

# ***Installation Manual***

## ***CLASS A AIS***

### ***Model FA-170***

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**PRODUCT NAME: U-AIS TRANSPONDER**

|                                                                |             |
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(GREG) FA-170



# SAFETY INSTRUCTIONS

The installer must read the safety instructions before attempting to install this 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, can result in minor or moderate injury.



Warning, Caution



Prohibitive Action



Prohibitive Action



## WARNING



**ELECTRICAL SHOCK HAZARD**  
Do not open the equipment unless totally familiar with electrical circuits and service manual.

Only qualified personnel should 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.



**Do not install the equipment where it may get wet from rain or water splash.**

Water in the equipment can result in fire, electrical shock or damage the equipment.



**Do not approach the antenna closer than listed below when it is transmitting.**

The antenna emits radio waves that can be harmful to the human body.

| RF power density on antenna aperture | Distance |
|--------------------------------------|----------|
| 100 W/m <sup>2</sup>                 | N/A      |
| 10 W/m <sup>2</sup>                  | 0.04 m   |
| 2 W/m <sup>2</sup>                   | 0.09 m   |



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

Connection of an incorrect power supply can cause fire or damage the equipment. The voltage rating of the equipment appears on the label above the power connector.



## CAUTION



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

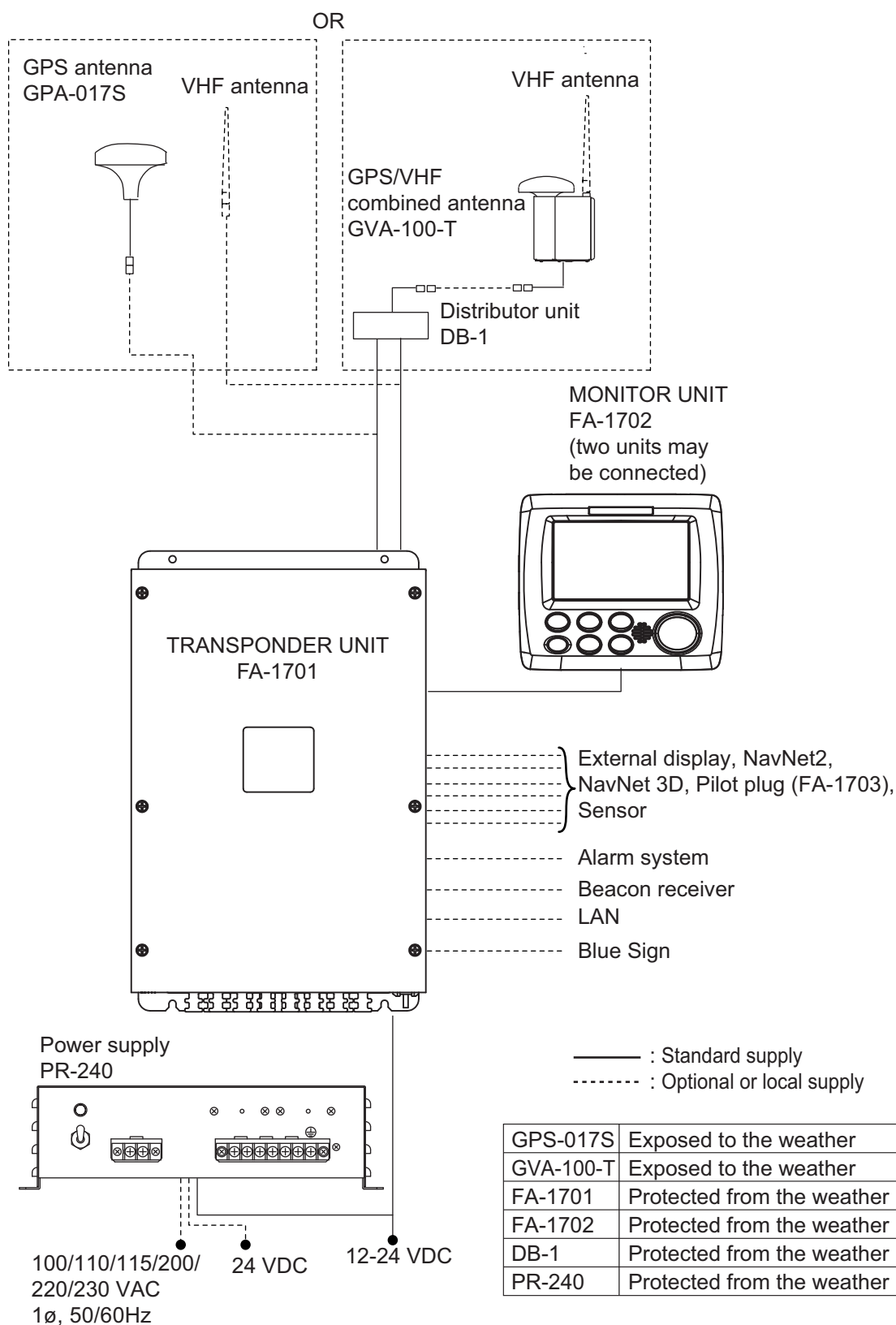
| Equipment                | Standard compass | Steering compass | Equipment | Standard compass | Steering compass |
|--------------------------|------------------|------------------|-----------|------------------|------------------|
| FA-1701 Transponder unit | 1.70 m           | 1.10 m           | GVA-100-T | 0.40 m           | 0.30 m           |
| FA-1702 Monitor unit     | 0.65 m           | 0.40 m           | DB-1      | 0.30 m           | 0.30 m           |
| FA-1703 Pilot Plug unit  | 0.35 m           | 0.30 m           | PR-240    | 0.90 m           | 0.60 m           |



**Attach protective earth securely to the ship's body.**

The protective earth is required to the power supply to prevent electrical shock.

# SYSTEM CONFIGURATION



# EQUIPMENT LISTS

## Standard supply

| Name                          | Type       | Code no.    | Qty | Remarks                                                                          |
|-------------------------------|------------|-------------|-----|----------------------------------------------------------------------------------|
| Transponder unit              | FA-1701    | —           | 1   |                                                                                  |
| Monitor Unit                  | FA-1702    | —           | 1   |                                                                                  |
| GPS Antenna                   | GPA-017S   | —           | 1   | Select one.                                                                      |
| GPS/VHF Com-<br>bined Antenna | GVA-100-T  | —           | 1   |                                                                                  |
| Distributor Unit              | DB-1       | —           | 1   | For GVA-100-T.                                                                   |
| Installation Materi-<br>als   | CP05-13600 | 000-029-284 | 1   | For DB-1 (GVA-100-T).<br>See table below for contents.                           |
|                               | CP05-13610 | 000-029-285 | 1   | For DB-1 (GVA-100-T, Deep<br>Sea) and GPA-017S.<br>See table below for contents. |
|                               | CP05-13620 | 000-029-286 | 1   | For DB-1 (GVA-100-T).<br>See table below for contents.                           |
|                               | CP24-00141 | 001-176-030 | 1   | For GVA-100-T.                                                                   |
|                               | CP05-13630 | 000-029-287 | 1   | For GPA-017S.<br>See table below for contents.                                   |
|                               | CP05-13640 | 000-029-288 | 1   | For GPA-017S.<br>See table below for contents.                                   |
| Spare Parts                   | SP05-06501 | 001-426-300 | 1   | For FA-1701<br>(Type: FGMB 125V 8A PBF, 2<br>pcs. Code: 000-191-004-10).         |

## Installation materials

| Installation<br>materials | Contains   |            |                    |                     |
|---------------------------|------------|------------|--------------------|---------------------|
|                           | CP05-13601 | CP24-00101 | Z-AWG25X4P-SB L050 | TNC-PS/PS-3D-L15M-R |
| CP05-13600                | Y          | Y          | N                  | N                   |
| CP05-13610                |            | N          | N                  | N                   |
| CP05-13620                |            | Y          | Y                  | N                   |
| CP05-13630                |            | N          | Y                  | N                   |
| CP05-13640                |            | N          | Y                  | Y                   |

**Optional supply**

| Name                      | Type                | Code no.       | Qty | Remarks                                                                        |
|---------------------------|---------------------|----------------|-----|--------------------------------------------------------------------------------|
| Pilot Plug Unit           | FA-1703             | —              | 1   |                                                                                |
| Monitor Unit              | FA-1702             | —              | 1   |                                                                                |
| Power Supply Unit         | PR-240              | —              | 1   |                                                                                |
| Antenna Cable Assembly    | CP20-02700 (30M)    | 004-381-160    | 1   | For GPA-017S. (30 m)                                                           |
|                           | CP20-02710 (50M)    | 004-381-170    | 1   | For GPA-017S. (50 m)                                                           |
|                           | CP20-02720 (40M)    | 001-207-990    | 1   | For GPA-017S. (40 m)                                                           |
| Antenna Cable Set         | CP24-00300          | 000-041-938    | 1   | For GVA-100. (30 m)                                                            |
|                           | CP24-00310          | 000-041-939    | 1   | For GVA-100. (50 m)                                                            |
|                           | CP24-00320          | 000-022-637    | 1   | For GVA-100. (40 m)                                                            |
| Mast Mounting Kit         | CP20-01111          | 004-365-780    | 1   | For GPA-017S.                                                                  |
| Antenna Fixing Bracket    | CP05-14001          | 001-430-360    | 1   |                                                                                |
| AD Converter              | AD-100-E            | 000-040-110    | 1   |                                                                                |
| Mast Mounting Kit         | OP24-5              | 005-954-510    | 1   | For GVA-100-T.                                                                 |
| Front Fixing Panel        | OP24-35             | 001-247-240    | 1   | For FA-1702.                                                                   |
| F Mount Cushion Kit       | OP05-141            | 001-436-880    | 1   |                                                                                |
| Installation Materials    | CP03-28900 (10M)    | 000-082-658    | 1   | LAN cable (10 m).                                                              |
|                           | CP03-28910 (20M)    | 000-082-659    | 1   | LAN cable (20 m).                                                              |
|                           | CP03-28920 (30M)    | 000-082-660    | 1   | LAN cable (30 m).                                                              |
|                           | CP03-28930 (50M)    | 000-084-368    | 1   | LAN cable (50 m).                                                              |
|                           | CP03-28940 (100M)   | 000-090-429    | 1   | LAN cable (100 m).                                                             |
| Antenna                   | FAB-151D            | 001-144-490-10 | 1   |                                                                                |
| Right Angle Mounting Base | NO. 13-QA330        | 001-111-910-10 | 1   | For GPA-017S.                                                                  |
| L-Angle Mounting Base     | NO. 13-QA310        | 001-111-900-10 | 1   | For GPA-017S.                                                                  |
| Handrail Mounting Base    | NO. 13-RC5160       | 001-111-920-10 | 1   | For GPA-017S.                                                                  |
| Antenna Fixing Bracket    | 4-310071            | 000-166-333-10 | 1   | For FAB-151D.                                                                  |
| Cable Assembly            | TNC-PS/PS-3D-L15M-R | 001-173-110-10 | 1   | For connection to GPA-017S.                                                    |
|                           | Z-AWG25X4P-SB L050  | 001-426-390    | 1   | For connection between FA-1701 and FA-1702. Contains Z-AWG25X4P-SB L050 (5 m)  |
|                           | Z-AWG25X4P-SB L100  | 001-426-440    | 1   | For connection between FA-1701 and FA-1702. Contains Z-AWG25X4P-SB L100 (10 m) |
| Water Proof Kit           | OP05-139            | 001-426-500    | 1   | For FA-1702.                                                                   |
| Replacement Kit           | OP05-140            | 001-426-510    | 1   | For FA-1702.                                                                   |

# 1. MOUNTING

## NOTICE

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

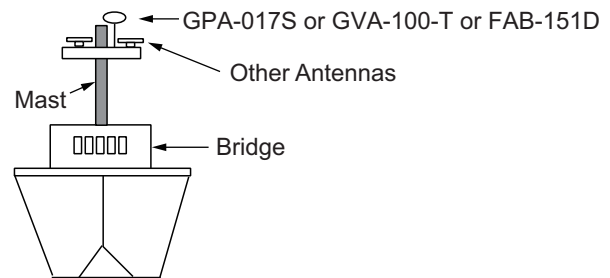
Those items contain organic solvents that can damage coating and plastic parts, especially plastic connectors.

## 1.1 How to Install the Antenna Unit(s)

### 1.1.1 Mounting considerations for all antenna units

When selecting a mounting location for the antenna, keep in mind the following points.

- Select a location out of the radar beam. The radar beam will obstruct or prevent reception of the GPS satellite signal.
- There should be no interfering object within the line-of-sight to the satellites. Objects within line-of-sight to a satellite, for example, a mast, may block reception or prolong acquisition time.
- Mount the antenna unit as high as possible to keep it free of interfering objects and water spray, which can interrupt reception of GPS satellite signal if the water freezes.
- Referring to the drawing at the back of this manual, leave sufficient space between all antennas to avoid mutual interference.



For VHF antennas, also keep in mind the following points:

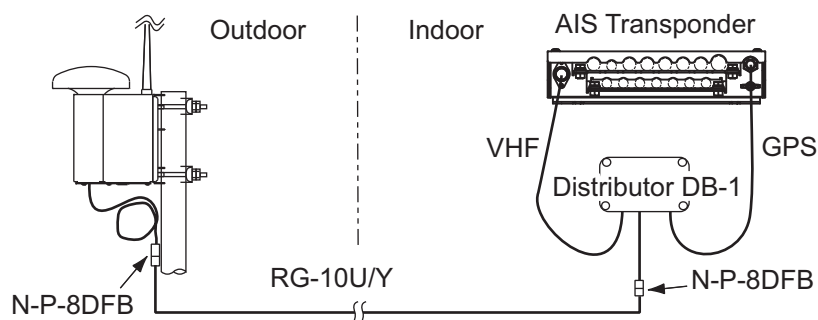
- The AIS VHF antenna should be placed in an elevated position that is as free as possible with a minimum of 0.5 meters in the horizontal direction from constructions made of conductive materials. The antenna should not be installed close to any large vertical obstruction. The objective for the AIS VHF antenna is to see the horizon freely through 360 degrees.
- The AIS VHF antenna should be installed safely away from interfering high-power energy sources like radar and other transmitting radio antennas, preferably at least 3 meters away from and out of the transmitting beam.
- There should not be more than one antenna on the same plane. The AIS VHF antenna should be mounted directly above or below the ship's primary VHF radiotelephone antenna, with no horizontal separation and with a minimum of 2.8 meters vertical separation. If it is located on the same plane as other antennas, the distance apart should be at least 10 meters.

## 1. MOUNTING

### 1.1.2 GPS/VHF combined antenna (GVA-100-T)

Install the combined antenna unit referring to the outline drawing. When selecting a mounting location for the antenna, keep in mind the following points.

- Select a location out of the radar beam. The radar beam will obstruct or prevent reception of the GPS satellite signal.
- There should be no interfering object within the line-of-sight to the satellites. Objects within line-of-sight to a satellite, for example, a mast, may block reception or prolong acquisition time.
- Mount the antenna unit as high as possible. Mounting it this way keeps it free of interfering objects and water spray, which can interrupt reception of GPS satellite signal if the water freezes.
- Also, refer to the antenna installation guidelines on page 1-6.

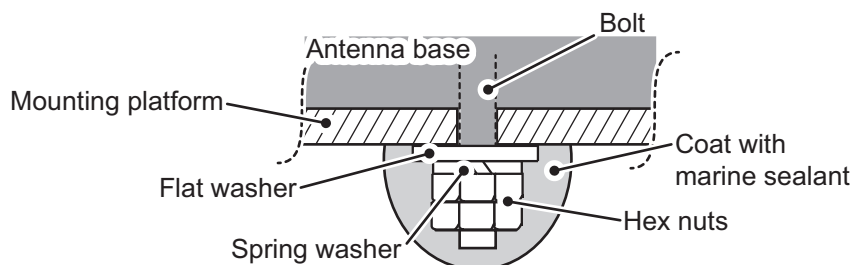


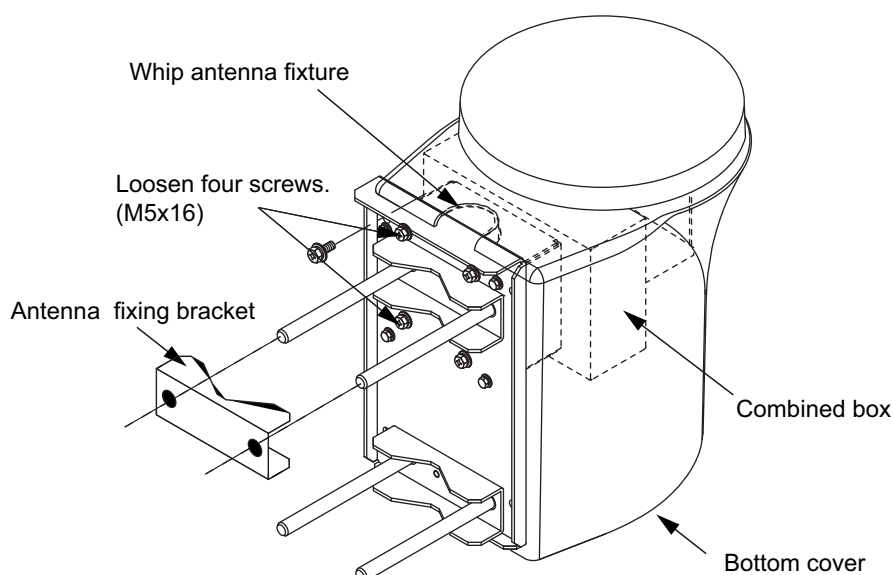
*Installation overview of GPS/VHF combined antenna*

#### **Mounting procedure**

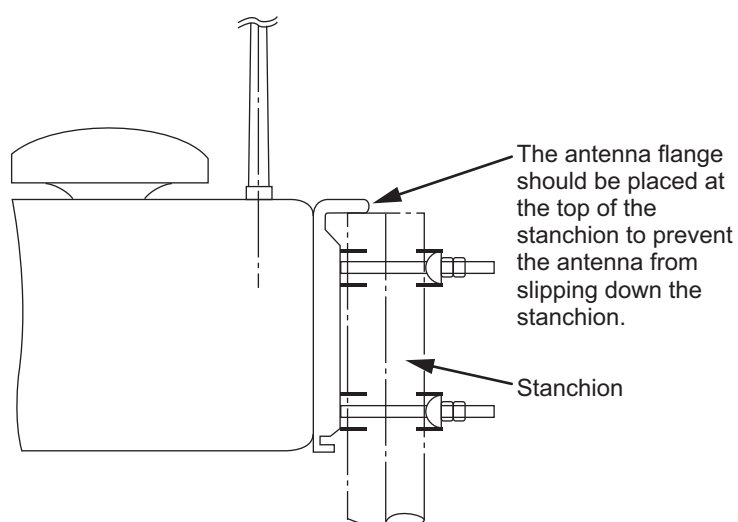
1. Dismount the bottom cover, cut the cable-tie inside the unit and take out the coaxial connector attached to the combined box.
2. Loosen four screws to loosen whip antenna fixture and pull out the coaxial connector coming from the combined box through the hole in the whip antenna fixture.
3. Connect the coaxial connector to the whip antenna base and wrap the junction part of the whip antenna with vulcanizing tape and then vinyl tape for waterproofing.
4. Insert the whip antenna from the top of the combined antenna.
5. Secure the whip antenna with whip antenna fixture.
6. Using a new cable tie (supplied), secure the cables and coaxial connector inside the antenna case.
7. Mount the bottom cover.
8. Fix the GPS/VHF combined antenna to the ship's stanchion (40 to 50 mm diameter) with antenna fixing brackets, flat washers and hex. nuts.

**Note:** Coat the exposed parts of bolts and nuts with marine sealant (local supply).



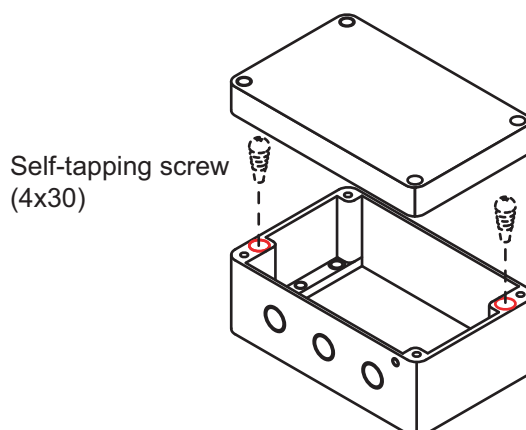


*GPS/VHF Combined antenna*



### **How to install distributor unit DB-1**

The length of the cable between the distributor unit and transponder unit is 1 m so locate the distributor unit within 1 m from the transponder unit. Fix the distributor unit on the bulkhead, facing the cable entrance downward. Remove the lid of the distributor unit and secure the unit with two self-tapping screws.



**Note:** Be sure no foreign material or water enters the distributor unit.

## 1.1.3 GPS antenna unit (GPA-017S)

Install the GPS antenna unit referring to the outline drawing at the back of this manual.

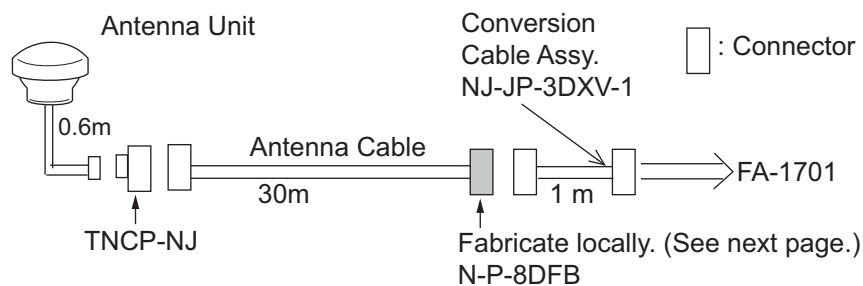
When selecting a mounting location for the antenna, keep in mind the following points.

- Select a location out of the radar beam. The radar beam will obstruct or prevent reception of the GPS satellite signal.
- There should be no interfering object within the line-of-sight to the satellites. Objects within line-of-sight to a satellite, for example, a mast, may block reception or prolong acquisition time.
- Mount the antenna unit as high as possible to keep it free of interfering objects and water spray, which can interrupt reception of GPS satellite signal if the water freezes.

### How to extend the antenna cable

Three types of antenna cable extensions are optionally available.

#### a) Antenna cable set CP20-02700



#### ● Securing and waterproofing the connector

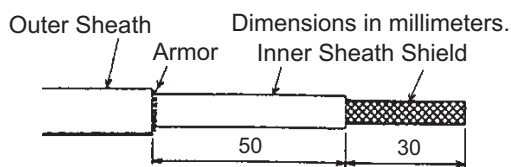
Referring to the figures in section 2.2.1 secure and waterproof the connections.

#### b) Antenna cable set CP20-02720 (8D-FB-CV, 40m)/CP20-02710 (8D-FB-CV, 50m)

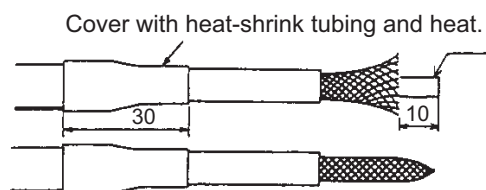
Connect the cable the same as a) above.

#### c) Cable type RG-10/UY (shipyard supply)

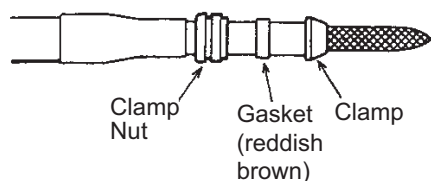
**Note:** The length of this cable should be less than 20 m to prevent signal loss. The coax. coupling cable assy.(type: NJ-TP+3DXV-1, code no. 000-123-809-10), coaxial connector (N-P-8DFB; supplied), vulcanizing tape and vinyl tape are required. Fabricate both ends of the cable as shown in the figure on the next page.

**How to attach the connector N-P-8DFB for cable 8D-FB-CV**

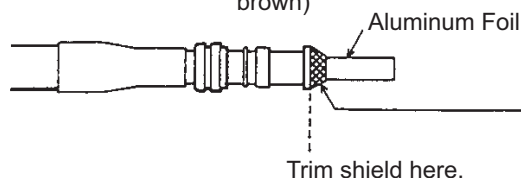
Remove outer sheath and armor by the dimensions shown left.  
Expose inner sheath and shield by the dimensions shown left.



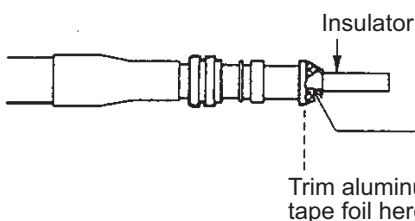
Cut off insulator and core by 10mm.



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



Fold back shield over clamp and trim.

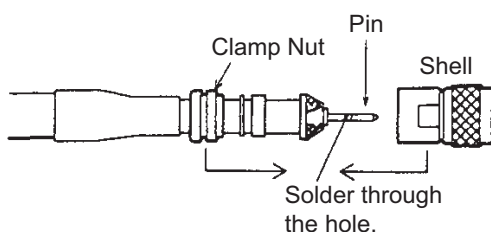


Fold back aluminum foil onto shield and trim.



Expose the insulator by 1mm.

Expose the core by 5mm.



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

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

## 1.1.4 VHF antenna (FAB-151D, option)

### Location

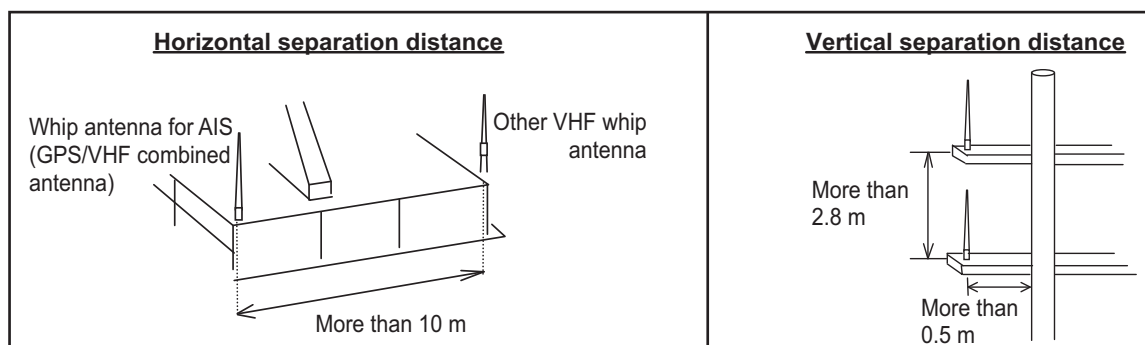
The location of the mandatory AIS VHF-antenna should be carefully considered. Digital communication is more sensitive than analog/voice communication to interference created by reflections in obstructions like masts and booms. It may be necessary to relocate the VHF radiotelephone antenna to minimize interference effects.

To minimize interference effects, the following guidelines apply:

- The AIS VHF antenna should be placed in an elevated position that is as free as possible with a minimum of 0.5 meters in the horizontal direction from constructions made of conductive materials. The antenna should not be installed close to any large vertical obstruction. The objective for the AIS VHF antenna is to see the horizon freely through 360 degrees.
- The AIS VHF antenna should be installed safely away from interfering high-power energy sources like radar and other transmitting radio antennas, preferably at least 3 meters away from and out of the transmitting beam.
- There should not be more than one antenna on the same plane. The AIS VHF antenna should be mounted directly above or below the ship's primary VHF radiotelephone antenna, with no horizontal separation and with a minimum of 2.8 meters vertical separation. If it is located on the same plane as other antennas, the distance apart should be at least 10 meters.

### Cabling

- The cable should be kept as short as possible to minimize signal attenuation. Coaxial cables equal to or better than RG10U/Y are recommended.
- All outdoor-installed connectors on coaxial cables should be fitted with preventive isolation such as vulcanizing tape to protect against water penetration into the antenna cable.
- Coaxial cables should be installed in separate signal cable channels/tubes and at least 10 cm away from power supply cables. Crossing of cables should be done at right angles (90°). The minimum bend radius of the coaxial cable should be 5 times the cable's outer diameter.
- Install the VHF whip antenna referring to the outline drawing at the back of this manual. Separate this antenna from other VHF radiotelephone antennas as shown below to prevent interference to the FA-170.

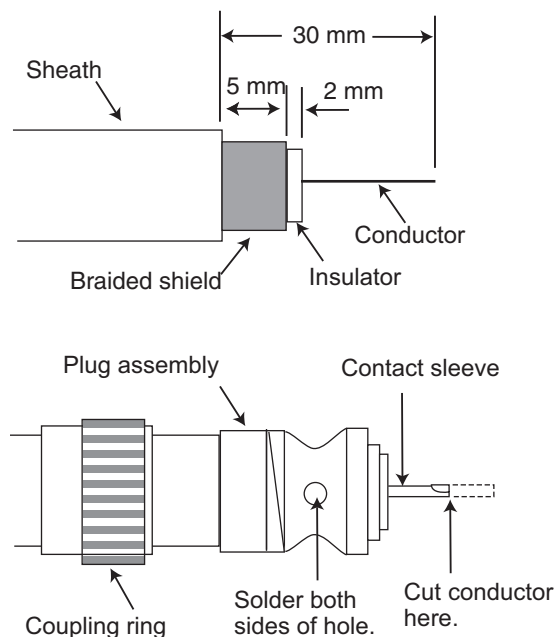


When coaxial cable RG-10/U(Y) (shipyard supply) is used, attach the coaxial plug M-P-7 (dockyard supply) as shown on the following page.

### **How to attach the plug M-P-7**

Lay the coaxial cable and attach an M-type plug (if necessary) to the cable as follows.

1. Remove the sheath by 30 mm.
2. Bare 23 mm of the center conductor. Trim braided shield by 5 mm and tin.
3. Slide coupling ring onto cable.
4. Screw the plug assembly on the cable.
5. Solder plug assembly to braided shield through solder holes. Solder contact sleeve to conductor.
6. Screw coupling ring into plug assembly.



## **1.2 How to Install the FA-1702 Monitor Unit**

The monitor unit can be installed on a desktop, overhead (bulkhead) or flush mounted in a panel. Install it on the chart table or near the steering place, referring to the outline drawing.

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

- Keep the unit out of direct sunlight.
- The temperature and humidity should be moderate and stable.  
(Operating temperature range: -15°C to +55°C)
- Locate the unit away from exhaust pipes and vents.
- The mounting location should be well ventilated.
- Mount the unit where shock and vibration are minimal.
- Keep the unit away from electromagnetic field generating equipment such as motor, generator.
- For maintenance and checking purposes, leave sufficient space at the sides and rear of the unit and leave slack in cables. Refer to the outline drawing.
- A magnetic compass will be affected if the unit is placed too close to it. Observe the following compass safe distances to prevent disturbance to the magnetic compass:
  - Standard compass: 0.65 meters
  - Steering compass: 0.40 meters
- For flush mount installation, make sure the mounting location is flat.
- To avoid damage to the cabling when mounting the FA-1702, make sure the cabling is not excessively bent.

**Note:** The cabling to the FA-170 should be completed before mounting the unit. See "How to connect the FA-1702 monitor unit" on page 2-5.

## 1. MOUNTING

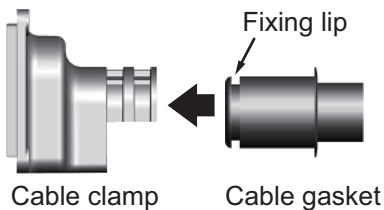
### 1.2.1 How to fit the optional waterproofing kit (OP05-139)

The optional waterproofing kit must be fitted at the same time as the cabling is connected to the FA-1702. The kit contains the following items:

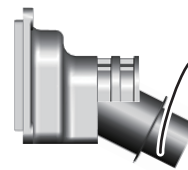
- Cover gasket (Code:100-403-800-10) ×1
- Cable gasket (Code:100-403-791-10) ×1

1. Unfasten the four screws on the rear cable clamp, then remove the cable clamp to reveal the WAGO connector.
2. Fit the cable gasket to the cable clamp, referring to the figure below.

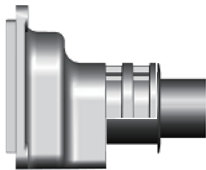
1. Fit the cable gasket to the cable clamp, passing the fixing lip partially through the cable clamp.



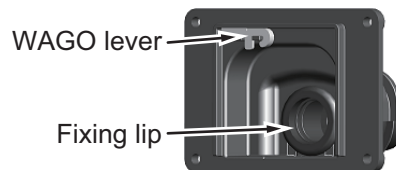
2. To pass the fixing lip completely through the cable gasket, twist the cable gasket gently.



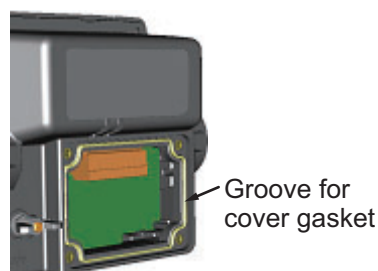
3. Check that the cable gasket is flush against the cable clamp, as shown below.



4. Check that the cable gasket's fixing lip is flush against the inside of the cable clamp.



3. Pass the cabling through the cable gasket and cable clamp.
4. Fit the cover gasket to the rear of the FA-1702. Make sure the cover gasket is placed inside the groove indicated in the figure below.



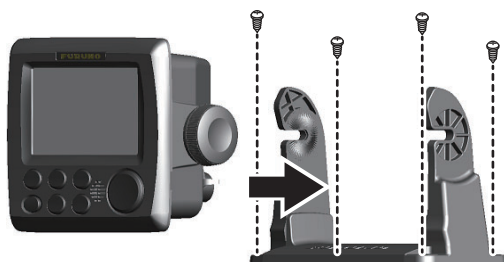
5. Connect the cabling to the FA-1702, referring to section 2.3.1.
6. Slide the cable clamp along the cable until the clamp is flush against the rear of the FA-1702.  
**Note:** The cable clamp must be oriented with the dome-side up, to prevent water intrusion.
7. Fasten the four screws removed at step 1.
8. Secure the cabling to the cable clamp with cable ties (included) referring to the figure in section 2.3.1.

### 1.2.2 How to install the FA-1702 on a desktop or bulkhead

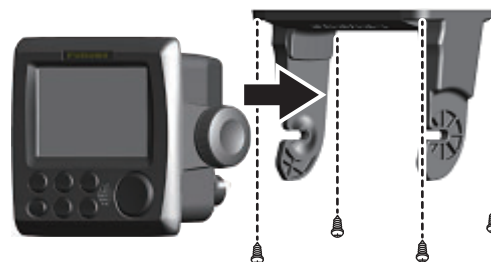
**Note 1:** The example figures in this procedure show the optional waterproofing kit OP05-139 attached.

**Note 2:** The cable clamp must be oriented with the dome-side up, to prevent water intrusion.

1. Fit the two knobs to the monitor unit, then loosely fasten the knobs. Leave approximately 30 mm of space between the knob and the monitor unit.
2. Secure the hanger to the desktop or overhead bulkhead with four self-tapping screws (5×20). The hanger should be oriented with the insertion slots facing forwards, to prevent the monitor unit being dislodged during operation.



Desktop mounted



Roof (bulkhead) mounted

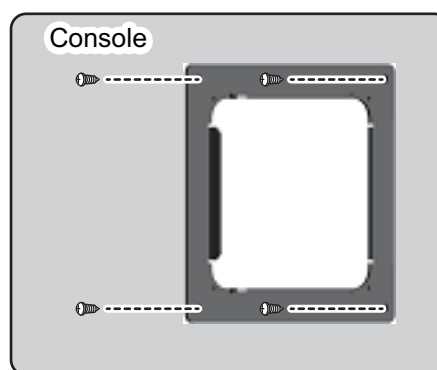
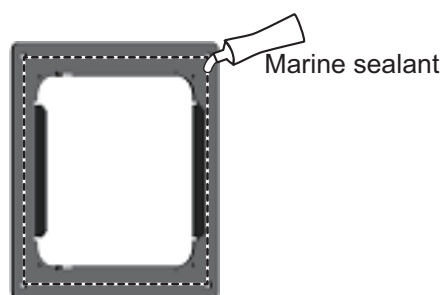
3. Fit the monitor unit to the hanger, then fasten the two knobs evenly.

### 1.2.3 How to flushmount the FA-1702

**Note 1:** The figures and procedure below show the optional front fixing panel (OP24-35) and the optional waterproofing kit (OP05-139).

**Note 2:** It is recommended to have marine sealant prepared before beginning this installation.

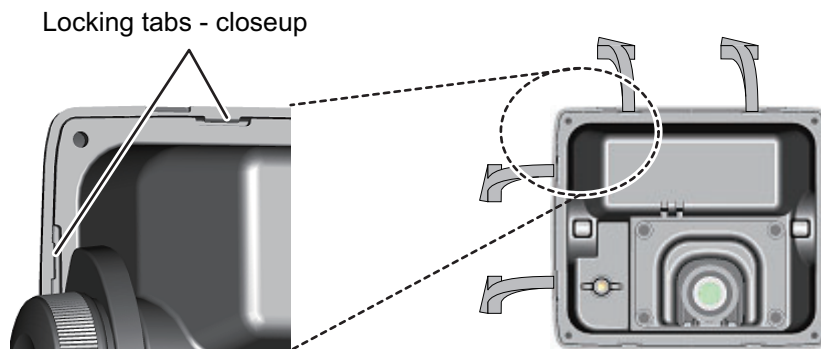
1. Cut a hole in the mounting location, using the template at the back of this manual.
2. Apply a thin bead of marine sealant to the rear of the front fixing panel (option) as indicated in the figure below.



3. Place the front fixing panel in the cutout, then secure the panel using the screws included in the kit (OP24-35). Allow sufficient time for the marine sealant to cure before proceeding to the next step.  
Where the optional front fixing panel is not used, proceed to step 4.

## 1. MOUNTING

- Referring to the figure below, unlock two adjoining sides of the front panel, then remove the front panel. To unlock the front panel, lift the locking tabs gently, then pull the locking tabs away from the unit.



Rear view of FA-1702

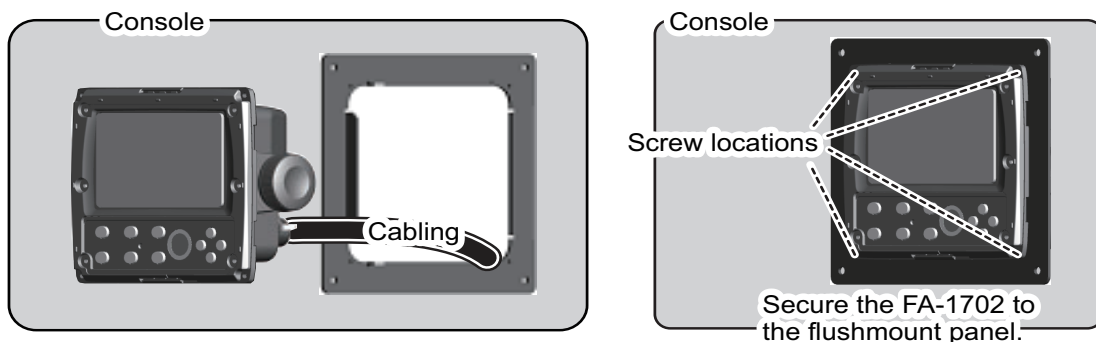
- Referring to the figure below, fit the optional F Mount Cushion Kit (OP05-141) to the rear of the FA-1702. Take care to align the screw holes in the cushion to the screw holes on the FA-1702. Where the optional kit is not used, proceed to step 6.

Step 4:



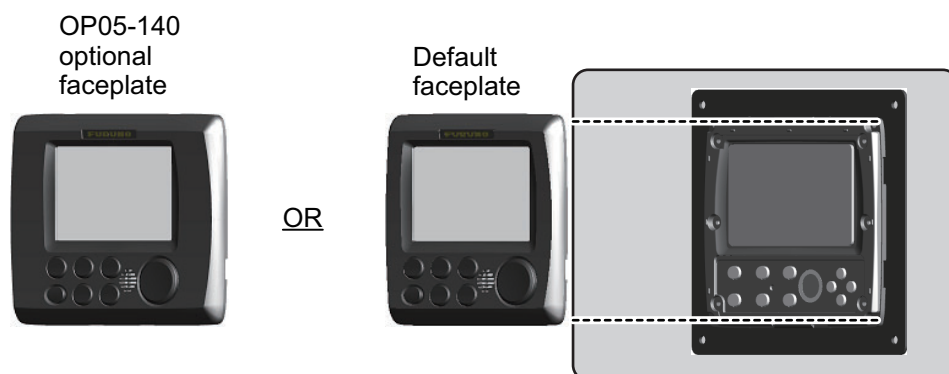
Fit the F Mount Cushion Kit (option) to the location shown above.

- Run the cabling through the cutout, then, referring to section 2.3.1, connect the necessary cabling to the FA-1702.

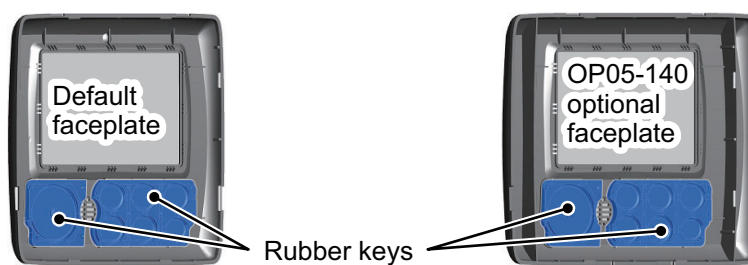


- Referring to the figure above, fit the FA-1702 to the cutout, then use the supplied screws to secure the FA-1702 the flush mount panel. Note that the screw location for fixing the FA-1702 to the cutout with no flushmount panel is the same as indicated in the figure above.

8. Fit the front panel to the FA-1702. For FA-150 to FA-170 retrofits, use the optional replacement kit (OP05-140). See the figure below for reference.



FA-170 front panel - rear view



For FA-150 retro-fits, carefully remove the rubber keys from the supplied front panel, then fit the rubber keys to the optional front panel.

### 1.3 How to Install the FA-1701 Transponder Unit

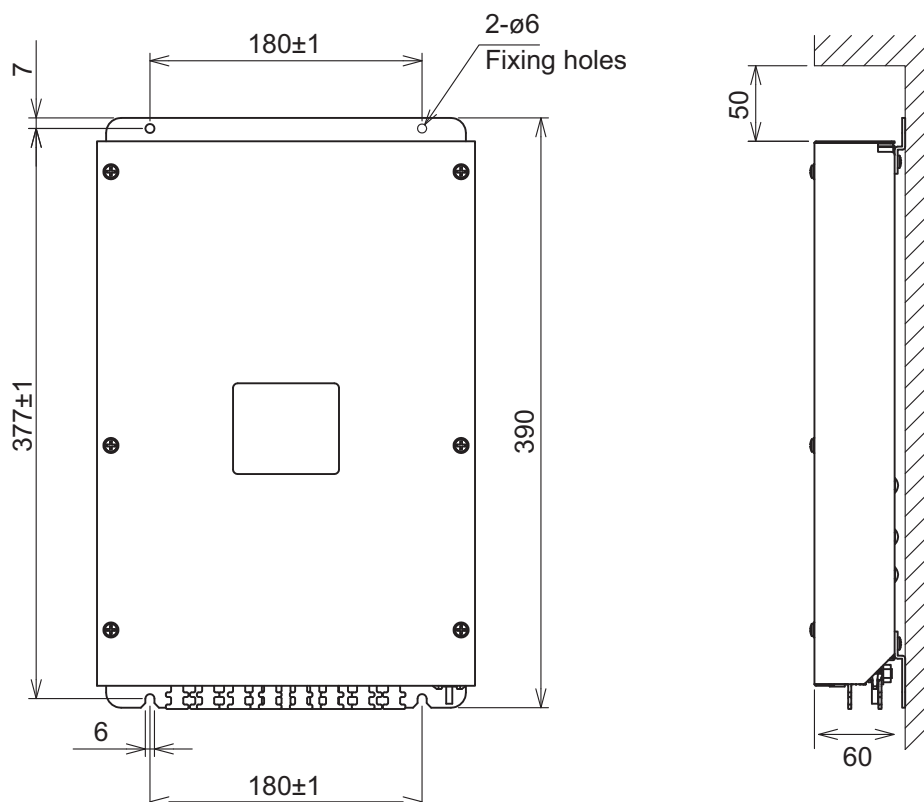
Mount the transponder where it is protected from rain and water splash. This unit can be installed on a bulkhead, wall or on the floor. Install it referring to the outline drawing at the back of this manual for dimensions.

When selecting a mounting location for the transponder, keep the following in mind:

- Keep the transponder out of direct sunlight.
- The temperature and humidity should be moderate and stable.  
(Operating temperature range: -15°C to +55°C)
- Locate the unit away from exhaust pipes and vents.
- The mounting location should be well ventilated.
- Mount the unit where shock and vibration are minimal.
- Keep the unit away from electromagnetic field generating equipment such as motor, generator.
- For maintenance and checking purposes, leave sufficient space at the sides and rear of the unit and leave slack in cables. Refer to the outline drawing.
- A magnetic compass will be affected if the unit is placed too close to it. Observe the following compass safe distances to prevent disturbance to the magnetic compass:  
Standard compass: 1.70 meters  
Steering compass: 1.10 meters
- Avoid floor mounting the transponder in locations where there is water splash. Keep the cable entry away from water spray and splash.

#### **Mounting**

Secure the unit to the mounting location with four self-tapping screws (5×20 SUS304, supplied).



## 1.4 How to Install the PR-240 Power Supply (option)

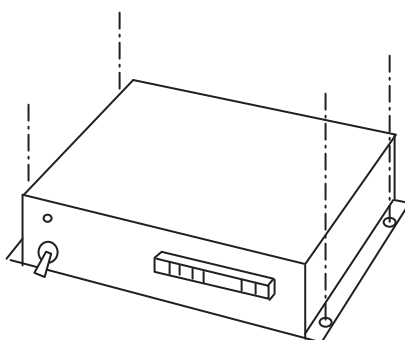
When selecting a mounting location for the unit, keep the following in mind:

- Keep the unit out away from areas subject to water splash.
- Locate the unit away from exhaust pipes and vents.
- The mounting location should be well ventilated.
- Mount the unit where shock and vibration are minimal.
- A magnetic compass will be affected if the unit is placed too close to it. Observe the following compass safe distances to prevent disturbance to the magnetic compass:

Standard compass: 0.90 meters

Steering compass: 0.60 meters

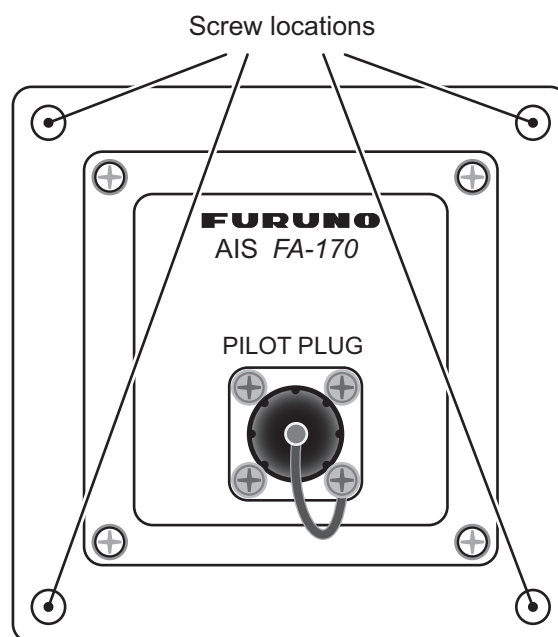
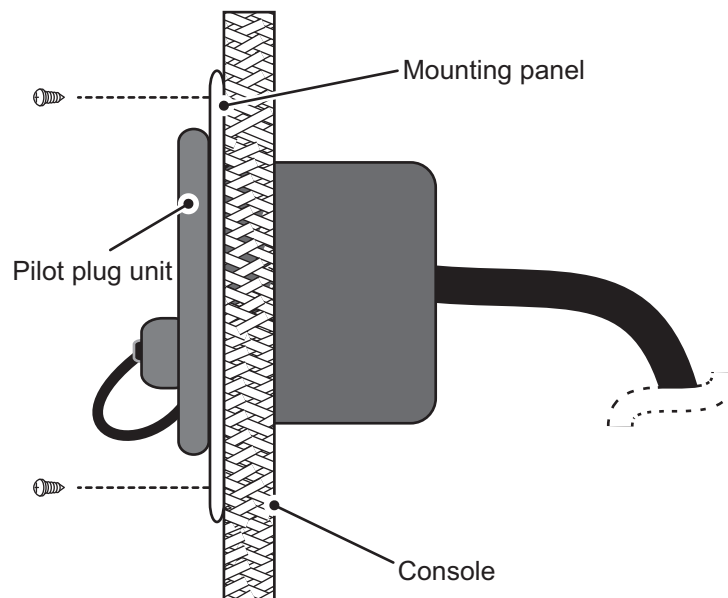
Fix the unit with four self-tapping screws (4x16) to a desktop or the deck as shown in the figure below. It is not necessary to open the cover.



## 1.5 How to Install the FA-1703 Pilot Plug Unit (option)

The pilot plug unit is only available in flushmount configuration and should be mounted near where the pilot steers the ship. This plug is used to connect a PC to display AIS information for use by the pilot.

1. Cut a mounting hole in the mounting location, referring to the outline drawing at the back of this manual for mounting dimensions.
2. Feed the necessary cables through the cutout, then referring to chapter 2, connect the pilot plug unit.
3. Set the pilot plug unit to the cutout. Use caution to prevent damage to cables when setting the pilot plug unit into the cutout.

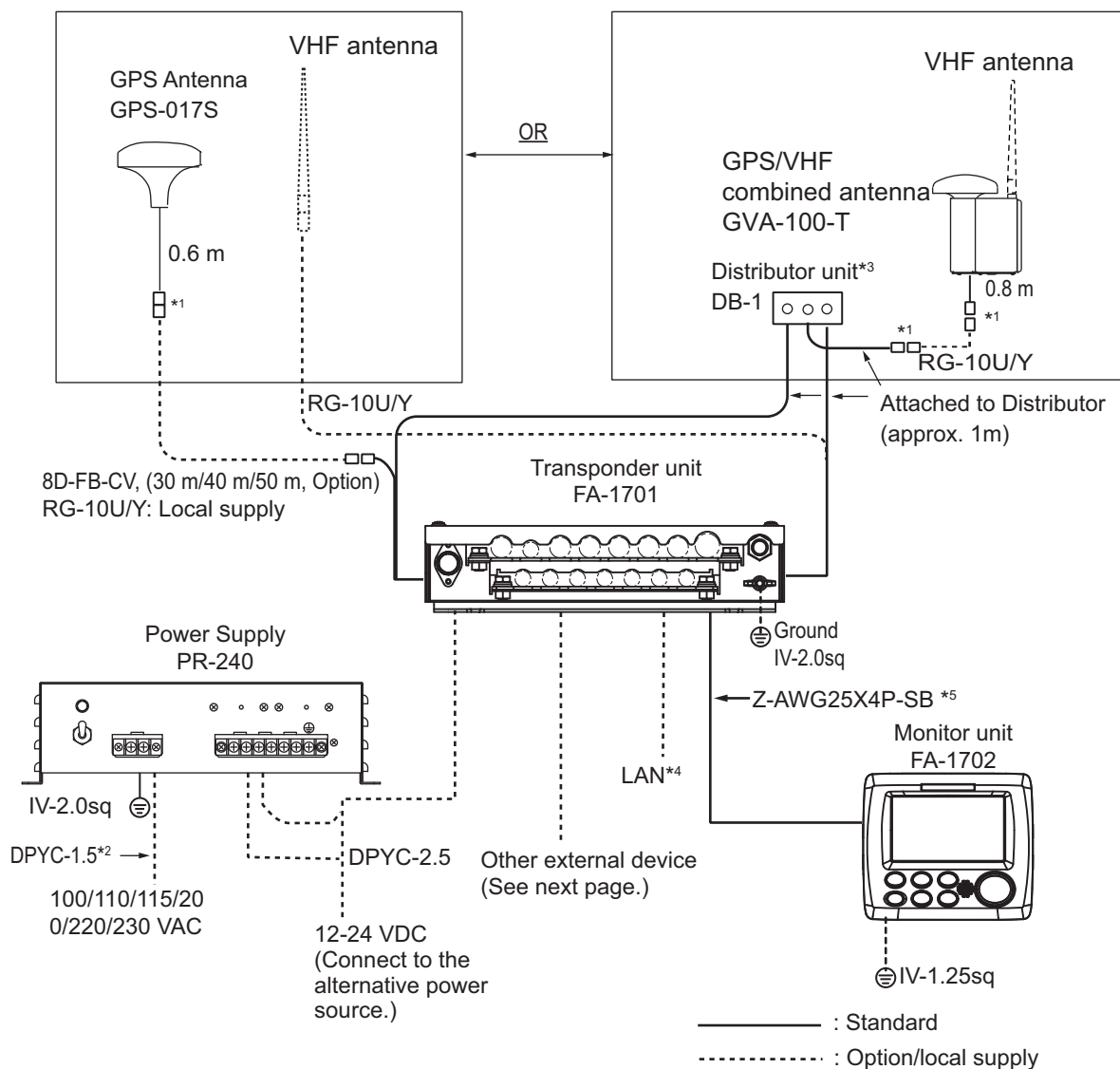


4. Secure the pilot plug unit in place with the supplied screws, referring to the figures above.

## 2. WIRING

### 2.1 Connection Overview

Connect the equipment, referring to the interconnection diagram at the back of this manual.



| Power supply specifications |                                        |
|-----------------------------|----------------------------------------|
| Transponder Unit            | 12-24 VDC, 6-3 A                       |
| Monitor Unit                | 12 VDC, 0.3 A max.                     |
| AC/DC Power Supply Unit     | 100-115/200-230 VAC, 1 phase, 50/60 Hz |

\*1: Connections must be waterproofed. See "How to secure and waterproof exposed connections" on page 2-2.

\*2: DPYC-2.5, TTYCSLA-1, TTYCSLA-1Q, TTYCSLA-4 and TTYCSLA-7 are Japan Industry Standard cables. Use them or the equivalents, referring to the "JIS CABLE GUIDE" on page AP-1.

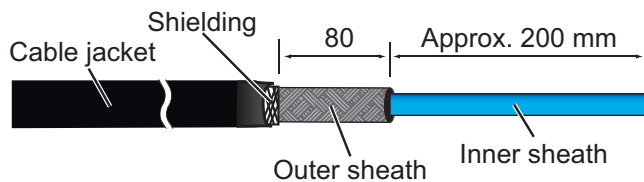
\*3: Ground is not required.

\*4: When connecting the LAN cable, leave approx. 200 mm slack before clamping the cable at the cable clamps.

\*5: Cable type varies depending on configuration. Z-AWG25X4P-SB cable may be substituted for TTYCSLA type cable or locally supplied cable.

## 2.2 How to Fabricate the Cables

### LAN cable fabrication



Expose the inner and outer sheaths as shown to the left.

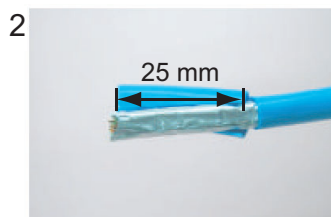


Cover the cable jacket with insulated tape (20 mm width)

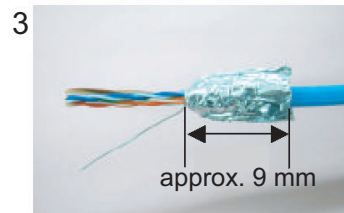
Cover the cable jacket at the cut as shown to the left.



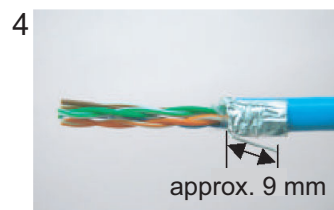
Expose inner vinyl sheath.



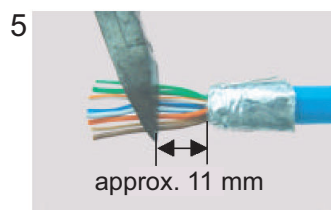
Remove the outer sheath by approx 25 mm. Be careful not to damage inner shield and cores.



Fold back the shield, wrap it onto the outer sheath and cut it, leaving 9 mm.



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



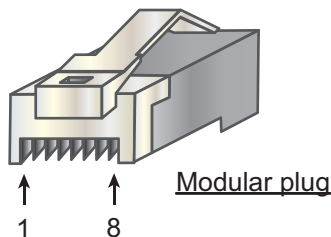
Straighten and flatten the cores in order then cut them, leaving 11 mm.



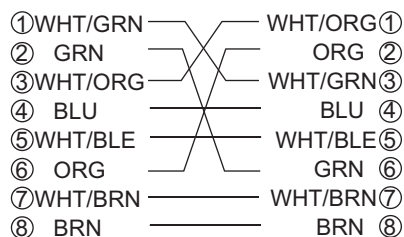
Insert the cable into the modular plug so that the folded part of the shield enters the modular plug. The drain wire must be on the tab side of the jack.



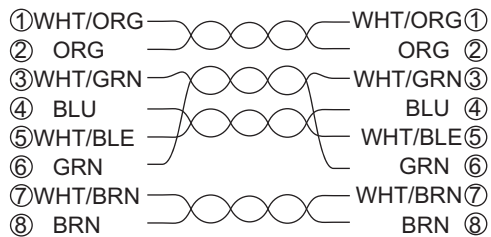
Using special crimping tool MPT5-8AS (PANDUIT CORP.), crimp the modular plug. Finally check the plug visually.

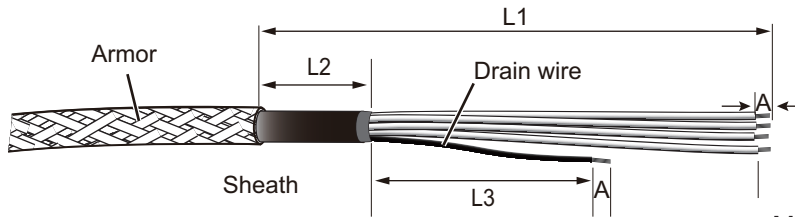


[Cross-over cable]



[Straight cable]



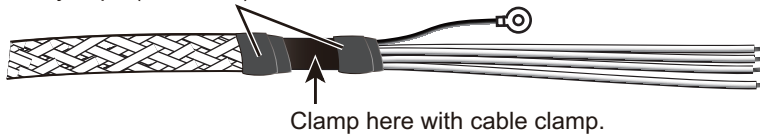
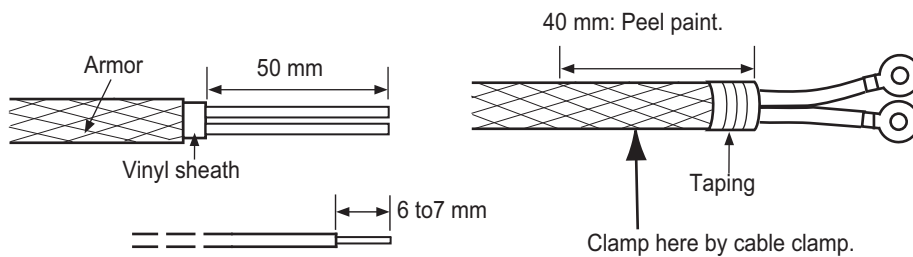
**Fabrication of cables TTYCSLA-4, TYCSLA-7, TTYCSLA-1Q and TTYCSLA-1**

Measurements are displayed in mm

| Unit    | L1  | L2  | L3 | A |
|---------|-----|-----|----|---|
| FA-1701 | 200 | 80  | 80 | 6 |
| FA-1702 | 140 | 80  | 60 | 6 |
| FA-1703 | 180 | 100 | 80 | 9 |

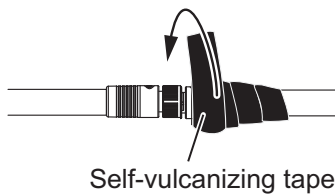
Using the terminals supplied on the inside of the FA-1701, fit the drain wire of each TTYCSLA cable with a terminal, then attach the terminal to the inside of the FA-1701 (the same place it was situated originally).

Vinyl tape (Width: 20)

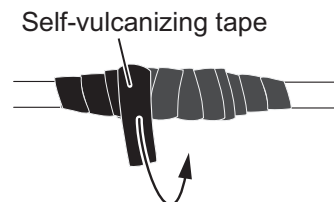
**Fabrication of power cable DPYC-2.5****2.2.1 How to secure and waterproof exposed connections**

All exposed connections between units should be secured and waterproofed using the procedure below.

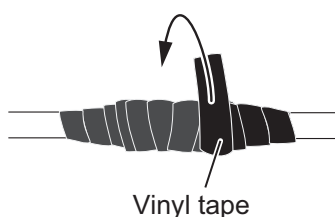
1) Wrap the connection with self-vulcanizing tape.



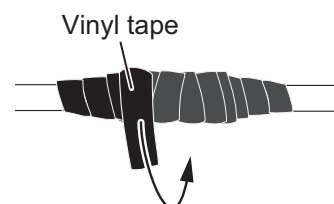
2) Wrap a second layer of self-vulcanizing tape in the opposite direction.



3) Wrap vinyl tape over the self-vulcanizing tape.



4) Wrap a second layer of vinyl tape in the opposite direction.



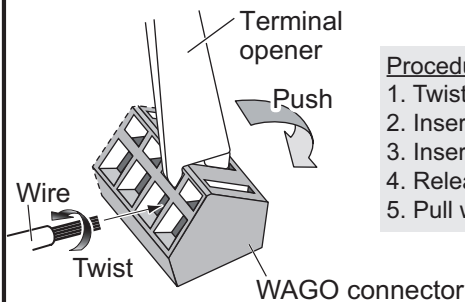
## 2.3 Unit Interconnection

The transponder unit (FA-1701), monitor unit (FA-1702) and the pilot plug unit (FA-1703) use different connectors for interconnection. See the figures below to fabricate the connections.

### How to attach wires to the connectors

#### Transponder unit FA-1701

Terminal opener is located on rear of the FA-1701 cover.



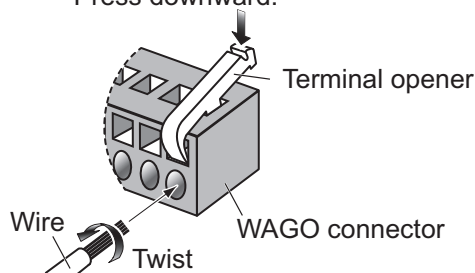
#### Procedure

1. Twist core.
2. Insert terminal opener and push.
3. Insert wire into hole. Be careful not to pinch the sheath.
4. Release terminal opener.
5. Pull wire to confirm it is correctly inserted.

#### Monitor unit FA-1702

Terminal opener is located inside cable clamp (rear cover).

Press downward.



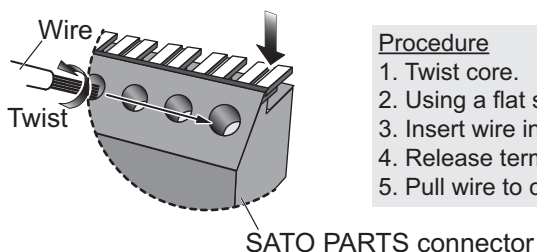
#### Procedure

1. Twist the cores.
2. Press the terminal opener downward.
3. Insert the wire to hole.
4. Remove the terminal opener.
5. Pull the wire to confirm that it is secure.

#### Pilot plug unit FA-1703

Use a flat head screwdriver to open the terminals.

Press downward.

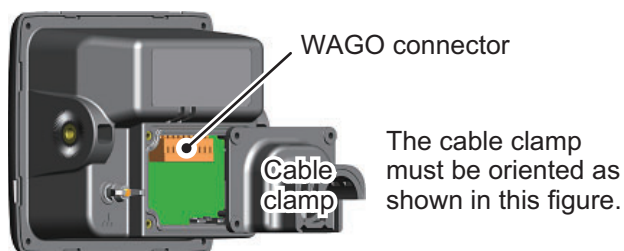


#### Procedure

1. Twist core.
2. Using a flat screw driver, press the terminal opener.
3. Insert wire into hole. Be careful not to pinch the sheath.
4. Release terminal opener.
5. Pull wire to confirm it is correctly inserted.

### 2.3.1 How to connect the FA-1702 monitor unit

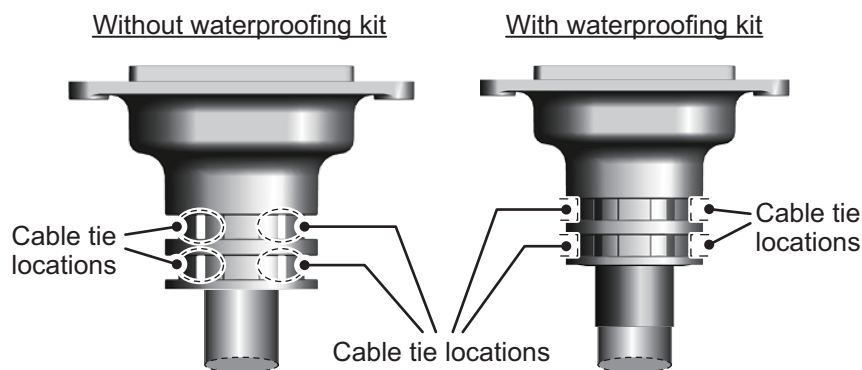
1. Unfasten the four screws on the rear cable clamp, then remove the cable clamp to reveal the WAGO connector.



2. Unplug the WAGO connector from the FA-1702.
3. Pass the cable through the cable clamp.
4. Referring to the table below and the interconnection diagram at the back of this manual, connect the FA-1702 using the WAGO connector inside the unit.

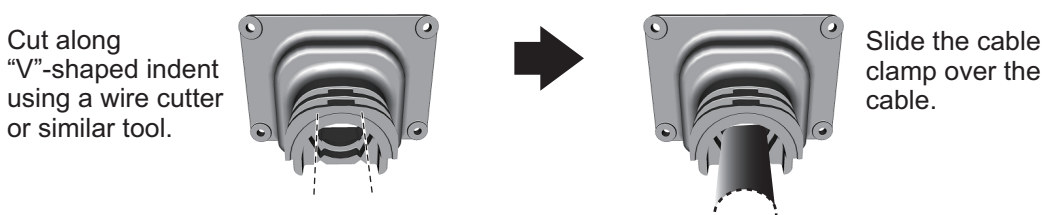
| WAGO Pin No. | Connection | WAGO Pin No. | Connection |
|--------------|------------|--------------|------------|
| 1            | P12V_P     | 6            | TD-B       |
| 2            | GND        | 7            | RD-A       |
| 3            | PON-H      | 8            | RD-B       |
| 4            | PON-C      | 9            | Drain wire |
| 5            | TD-A       |              |            |

5. Slide the cable clamp along the cable towards the FA-1702, then fasten the four screws which were removed at step 1. The cable clamp must be oriented as shown the figure above.
6. Secure the cable to the cable clamp with cable ties (included). The location of the cable ties is different, depending on whether the optional waterproofing kit is installed. Refer to the figure below for the correct locations.



In cases where the WAGO connector is connected to the cable before the cable is passed through the cable clamp, the cable clamp can be adjusted to allow connection.

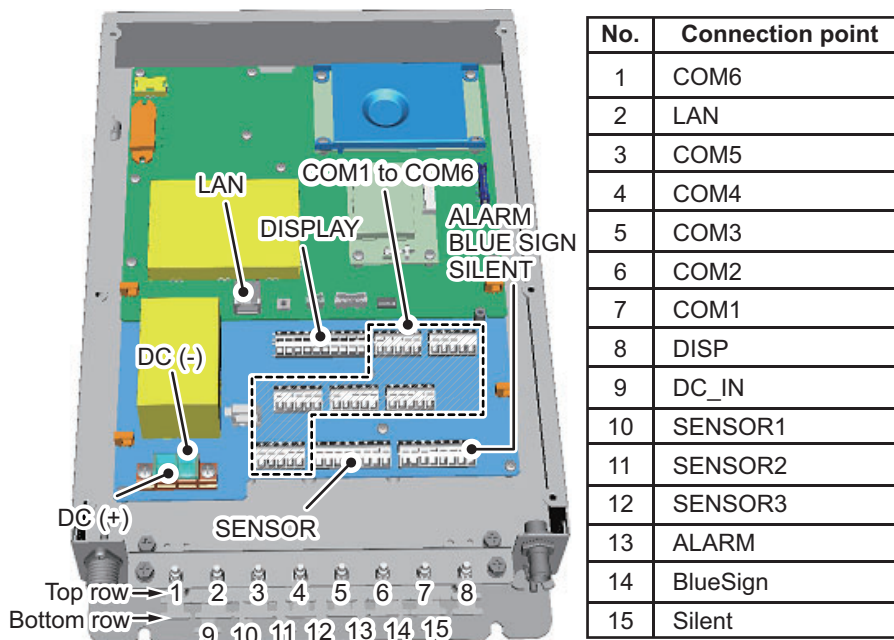
**Note:** Adjusting the cable clamp as outlined in the figure below voids the IPx5 waterproof rating of the clamp and the unit. To keep the IPx5 rating, remove the WAGO connector, then repeat the procedure above.



### 2.3.2 How to connect the FA-1701 transponder unit

Referring to the figure and table below, connect the FA-1701. The figure below also shows the recommended entry point for connected cables. (Based on a vessel configured to use all WAGO connection points.)

The WAGO connection points are individually marked on the PC board.



Cable entry #8 should be used for DISP cabling, regardless of vessel configuration, as the entry hole is larger than the other entry points.

Cable entry #2 should be used for LAN connection, regardless of vessel configuration, to avoid excess stress on the LAN cable.

| Port         | Description                                                                                                                                                                                   |
|--------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| COM1 to COM3 | Long range communication device (Inmarsat C, etc.) or External display (Radar, ECDIS, NAVNET2), BEACON or Pilot Plug Unit                                                                     |
| COM4 to COM6 | Long range communication device (Inmarsat C, etc.) or External display (Radar, ECDIS, NAVNET2), Pilot Plug Unit, BEACON or Sensor (GPS, Gyrocompass, Speed log, ROT)                          |
| DISPLAY      | Connects to Monitor Unit FA-1702.                                                                                                                                                             |
| ALARM        | Connects to on-board alarm system (BAMS, etc).                                                                                                                                                |
| BLUE SIGN    | Connects a Blue Sign device, a lighting device mounted on the bridge which gives off a blue light to warn oncoming vessels when your vessel is navigating a channel in the reverse direction. |
| SENSOR       | GPS, Gyrocompass, Speed log, ROT.                                                                                                                                                             |

**Note 1:** The cable entry points (for the top row only) are protected from foreign material with small plastic spacers. Remove the spacers as required when connecting cables to the FA-1701.

**Note 2:** For configurations with seven or less connections to the FA-1701, use the bottom row of cable entries.

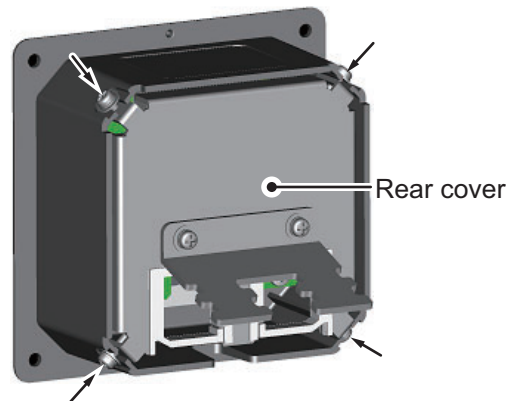
All cables should be secured at the cable clamps (indicated as #1 through #15 in the figure above) using cable ties (included). The LAN cable in particular should be secured with the outer sheath of the LAN cable on the cable clamp.

### 2.3.3 How to Connect the FA-1703 (Pilot Plug Unit, optional)

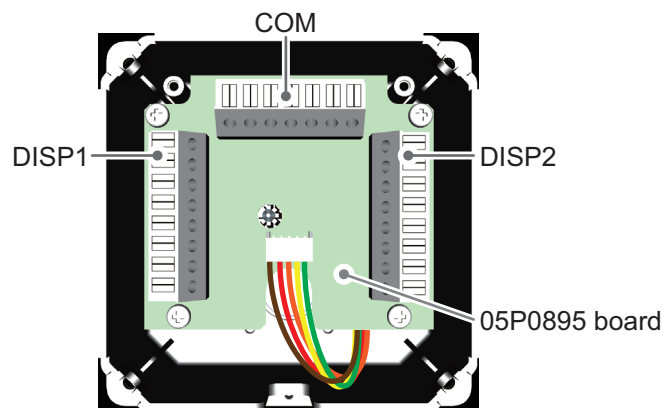
The FA-1703 is shipped with a flushmount panel attached. The flushmount panel can be removed to suit your installation needs.

The example figures below show the FA-1703 without a flushmount panel.

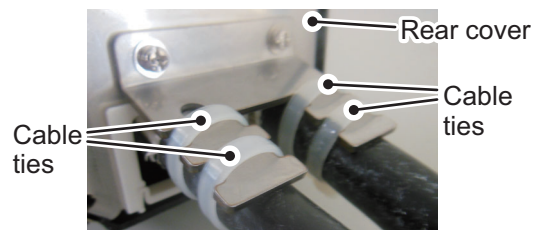
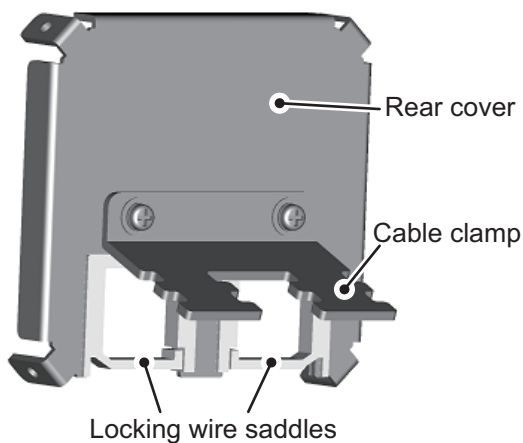
1. Unfasten the four screws at the locations indicated with arrows in the figure below.



2. Remove the rear cover of the FA-1703. The 05P0895 board, with three SATO PARTS connectors is exposed.



3. Referring to "Unit Interconnection" on page 2-4 and the interconnection diagram at the rear of this manual, connect the FA-1703.
4. Pass the connected cables through the locking wire saddle on the rear cover, then fit the rear cover to the FA-1703.



5. Fasten the four screws removed at step 1, then secure the connected cables to the cable clamp with cable ties.

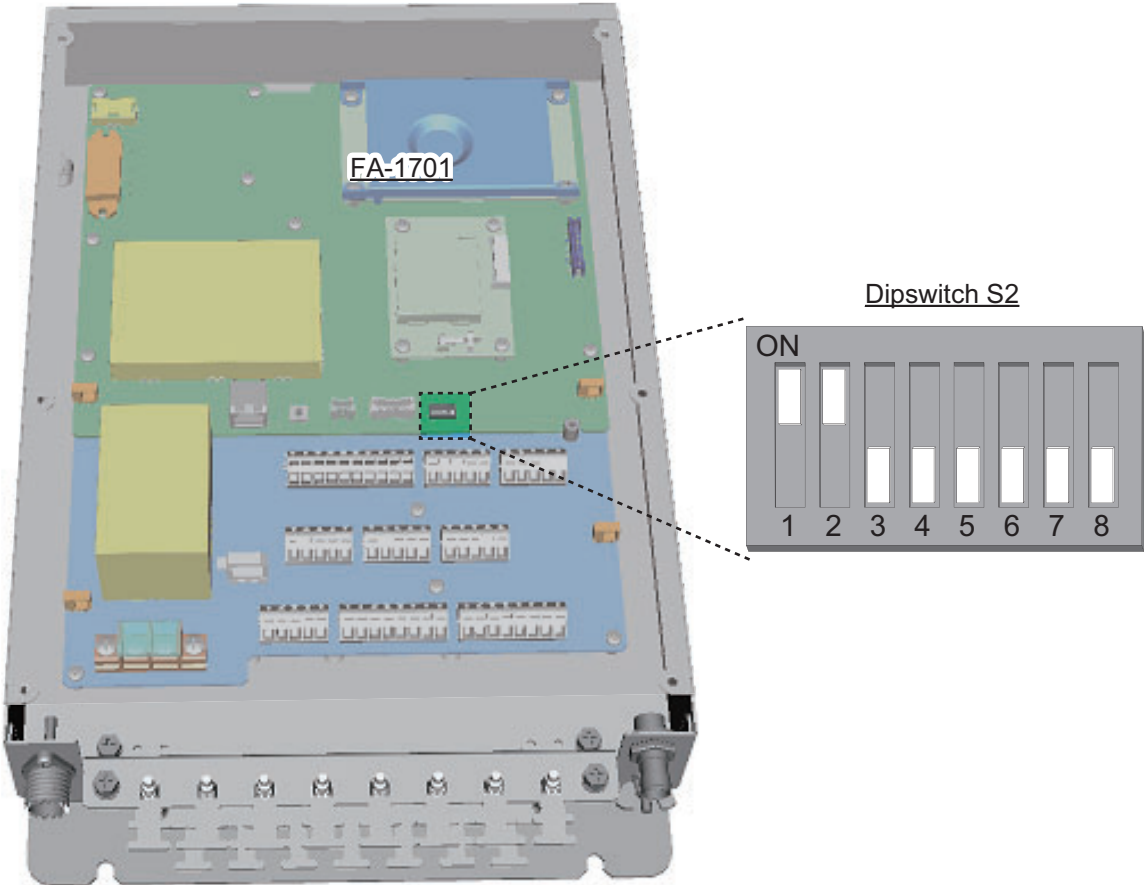
# 2.4 How to Terminate COM ports (For IEC 61162-1/2 signal)

When the output/input signal used is IEC61162-1/2 format, termination is required at the dipswitch (S2) as follows. The dipswitch is located on the TRX-PWR board, see the figure below.

COM ports 3 to 6 are pre-terminated.

**Note 1:** Incorrect setting of the termination may cause communication errors.

**Note 2:** The factory default for all switches on dipswitch S2 is OFF.



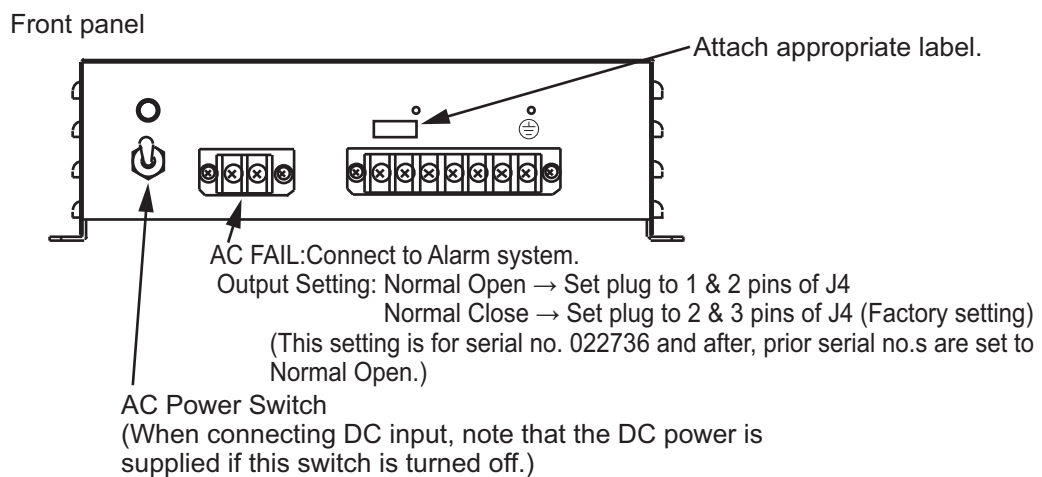
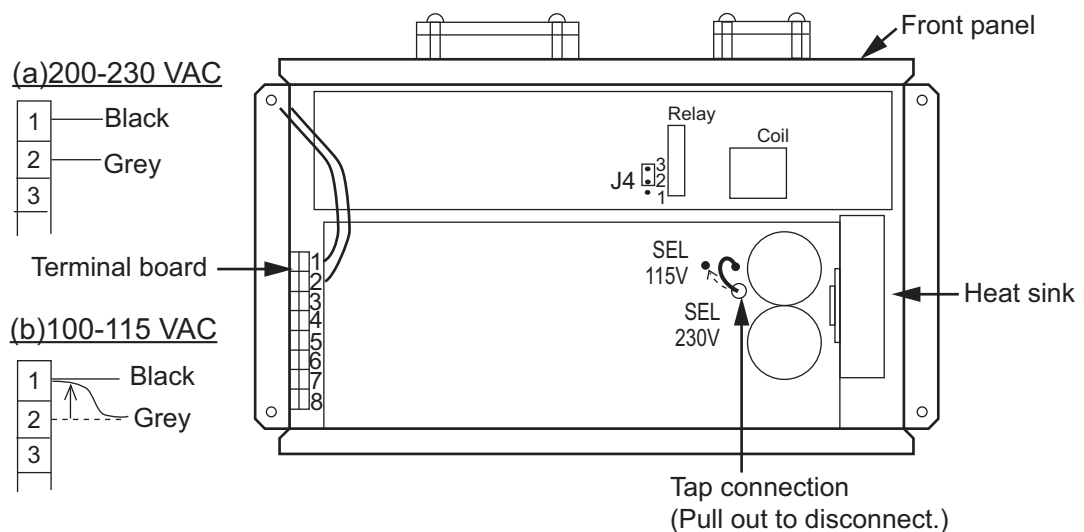
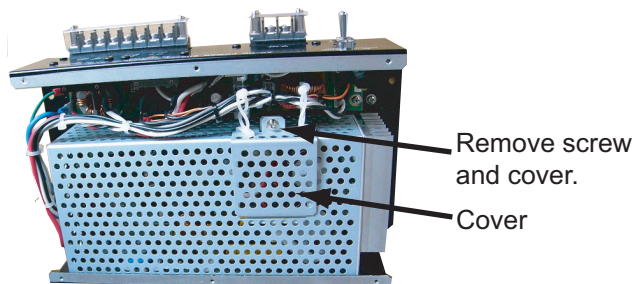
| COM port | Termination      |
|----------|------------------|
| COM1     | Set S2 #1 to ON. |
| COM2     | Set S2 #2 to ON. |

**Note:** S2 #3 to #8 are for technical personnel only. Do not change these settings.

## 2.5 How to Change the Ship's Mains Specifications

The AC-DC power supply PR-240 is shipped ready for connection to a 200-230 VAC ship's mains. If the ship's mains is 100 VAC-115 VAC, change the tap connection and terminal board connection as below. Attach label supplied as accessories to the front panel according to the ship's mains.

| Ship's mains | Tap connection | Terminal board | Label                                      |
|--------------|----------------|----------------|--------------------------------------------|
| AC200-230V   | SEL 230 V      | Below (a)      | 200-230 VAC 2.5-2.0 A<br>1 $\phi$ 50/60 Hz |
| AC100-115V   | SEL 115 V      | Below (b)      | 100-115 VAC 4.0-3.5 A<br>1 $\phi$ 50/60 Hz |



**Note:** The DC output load must be less than 8A.

## 2. WIRING

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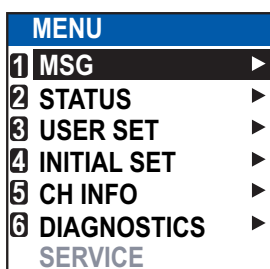
### 3. SETTING AND ADJUSTMENT

After installing the equipment, set up the own ship's static information (MMSI, IMO number, ship's name, call sign, type of ship and GPS antenna position). Also, set up the I/O ports.

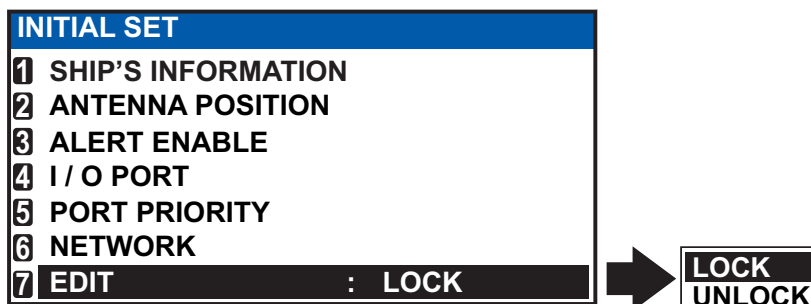
#### How to access the [INITIAL SET] menu

The [INITIAL SET] menu can be accessed at any time, however settings are password locked and require a qualified technician or dealer for password input.

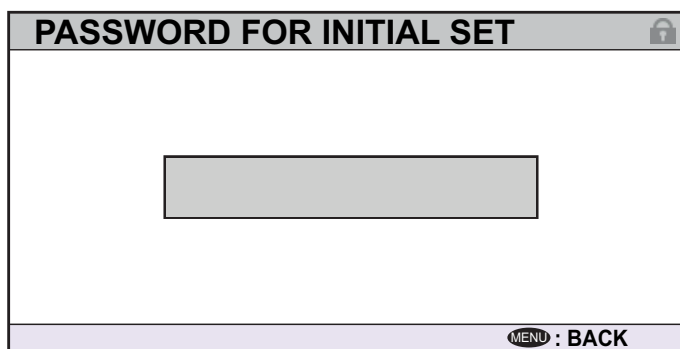
1. Press the **MENU/ESC** key to open the menu.



2. Select [INITIAL SET], then press the **ENT/ACK** key.
3. Select [EDIT], then press the **ENT/ACK** key. A pop up options window is displayed.



4. Select [UNLOCK], then press the **ENT/ACK** key. The password entry screen is displayed.

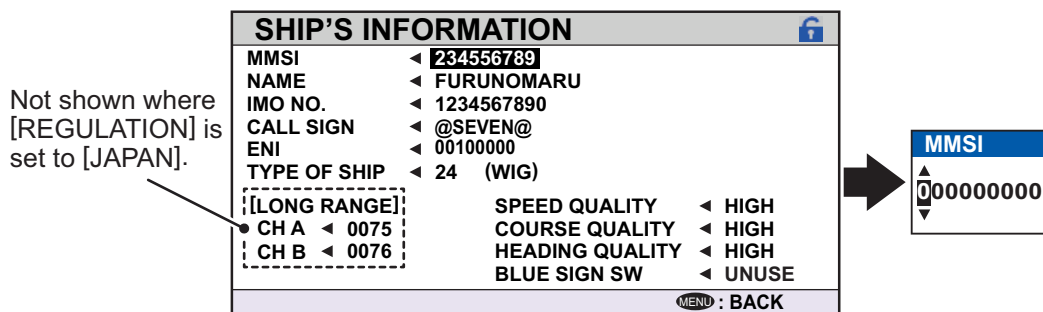


5. Input the password, then press the **ENT/ACK** key.

If the password is correct, the indication for [EDIT] reads "UNLOCK" and the [INITIAL SET] menu items can be edited. The lock icon, found on all settings screens also changes to a blue colored open lock icon.

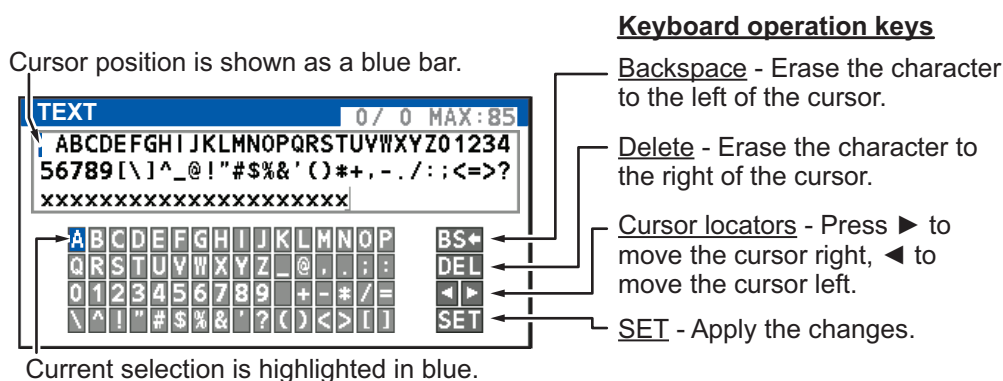
## 3.1 How to Set MMSI, IMO No., Name and Call Sign

1. Access the [INITIAL SET] menu, following the procedure outlined in "How to access the [INITIAL SET] menu" on page 3-1.
2. Select [SHIP'S INFORMATION], then press the **ENT/ACK** key.
3. Select [MMSI], then press the **ENT/ACK** key to display the [MMSI] pop up window.



**Note:** [ENI], [SPEED QUALITY], [COURSE QUALITY], [HEADING QUALITY] and [BLUE SIGN SW] are Inland AIS settings. These items do not appear for other AIS modes.

4. Use the arrow keys to set the [MMSI], then press the **ENT/ACK** key. The selected digit cycles through characters in the following order when **▲** is pressed: 1, 2 ... 9, 0, 1, 2... press **▼** to cycle through characters in the opposite direction. Press **▶** or **◀** to move the selection cursor.
5. Input the IMO number in a similar manner to MMSI.  
**IMO:** Ten digits. If the IMO number has 8 digits, enter "0" twice followed by IMO number. If the ship has no IMO number, enter ten zeros.
6. For [NAME] and [CALL SIGN], the software keyboard is displayed when the item is selected.



- 1) Referring to the figure above, press the arrow keys to select a character or keyboard operation.
- 2) Press the **ENT/ACK** key to confirm your selection.
- 3) Repeat steps 1 and 2 to complete the alphanumeric input.
- 4) Select [SET], then press the **ENT/ACK** key.
7. Select [TYPE OF SHIP] referring to section 1.5 of the operator's manual, then press the **ENT/ACK** key.
8. After entering data, press the **DISP** key to close the menu.

**Note:** If you enter incorrect data, do the procedure from step 1.

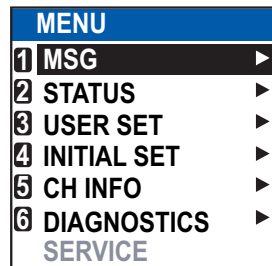
## 3.2 Inland AIS Specific Settings

This section shows how to activate and set up the Inland AIS feature. (If this feature is not required, go to "How to Set MMSI, IMO No., Name and Call Sign" on page 3-2.) The AIS activation key is obtained from the place of purchase.

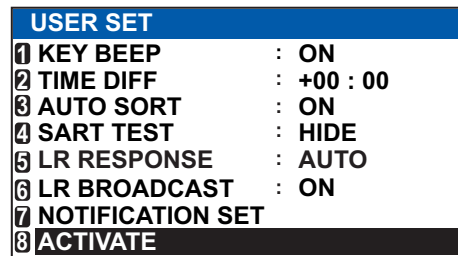
### 3.2.1 How to Activate the Inland AIS

Input your key number (received from dealer) to activate the Inland AIS.

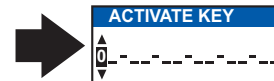
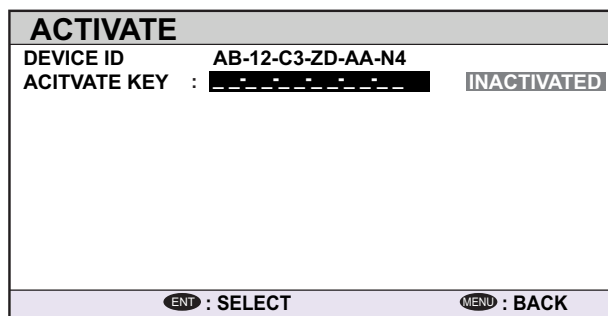
1. Press the **MENU/ESC** key to open the menu.



2. Select [USER SET] then press the **ENT/ACK** key.



3. Select [ACTIVATE] then press the **ENT/ACK** key.



4. Press the **ENT/ACK** key to display the alphanumeric pop up window.  
The selected digit cycles through characters in the following order when ▲ is pressed: 1, 2 ... 8, 9, A, B, C ... X, Y, Z, 1, 2... press ▼ to cycle through characters in the opposite direction. Press ► or ◀ to move the selection cursor.
5. Input the activation key, then press the **ENT/ACK** key.

If you entered the activation key correctly, the indication "ACTIVATED. SYSTEM WILL RESTART" appears then the system is automatically restarted.

### 3.2.2 How to set blue sign status

Blue sign (a day-sign), which in combination with a white flashing light, must be shown if you are sailing on the port-side shore (against traffic direction).

1. Access the INITIAL SET menu, following the procedure outlined in "How to access the [INITIAL SET] menu" on page 3-1.
2. Select [SHIP'S INFORMATION] then press the **ENT/ACK** key.
3. Select [BLUE SIGN SW], then press the **ENT/ACK** key. A pop up options window is displayed.

| SHIP'S INFORMATION |                |
|--------------------|----------------|
| MMSI               | ◀ 234556789    |
| NAME               | ◀ FURUNOMARU   |
| IMO NO.            | ◀ 1234567890   |
| CALL SIGN          | ◀ @SEVEN@      |
| ENI                | ◀ 00100000     |
| TYPE OF SHIP       | ◀ 24 (WIG)     |
| [LONG RANGE]       |                |
| CH A               | ◀ 0075         |
| CH B               | ◀ 0076         |
| SPEED QUALITY      | ◀ HIGH         |
| COURSE QUALITY     | ◀ HIGH         |
| HEADING QUALITY    | ◀ HIGH         |
| BLUE SIGN SW       | ◀ <b>UNUSE</b> |

➡

| BLUE SIGN SW |
|--------------|
| USE          |
| UNUSE        |

▲▼ : CURSOR    ENT : SELECT    MENU : BACK

4. Select [UNUSE] (not in use) or [USE] (in use) as applicable, then press the **ENT/ACK** key.

### 3.2.3 Other inland AIS specific settings

Inland AIS requires the following additional settings:

#### ENI:

1. Select [ENI], then press the **ENT/ACK** key to display the [ENI] pop up window.
2. Use the arrow keys to set the [ENI], then press the **ENT/ACK** key. The selected digit cycles through characters in the following order when ▲ is pressed: 1, 2 ... 9, 0, 1, 2... press ▼ to cycle through characters in the opposite direction. Press ► or ◀ to move the selection cursor.

#### Sensor quality

Set [SPEED QUALITY], [COURSE QUALITY] and [HEADING QUALITY] as follows:

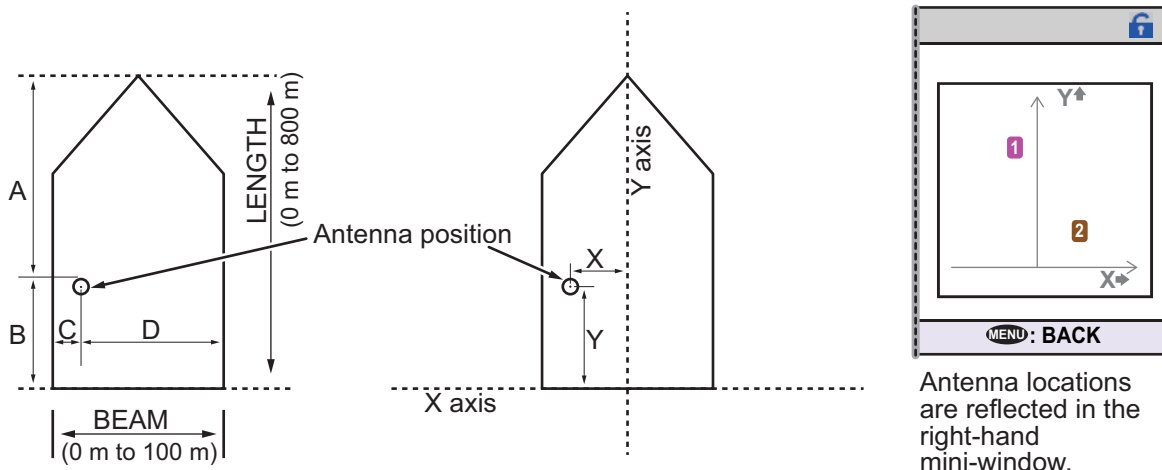
1. Select [SPEED QUALITY], then press the **ENT/ACK** key to display the [SENSOR QUALITY (SPEED)] pop up window.
2. Select the [HIGH] or [LOW] as appropriate, then press the **ENT/ACK** key.  
 Select [HIGH] where there is more are multiple referenced sensors, giving a higher quality reading.  
 Select [LOW] where there is only one or two sensors, giving a reading which may require periodic adjustment.
3. Set [COURSE QUALITY] and [HEADING QUALITY] in the same manner.

### 3.3 How to Set GPS Antenna Position

1. Access the [INITIAL SET] menu, following the procedure outlined in "How to access the [INITIAL SET] menu" on page 3-1.
2. Select [ANTENNA POSITION], then press the **ENT/ACK** key. The settings screen for [ANTENNA POSITION] is displayed.

| ANTENNA POSITION                            |   |         |         |
|---------------------------------------------|---|---------|---------|
| [SHIP SIZE]                                 | : | LENGTH  | BEAM    |
|                                             | : | 0m      | 0m      |
| [ANT POSN]                                  | : | Y       | X       |
| 1 INTERNAL                                  | : | 0m      | 0m      |
| 2 EXTERNAL                                  | : | 0m      | 0m      |
| [ANT POSN]                                  | : | ↕ A,B ↕ | ↔ C,D ↔ |
| 1 INTERNAL                                  | ◀ | 00,00   | 00,00   |
| 2 EXTERNAL                                  | ◀ | 00,00   | 00,00   |
| CURSOR: CURSOR    ENT: SELECT    MENU: BACK |   |         |         |

3. The [LENGTH] option is selected, press the **ENT/ACK** key to input the vessel length. The available range for length is 0 m to 800 m. Press the **ENT/ACK** key to apply the setting.
4. Select [BEAM], then press the **ENT/ACK** key to input the vessel beam. The available range for beam is 0 m to 100 m. Press the **ENT/ACK** key to apply the setting.



5. Select the Y indication for the internal antenna, then press the **ENT/ACK** key. A settings pop up window is displayed. The pop up shows the available setting range at the bottom.  
The Y axis coordinates are calculated from the stern of your vessel. The setting range varies depending on your vessel's dimensions.
6. Set the bow-stern location for the antenna, then press the **ENT/ACK** key.
7. Select the X indication for internal antenna, then press the **ENT/ACK** key.  
The X coordinates are calculated from the center of the vessel. Negative settings give a port-side positioning, positive settings give a starboard-side positioning.
8. Set the port-starboard location for the antenna, then press the **ENT/ACK** key.
9. Set the location for the external antenna, then press the **ENT/ACK** key. A settings pop up window is displayed. The pop up shows the available setting range at the bottom.  
**Note:** The settings for the antenna location are reflected at the bottom of the screen, in gray, as [A,B] for bow-stern positioning and [C,D] for port-starboard positioning, and the antenna numbers are also shown in the right-hand mini-window.
10. Press the **MENU/ESC** key to return to the [INITIAL SET] menu.