna position.
8. Press the **DISP** key to close the menu.

3.5 Event Switch Setting

When the event switch(es) is connected, assign the function for the event switch(es) as follows:

1. Press the **MENU** key to open the main menu.
2. Select [0. SYSTEM SETTING].
3. Select [1. DISPLAY FORMAT].
   The [DISPLAY FORMAT] menu has six pages. When the page 6 is not displayed, press the **6** key (or ◀, ▶) to open page 6.



[DISPLAY FORMAT] menu, page 6

4. Select [EVENT SWITCH 1] or [EVENT SWITCH 2].
5. Select the function for the event switch.
   - [NONE]: The event switch is disabled.
   - [ENTER MOB]: Operate the switch to place the MOB mark at the current position.
   - [SCREEN SHOT]: Operate the switch to create a screen shot (image capture of the screen).
   - [INPUT MARK]: Operate the switch to place an event mark at the current position.
6. Press the **DISP** key to close the menu.

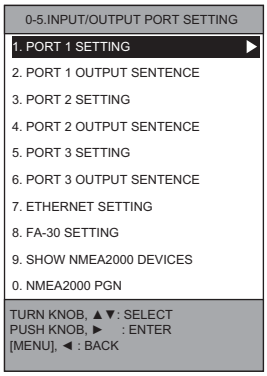
3.6 Input/Output Port Setting

3.6.1 Serial port setting

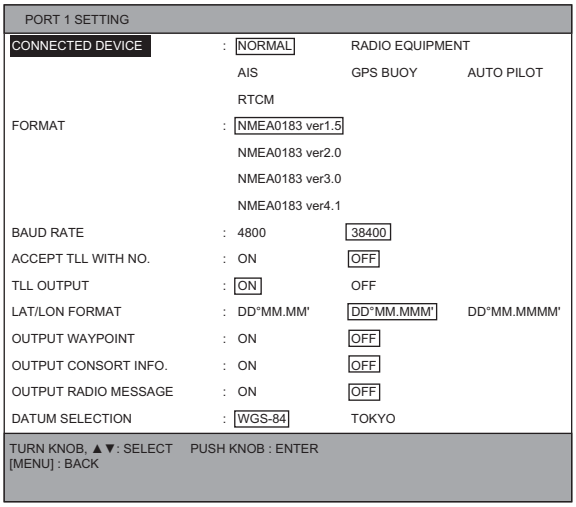
When the NMEA 1 to NMEA 3 ports are used to connect external navigation equipment, set up the ports according to the equipment connected.

Connected equipment setup

1. Press the **MENU** key to open the main menu.
2. Select [0. SYSTEM SETTING].
3. Select [5. INPUT/OUTPUT PORT SETTING].



4. Select [1. PORT 1 SETTING].

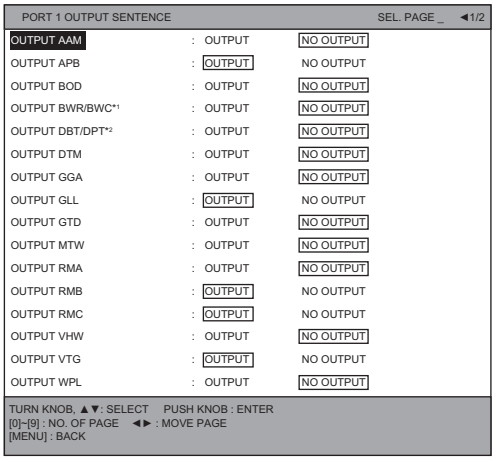


5. Select [CONNECTED DEVICE].
6. Select the equipment that is connected to the NMEA 1 port.
   The input/output sentences change according to the setting item here (see section 2.3.1).
   - [NORMAL]: Select this setting option for equipment other than the following equipment.
   - [RADIO EQUIPMENT]: Not used.
   - [AIS]: Imports the AIS information from the AIS.
   - [GPS BUOY]: Imports the GPS buoy information.
   - [AUTO PILOT]: Imports the autopilot information.
   - [RTCM]: Outputs the DGPS information with the RTCM SC-104 format.
7. Select [FORMAT].

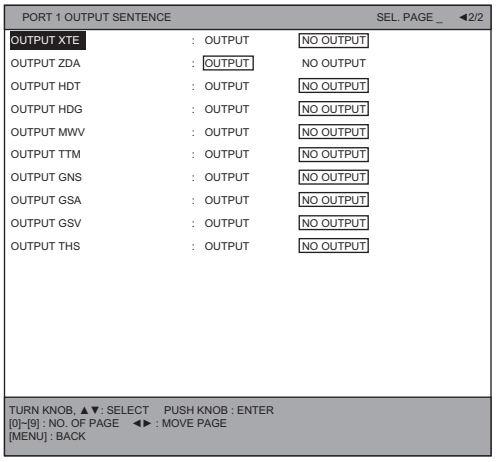
8. Select the NMEA0183 version for output. Select the appropriate version according to the connected equipment.
9. Select [BAUD RATE].
10. Select the output baud rate.
11. Select [ACCEPT TLL WITH NO.].
12. Select [ON] to register the TLL mark or the waypoint when receiving the TLL data with the target number from the connected radar. If not, select [OFF].
13. Select [TLL OUTPUT].
14. Select [ON] to output the latitude and longitude of the mark when a mark is entered. If not, select [OFF].
15. Select [LAT/LON FORMAT].
16. Select the output format for the position data (DD°MM.MM', DD°MM.MMM', DD°MM.MMMM').
17. Select [OUTPUT WAYPOINT].
18. Select [ON] to output the WPL and RTE sentence when a route is set as a destination. If not, select [OFF].
    Note: When [RTE SENTENCE] is set to [DNV] on the [NAVIGATOR SETUP] menu, the RTE sentence is not output for routes that have only one waypoint.
19. Select [DATUM SELECTION].
20. Select the geodetic datum used on the external navigator.
21. Press the **MENU** key to go back to the [INPUT/OUTPUT PORT SETTING] menu.
22. Setup [3. PORT 2 SETTING] and [5. PORT 3 SETTING] in a similar manner.
23. Press the **DISP** key to close the menu.

Output sentence setting

1. Press the **MENU** key to open the main menu.
2. Select [0. SYSTEM SETTING].
3. Select [5. INPUT/OUTPUT PORT SETTING].
4. Select [2. PORT 1 OUTPUT SENTENCE].
   The [PORT 1 OUTPUT SENTENCE] menu has two pages. Press ◀ or ▶ to move the page. The output sentences that can be turned on or off appear on this menu.



[PORT 1 OUTPUT SENTENCE] menu, page 1



[PORT 1 OUTPUT SENTENCE] menu, page 2

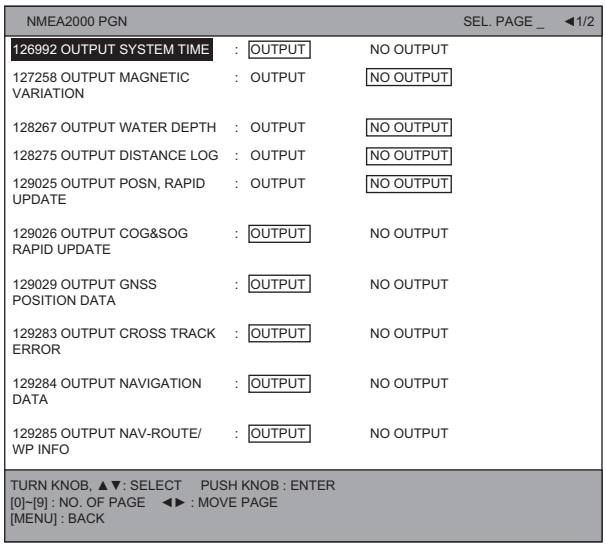
*1: BWR: Output for rumbline navigation, BWC: Output for great circle navigation.
*2: DBT: Output for NMEA0183 ver.1.5, DPT: Output for NMEA ver.2.0, 3.0 and 4.1.

5. Select the sentence to be set.
6. Select [OUTPUT] or [NO OUTPUT].
7. Repeat step 5 and step 6 to turn other sentences on or off.
8. Press the **MENU** key to go back to the [INPUT/OUTPUT PORT SETTING] menu.
9. Setup [4. PORT 2 OUTPUT SENTENCE] and [6. PORT 3 OUTPUT SENTENCE] in a similar manner.
10. Press the **DISP** key to close the menu.

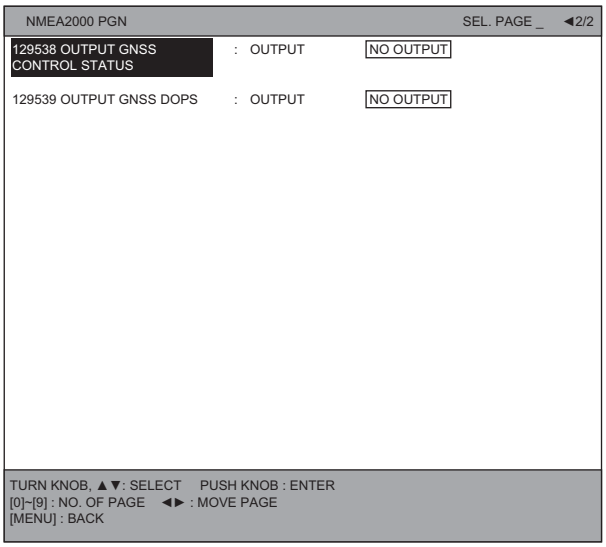
3.6.2 NMEA2000 port setting

When this equipment is connected to the NMEA2000 network, select the PGNs to be output from the NMEA2000 port.

1. Press the **MENU** key to open the main menu.
2. Select [0. SYSTEM SETTING].
3. Select [5. INPUT/OUTPUT PORT SETTING].
4. Select [0. NMEA2000 PGN].
   The [NMEA2000 PGN] menu has two pages. Press ◀ or ▶ to move the page. The output PGNs that can be turned on or off appear on this menu.



[NMEA2000 PGN] menu, page 1



[NMEA2000 PGN] menu, page 2

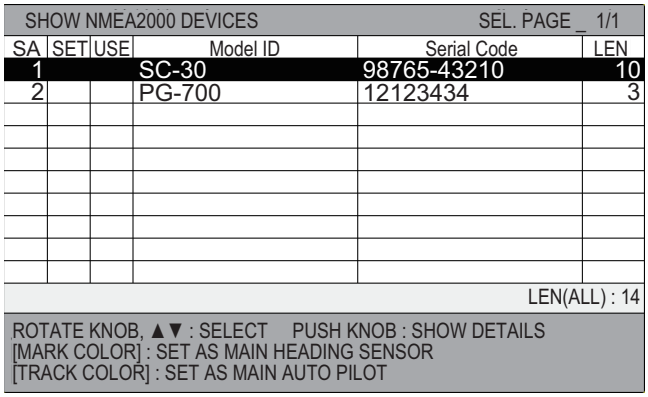
5. Select the PGN to be set.
6. Select [OUTPUT] or [NO OUTPUT].
7. Repeat step 5 and step 6 to turn other sentences on or off.
8. Press the **DISP** key to close the menu.

3.6.3 NMEA2000 equipment list

You can check the information of equipment on the NMEA2000 network. Do as follows to show the information:

1. Press the **MENU** key to open the main menu.
2. Select [0. SYSTEM SETTING].
3. Select [5. INPUT/OUTPUT PORT SETTING].

4. Select [9. SHOW NMEA2000 DEVICES].



5. Select the device, then do the either one of the following operations:
   - Push the **ENTER** knob: Shows detailed equipment information.
   - Press the **MARK COLOR** key: Set as the main heading sensor.
   - Press the **TRACK COLOR** key: Set as the main autopilot.

   The following icons appear on the [SET] and [USE] column. The icons and their meaning are listed in the following table.

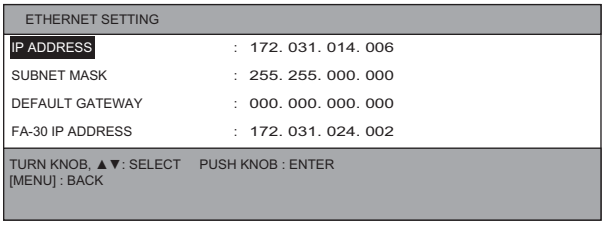
Icon	Meaning	Color
	**SET**: Main heading sensor	Same as character color
	USE: Heading sensor that is currently used.	Orange
	**SET**: Main autopilot	Same as character color
	USE: Autopilot that is currently used.	Orange
	**SET**: Main heading sensor and autopilot	Same as character color
	USE: Heading sensor and autopilot that is currently used.	Orange

6. Press the **DISP** key to close the menu.

3.6.4 Ethernet setting

When the HUB-101 is connected to the NETWORK port, do the Ethernet network setting as follows:

1. Press the **MENU** key to open the main menu.
2. Select [0. SYSTEM SETTING].
3. Select [5. INPUT/OUTPUT PORT SETTING].
4. Select [7. ETHERNET SETTING].



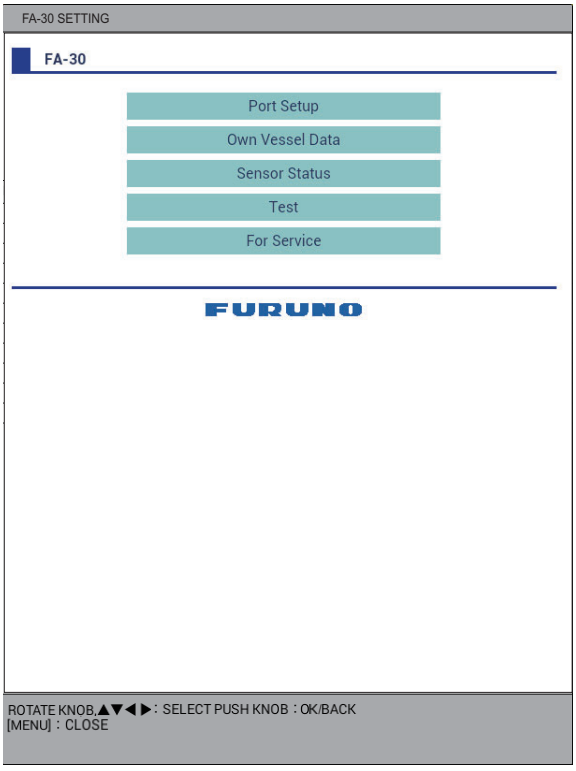
5. Select [IP ADDRESS].
6. Press the appropriate numeric key to enter the IP address for your equipment.
   Note: Be sure the IP address is not the same as other equipment on the network.
7. Select [SUBNET MASK].
8. Press the appropriate numeric key to enter the subnet mask for your equipment.

9. Select [DEFAULT GATEWAY].
10. Press the appropriate numeric key to enter the default gateway for your equipment.
11. When the FA-30 is connected through the HUB-101, select [FA-30 IP Address] and press the numeric key to enter the IP address of the FA-30.
12. Press the **DISP** key to close the menu.

3.6.5 FA-30 setting

When a FURUNO FA-30 is connected to this equipment, you can set up the FA-30 from this equipment.

1. Press the **MENU** key to open the main menu.
2. Select [0. SYSTEM SETTING].
3. Select [5. INPUT/OUTPUT PORT SETTING].
4. Select [8. FA-30 SETTING].



5. Set each item referring to the operator's manual of the FA-30.
6. Press the **DISP** key to close the menu.

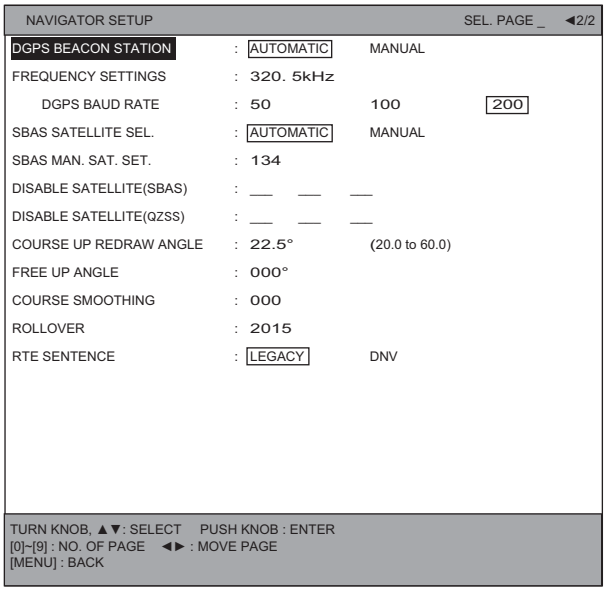
3.7 DGPS Setting

When the beacon receiver is installed in the display unit, do the DGPS setting as follows:

3.7.1 DGPS station selection

DGPS reference station can be searched for automatically (default) or manually. When the auto search takes more than five minutes to fix the DGPS position, use the manual search. To use the manual search, do as follows:

1. Press the **MENU** key to open the main menu.
2. Select [0. SYSTEM SETTING].
3. Select [2. NAVIGATOR SETUP].
   The [NAVIGATOR SETUP] menu has two pages. Press the **2** key (or ◀, ▶) to open page 2.

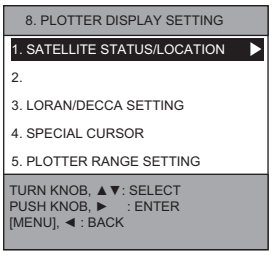


4. Select [DGPS BEACON STATION].
5. Select [MANUAL].
6. Select [FREQUENCY SETTINGS].
7. Press the numeric key to enter the frequency of the DGPS reference station which is the nearest to own ship.
8. Select [DGPS BAUD RATE].
9. Select the transmission rate of the DGPS reference station (50, 100 or 200 bps).
10. Press the **DISP** key to close the menu.

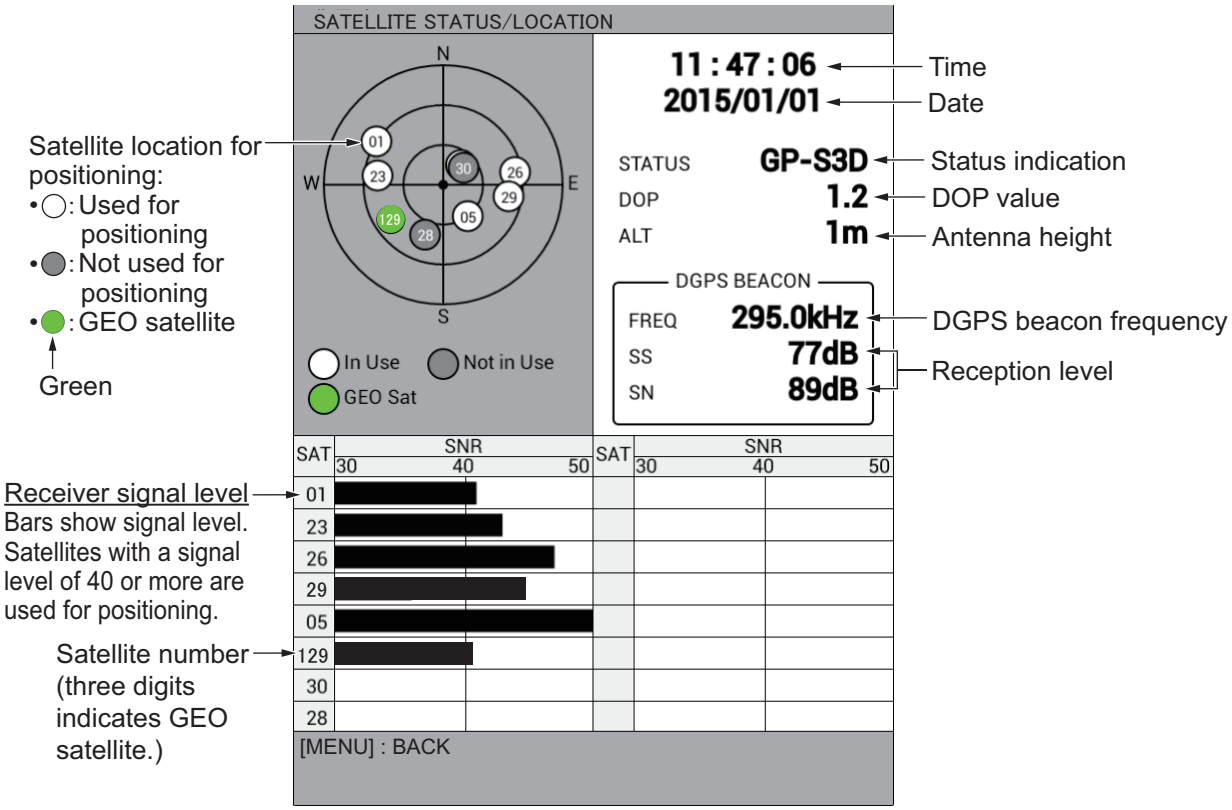
3.7.2 DGPS operation checking

You can check the DGPS operation as follows:

1. Press the **MENU** key to open the main menu.
2. Select [8. PLOTTER DISPLAY SETTING].



3. Select [1. SATELLITE STATUS/LOCATION].
   The [SATELLITE STATUS/LOCATION] window appears.



- SS (Signal Strength): Shows the electric field intensity of the beacon signal. The higher the value the stronger the signal. The value is normally 60 dB or more. Note that noise may be included in the receive frequency band regardless of higher value.
- SN (Signal Noise): Shows the signal-to-noise ratio of the received beacon signal. The higher the value the better the signal. The value is normally 21 dB or more.

4. Press the **DISP** key to close the [SATELLITE STATUS/LOCATION] window.

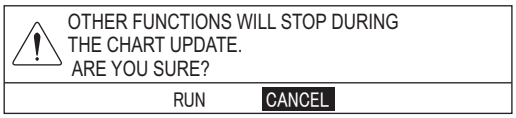
3.8 How to Control Charts

This section shows you how to install or update charts.

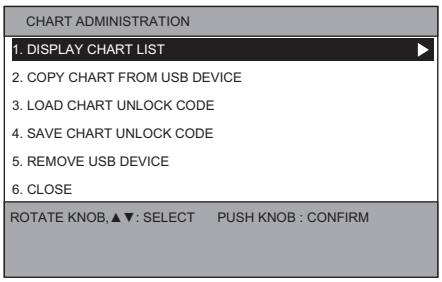
3.8.1 How to install charts

Note: Save the chart data to a USB flash memory first. You do not need to create a folder.

1. Connect the USB flash memory with chart data to the USB drive.
2. Press the **MENU** key to open the main menu.
3. Select [0. SYSTEM SETTING].
4. Select [0. MAINTENANCE].
5. Select [3. UPDATE CHART]. The following message appears.



6. Select [RUN]. The message "PROCESSING. PLEASE WAIT." appears, then the [CHART ADMINISTRATION] menu appears.



7. Select [2. COPY CHART FROM USB DEVICE] to display the list for data in the USB flash memory.
8. Select the chart data to copy.
9. Select [SELECT CHART TO COPY]. The confirmation message appears.
10. Select [RUN] to copy the chart data.
11. Push the **ENTER** knob.
12. Do one of the following methods to unlock the chart data.

    <u>How to unlock the chart data automatically</u>

    Note: Save the unlock code to the USB flash memory first. The file extension is “uc”.

    1) Select [3. LOAD CHART UNLOCK CODE] in the [CHART ADMINISTRATION] menu to display the list for data in the USB flash memory.
    2) Select the file for the unlock code. The confirmation message appears.
    3) Select [RUN]. The message "UNLOCK CODE VERIFIED." appears.
    4) Push the **ENTER** knob.

    <u>How to unlock the chart data manually</u>

    1) Select [1. DISPLAY CHART LIST] in the [CHART ADMINISTRATION] menu to display the chart list.
    2) Select the locked chart data (displayed with red letters), then press the **CURSOR ON/OFF** key to display the character entry window.

3) Set the unlock code as described below.
Rotate the **ENTER** knob to select a character, then push the knob to confirm selection. Repeat this step to select all other characters. Select [ENTER] then push the knob.
The message "UNLOCK CODE VERIFIED." appears.

4) Push the **ENTER** knob.

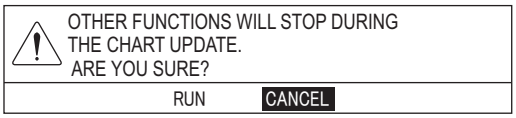
13. When unlocking the chart data automatically, select [5. REMOVE USB DEVICE]. The message "USB DEVICE CAN BE SAFELY REMOVED." appears. Push the **ENTER** knob then remove the USB device.
14. Select [6. CLOSE]. The confirmation message appears.
15. Select [RUN]. The system restarts.

3.8.2 How to update charts

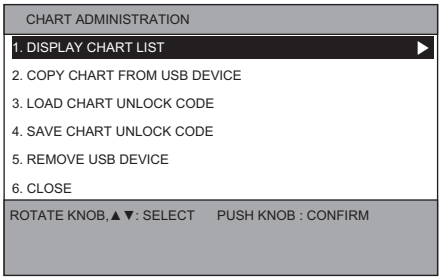
Note 1: Save the chart data to a USB flash memory first. You do not need to create a folder.

Note 2: Before updating charts, delete the old chart data. If needed, take backups for an unlock code.

1. Connect the USB flash memory with chart data on it in the USB drive.
2. Press the **MENU** key to open the main menu.
3. Select [0. SYSTEM SETTING].
4. Select [0. MAINTENANCE].
5. Select [3. UPDATE CHART]. The following message appears.



6. Select [RUN]. The message "PROCESSING. PLEASE WAIT." appears, then the [CHART ADMINISTRATION] menu appears.



When taking backups for an unlock code (saving an unlock code to a USB flush memory), go to step 7. Otherwise, go to step 10.

7. Select [4. SAVE CHART UNLOCK CODE]. The confirmation message appears.
8. Select [RUN]. The message "RECORDING FINISHED" appears.
9. Push the **ENTER** knob.
10. Select [1. DISPLAY CHART LIST] to display the chart list.
11. Select the chart data to delete then press the **CANCEL** key.
12. Select [RUN]. The message "CHART DELETION COMPLETE" appears.
13. Push the **ENTER** knob.
14. Follow steps 7 to 15 in paragraph 3.8.1.

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APPENDIX 1 JIS CABLE GUIDE

Cables listed in the manual are usually shown as Japanese Industrial Standard (JIS). Use the following guide to locate an equivalent cable locally.

JIS cable names may have up to 6 alphabetical characters, followed by a dash and a numerical value (example: DPYC-2.5).
For core types D and T, the numerical designation indicates the *cross-sectional Area (mm^2)* of the core wire(s) in the cable.
For core types M and TT, the numerical designation indicates the *number of core wires* in the cable.

1. Core Type

D: Double core power line
T: Triple core power line
M: Multi core
TT: Twisted pair communications (1Q=quad cable)

2. Insulation Type

P: Ethylene Propylene Rubber

3. Sheath Type

Y: PVC (Vinyl)

4. Armor Type

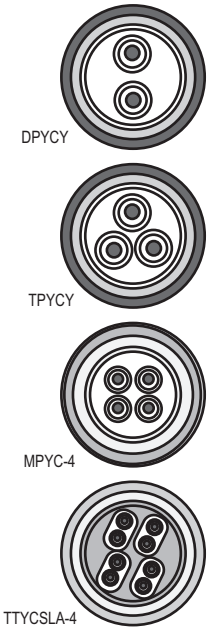
C: Steel

5. Sheath Type

Y: Anticorrosive vinyl sheath

6. Shielding Type

S: All cores in one sheath
-S: Individually sheathed cores
SLA: All cores in one shield, plastic tape w/aluminum tape
-SLA: Individually shielded cores, plastic tape w/aluminum tape



EX: TTYCYSLA - 4
(1 2 3 4 5 6)
Designation type — # of twisted pairs

MPYC - 4
(1 2 3 4)
Designation type — # of cores

The following reference table lists gives the measurements of JIS cables commonly used with Furuno products:

Type	Core Area	Core Diameter	Cable Diameter	Type	Core Area	Core Diameter	Cable Diameter
DPYC-1.5	1.5mm²	1.56mm	11.7mm	TTYCS-1	0.75mm²	1.11mm	10.1mm
DPYC-2.5	2.5mm²	2.01mm	12.8mm	TTYCS-1T	0.75mm²	1.11mm	10.6mm
DPYC-4	4.0mm²	2.55mm	13.9mm	TTYCS-1Q	0.75mm²	1.11mm	11.3mm
DPYC-6	6.0mm²	3.12mm	15.2mm	TTYCS-4	0.75mm²	1.11mm	16.3mm
DPYC-10	10.0mm²	4.05mm	17.1mm	TTYCSLA-1	0.75mm²	1.11mm	9.4mm
DPYCY-1.5	1.5mm²	1.56mm	13.7mm	TTYCSLA-1T	0.75mm²	1.11mm	10.1mm
DPYCY-2.5	2.5mm²	2.01mm	14.8mm	TTYCSLA-1Q	0.75mm²	1.11mm	10.8mm
DPYCY-4	4.0mm²	2.55mm	15.9mm	TTYCSLA-4	0.75mm²	1.11mm	15.7mm
MPYC-2	1.0mm²	1.29mm	10.0mm	TTYCY-1	0.75mm²	1.11mm	11.0mm
MPYC-4	1.0mm²	1.29mm	11.2mm	TTYCY-1T	0.75mm²	1.11mm	11.7mm
MPYCSLA-4	1.0mm²	1.29mm	11.4mm	TTYCY-1Q	0.75mm²	1.11mm	12.6mm
MPYC-7	1.0mm²	1.29mm	13.2mm	TTYCY-4	0.75mm²	1.11mm	17.7mm
MPYC-12	1.0mm²	1.29mm	16.8mm	TTYCY-4S	0.75mm²	1.11mm	21.1mm
TPYC-1.5	1.5mm²	1.56mm	12.5mm	TTYCY-4SLA	0.75mm²	1.11mm	19.5mm
TPYC-2.5	2.5mm²	2.01mm	13.5mm	TTYCYS-1	0.75mm²	1.11mm	12.1mm
TPYC-4	4.0mm²	2.55mm	14.7mm	TTYCYS-4	0.75mm²	1.11mm	18.5mm
TPYCY-1.5	1.5mm²	1.56mm	14.5mm	TTYCYSLA-1	0.75mm²	1.11mm	11.2mm
TPYCY-2.5	2.5mm²	2.01mm	15.5mm	TTYCYSLA-4	0.75mm²	1.11mm	17.9mm
TPYCY-4	4.0mm²	2.55mm	16.9mm				

APPENDIX 2 INSTALLATION FOR TRANSDUCER (THRU-HULL MOUNT)

This appendix provides a copy of the installation instructions for AIRMAR transducer.

525T-LTD/12 and 525T-LTD/20 corresponds to B60, SS60-SLTD/12 and SS60-SLTD/20 to SS60.

Thru-Hull

Tilted Element™ Transducer

Tilt Angles: 0°, 12°, 20°

Models: B60, B75H/M/L, B150M, B619
P19, SS60, SS150M, SS565, SS619

U.S. Patent No. 7,369,458. UK Patent No. 2 414 077. U.S. Patent Pending
17-364-01 rev. 07 01/12/13

Follow the precautions below for optimal product performance and to reduce the risk of property damage, personal injury, and/or death.

WARNING: Always wear safety goggles and a dust mask when installing.

WARNING: Immediately check for leaks when the boat is placed in the water. Do not leave the boat unchecked for more than three hours. Even a small leak may allow considerable water to accumulate.

WARNING: **B150M, B619, SS150M, SS619** - Do not use the spacer if there is insufficient space to tighten the nut, or it is within 11 mm (1/2") of the top of the housing.

WARNING: **Stainless steel housing in a metal hull** - Be sure the washer contacts the hull. Do not tighten the hull nut with the washer against the isolation bushing, as the housing will not be firmly installed. If necessary, sand the isolation bushing until the washer rests against the hull.

CAUTION: **CHIRP transducer** - Do not install in the engine compartment or other hot place. The transducer may fail if it overheats.

CAUTION: **CHIRP transducer** - Always operate the transducer in water. Operating in air will allow the transducer to overheat resulting in failure.

CAUTION: The arrow on the top of the transducer must point toward the keel or centerline of the boat. This will align the angle of the element inside the transducer with the deadrise angle of your hull.

CAUTION: Never pull, carry, or hold the transducer by its cable; this may sever internal connections.

CAUTION: **Plastic housing** - Never use a fairing with a plastic housing; the protruding sensor would be vulnerable to damage from impact.

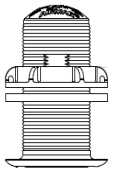
CAUTION: **Metal housing** - Never install a metal housing on a vessel with a positive ground system.

CAUTION: **Stainless steel housing in a metal hull** - The stainless steel housing must be isolated from a metal hull to prevent electrolytic corrosion. Use the isolation bushing supplied.

CAUTION: Never use solvents. Cleaners, fuel, sealant, paint and other products may contain solvents that can damage plastic parts, especially the transducer's face.

IMPORTANT: Read the instructions completely before proceeding with the installation. These instructions supersede any other instructions in your instrument manual if they differ.

Record the information found on the cable tag for future reference.
Part No._____ Date_____ Frequency_____kHz



P19

Applications

- **Plastic** housing recommended for fiberglass or metal hulls only. Never install a plastic housing in a wood hull since swelling of the wood can fracture the plastic.
- **Bronze** housing recommended for fiberglass or wood hulls. Never install a bronze housing in a metal hull, because electrolytic corrosion will occur.
- **Stainless steel** housing compatible with all hull materials. Recommended for metal hulls to prevent electrolytic corrosion provided the stainless steel housing is isolated from the metal hull.

Match Tilt Angle of Transducer to Deadrise

Be sure the tilt angle of your transducer model matches the deadrise angle of your boat at the mounting location. The tilt angle is printed on the top of the transducer (see Figure 1). To measure the deadrise angle of your hull at the selected mounting location, use an angle finder or a digital level (see Figure 2).

- **0**˚ models - For hull deadrise angles from 0˚ to 7˚
- **12**˚ models - For hull deadrise angles from 8˚ to 15˚
  B75H-12˚ - For hull deadrise angles from 6˚ to 15˚
  B75M-12˚ - For hull deadrise angles from 6˚ to 15˚
  B75L-12˚ - For hull deadrise angles from 0˚ to 24˚
- **20**˚ models - For hull deadrise angles from 16˚ to 24˚

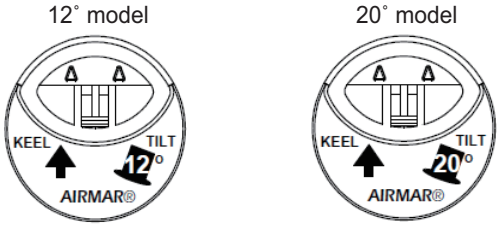


Figure 1. Top of transducer (B619 shown)

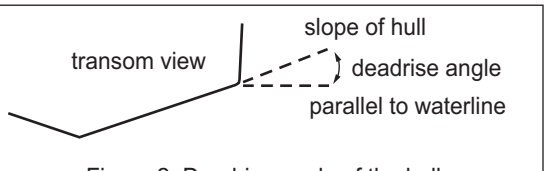


Figure 2. Deadrise angle of the hull

Identify Your Model

The model name is printed on the cable tag.

Model (Housing)	Hull Material	Outside Hull Hole Saw Size	Cored Fiberglass Hull Hull Interior Hole Saw Size
P19	Fiberglass metal	51 mm or 2"	60 mm or 2-3/8"
B150M B619 SS150M SS619	Fiberglass wood	51 mm or 2"	60 mm or 2-3/8"
SS150M SS619	Metal	57 mm or 2-1/4"	NA
B60 SS60 SS56	Fiberglass wood	60 mm or 2-3/8"	80 mm or 3-1/8"
B75H/M/L	Fiberglass wood	70 mm or 2-3/4"	80 mm or 3-1/8"
SS60 SS565	Metal	70 mm or 2-3/4"	NA

Tools & Materials

Safety goggles
Dust mask
Angle finder
Electric drill with 10 mm (3/8") or larger chuck capacity
Drill bit: 3 mm or 1/8"
Hole saw (see table above)
Countersink tool (installing SS565)
Sandpaper
Mild household detergent or weak solvent (such as alcohol)
File (installation in a metal hull)
Marine sealant (suitable for below waterline)
Slip-joint pliers (installing a metal housing)
Grommet(s) (some installations)
Cable ties
Water-based anti-fouling paint (**mandatory in salt water**)
Installation in a cored fiberglass hull (see page AP-7):
Hole saw for hull interior (see table above)
Fiberglass cloth and resin
or Cylinder, wax, tape, and casting epoxy

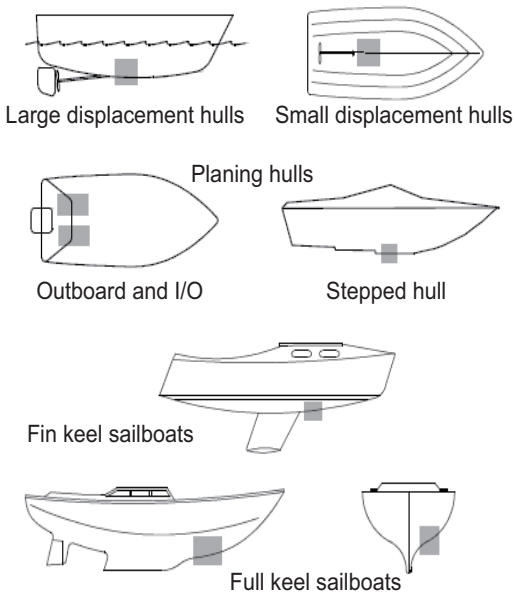


Figure 3. ■ Best location for transducer

Mounting Location

CAUTION: Do not mount near water intake or discharge openings or behind strakes, fittings, or other hull irregularities.
CAUTION: Do not mount in line with trailer rollers or bunks that may damage the transducer's face.

- The water flowing under the hull must be smooth with a minimum of bubbles and turbulence (especially at high speeds).
- The transducer must be continuously immersed in water.
- The transducer beam must be unobstructed by the keel or propeller shaft(s).
- Choose a location away from interference caused by power and radiation sources such as: the propeller(s) and shaft(s), other machinery, other echosounders, and other cables. The lower the noise level, the higher the echosounder gain setting that can be used.
- **CHIRP transducer** - Mount in a cool well-ventilated area away from the engine to avoid overheating.

Hull Types (see Figure 3)

- **Displacement hull powerboats** - Locate amidships near the centerline. The starboard side of the hull where the propeller blades are moving downward is preferred.
- **Planing hull powerboats** - Mount well aft, on or near the centerline, and well inboard of the first set of lifting strakes to ensure that the transducer will be in contact with the water at high speeds. The starboard side of the hull where the propeller blades are moving downward is preferred.
  Outboard and I/O - Mount just forward of the engine(s).
  Inboard - Mount well ahead of the propeller(s) and shaft(s).
  Stepped hull - Mount just ahead of the first step.
  Boat capable of speeds above 25 kn (29 MPH) - Review the installation location and operating results of similar boats before proceeding.
- **Fin keel sailboats** - Mount on or near the centerline and forward of the fin keel 300 - 600 mm (1 - 2').
- **Full keel sailboats** - Locate amidships and away from the keel.

Installation

Hole Drilling

Cored fiberglass hull *- Follow separate instructions on page AP-7.*

1. Drill a 3 mm or 1/8" pilot hole from inside the hull. If there is a rib, strut, or other hull irregularity near the selected mounting location, drill from the outside.
2. Using the appropriate size outside hull hole saw, cut a hole from outside of the hull perpendicular to the hull surface (see table above).
   SS565 - Use a countersink tool to create a "seat" in the hull.
3. Sand and clean the area around the hole, inside and outside, to ensure that the sealant will adhere properly to the hull. If there is any petroleum residue inside the hull, remove it with either mild household detergent or a weak solvent (alcohol) before sanding.
   Metal hull - Remove all burrs with a file and sandpaper.

Bedding

CAUTION: Be sure the surfaces to be bedded are clean and dry.
Apply a 2 mm (1/16") thick layer of marine sealant around the flange of the housing that contacts the hull and up the sidewall of the housing (see Figure 4 or 5). The sealant must extend 6 mm (1/4") higher than the combined thickness of the hull, washer(s), hull nut, and any spacer. This will ensure there is marine sealant in the threads to seal the hull and to hold the hull nut securely in place.

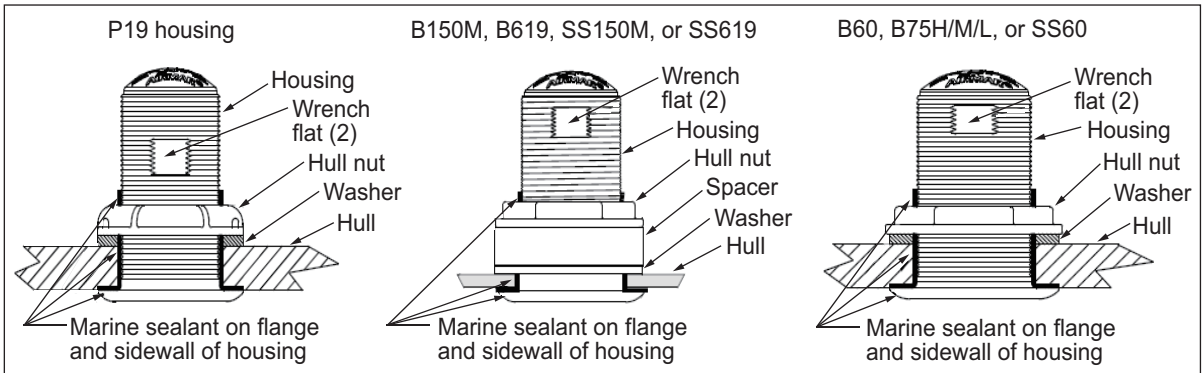


Figure 4. Bedding and installing in solid fiberglass or wood hull

Stainless steel housing in a metal hull - To prevent electrolytic corrosion, the stainless steel housing must be isolated from the metal hull. Slide the isolation bushing onto the housing (see Figure 5). Apply additional marine sealant to the surfaces of the bushing that will contact the hull, filling any cavities in and around the isolation bushing.

Installing

1. From outside the hull, thread the cable through the mounting hole. Push the housing into the mounting hole using a twisting motion to squeeze out excess sealant.
   12° and 20° models - From inside the hull, point the arrow on the top of the transducer (and the cable exit) toward the KEEL or centerline of the boat (see Figure 1). This will align the angle of the element inside the transducer with the deadrise angle of your hull.
2. Slide the washer onto the housing (see Figure 4 or 5).
   B150M, B619, SS150M, SS619 - Also slide the spacer onto the housing and rest it against the washer. Do not use the spacer if there is insufficient space to tighten the nut or it is within 11 mm (1/2") of the top of the housing.
   Stainless steel housing in a metal hull - Be sure the washer contacts the hull. Do not tighten the hull nut with the washer against the isolation bushing, as the housing will not be firmly installed. If necessary, sand the isolation bushing until the washer rests against the hull.
3. Screw the hull nut in place.
   Plastic housing - Do not clamp tightly on the wrench flats to avoid possibly fracturing the housing.
   Plastic hull nut - Hand-tighten only. Do not over tighten.
   Metal hull nut - Tighten with slip-joint pliers.
   Metal hull - Use the spacer if there are not enough threads to tighten the hull nut against the hull.
   Cored Fiberglass Hull - Do not over tighten, crushing the hull.
   Wood hull - Allow the wood to swell before tightening the hull nut.
4. Remove any excess marine sealant on the outside of the hull to ensure smooth water flow under the transducer.

Cable Routing & Connecting

CAUTION: If your transducer came with a connector, do not remove it to ease cable routing. If the cable must be cut and spliced, use Airmar's splash-proof Junction Box No. 33-035 and follow the instructions provided. Removing the waterproof connector or cutting the cable, except when using a water-tight junction box, will void the sensor warranty.

1. Route the cable to the instrument, being careful not to tear the cable jacket when passing it through the bulkhead(s) and other parts of the boat. Use grommets to prevent chaffing. To reduce electrical interference, separate the transducer cable from other electrical wiring and the engine. Coil any excess cable and secure it in place using cable ties to prevent damage.
2. Refer to the echosounder owner's manual to connect the transducer to the instrument.

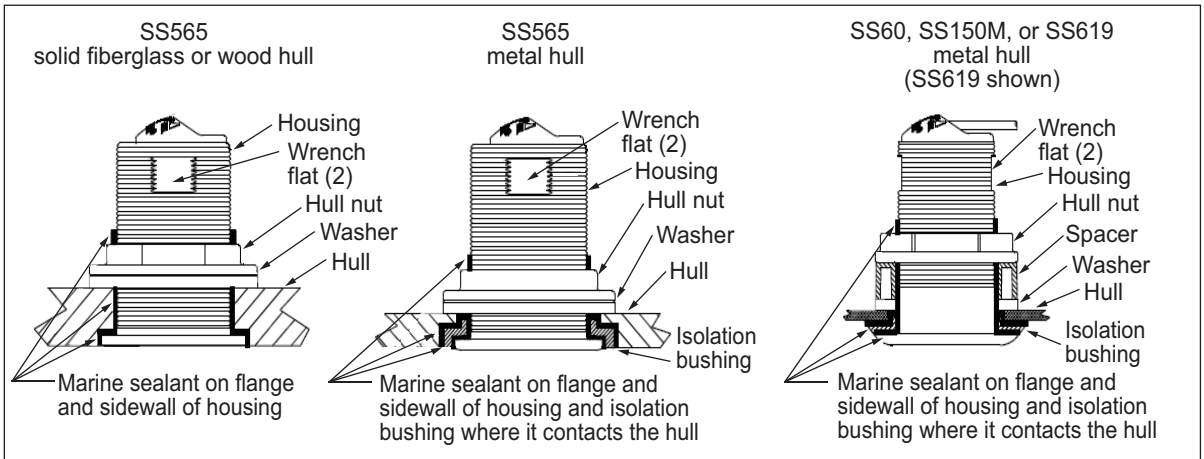


Figure 5. Bedding and installing

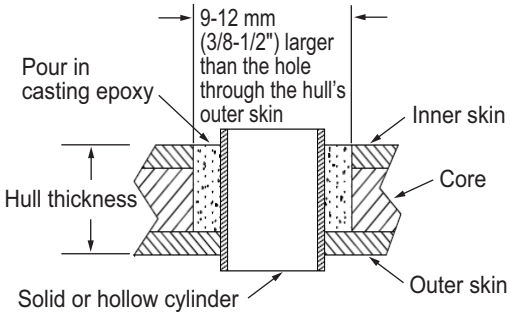


Figure 6. Preparing a cored fiberglass hull

Checking for Leaks

When the boat is placed in the water, **immediately** check around the transducer for leaks. Note that very small leaks may not be readily observed. Do not leave the boat in the water for more than 3 hours before checking it again. If there is a small leak, there may be considerable bilge water accumulation after 24 hours. If a leak is observed, repeat "Bedding" and "Installing" **immediately** (see pages AP-5 to AP-6).

Installation in a Cored Fiberglass Hull

The core (wood or foam) must be cut and sealed carefully. The core must be protected from water seepage, and the hull must be reinforced to prevent it from crushing under the hull nut allowing the housing to become loose.

CAUTION: Completely seal the hull to prevent water seepage into the core.

1. Drill a 3 mm or 1/8" pilot hole from inside the hull (see Figure 6). If there is a rib, strut, or other hull irregularity near the selected mounting location, drill from the outside. (If the hole is drilled in the wrong location, drill a second hole in a better location. Apply masking tape to the outside of the hull over the incorrect hole and fill it with epoxy.)
2. Using the appropriate size outside hull hole saw, cut a hole from outside the hull through the outer skin only (see table on page AP-5).
3. From inside the hull, using the appropriate size hull interior hole saw, cut through the inner skin and most of the core. The core material can be very soft. Apply only light pressure to the hole saw after cutting through the inner skin to avoid accidentally cutting the outer skin.
4. Remove the plug of core material, so the inside of the outer skin and the inner core of the hull is fully exposed. Sand and clean the inner skin, core, and the outer skin around the hole.
5. If you are skilled with fiberglass, saturate a layer of fiberglass cloth with a suitable resin and lay it inside the hole to seal and strengthen the core. Add layers until the hole is the correct diameter.
   Alternatively, a hollow or solid cylinder of the correct diameter can be coated with wax and taped in place. Fill the gap between the cylinder and hull with casting epoxy. After the epoxy has set, remove the cylinder.
6. Sand and clean the area around the hole, inside and outside, to ensure that the marine sealant will adhere properly to the hull. If there is any petroleum residue inside the hull, remove it with either mild household detergent or a weak solvent (alcohol) before sanding.
7. Proceed with "Bedding" on page AP-5.

Maintenance & Replacement

Anti-fouling Paint

Surfaces exposed to salt water must be coated with anti-fouling paint. Use water-based anti-fouling paint only. Never use ketone-based paint, since ketones can attack many plastics possibly damaging the transducer. Reapply anti-fouling paint every 6 months or at the beginning of each boating season.

Cleaning

Aquatic growth can accumulate rapidly on the transducer's face, reducing its performance within weeks. Clean the surface with a Scotch-Brite® scour pad and mild household detergent, being careful to avoid making scratches. If the fouling is severe, lightly wet sand it with fine grade wet/dry paper.

Replacement Transducer & Parts

The information needed to order a replacement transducer is printed on the cable tag. Do not remove this tag. When ordering, specify the part number, date, and frequency in kHz. For convenient reference, record this information on the top of page AP-4.

Lost, broken, and worn parts should be replaced immediately.

Model	Hull Nut	Washer	Spacer	Isolation Bushing
P19	04-004	09-452	-	-
B60	02-133-01	09-813-01	-	-
B75H/M/L	02-143-01	09-1012-01	-	-
B150M B619	02-030	09-452	04-646-01	-
SS60	02-563-01	09-813-01	-	04-660-01
SS150M SS619	02-520-02	09-452	04-646-01	04-186-1
SS565	02-563-01	09-813-01	-	04-589-01

Obtain parts from your instrument manufacturer or marine dealer.

Gemeco (USA)	Tel:803-693-0777 Fax:803-693-0477 email:sales@gemeco.com
Airmar EMEA (Europe, Middle East, Africa)	Tel:+33.(0)2.23.52.06.48 Fax:+33.(0)2.23.52.06.49 email:sales@airmar-emea.com

AIRMAR® TECHNOLOGY CORPORATION
35 Meadowbrook Drive, Milford, New Hampshire 03055-4613, USA
www.airmar.com

APPENDIX 3 INSTALLATION OF TEMPERATURE SENSORS

The installation instructions in this chapter are copied from the manufacturer's (AIRMAR Technology Corporation) installation guide, which is included with your sensor.
The model number mentioned within the documentation should be read as follows:
T42 => T-04MSB

OWNER'S GUIDE & INSTALLATION INSTRUCTIONS

Thru-Hull, Analog

High-Precision Temperature Sensor

Model **T42**

05/28/14

17-437-02 rev. 01

Follow the precautions below for optimal product performance and to reduce the risk of property damage, personal injury, and/or death.

WARNING: Always wear safety goggles and a dust mask when installing.

WARNING: Immediately check for leaks when the boat is placed in the water. Do not leave the boat unchecked for more than three hours. Even a small leak can allow considerable water to accumulate.

CAUTION: Never install a bronze sensor in a metal hull because electrolytic corrosion will occur.

CAUTION: Never install a metal sensor on a vessel with a positive ground system.

CAUTION: Never pull, carry, or hold the sensor by its cable; this may sever internal connections.

CAUTION: Never use solvents. Cleaner, fuel, sealant, paint, and other products may contain solvents that can damage plastic parts, especially the sensor's face.

IMPORTANT: Read the instructions completely before proceeding with the installation. These instructions supersede any other instructions in your instrument manual if they differ.

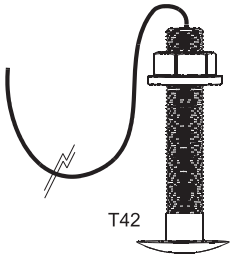
Applications

- Bronze sensor recommended for fiberglass or wood hull only.
- The hull must be a minimum of 8mm (5/16") thick at the mounting location.

Mounting Location

Choose a location where the temperature sensor will be in contact with the water at all times.

Record the information found on the cable tag for future reference.
Part No._____Date_____



Tools & Materials

Safety goggles

Dust mask

Electric drill

Drill bit/hole saw/spade bit:

Pilot hole	3mm *or* 1/8"
T42	22mm *or* 7/8"

Sandpaper

Mild household detergent *or* weak solvent (alcohol)

Marine sealant (suitable for below waterline)

Slip-joint pliers

Installation in a cored fiberglass hull (see page 2)

Hole saw for hull interior: 30mm *or* 1-1/4"

Cylinder, wax, tape, and casting epoxy

Water-based anti-fouling paint (**mandatory in salt water**)

Sensor Installation

Hole Drilling

Cored fiberglass hull — *Follow separate instructions on page 2.*

1. Drill a 3mm or 1/8" pilot hole from inside the hull. If there is a rib, strut, or other hull irregularity near the selected mounting location, drill from the outside.
2. Using the appropriate drill bit, cut a hole perpendicular to the hull from outside the boat.
3. Sand and clean the area around the hole, inside and outside, to ensure that the marine sealant will adhere properly to the hull. If there is any petroleum residue inside the hull, remove it with either mild household detergent or a weak solvent (alcohol) before sanding.

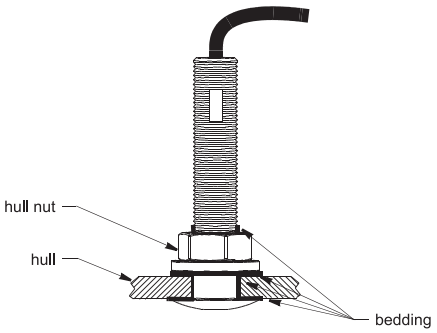


Figure 1. Bedding and installing

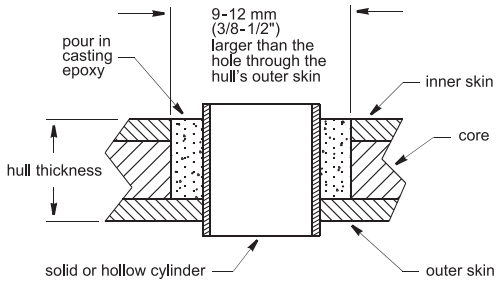


Figure 2. Preparing a cored fiberglass hull

Bedding

CAUTION: Be sure all surfaces to be bedded are clean and dry.

1. Remove the hull nut (see Figure 1).
2. Apply a 2 mm (1/16") thick layer of marine sealant around the flange of the sensor that will contact the hull and up the stem. The sealant must extend 6 mm (1/4") higher than the combined thickness of the hull and the hull nut. This will ensure that there is marine sealant in the threads to seal the hull and hold the hull nut securely in place.
3. Apply a 2 mm (1/16") thick layer of marine sealant to the flange of the hull nut that will contact the hull.

Installing

1. From outside the hull, thread the cable through the mounting hole.
2. Push the sensor into the mounting hole using a twisting motion to squeeze out excess marine sealant (see Figure 1).
3. From inside the hull, slide the hull nut onto the cable. Screw the hull nut in place. Tighten it with slip-joint pliers.
   Cored fiberglass hull—Do not over tighten, crushing the hull.
   Wood hull—Allow for the wood to swell before tightening.
4. Remove any excess marine sealant on the outside of the hull to ensure smooth water flow over the sensor.

Checking for Leaks

When the boat is placed in the water, **immediately** check around the thru-hull sensor for leaks. Note that very small leaks may not be readily observed. Do not to leave the boat in the water for more than 3 hours before checking it again. If there is a small leak, there may be considerable bilge water accumulation after 24 hours. If a leak is observed, repeat “Bedding” and “Installing” **immediately** (see page 2).

Cable Routing & Connecting

CAUTION: If the sensor came with a connector, do not remove it to ease cable routing. If the cable must be cut and spliced, use Airmar’s splash-proof Junction Box No. 33-035 and follow the instructions supplied. Removing the waterproof connector or cutting the cable, except when using a water-tight junction box, will void the sensor warranty.

1. Route the cable to the instrument being careful not to tear the cable jacket when passing it through the bulkhead(s) and other parts of the boat. Use grommet(s) to prevent chafing. To reduce electrical interference, separate the transducer cable from other electrical wiring and the engine. Coil any excess cable and secure it in place with cable ties to prevent damage.
2. Refer to the instrument owner’s manual to connect the transducer to the instrument.

Installation in a Cored Fiberglass Hull

The core (wood or foam) must be cut and sealed carefully. The core must be protected from water seepage, and the hull must be reinforced to prevent it from crushing under the hull nut allowing the sensor to become loose.

CAUTION: Completely seal the hull to prevent water seepage into the core.

1. Drill a 3 mm or 1/8" pilot hole from inside the hull. If there is a rib, strut, or other hull irregularity near the selected mounting location, drill from the outside. (If the hole is drilled in the wrong location, drill a second hole in a better location. Apply masking tape to the outside of the hull over the incorrect hole and fill it with epoxy.)
2. Using the 21 mm or 7/8" drill bit, cut a hole from outside the hull through the *outer* skin only (see Figure 2).
3. From inside the hull using the 30 mm or 1-1/4" hole saw, cut through the *inner* skin and most of the core. The core material can be very soft. Apply only light pressure to the hole saw after cutting through the inner skin to avoid accidentally cutting the *outer* skin.
4. Remove the plug of core material so the *inside* of the outer skin and the inner core of the hull is fully exposed. Clean and sand the inner skin, core, and the outer skin around the hole.
5. Coat a hollow or solid cylinder of the correct diameter with wax and tape it in place. Fill the gap between the cylinder and hull with casting epoxy. After the epoxy has set, remove the cylinder.
6. Sand and clean the area around the hole, inside and outside, to ensure that the sealant will adhere properly to the hull. If there is any petroleum residue inside the hull, remove it with either mild household detergent or a weak solvent (alcohol) before sanding.
7. Proceed with “Bedding” and “Installing” (see page 2).

Maintenance & Replacement

Aquatic growth can accumulate rapidly on the sensor's surface reducing its performance within weeks. Clean the surface with a Scotch-Brite® scour pad and mild household detergent taking care to avoid making scratches. If the fouling is severe, lightly wet sand with fine grade wet/dry paper.

Anti-fouling Paint

Surfaces exposed to salt water must be coated with anti-fouling paint. *Use water-based anti-fouling paint only*. Never use ketone-based paint since ketones can attack many plastics possibly damaging the sensor. Reapply anti-fouling paint every 6 months or at the beginning of each boating season.

Replacement Sensor & Parts

The information needed to order a replacement sensor is printed on the cable tag. Do not remove this tag. When ordering, specify the part number and date. For convenient reference, record this information at the top of page one.

Lost, broken, or worn parts should be replaced immediately.

Hull nut	02-031-3

Obtain parts from your instrument manufacturer or marine dealer.

Gemeco	Tel:	803-693-0777
(USA)	Fax:	803-693-0477
	email:	sales@gemeco.com
Airmar EMEA	Tel:	+33.(0)2.23.52.06.48
(Europe, Middle East, Africa)	Fax:	+33.(0)2.23.52.06.49
	email:	sales@airmar-emea.com

PACKING LIST GP-3700-*-1N/HK , GP-3700F-*-1N/HK

14DA-X-9852-3 1/1

A-2

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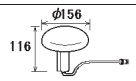
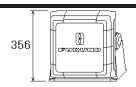
空中線部 ANTENNA ASSEMBLY		GPA-020S 000-026-988-00	1
指示器 DISPLAY UNIT		GP-3700* 000-029-375-00 **	1
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予備品 SPARE PARTS		SP14-03601 001-246-900-00	1
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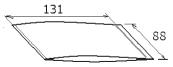
ﾌｨﾙﾀｰｸﾘｰﾅｰ LCD CLEANING CLOTH		19-028-3125-6 100-360-676-10	1
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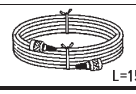
ｹｰﾌﾞﾙ組品 CABLE ASSEMBLY		TNC-PS/PS-3D-L15M-R 001-173-110-10	1
ｹｰﾌﾞﾙ組品MJ CABLE ASSEMBLY		MJ-A3SPF0013-035C(5A) 000-157-939-10	1
工事材料 INSTALLATION MATERIALS		CP14-08201 001-430-020-00	1

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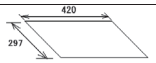
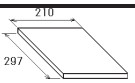
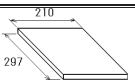
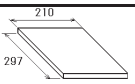
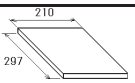
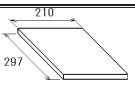
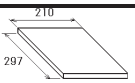
ﾌﾗｯｼｭﾏｳﾝﾄ型紙 FLUSH MOUNTING TEMPLATE		C42-01505-* 000-191-168-1*	1
取扱説明書 OPERATOR'S MANUAL		OM*-44910-* 000-191-154-1* **	1 (*1)
取扱説明書 OPERATOR'S MANUAL		OM*-44920-* 000-191-161-1* **	1 (*2)
操作要領書 OPERATOR'S GUIDE		OS*-44910-* 000-191-156-1* **	1 (*1)
操作要領書 OPERATOR'S GUIDE		OS*-44920-* 000-191-163-1* **	1 (*2)
装備要領書 INSTALLATION MANUAL		IM*-44910-* 000-191-158-1* **	1 (*1)
装備要領書 INSTALLATION MANUAL		IM*-44920-* 000-191-165-1* **	1 (*2)

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)の書類は、GP-3700用です。
2.(*1) MARKED DOCUMENTS ARE FOR GP-3700.

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

3.(*2)の書類は、GP-3700F用です。
3.(*2) MARKED DOCUMENTS ARE FOR GP-3700F.

C4491-Z02-D

PACKING LIST GP-3700-*-1A/HK , GP-3700F-*-1A/HK

14DA-X-9851-3 1/1

A-1

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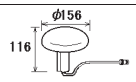
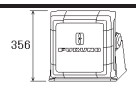
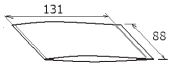
空中線部 ANTENNA ASSEMBLY		GPA-020S 000-026-988-00	1
指示器 DISPLAY UNIT		GP-3700* 000-029-375-00 **	1
予備品 SPARE PARTS			
予備品 SPARE PARTS		SP14-03601 001-246-900-00	1
付属品 ACCESSORIES			
ﾌｨﾙﾀｰｸﾘｰﾅｰ LCD CLEANING CLOTH		19-028-3125-6 100-360-676-10	1
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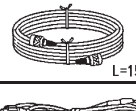
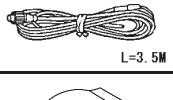
ｹｰﾌﾞﾙ組品 CABLE ASSEMBLY		TNC-PS/PS-3D-L15M-R 001-173-110-10	1
ｹｰﾌﾞﾙ組品MJ CABLE ASSEMBLY		MJ-A3SPF0013-035C(5A) 000-157-939-10	1
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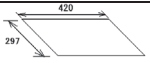
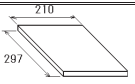
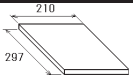
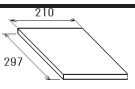
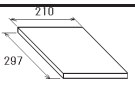
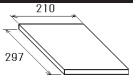
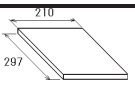
ﾌﾗｯｼｭﾏｳﾝﾄ型紙 FLUSH MOUNTING TEMPLATE		C42-01505-* 000-191-168-1*	1
取扱説明書 OPERATOR'S MANUAL		OM*-44910-* 000-191-154-1* **	1 (*1)
取扱説明書 OPERATOR'S MANUAL		OM*-44920-* 000-191-161-1* **	1 (*2)
操作要領書 OPERATOR'S GUIDE		OS*-44910-* 000-191-156-1* **	1 (*1)
操作要領書 OPERATOR'S GUIDE		OS*-44920-* 000-191-163-1* **	1 (*2)
装備要領書 INSTALLATION MANUAL		IM*-44910-* 000-191-158-1* **	1 (*1)
装備要領書 INSTALLATION MANUAL		IM*-44920-* 000-191-165-1* **	1 (*2)

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)の書類は、GP-3700用です。
2.(*1) MARKED DOCUMENTS ARE FOR GP-3700.

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

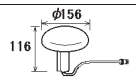
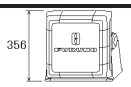
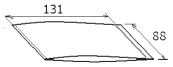
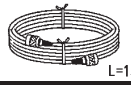
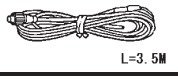
3.(*2)の書類は、GP-3700F用です。
3.(*2) MARKED DOCUMENTS ARE FOR GP-3700F.

C4491-Z01-D

PACKING LIST GP-3700-*-2NB/HK , GP-3700F-*-2NB/HK

14DA-X-9854-3 1/1

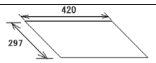
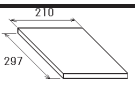
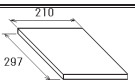
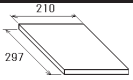
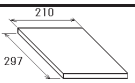
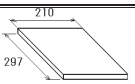
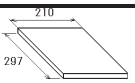
A-4

NAME	OUTLINE	DESCRIPTION/CODE No.	Q'TY
ユニット UNIT			
空中線部 ANTENNA ASSEMBLY		GPA-021S 000-026-989-00	1
指示器 DISPLAY UNIT		GP-3700* 000-029-375-00 **	1
予備品 SPARE PARTS			
予備品 SPARE PARTS		SP14-03601 001-246-900-00	1
付属品 ACCESSORIES			
ﾌｨﾙﾀｰｸﾘｰﾅｰ LCD CLEANING CLOTH		19-028-3125-6 100-360-676-10	1
工事材料 INSTALLATION MATERIALS			
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-A3SPF0013-035C(5A) 000-157-939-10	1
工事材料 INSTALLATION MATERIALS		CP14-08201 001-430-020-00	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)の書類は、GP-3700用です。
2.(*1) MARKED DOCUMENTS ARE FOR GP-3700.

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

NAME	OUTLINE	DESCRIPTION/CODE No.	Q'TY
図書 DOCUMENT			
ﾌﾗｯｼｭﾏｳﾝﾄ型紙 FLUSH MOUNTING TEMPLATE		C42-01505-* 000-191-168-1*	1
取扱説明書 OPERATOR'S MANUAL		OM*-44910-* 000-191-154-1* **	1 (*1)
取扱説明書 OPERATOR'S MANUAL		OM*-44920-* 000-191-161-1* **	1 (*2)
操作要領書 OPERATOR'S GUIDE		OS*-44910-* 000-191-156-1* **	1 (*1)
操作要領書 OPERATOR'S GUIDE		OS*-44920-* 000-191-163-1* **	1 (*2)
装備要領書 INSTALLATION MANUAL		IM*-44910-* 000-191-158-1* **	1 (*1)
装備要領書 INSTALLATION MANUAL		IM*-44920-* 000-191-165-1* **	1 (*2)

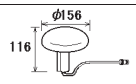
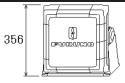
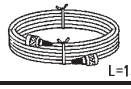
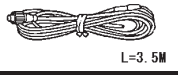
3.(*2)の書類は、GP-3700F用です。
3.(*2) MARKED DOCUMENTS ARE FOR GP-3700F.

C4491-Z04-D

PACKING LIST GP-3700-*-2AB/HK , GP-3700F-*-2AB/HK

14DA-X-9853-3 1/1

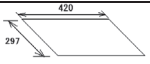
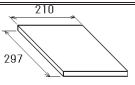
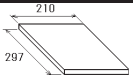
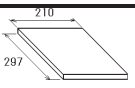
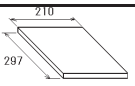
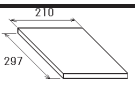
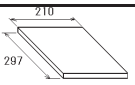
A-3

NAME	OUTLINE	DESCRIPTION/CODE No.	Q'TY
ユニット UNIT			
空中線部 ANTENNA ASSEMBLY		GPA-021S 000-026-989-00	1
指示器 DISPLAY UNIT		GP-3700* 000-029-375-00 **	1
予備品 SPARE PARTS			
予備品 SPARE PARTS		SP14-03601 001-246-900-00	1
付属品 ACCESSORIES			
ﾌｨﾙﾀｰｸﾘｰﾅｰ LCD CLEANING CLOTH		19-028-3125-6 100-360-676-10	1
工事材料 INSTALLATION MATERIALS			
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-A3SPF0013-035C(5A) 000-157-939-10	1
ﾏｽﾄ取付金具袋詰品 MAST MOUNTING KIT		CP20-01111 004-368-920-00	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)の書類は、GP-3700用です。
2.(*1) MARKED DOCUMENTS ARE FOR GP-3700.

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

NAME	OUTLINE	DESCRIPTION/CODE No.	Q'TY
工事材料 INSTALLATION MATERIALS		CP14-08201 001-430-020-00	1
図書 DOCUMENT			
ﾌﾗｯｼｭﾏｳﾝﾄ型紙 FLUSH MOUNTING TEMPLATE		C42-01505-* 000-191-168-1*	1
取扱説明書 OPERATOR'S MANUAL		OM*-44910-* 000-191-154-1* **	1 (*1)
取扱説明書 OPERATOR'S MANUAL		OM*-44920-* 000-191-161-1* **	1 (*2)
操作要領書 OPERATOR'S GUIDE		OS*-44910-* 000-191-156-1* **	1 (*1)
操作要領書 OPERATOR'S GUIDE		OS*-44920-* 000-191-163-1* **	1 (*2)
装備要領書 INSTALLATION MANUAL		IM*-44910-* 000-191-158-1* **	1 (*1)
装備要領書 INSTALLATION MANUAL		IM*-44920-* 000-191-165-1* **	1 (*2)

3.(*2)の書類は、GP-3700F用です。
3.(*2) MARKED DOCUMENTS ARE FOR GP-3700F.

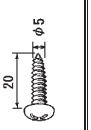
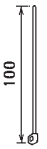
C4491-Z03-D

A-6

FURUNO

工事材料表
INSTALLATION MATERIALS

CODE NO.	001-430-020-00	14DA-X-9401 -2 1/1
TYPE	CP14-08201	

番号 NO.	名称 NAME	略図 OUTLINE	型名／規格 DESCRIPTIONS	数量 Q'TY	用途／備考 REMARKS
1	ﾄﾗｽｽｸｯﾋﾟﾝﾁｬﾐﾝｸﾞ ﾋﾞｽ SELF-TAPPING SCREW		5X20 SUS304 CODE NO. 000-162-608-10	6	
2	ｲﾝｼｭﾛｯｸﾀｲ TIEING WIRE BAND		AB100-S CODE NO. 000-191-622-10	3	

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

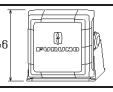
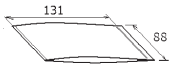
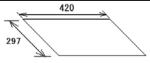
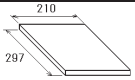
FURUNO ELECTRIC CO., LTD.

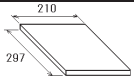
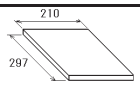
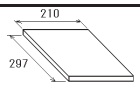
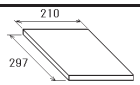
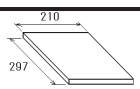
C4491-M01-C

A-5

PACKING LIST GP-3700-*-ON/HK , GP-3700F-*-ON/HK

14DA-X-9855-3 1/1

NAME	OUTLINE	DESCRIPTION/CODE No.	Q'TY
ユニット UNIT			
指示器 DISPLAY UNIT		GP-3700* 000-029-375-00 **	1
予備品 SPARE PARTS			
予備品 SPARE PARTS		SP14-03601 001-246-900-00	1
付属品 ACCESSORIES			
ﾌｨﾙﾀｰｸﾘｰﾅｰ LCD CLEANING CLOTH		19-028-3125-6 100-360-676-10	1
工事材料 INSTALLATION MATERIALS			
ｹｰﾌﾞﾙ組品MJ CABLE ASSEMBLY		MJ-A3SPF0013-035C(5A) 000-157-939-10	1
工事材料 INSTALLATION MATERIALS		CP14-08201 001-430-020-00	1
図書 DOCUMENT			
ﾌﾗｯｼｭﾏｳﾝﾄ型紙 FLUSH MOUNTING TEMPLATE		C42-01505-* 000-191-168-1*	1
取扱説明書 OPERATOR'S MANUAL		OM*-44910-* 000-191-154-1* **	1 (*1)

NAME	OUTLINE	DESCRIPTION/CODE No.	Q'TY
取扱説明書 OPERATOR'S MANUAL		OM*-44920-* 000-191-161-1* **	1 (*2)
操作要領書 OPERATOR'S GUIDE		OS*-44910-* 000-191-156-1* **	1 (*1)
操作要領書 OPERATOR'S GUIDE		OS*-44920-* 000-191-163-1* **	1 (*2)
装備要領書 INSTALLATION MANUAL		IM*-44910-* 000-191-158-1* **	1 (*1)
装備要領書 INSTALLATION MANUAL		IM*-44920-* 000-191-165-1* **	1 (*2)

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)の書類は、GP-3700用です。
2.(*1) MARKED DOCUMENTS ARE FOR GP-3700.

3.(*2)の書類は、GP-3700F用です。
3.(*2) MARKED DOCUMENTS ARE FOR GP-3700F.

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

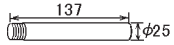
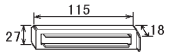
C4491-Z05-D

FURUNO

CODE NO.	004-365-780-00	14BN-X-9403 -7
TYPE	CP20-01111	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	ﾊﾟｲﾌﾟ PIPE		20-007-3011-4 CODE NO. 100-183-264-10	1	
2	取付補助金具 INSTALLING SPACER		20-007-3012-1 ROHS CODE NO. 100-183-271-10	1	
3	ﾎｰｽｸﾗﾝﾌﾟ HOSE CLAMP		NO.6348 CODE NO. 000-166-005-10	2	

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.）

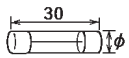
FURUNO ELECTRIC CO ., LTD.

C3446-M01-J

FURUNO

CODE NO.	001-246-900-00	14CZ-X-9301-0 1/1
TYPE	SP14-03601	BOX NO. P

SHIP NO.	SPARE PARTS LIST FOR	U S E	SETS PER VESSEL

ITEM NO.	NAME OF PART	OUTLINE	DWG. NO. OR TYPE NO.	QUANTITY WORKING PER SET	QUANTITY WORKING PER VES	QUANTITY SPARE	REMARKS/CODE NO.
1	ﾋｭｰｽﾞ GLASS TUBE FUSE		FGBO-A 125V 5A PBF	1		2	000-155-853-10

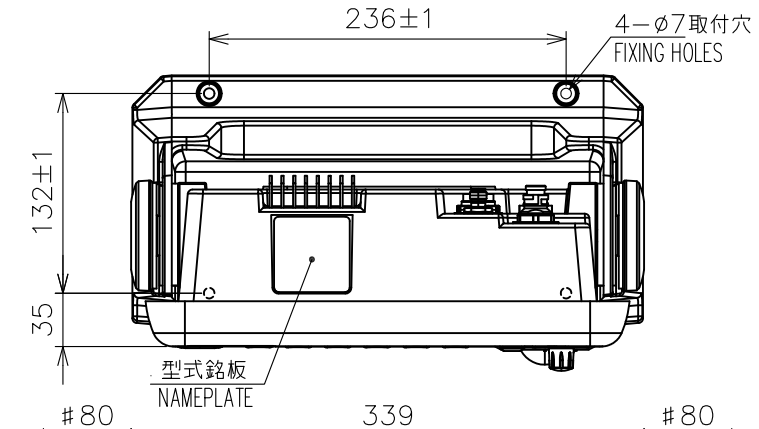
MFR'S NAME	FURUNO ELECTRIC CO.,LTD.	DWG NO.	C4483-P01-A	1/1

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

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.

FURUNO



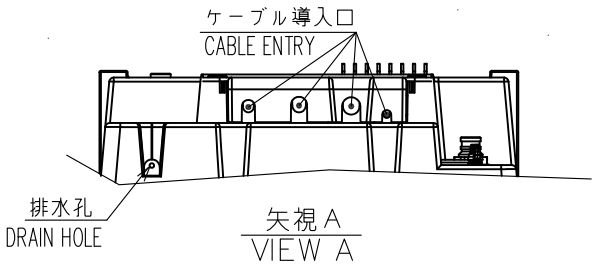
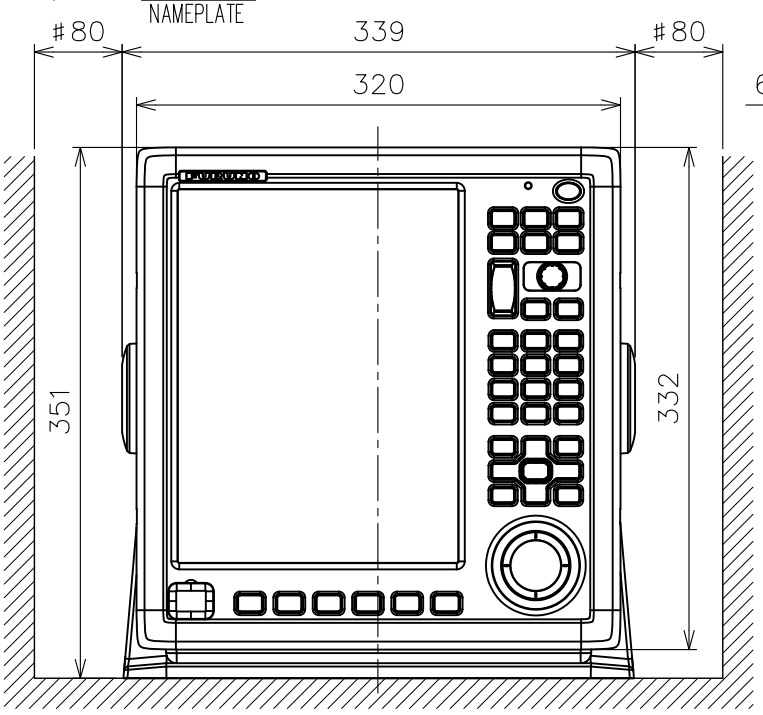


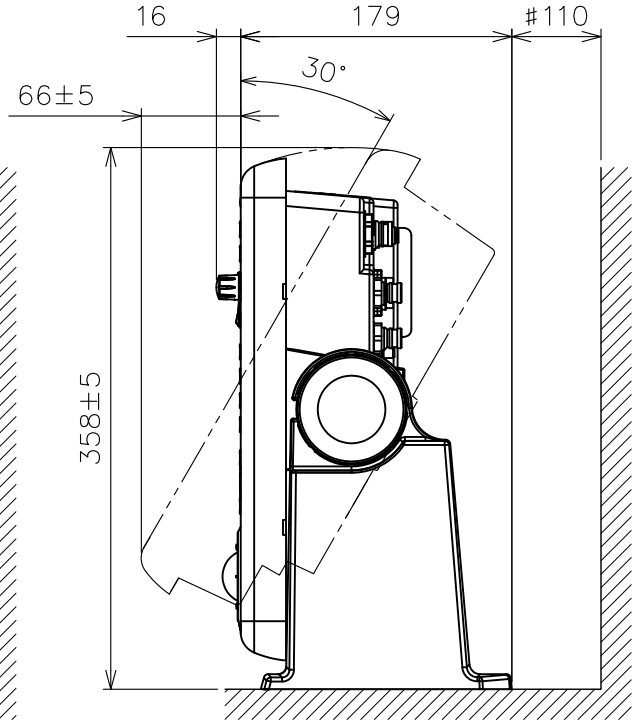
表1 TABLE 1

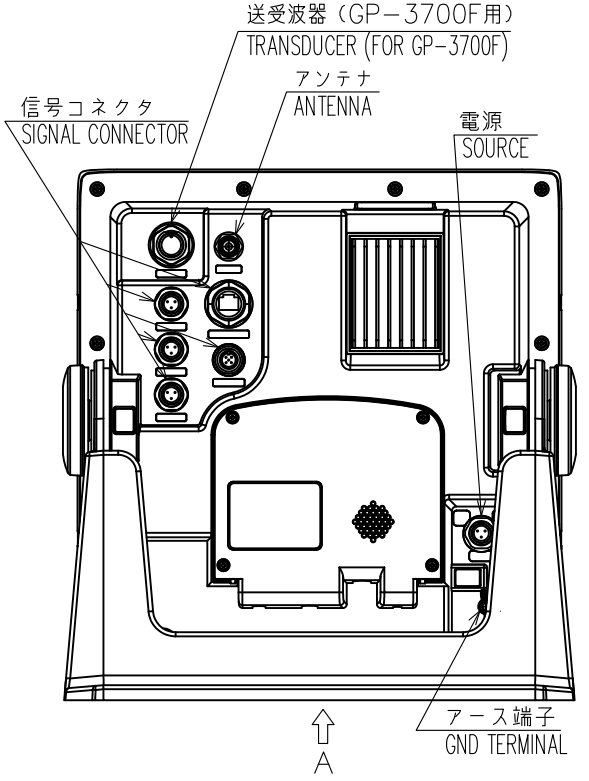
寸法区分(mm) DIMENSION	公差(mm) TOLERANCE
0 < L ≤ 50	±1.5
50 < L ≤ 100	±2.5
100 < L ≤ 500	±3

表2 TABLE 2

型式 MODEL	質量 (kg±10%) MASS
GP-3700	4.6
GP-3700F	4.8







注記 1）指定なき寸法公差は表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 CLEARNCE
3. USE TAPPING SCREWS ø5x20 FOR FIXING THE UNIT.

DRAWN 1/Apr/2016 A. MURAO		TITLE	GP-3700/3700F
CHECKED 1/Apr/2016 T. YAMASAKI		名称	指示器（卓上装備）
APPROVED 4/Apr/2016 H.MAKI	GP-3700/F		外寸図
SCALE 1/5	MASS 表2参照 SEE TABLE 2	NAME	DISPLAY UNIT (TABLETOP MOUNT)
DWG.No. C4491-G01- B	REF.No. 14-083-100G-3		OUTLINE DRAWING

FURUNO ELECTRIC CO., LTD.

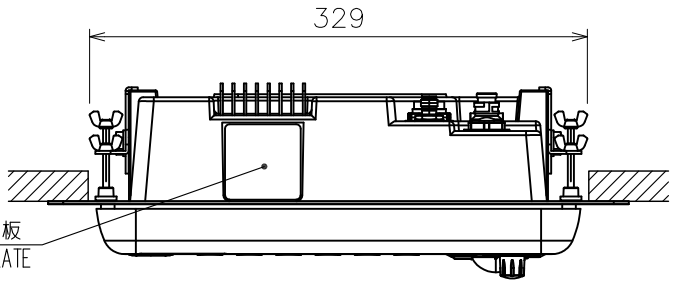
FURUNO

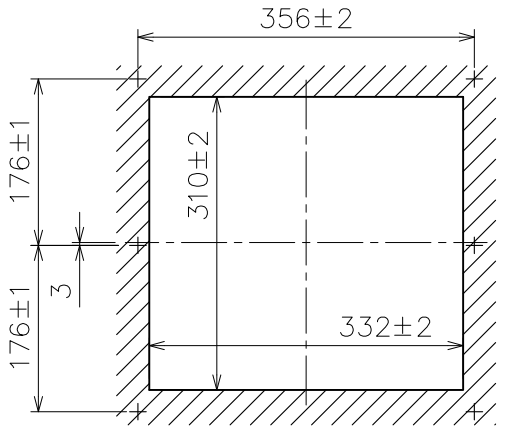
表1 TABLE 1

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

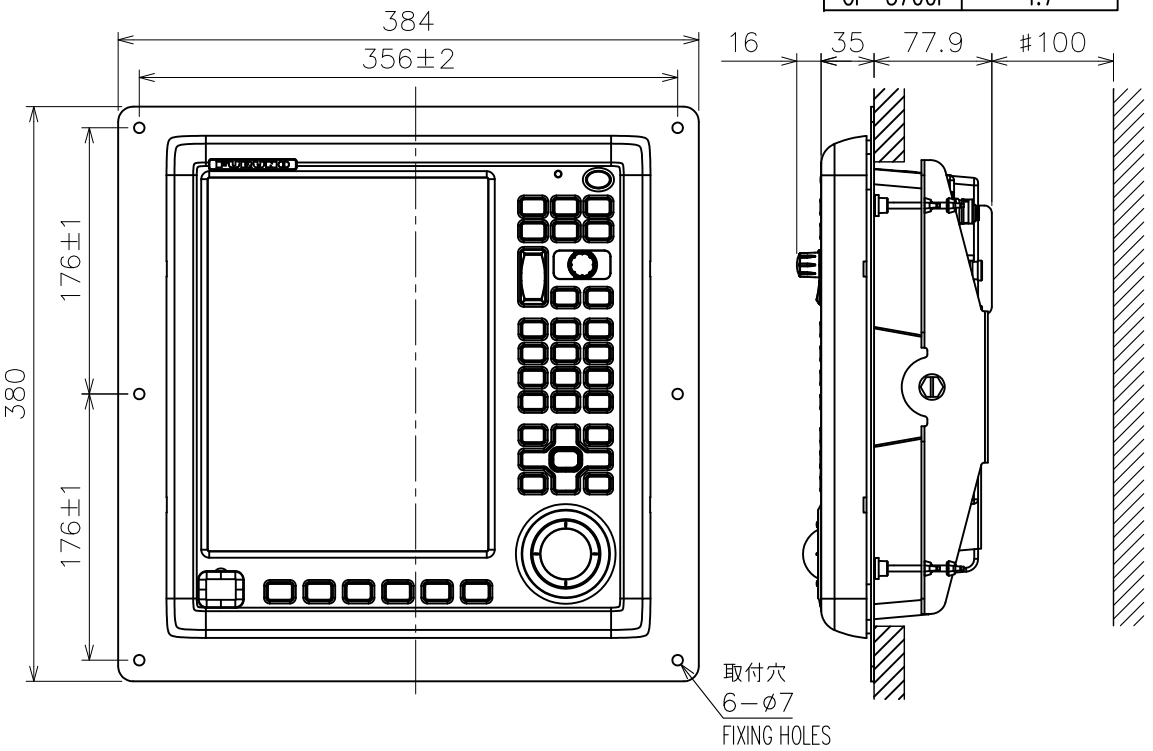
表2 TABLE 2

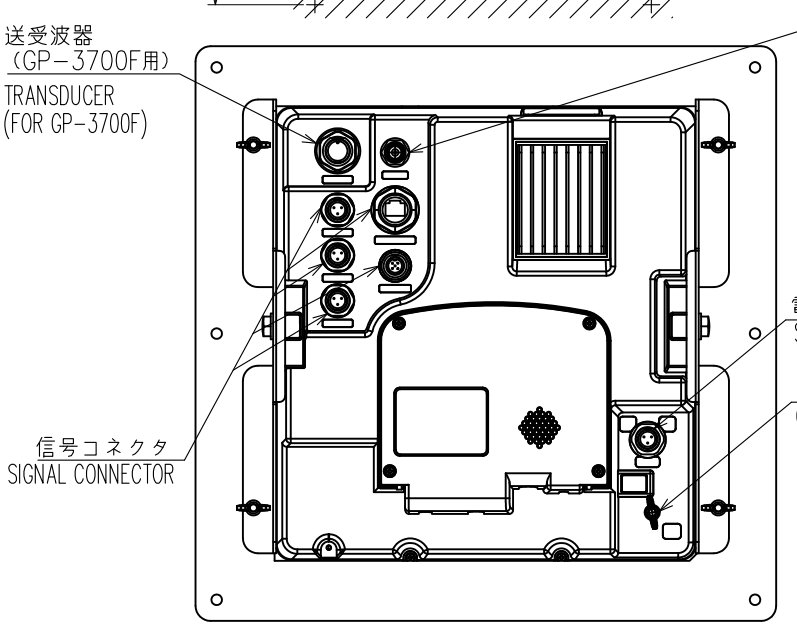
型式 MODEL	質量 (kg±10%) MASS
GP-3700	4.5
GP-3700F	4.7

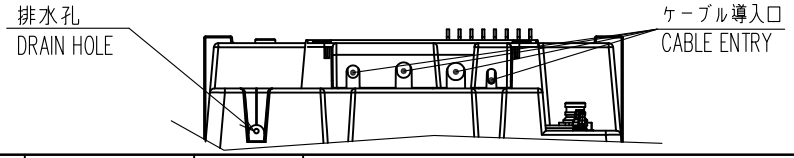




取付穴寸法（尺度：1/8）
CUTOUT DIMENSIONS
(SCALE: 1/8)







注記　1）指定なき寸法公差は表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 CLEARNCE
3. USE TAPPING SCREWS ø5x20 FOR FIXING THE UNIT.

DRAWN 1/Apr/2016 A. MURAO			TITLE GP-3700/3700F
CHECKED 1/Apr/2016 T. YAMASAKI			名称 指示器（埋込装備）
APPROVED 4/Apr/2016 H.MAKI		GP-3700/F	外寸図
SCALE 1/5	MASS 表2参照 SEE TABLE 2		NAME DISPLAY UNIT (FLUSH MOUNT)
DWG.No. C4491-G02- B		REF.No. 14-083-1106-3	OUTLINE DRAWING

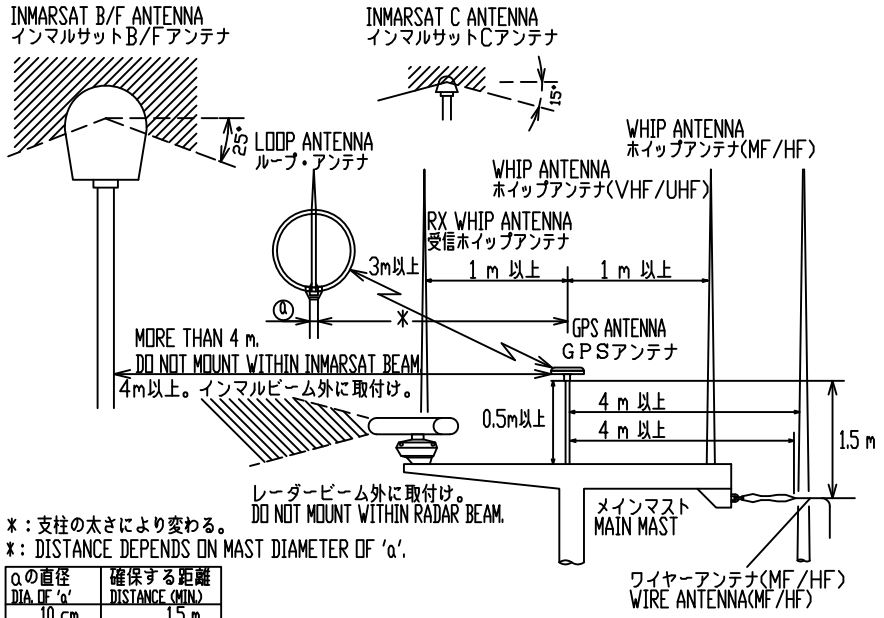
FURUNO ELECTRIC CO., LTD.

D-2

FURUNO

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.



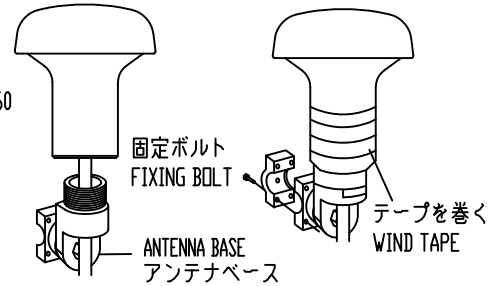
*：支柱の太さにより変わる。
*: DISTANCE DEPENDS ON MAST DIAMETER OF 'a'.

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

B）スタンションやパルピットにつけるとき
レール用アンテナベース No.13-RC5160
（取付可能レール直径：ø19~ø32）
（コード番号：000-806-114）

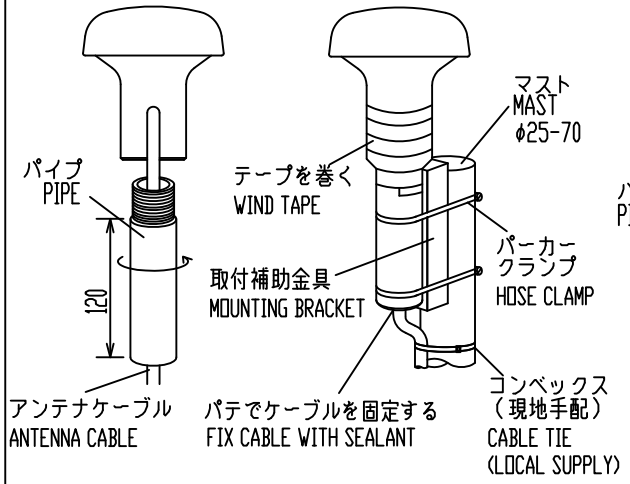
HANDRAIL MOUNTING

USE HANDRAIL MOUNTING BASE No.13-RC5160 (CODE No.000-806-114, OPTION).
THE DIAMETER OF THE HANDRAIL MAY BE FROM ø19mm TO ø32mm.

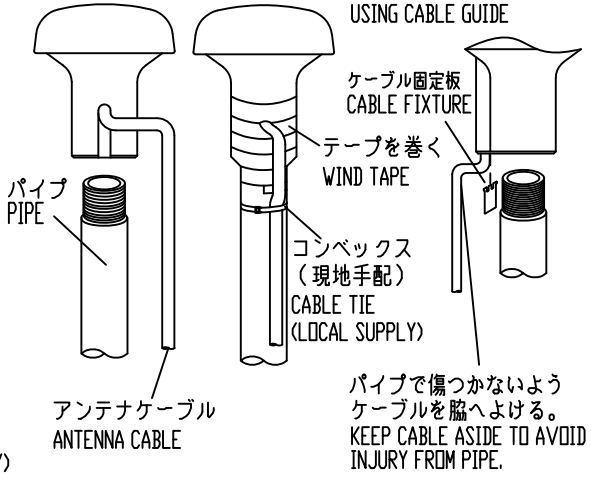


A）マストへの取付け　MAST MOUNTING

a)マスト取付金具CP20-01111(工事材料)でマストに固定する。
USE MAST MOUNTING KIT CP20-01111.

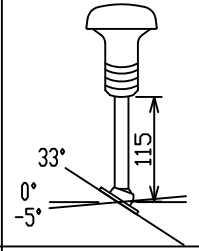
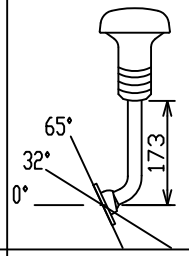
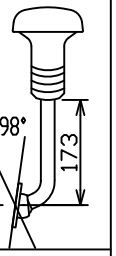


b)パイプのみを使うとき
USE A PIPE ONLY.

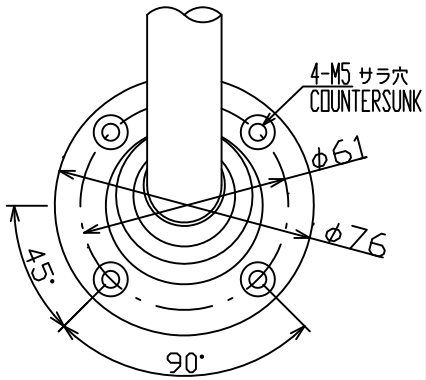


C）取付ける場所が傾斜しているとき　ANTENNA BASE MOUNTING

オプションのアンテナベースを使う。
USE OPTIONAL ANTENNA BASE.

傾斜 INCLINATION	-5° - 33°	32° - 65°	65° - 98°
装備方法 MOUNTING METHOD			
アンテナベース型式 ANT. BASE TYPE コード番号 CODE No.	直型アンテナベース RIGHT ANGLE ANTENNA BASE No.13-QA330 000-803-239	L型アンテナベース L-TYPE ANTENNA BASE No.13-QA310 000-803-240	

アンテナベース基部
MOUNTING DIMENSIONS OF ANTENNA BASE.

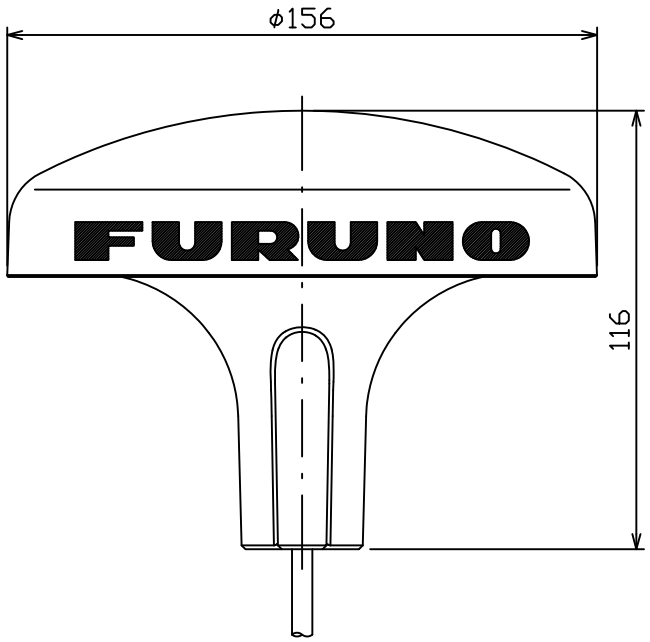


注記 1）パイプやアンテナベースはアンテナユニットにねじ込んだ後に固定する。
2）アンテナを固定するときはパイプ（アンテナベース）をアンテナにねじ込むこと。
アンテナ側をねじるとコネクタ部やケーブルに無理がかかり、故障の原因となる。

NOTE 1. FASTEN PIPE(ANTENNA BASE) TO ANTENNA UNIT FIRST THEN FIX THEM TO MAST OR HANDRAIL.
2. WHEN FIXING ANTENNA, TURN PIPE OR ANTENNA BASE; NOT THE ANTENNA.
TURNING THE ANTENNA MAY TWIST THE CABLE AND PLACE STRESS ON CONNECTOR.

DRAWN 14/MAY/2014 T.YAMASAKI		TITLE	GPA series
CHECKED 14/MAY/2014 H.MAKI		名称	空中線部
APPROVED 15/May/2014 H.MAKI			装備要領図
SCALE / MASS		NAME	ANTENNA UNIT
DWG.No. C4384-Y01- F			INSTALLATION PROCEDURE

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

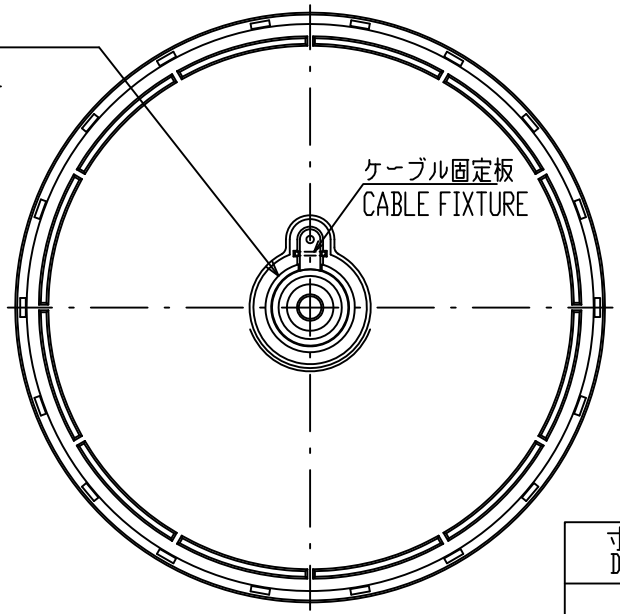


表1 TABLE 1

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.

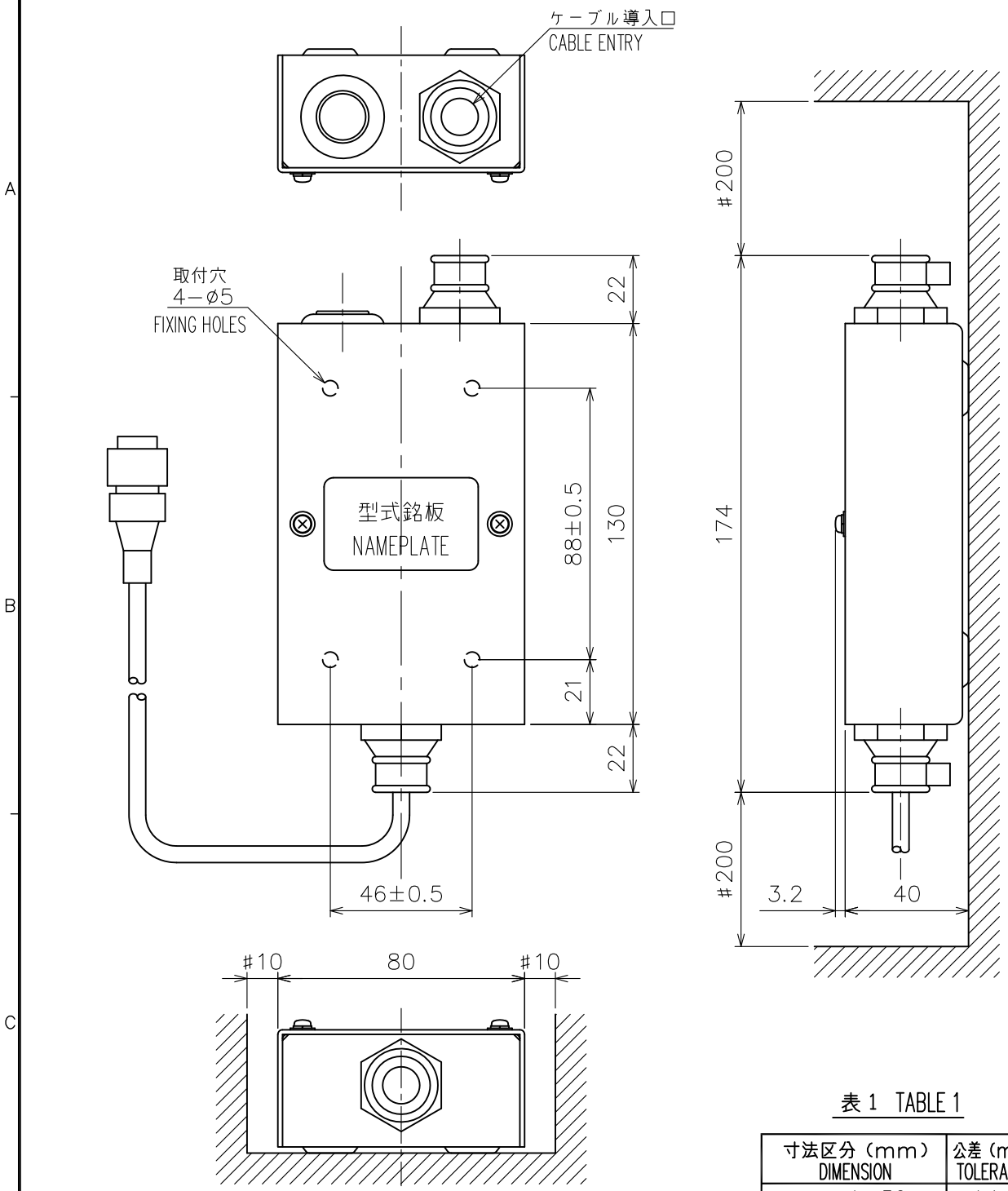


表 1　TABLE 1

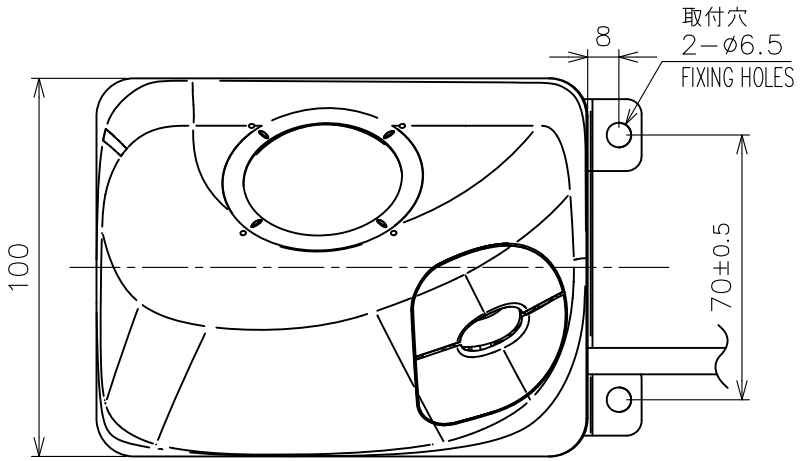
寸法区分（mm） DIMENSION	公差（mm） TOLERANCE
L≦50	±1.5
50<L≦100	±2.5
100<L≦500	±3

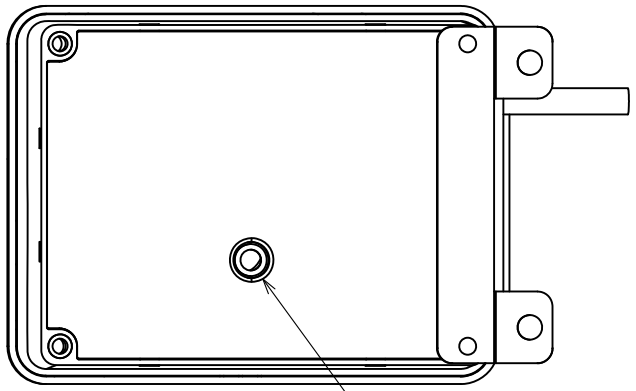
注　記　1）　指定外の寸法公差は表 1 による。
　　2）　＃印寸法は最小サービス空間寸法とする。
　　3）　取付にはタッピンネジ呼び４を使用のこと。

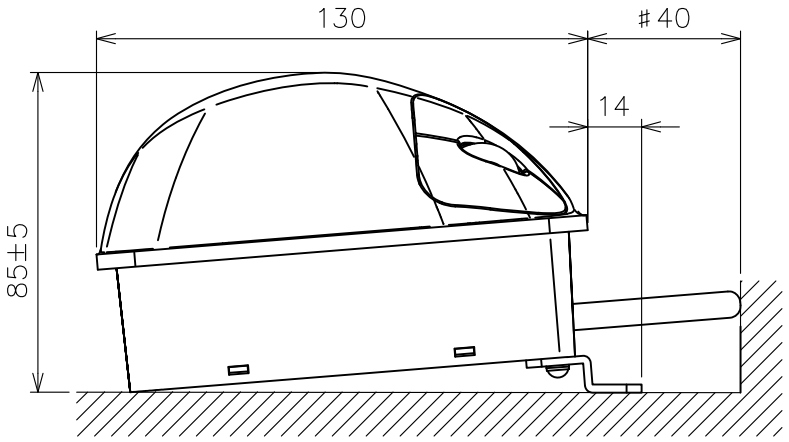
NOTE　1.　TABLE 1 INDICATES TOLERANCE OF DIMENSIONS WHICH IS NOT SPECIFIED.
　　2.　#: MINIMUM SERVICE CLEARANCE.
　　3.　USE TAPPING SCREWS ø4 FOR FIXING THE UNIT.

DRAWN 12/Mar/2015 T.YAMASAKI		TITLE	MB-1100
CHECKED 12/Mar/2015 H.MAKI		名称	分配箱
APPROVED 12/Mar/2015 H.MAKI			外寸図
SCALE 1/2	MASS 0.30 ±10% kg	質量はケーブル（1ｍ）を含む。 MASS INCLUDES 1 m CABLE.	NAME MATCHING BOX
DWG. No. C2375-G03- C	REF. No. 02-155-200G-2		OUTLINE DRAWING

FURUNO







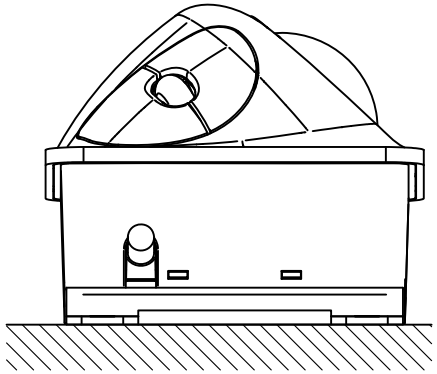


表1 TABLE 1

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

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）　取付ネジはトラスタッピンネジ呼び径５Ｘ２０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 6/Nov/2013 T.YAMASAKI		TITLE	RCU-030
CHECKED 6/Nov/2013 H.MAKI		名称	トラックボール操作部（取付金具）
APPROVED 7/Nov/2013 H.MAKI	FMD-3100		外寸図
SCALE 1/2 MASS 0.4 ±10% kg	質量は2mケーブルを含む。 MASS INCLUDES 2m CABLE.	NAME	TRACKBALL CONTROL UNIT (FIXTURE MOUNT)
DWG.No. C4484-G01- A	REF.No. 24-016-110G-0		OUTLINE DRAWING

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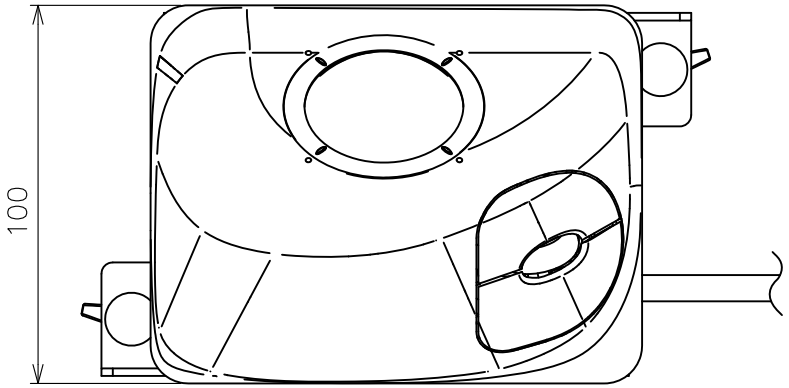
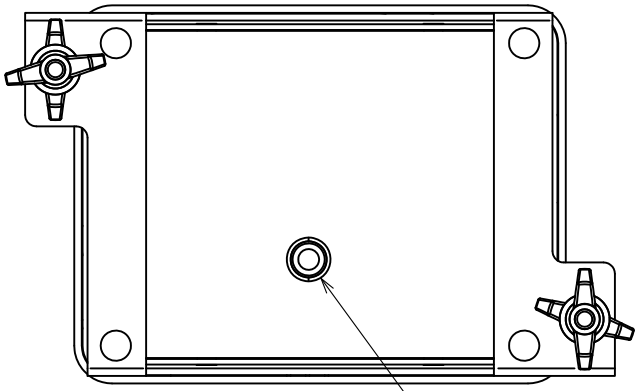
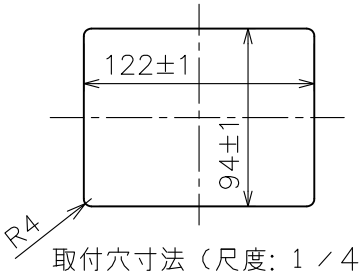


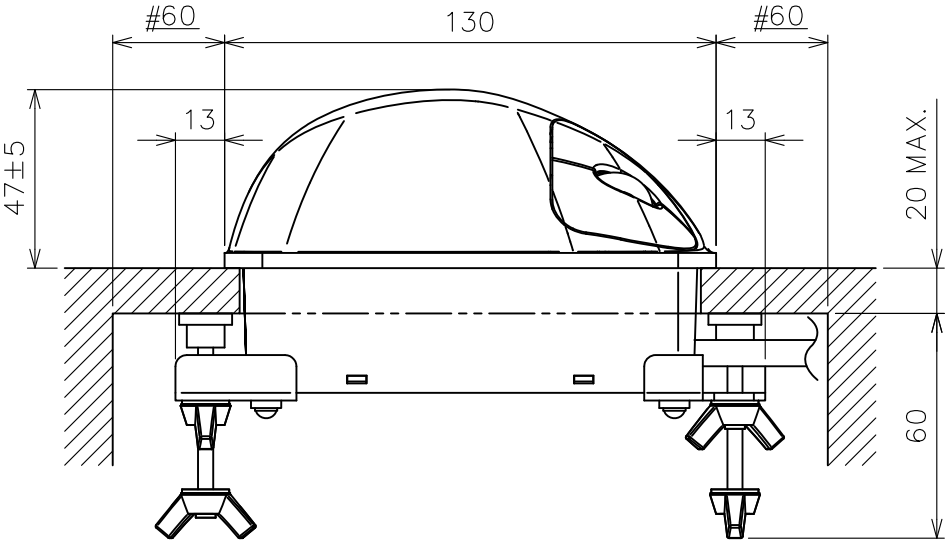


底面図
BOTTOM VIEW

水抜き穴
DRAIN



取付穴寸法（尺度：１／４）
CUTOUT DIMENSIONS (SCALE: 1/4)



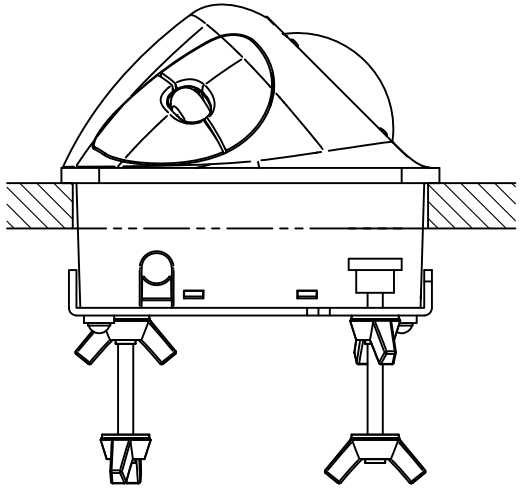


表1 TABLE 1

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

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。

NOTE　1.　TABLE 1 INDICATES TOLERANCE OF DIMENSIONS WHICH IS NOT SPECIFIED.
　　2.　#: MINIMUM SERVICE CLEARANCE.

DRAWN 6/Nov/2013 T.YAMASAKI		TITLE	RCU-030
CHECKED 6/Nov/2013 H.MAKI		名称	トラックボール操作部（埋込装備）
APPROVED 7/Nov/2013 H.MAKI	FMD-3100		外寸図
SCALE 1/2 MASS 0.5 ±10% kg	質量は2mケーブルを含む。 MASS INCLUDES 2m CABLE.	NAME	TRACKBALL CONTROL UNIT (FLUSH MOUNT)
DWG.No. C4484-G02- A	REF.No. 24-016-120G-0		OUTLINE DRAWING

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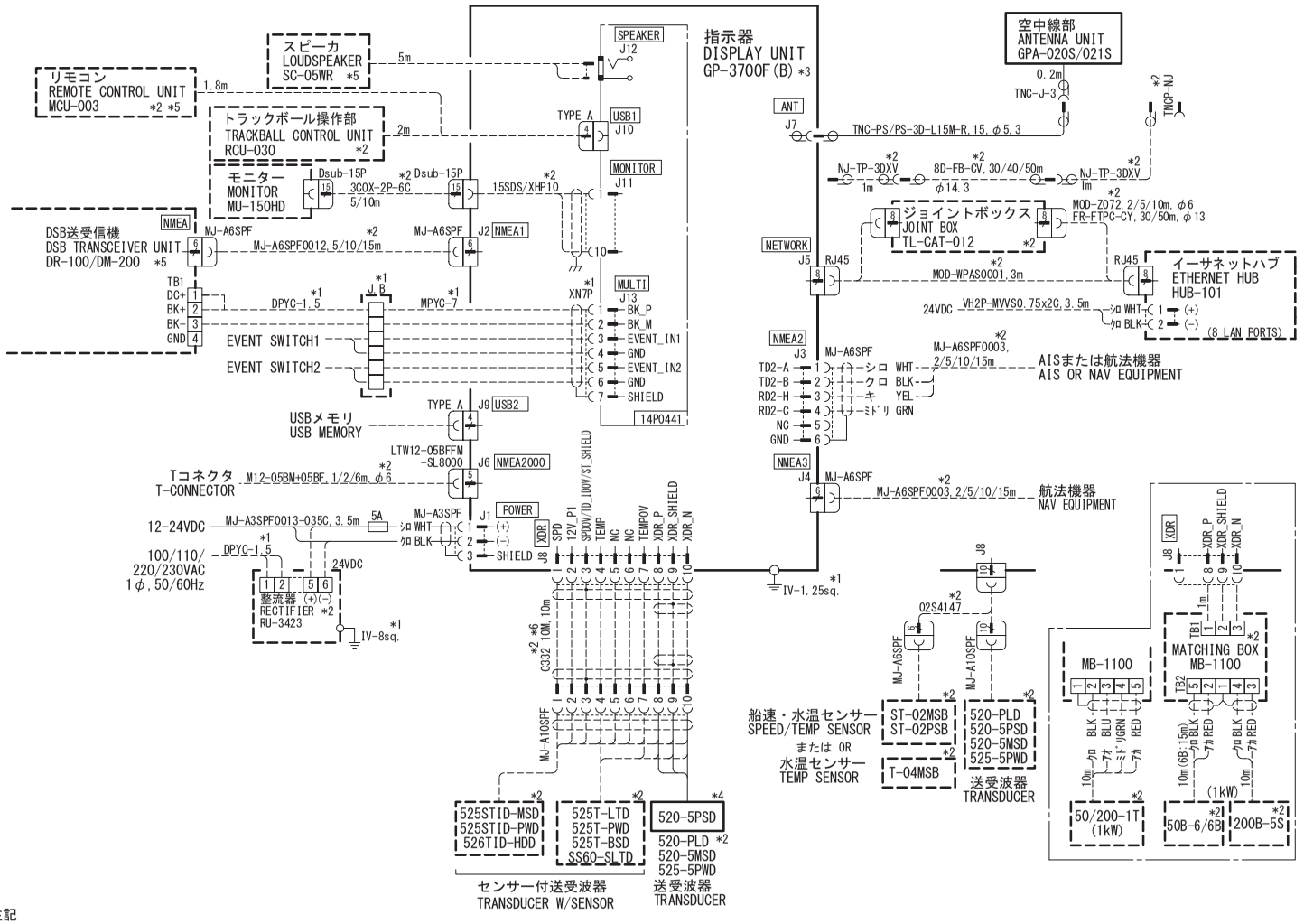

注記
＊1）造船所手配。
＊2）オプション。
＊3）B仕様はDGPSビーコン受信基板を内蔵。
＊4）国内仕様のみ標準支給。
＊5）日本国内のみ。
＊6）ケーブル延長の場合、ACCU-FISH性能低下の恐れあり。

NOTE
*1: SHIPYARD SUPPLY.
*2: OPTION.
*3: GP-3700F-B INCLUDES DGPS BEACON RECEIVER.
*4: STANDARD SUPPLY FOR JAPAN.
*5: JAPAN ONLY.
*6: ACCU-FISH PERFORMANCE MAY BE DECLINED BY CABLE EXTENSION.

DRAWN 14/Mar/2017 R. FUJIYAMA		TITLE	GP-3700F
CHECKED 14/Mar/2017 T. YAMASAKI		名称	カラーGPSプロッタ魚探
APPROVED 15/Mar/2017 H.MAKI			相互結線図
SCALE / MASS kg		NAME	GPS/PLOTTER/SOUNDER
DWG No. C4492-C01- H	REF. No. 14-083-5001-0		INTERCONNECTION DIAGRAM

FURUNO ELECTRIC CO., LTD.