

# *Installation Manual*

## *Color Scanning Sonar*

### *Model FSV-35/FSV-35S*

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**ECF**

(Elemental Chlorine Free)

The paper used in this manual  
is elemental chlorine free.

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• FURUNO Authorized Distributor/Dealer

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Pub. No. IME-13330-B1

(ETMI ) FSV-35/35S

A : JUL. 2012

B1 : MAY 07, 2013






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# SAFETY INSTRUCTIONS

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

|  |   |
|--|---|
|  <b>DANGER</b>  | Indicates a potentially hazardous situation which, if not avoided, will result in death or serious injury.  |
|  <b>WARNING</b> | Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury. |
|  <b>CAUTION</b> | Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.  |


|  |  |  |
|--|--|--|
|  Warning, Caution |  Prohibitive Action |  Mandatory Action |
|--|--|--|


 **DANGER**



**Keep away from raise/lower shaft in hull unit when it is moving.**


Gears will cause serious injury.

 **WARNING**





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

High voltage exists inside the equipment, and a residual charge remains in capacitors several minutes after the power is turned off. Improper handling can result in electrical shock.

 **Turn off power at the switchboard before starting the installation.**


Electrical shock or fire can result if the the power is left on.

 **WARNING**




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

Water can cause fire or electrical shock, or damage the equipment.

 **Be sure no water leaks in at the hull unit.**

Water leakage can sink the vessel. Also confirm that the transducer will not loosen by ship's vibration. 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.

 **Install the specified transducer tank in accordance with the installation instructions. If a different tank is to be installed the shipyard is solely responsible for its installation, and it should be installed so the hull will not be damaged if an object strikes the tank.**

The tank or hull may be damaged if the tank strikes an object.

**⚠ WARNING**

**!** If a steel tank is installed on a wooden or FRP vessel, take appropriate measures to prevent electrolytic corrosion.

Electrolytic corrosion can damage the hull.

**!** Be sure to power each unit with proper voltage.

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

**⚠ CAUTION**

**!** Maximum speed while the transducer is projected or being raised or lowered is as below, to prevent damage to the transducer.

|                | Projected  | Raising/<br>Lowering |
|----------------|------------|----------------------|
| 1200 mm stroke | Max. 18 kn | Max. 15 kn           |
| 1600 mm stroke | Max. 15 kn | Max. 12 kn           |

**⚡** Ground the equipment to prevent electrical shock and mutual interference.

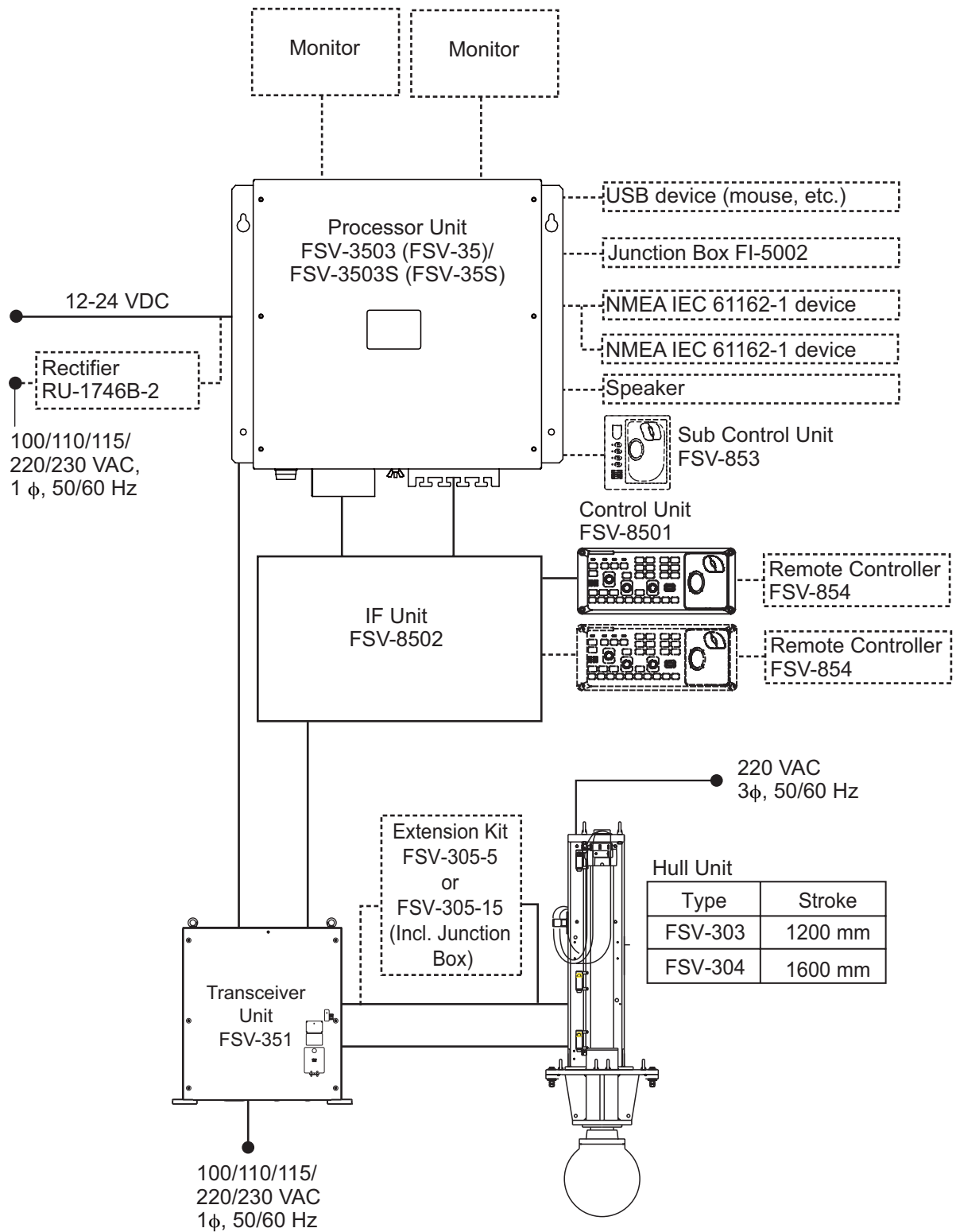
**!** Observe the following compass safe distances to prevent interference to a magnetic compass:

|                          | Standard compass | Steering compass |
|--------------------------|------------------|------------------|
| Processor Unit           | 1.45 m           | 0.90 m           |
| Control Unit FSV-8501    | 0.35 m           | 0.30 m           |
| IF Unit                  | 0.80 m           | 0.50 m           |
| Sub Control Unit FSV-853 | 0.90 m           | 0.55m            |

|  |  |
|--|--|
|  | <b>⚠ DANGER</b>  |
|  | Keep fingers away from gears. Shaft may cause injury. Keep away from moving shaft. |
|  | <b>⚠ 危険</b>  |
|  | ギヤに巻込まれる恐れあり。上下動シャフトにより、けがをすする恐れあり。稼動中は近づかないこと。                                    |

Name: Warning Label  
 Type: 10-071-5313  
 Code No.: 100-291-160-10

# SYSTEM CONFIGURATION



----- : Optional equipment

# EQUIPMENT LISTS

## Standard supply

| Name                   | Type       | Code No.    | Qty | Remarks   |
|------------------------|------------|-------------|-----|---|
| Control Unit           | FSV-8501   | -           | 1   | With 5 m or 10 m cable                            |
| IF Unit                | FSV-8502   | -           | 1   |   |
| Processor Unit         | FSV-3503   | -           | 1   | For FSV-35  |
|                        | FSV-3503S  | -           | 1   | For FSV-35S                                       |
| Transceiver            | FSV-351    | -           | 1   |   |
| Hull Unit              | FSV-303    | -           | 1   | 1200 mm stroke                                    |
|                        | FSV-304    | -           |     | 1600 mm stroke                                    |
| Installation Materials | CP10-06000 | 000-067-071 | 1   | For FSV-35/35S, no Transducer Cable Extension Kit |
|                        | CP10-06201 | 007-008-540 | 1   | For Transceiver Unit                              |
|                        | CP10-07200 | 000-117-257 | 1   | For Control Unit, w/CP10-07201, CP03-33202        |
|                        | CP10-07300 | 000-017-123 | 1   | For IF Unit, w/CP10-07301 (incl. cables)          |
|                        | CP19-00600 | 000-011-664 | 1   | For Processor Unit, w/CP19-00601                  |
| Spare Parts            | SP10-03101 | 007-008-530 | 1   | For Transceiver Unit                              |
|                        | SP19-00501 | 001-023-090 | 1   | For Processor Unit                                |
|                        | SP10-02603 | 006-921-360 | 1   | For Hull Unit                                     |

## Optional supply

| Name                   | Type             | Code No.       | Remarks                |
|------------------------|------------------|----------------|------------------------|
| Control Unit           | FSV-8501         | -              | With 5 m or 10 m cable |
| Sub Control Unit       | FSV-853          | 000-019-212    | Inst. Mat. CP10-07501  |
| Rectifier              | RU-1746B-2       | 000-030-439    |                        |
| Remote Controller      | FSV-854          | 000-017-128    | Inst. Mat. CP10-07401  |
| Junction Box           | FI-5002          | 000-010-765    | For CANbus/NMEA 0183   |
| Attachment Kit         | OP10-24          | 006-943-530    | For 1600 m stroke      |
| Attachment Flange      | OP10-27          | 000-067-050    | For 1200 m stroke      |
| Flushmount Kit         | FP03-09870       | 008-535-630    |                        |
| Extension Kit          | FSV-305-5        | 000-067-072    | Junction Box, 5 m      |
|                        | FSV-305-15       | 000-067-073    | Junction Box, 15 m     |
| Cable                  | VV-SB-CJ0.3SQX5P | 001-112-320-10 | 5P, 100 m              |
| 8 Core Cable           | VV-S0.3X8C       | 000-555-043    | 6 m                    |
| Cable Assy.            | MJ-ASPF0012-050C | 000-154-053-10 | 6P-6P, 5 m             |
|                        | MJ-ASPF0012-100C | 000-154-057-10 | 6P-6P, 10 m            |
| Installation Materials | CP03-28900       | 000-082-658    | LAN cable (10 m)       |
|                        | CP03-28910       | 000-082-659    | LAN cable (20 m)       |
|                        | CP03-28920       | 000-082-660    | LAN cable (30 m)       |
|                        | CP03-28930       | 000-084-368    | LAN cable (50 m)       |
|                        | CP03-28940       | 000-090-429    | LAN cable (100 m)      |

# 1. HOW TO INSTALL THE SYSTEM

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## 1.1 Hull Unit

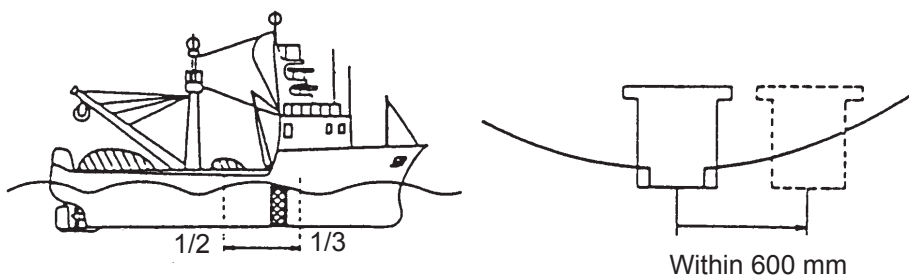
**Note 1:** The control box on the hull unit contains a motion sensor. Handle the hull unit carefully.

**Note 2:** Handle the transducer carefully. Rough handling will damage its sensitive components.

### 1.1.1 Installation considerations

Decide the location of the hull unit through consultation with the dockyard and ship owner. When deciding the location, the following points should be taken into account.

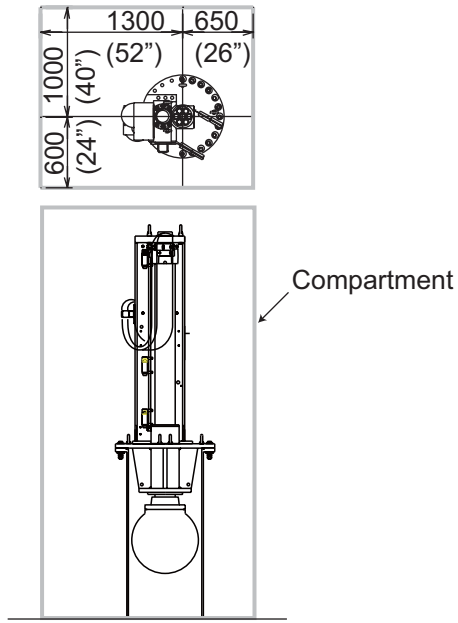
- Select an area where propeller noise, cruising noise, air bubbles and interference from turbulence are at a minimum. Generally, the point at  $1/3$  to  $1/2$  of the ship's length from the bow on or near the keel is optimum. On-the-keel installation is advantageous for minimizing oil consumption in comparison with off-the-keel. If the hull unit can not be installed on the keel, the center of the retraction tank should be within 600 mm from the keel to prevent a rolling effect. For large ship with deep draft, the hull unit can be installed at the bow.



- Select a place where the hull bottom is flat and the draft is sufficiently deep. Normally, the transducer should protrude at least 500 mm beyond the keel to minimize the effect of air foam and bubbles.
- Select a place where interference from other transducers is minimal. The hull unit should be at least 2.5 m away from the transducers of other equipment.
- No obstacle should be in the fore direction since it causes a shadow zone and aerated water, resulting in poor sonar performance.
- The physical distance between the hull unit and the transceiver unit should be no more than 5 m.
- The space shown in the figure on the next page is required around the hull unit for wiring and maintenance.

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- If the ambient temperature around the unit will be below 0°C, provide the sonar compartment with a heater to keep the temperature above 0°C.



**Note:** After you mount the hull unit, be sure to install anti-vibration stays, referring to page 1-5.



### 1.1.2 Guideline for how to shorten the retraction tank

Shorten the tank as necessary so that the transducer positions well below the keel when it is fully lowered. The following table provides guidelines for shortening the tank. Refer also to the retraction tank installation drawing at the back of this manual.

|                     |  |  |   |  |
|---------------------|--|--|---|--|
| Installation Method |  |  |   |  |
| Stroke              |  |  |   |  |
| 1200 mm stroke      | Remove 280 -290 mm from the bottom.      |  | The length "D" must be less than 1170 mm. |  |
| 1600 mm stroke      | Remove less than 290 mm from the bottom. |  | The length "D" must be less than 1150 mm. |  |

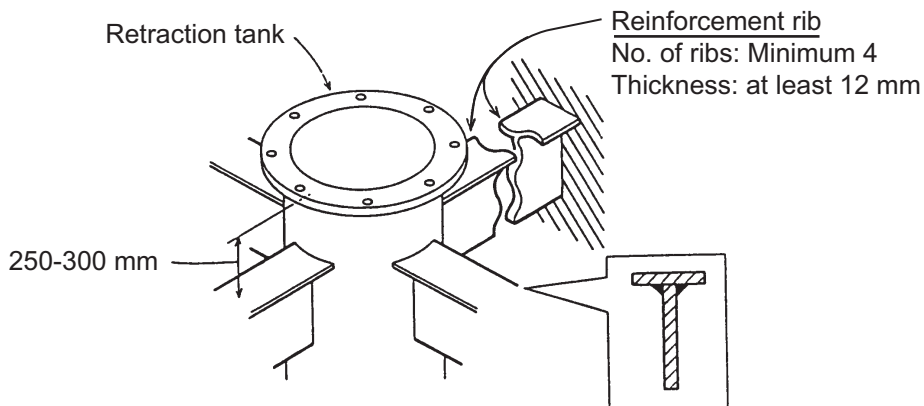
**Note 1:** For the 1200 mm stroke hull unit, the transducer will not fully protrude unless the tank is shorted by at least 280 mm from the bottom, and can not be fully retracted if more than 290 mm.

**Note 2:** For the 1600 mm stroke hull unit, the transducer can not be fully retracted if the tank is removed more than 290 mm.

**Note 3:** When maximum length is removed and "D" is minimum, the effect of air foam is minimized because the transducer fully protrudes in water.

#### Guideline for the installation of the retraction tank

- Install, if possible, the tank on the keel where the tank can be most firmly fixed.
- Install the reinforcement ribs as near as possible to the top of the retraction tank, allowing space for tightening of nuts and bolts.



- Fit a doubling plate (a plate added to another to give extra strength or stiffness) of 1200 mm diameter to the location where the retraction tank is welded to the hull bottom. See the outline drawing at the back of this manual.
- Inscribe the bow mark on the attachment flange.

## 1. HOW TO INSTALL THE SYSTEM

### 1.1.3 How to install the Hull Unit on the retraction tank

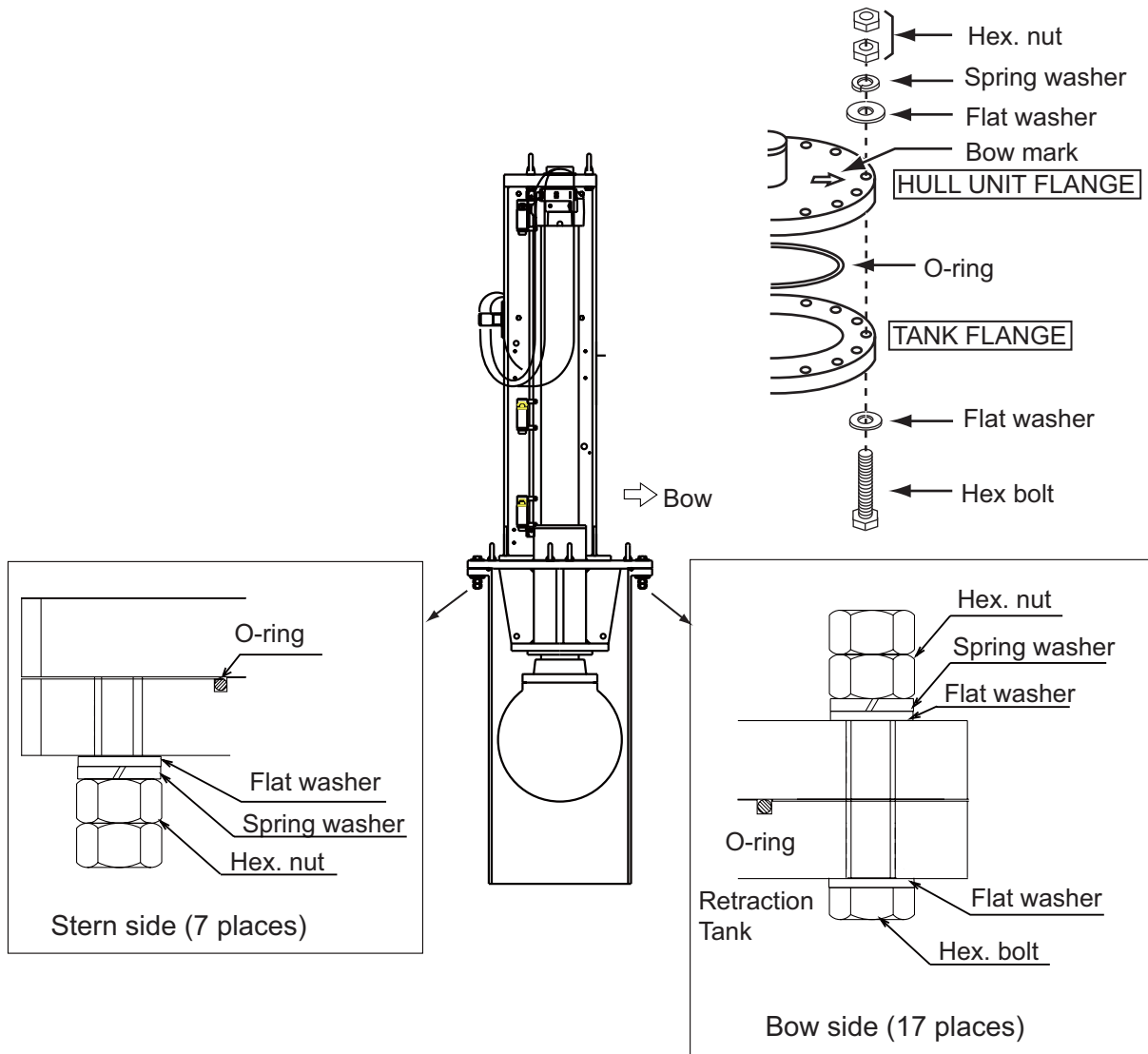
Weld the retraction tank and allow sufficient time for cooling. Install the hull unit as follows:

Prepare the materials and tools as shown below.

| Name            | Remarks   |
|-----------------|---|
| Screw wrench    | M20 (opposite side 30 mm)   |
| Ethyl alcohol   | 99.5%   |
| Waste cloths    |   |
| Lithium grease  | For O-ring<br>Common lithium grease (the equivalent of Daphne Eponex Grease #2) |
| Molytone grease | For drive shaft<br>Molytone grease #2 (by SUMICO LUBRICANT CO., LTD)            |

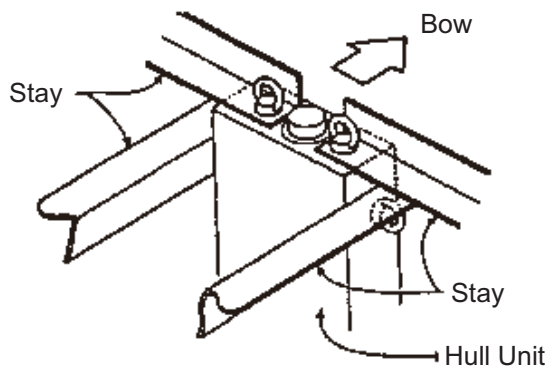
1. Clean the flange and O-ring groove of the retraction tank (welded to hull) with ethyl alcohol moistened waste cloths. Coat O-ring and O-ring groove with lithium grease. Place the O-ring in its groove on the tank flange.
2. Orient the hull unit so that the bow mark (inscribed) on its flange points toward the ship's bow. Note that heading adjustment is required if the bow mark is not facing the ship's bow.
3. Confirm the following points as below and place the hull unit on the tank.
  - Clean the flange platform.
  - Wipe the undersurface of the hull unit flange with clean waste cloths.
  - Keep O-ring in its groove.
4. Coat the threads of the bolts with a slight amount of lithium grease to prevent scorching. Insert the bolts with washers from the retraction tank flange, and then put the flat washers and spring washers in this order from above. Fasten bolts with nuts.
5. Reinforce the hull unit against vibration by extending stays to the ship's hull from the two eye-nuts at the top of the hull unit, referring to the procedure on page 1-5.

# 1. HOW TO INSTALL THE SYSTEM



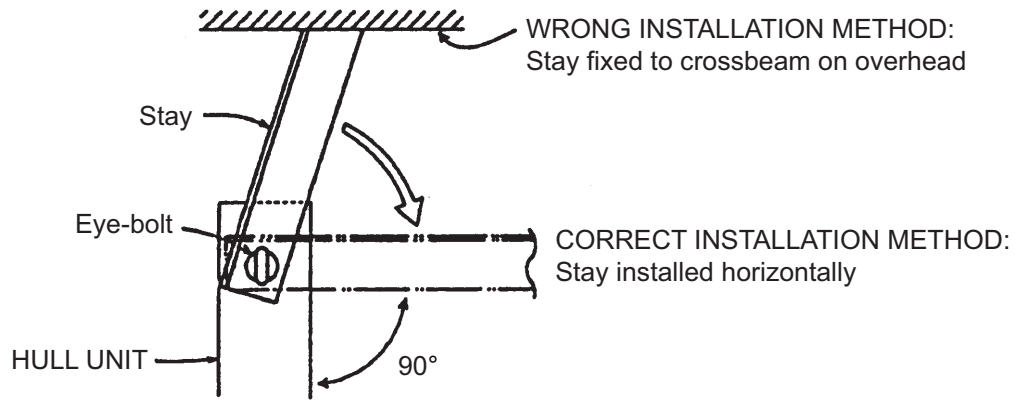
## How to install the stays (anti-vibration measure)

Install stays from the top of the hull unit to the ship's hull. The stays should be angle iron with a size of 75×75×9 mm or more and at least two pieces should be used; one each to ship's bow and stern directions. **This measure must be done to prevent damage to the transducer.**



Do not install the stays on a crossbeam on the overhead. Vibration-resistance effect is reduced since vibration is applied to the stays as rotation force. Install them horizontally.

## 1. HOW TO INSTALL THE SYSTEM



**Note:** Reinforce the hull unit against vibration by extending stays to prevent the damage to the transducer from the vibration.

## 1.2 Processor Unit

### 1.2.1 Installation considerations

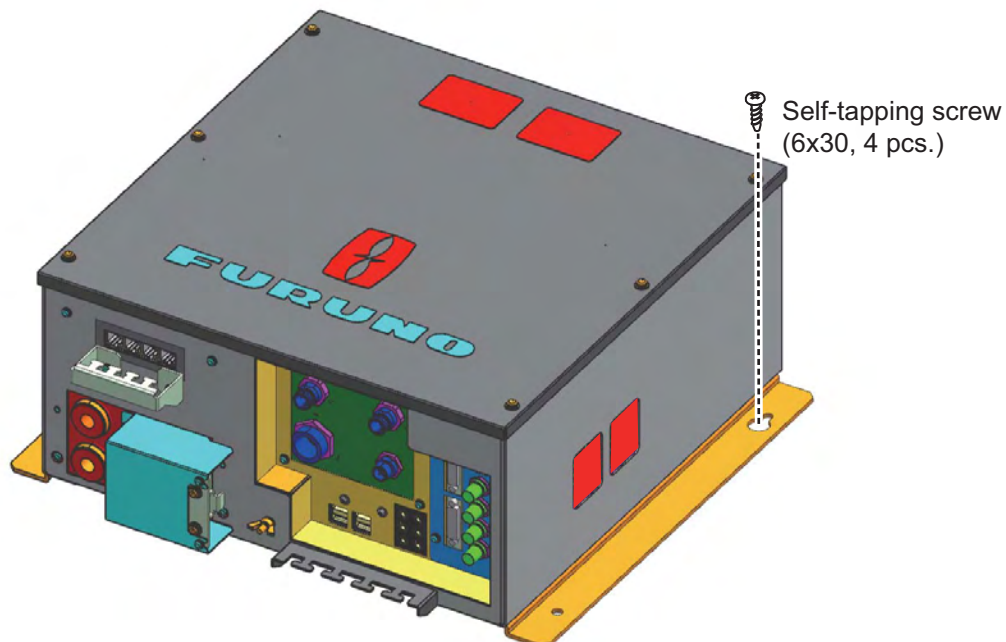
Follow the points below to select an installation location.

- Mount the unit upright.
- Locate the unit out of direct sunlight and away from heat sources because of heat that can build up inside the unit.
- Install the unit away from areas subject to water splash or rain.
- Be sure the mounting location is strong enough to support the weight of the unit under the continued vibration which is normally experienced on the ship. If necessary reinforce the mounting location.
- Determine the mounting location considering the length of these cables: - Signal cable from the transceiver unit - control cable from the control unit
- Leave sufficient space on the sides of the unit to facilitate maintenance. Also, leave a foot or so of "service loop" in cables for servicing or easy removal of connectors. See the outline drawing for recommended maintenance space.
- Follow the compass safe distances in the Safety Instructions to prevent interference to a magnetic compass.

### 1.2.2 How to install the processor unit

#### Desktop installation

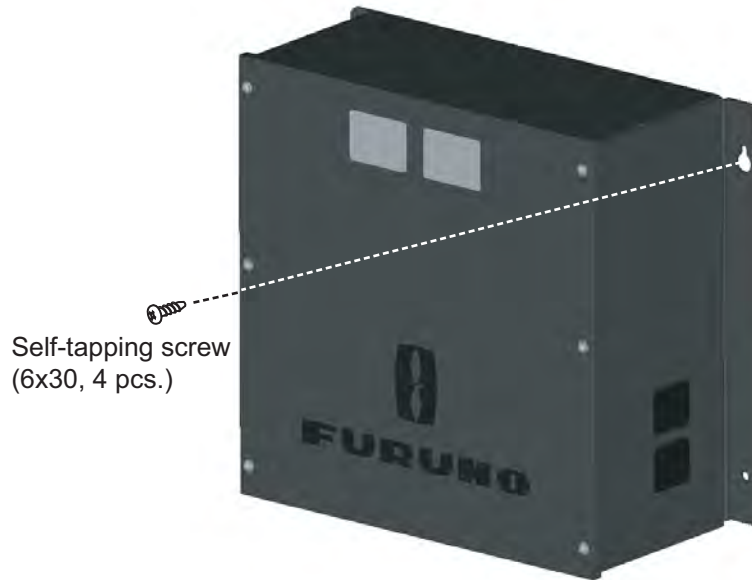
Fasten the unit with four self-tapping screws (6x30).



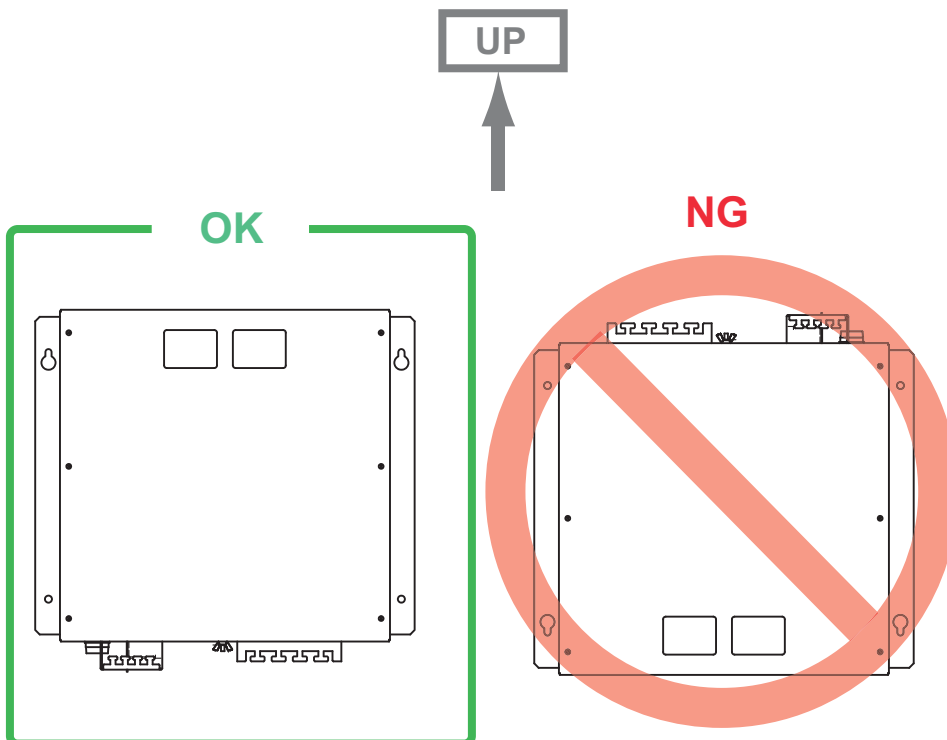
## 1. HOW TO INSTALL THE SYSTEM

### **Bulkhead installation**

1. Mark locations for four self-tapping screws on the installation location.
2. Insert two self-tapping screws (6x30, supplied) at the top two screw holes, leaving approx. 5 mm of the screws exposed.
3. Hang the processor unit on the two screws inserted at step 2.
4. Insert two self-tapping screws at the bottom of the unit.
5. Tighten all screws.



**Note:** The processor unit must be installed on the bulkhead with the following direction.



## 1.3 Control Unit

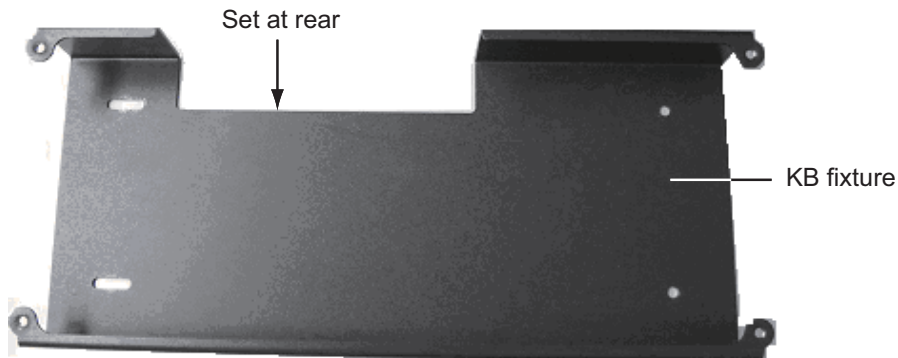
The control unit can be installed in a console (flush mount) or on a desktop (with KB fixture). Select a location considering the following points.

- Select a location where the controls can be easily operated.
- Locate the unit out of direct sunlight.
- Keep the unit away from water and water splash
- The length of the cable connected between the control unit and interface unit is 5 or 10 m. Select a location considering the length of the cable.
- Observe the compass safe distance (see the Safety Instructions) to prevent interference to a magnetic compass.

### 1.3.1 Control Unit FSV-8501

#### Desktop installation, with KB fixture

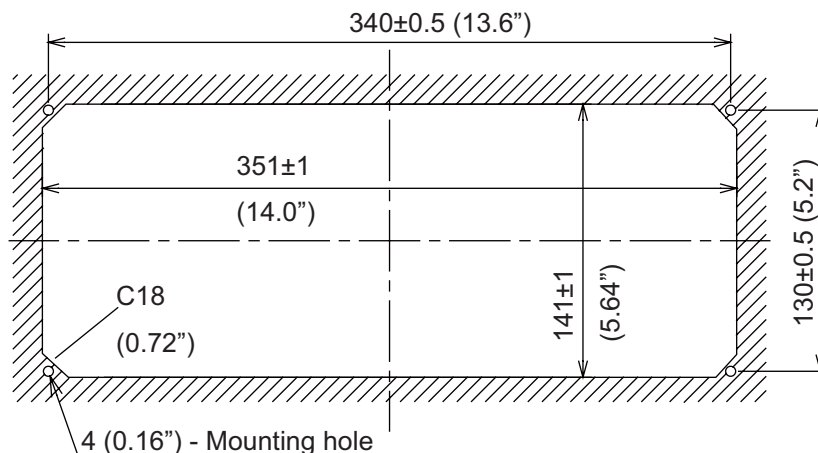
1. Fasten the KB fixture to the selected location with four self-tapping screws (M5x20).



2. Connect a ground wire (1.25 sq, local supply) between the ground terminal at the bottom of the unit and ship's ground.
3. Set the unit on top of the KB fixture and fasten the unit with four binding screws (M5x12) and wave washers.
4. Set cosmetic caps to fixing holes.

#### Flush mount

1. Prepare a cutout in the mounting location referring to outline drawing shown below.



## 1. HOW TO INSTALL THE SYSTEM

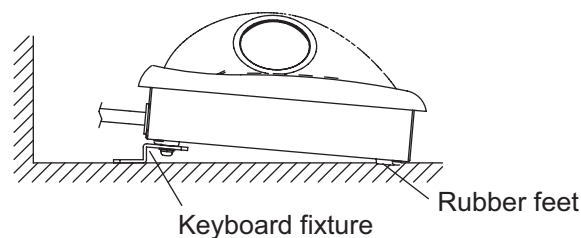
2. Make holes for four self-tapping screws (M5x20).
3. Peel the tape from the F mount gasket then attach the gasket to the rear of the control unit.
4. Connect a ground wire (1.25sq, local supply) between the ground terminal at the bottom of the unit and ship's ground.
5. Set the unit to the cutout and fasten it with four self-tapping screws (M5x20) and wave washers.
6. Set cosmetic caps to fixing holes.

### 1.3.2 Sub Control Unit FSV-853 (option)

#### Desktop installation. with keyboard fixture

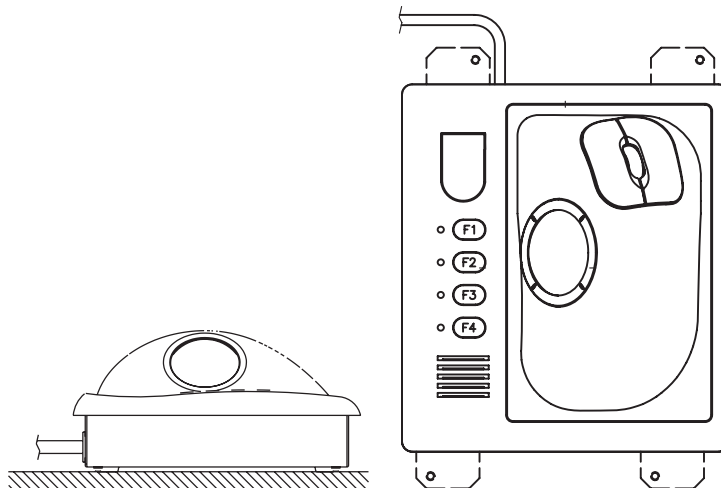
| Name              | Type               | Code No.       | Qty |
|-------------------|--------------------|----------------|-----|
| Keyboard fixture  | 03-163-7821-1      | 100-306-291-10 | 1   |
| Washer head screw | M4x12 C2700W MBN12 | 000-163-192-10 | 6   |
| Rubber foot       | M5x40              | 000-162-682-10 | 2   |

1. Fix the keyboard fixture to the bottom of the unit with the screws (M4x12) supplied.
2. Attach rubber feet (2 pcs.) to the bottom of the unit.
3. Fix the unit to the mounting location with self-tapping screws (local supply).



#### Desktop installation. no keyboard fixture

1. Drill four mounting holes of 5 mm diameter, referring to the outline drawing at the back of this manual.
2. Fix the unit with four screws (M4) from under side of the desktop. (Supply the screws locally. Be sure the screws are of a sufficient length for the thickness of the desktop.)



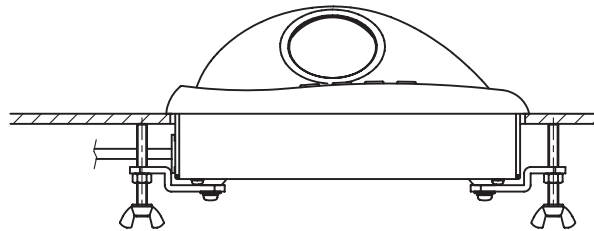


**Flush mount (option)**

Use the optional flush mount kit (Type: FP03-09870, Code No.: 008-535-630) to mount the sub control unit.

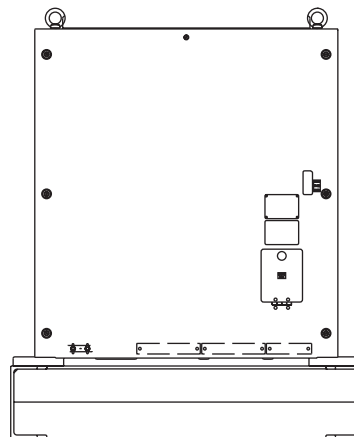
| Name           | Type        | Code No.       | Qty |
|----------------|-------------|----------------|-----|
| Mounting plate | 03-163-7531 | 100-306-261    | 4   |
| Hex nut        | M5          | 000-863-108    | 4   |
| Wing screw     | M5x40       | 000-162-682-10 | 4   |
| Pan head screw | M4x12       | 000-163-192-10 | 4   |

1. Prepare a cutout in the mounting location referring to the outline drawing at the back of this manual.
2. Set the unit to the cutout.
3. Attach the mounting plate to the unit with four screws from the rear side.
4. Screw the wing screw to each mounting plate and then insert hex bolt to each wing screw.
5. Fasten each wing screw and then fasten the hex nuts.



## 1.4 Transceiver Unit

Select a mounting location considering that the effective length of the cable between the transceiver unit and the hull unit is 5 m (standard). The transceiver unit should be fixed to a mounting base (shipyard supply) whose dimensions are as shown in the outline drawing at the back of this manual. Reinforce the transceiver unit against vibration by stays extending from the eye-bolts on the top of the unit. Fasten four bolts (M12, local supply) at the bottom of the transceiver unit to fix the unit to the mounting base.



## 1.5 Transducer Cable Extension Kit

The transducer cable extension kit can extend the distance between the hull unit and transceiver unit. The kit is available in two versions: 5 m extension and 15 m extension.

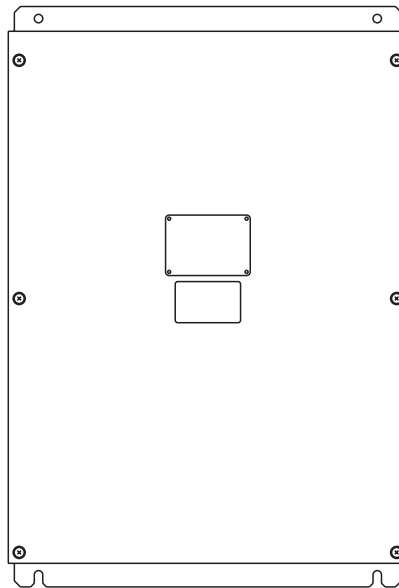
*Extension Kit (Type: FSV-305-5, Code No.: 000-067-072)*

| Name         | Type    | Code No.       | Qty   | Remarks      |
|--------------|---------|----------------|-------|--------------|
| Junction box | FSV-305 | 000-067-074    | 1     |              |
| Cable assy.  | 10S2240 | 000-148-369-03 | 1 set | 5 m, 10 pcs. |
| Cable assy.  | 10S2144 | 000-145-360    | 1     | 12.9 m       |

*Extension Kit (Type: FSV-305-15, Code No.: 000-067-073)*

| Name         | Type    | Code No.       | Qty   | Remarks       |
|--------------|---------|----------------|-------|---------------|
| Junction box | FSV-305 | 000-067-074    | 1     |               |
| Cable assy.  | 10S2240 | 000-148-369-03 | 1 set | 15 m, 10 pcs. |
| Cable assy.  | 10S2145 | 000-145-361    | 1     | 22.9 m        |

Install the unit between the hull unit and transceiver unit. Fasten the unit to the mounting location with four M6 bolts.



Junction box FSV-305

## 1.6 IF Unit

Refer to the outline drawing at the back of this manual for mounting dimensions. Fasten the unit with 5x20 self-tapping screws. If the unit is to be installed on a bulkhead, be sure that the location does not allow water to drip into the cable entrance.

## 1.7 Grounding the Equipment

Ground the equipment referring to the table shown below.

| Unit                  | Ground wire  | Remarks                          |
|-----------------------|--------------|----------------------------------|
| Hull Unit             | IV-8sq       | Local supply (protective ground) |
| Processor Unit        | IV-8sq       | Local supply                     |
| IF Unit               | IV-2sq       | Local supply                     |
| Control Unit          | IV-1.25sq    | Local supply                     |
| Transceiver Unit      | Copper strap | Standard supply                  |
| Junction Box (option) | Copper strap | Local supply                     |

## 1.8 Attachment Flange (option)

The attachment kit permits use of the retraction tank for the CSH-20 series using the 1200 mm stroke transducer.

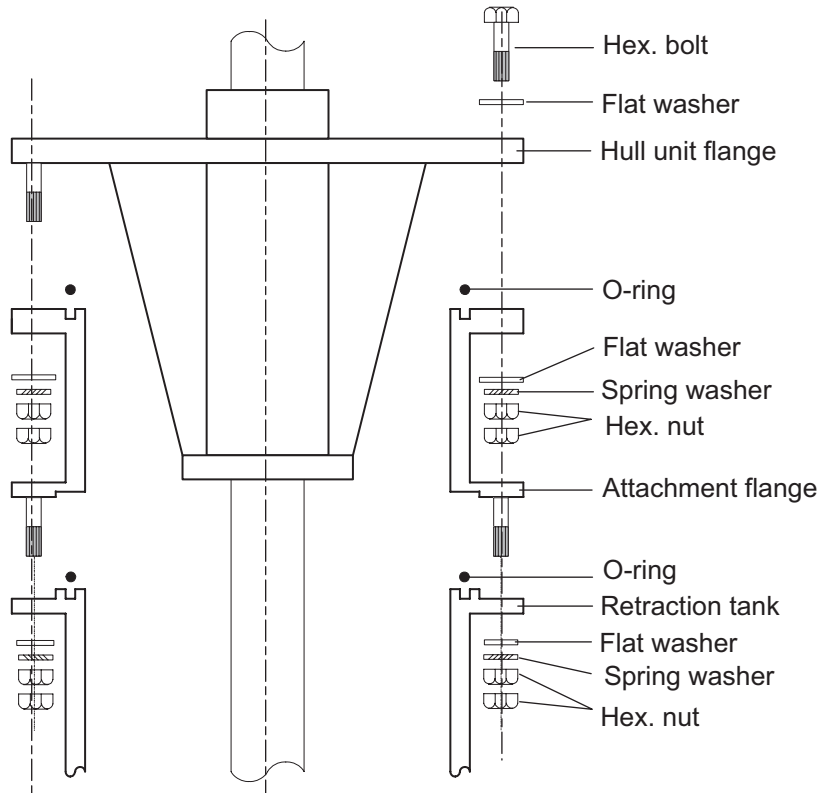
*Attachment flange (Type: OP10-27. Code No. 000-067-050)*

| Name              | Type           | Code No.       | Qty |
|-------------------|----------------|----------------|-----|
| Attachment Flange | 10-077-5802    | 100-303-610    | 1   |
| O-ring            | CO 0318A(V585) | 000-166-370-10 | 1   |
| Hex. Nut          | M20 SUS304     | 000-863-116    | 48  |
| Flat Washer       | M20 SUS304     | 000-864-136    | 24  |
| Spring Washer     | M20 SUS304     | 000-864-270    | 24  |

1. Clean the flange and O-ring groove of the retraction tank (welded to hull) with ethyl alcohol moistened waste cloths. Coat O-ring and O-ring groove with lithium grease.
2. Place the O-ring in position on the retraction tank flange.
3. Coat the threads of the bolts with a slight amount of lithium grease to prevent scorching.
4. Fix the attachment flange to the retraction tank with flat washers, spring washers and hex nuts.

To install the attachment flange and hull unit, see section 1.1.3.

## 1. HOW TO INSTALL THE SYSTEM



**Note:** Inscribe the bow mark to the attachment flange.

### 1.9 Attachment Kit (option)

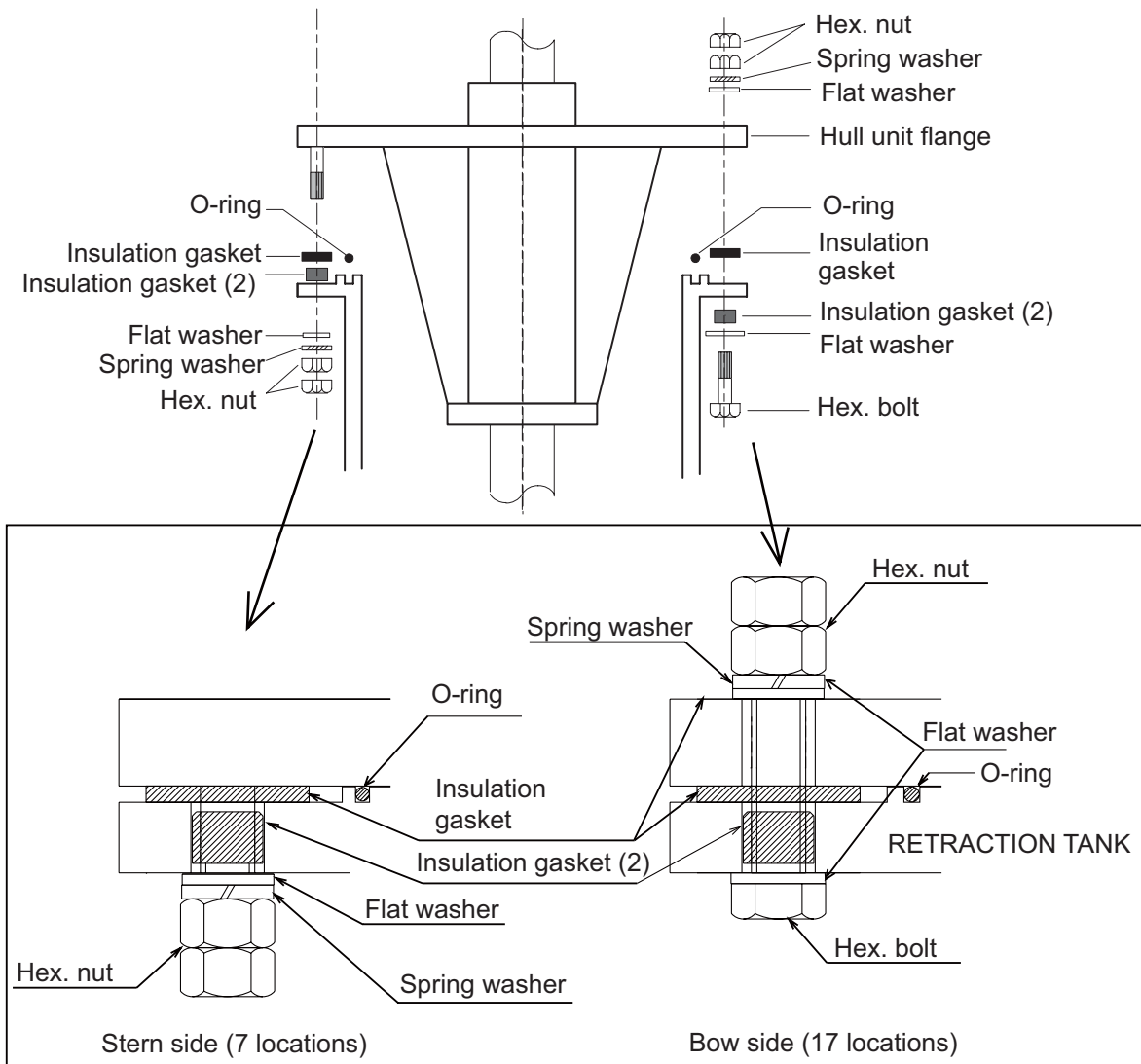
The attachment kit permits use of the retraction tank for the CSH-20 series using the 1600 mm stroke transducer and hull unit FSV-243E/244E.

*Attachment kit (Type: OP10-24. Code No.: 006-943-530)*

| Name                  | Type       | Code No.    | Qty |
|-----------------------|------------|-------------|-----|
| Insulation Gasket     | MS-1000-67 | 000-857-220 | 24  |
| Insulation Gasket (2) | MS-1000-68 | 000-857-221 | 24  |

1. Clean the flange and O-ring groove of the retraction tank (welded to hull) with ethyl alcohol moistened waste cloths. Coat O-ring and O-ring groove with lithium grease. Place the O-ring in its groove on the tank flange.
2. Lay the insulation gaskets on the top of the tank flange.
3. Position the hull unit so that the bow mark (inscribed) on its flange points toward the ship's bow. Note that heading adjustment in the monitor is required if the bow mark does not physically face the ship's bow.
4. Confirm the following points as below and place the hull unit on the tank.
  - Clean the flange platform.
  - Wipe the undersurface of the hull unit flange with clean waste cloths.
  - Keep O-ring in its position.
5. Insert the insulation gaskets (2) into the bolt holes of the tank flange.

6. Coat the threads of the bolts with a slight amount of lithium grease to prevent scorching. Insert the bolts with washers from the retraction tank flange, and then put the flat washers and spring washers in this order from above. Fasten bolts with nuts.



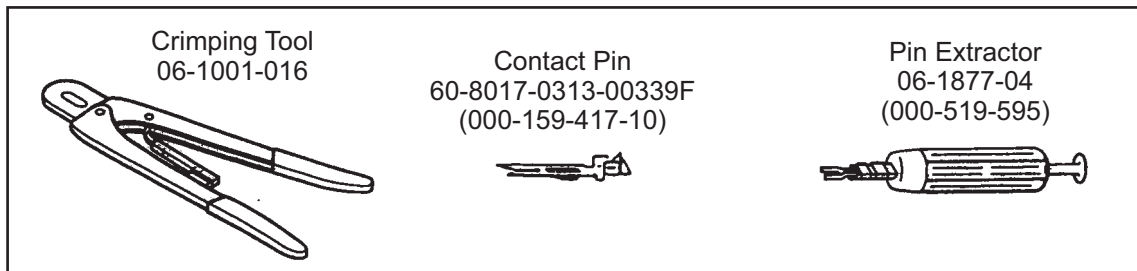
## 1. HOW TO INSTALL THE SYSTEM

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## 2. WIRING

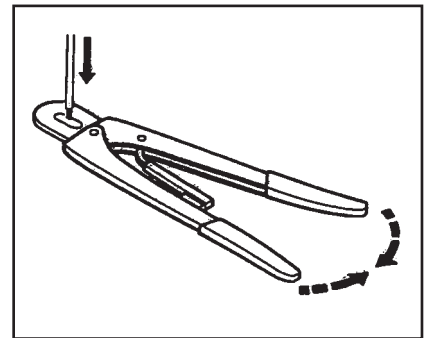
### 2.1 How to Use the Crimping Tool, Pin Extractor

A special crimping tool is necessary for connection of wires to the contact pins of the 10P connector. The pin extractor removes the contact pin from the connector body.



#### 2.1.1 How to use the crimping tool

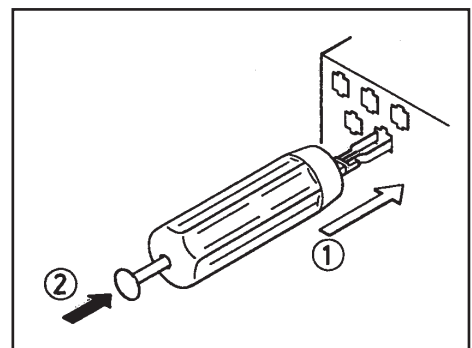
1. Remove the vinyl sheath by 3 to 4 mm to expose the core.
2. Hold the crimping tool horizontally and insert the contact pin with its slit facing downward into the crimp hole on the crimping tool.
3. Insert the wire onto the contact pin and squeeze the handle until the ratchet releases. (The wire should be placed deep enough into the contact pin so that its end comes in contact with the stopper plate of the crimping tool.)
4. With crimping completed, pull the wire while holding the contact pin to make sure that the wire is held firmly by the contact pin.



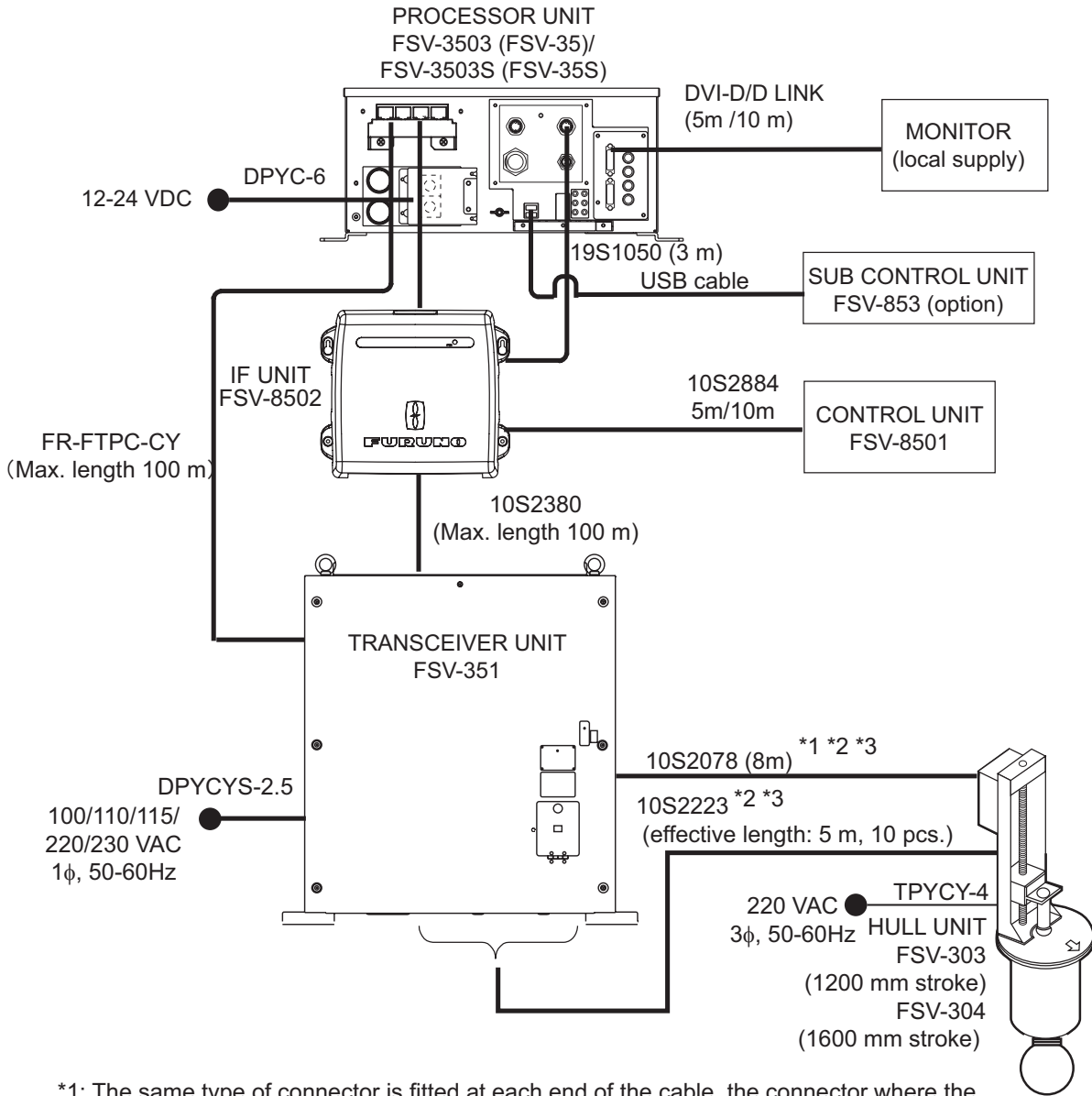
#### 2.1.2 How to use the pin extractor

If a contact pin is inserted into an incorrect hole on the connector body, remove it with the pin extractor.

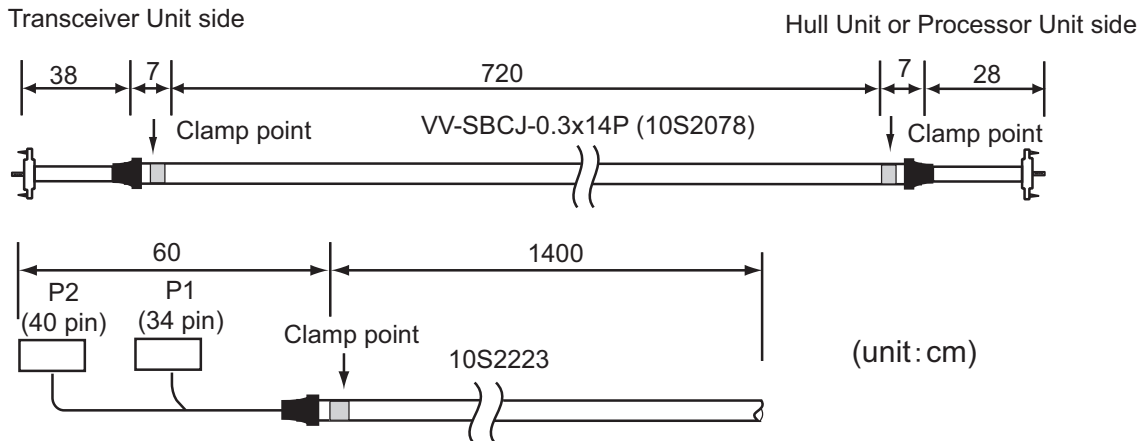
1. Push the pin extractor into the pin hole from the side opposite to the pin inserting side.
2. Push in the head of the pin extractor. The retaining spring comes free and the contact pin can be removed.



## 2.2 How to Connect Units



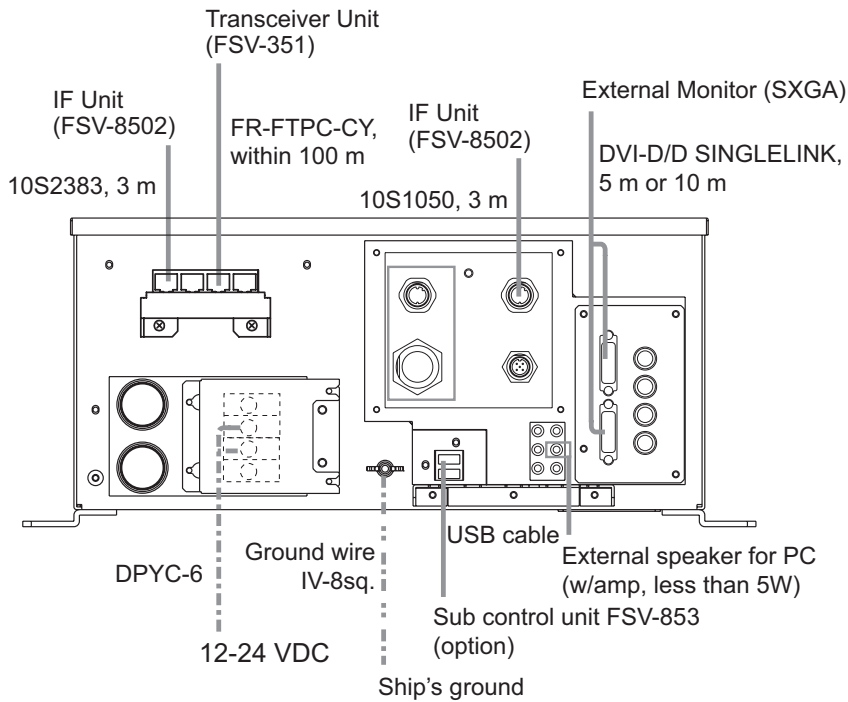
- \*1: The same type of connector is fitted at each end of the cable, the connector where the amount of sheath removed is greater should be connected to the transceiver unit.
- \*2: The details of the cable is shown below.
- \*3: When using cable for extension kit, the length of the cable between the transceiver unit and the hull unit is 10 m or 20 m.





## 2.3 Processor Unit

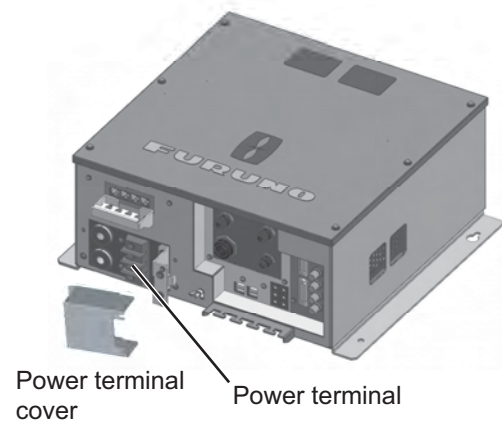
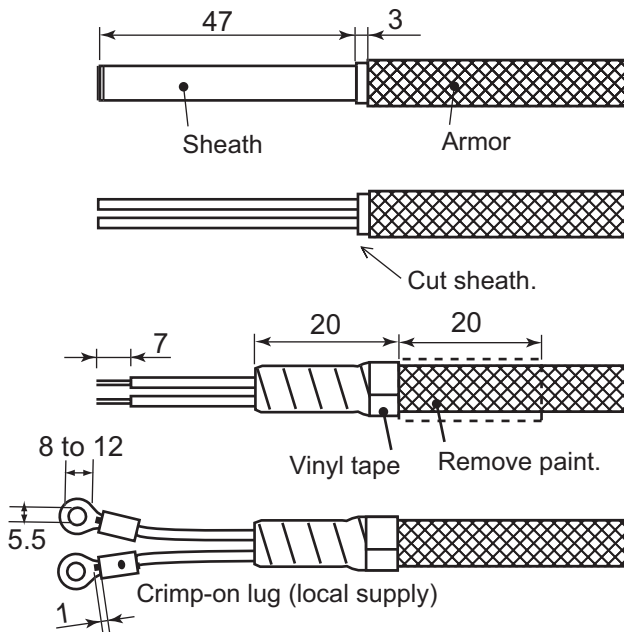
Connect the cables of other equipment at the rear of the processor unit.



### **Power cable**

Connect the power cable (DPYC-6, L=5 m, local supply) as follows:

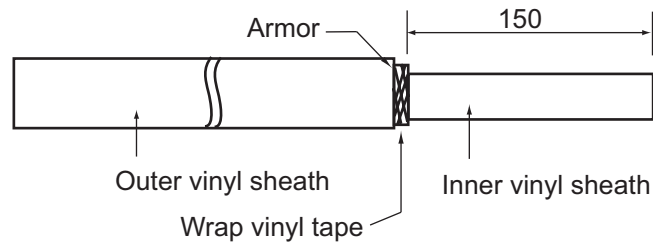
1. Fabricate the cable as shown below.
2. Open the power terminal cover on the processor unit. Connect the power cable: top terminal, +, bottom terminal, -.
3. Close the power terminal cover.



## 2. WIRING

### LAN cable

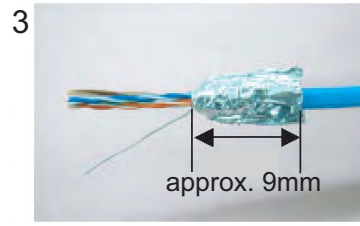
Fabricate the supplied LAN cable (FR-FTPC-CY, 10/20/30/50/100 m) as shown below. Cut the vinyl sheath and armor to the lengths shown below and attach the modular connector.



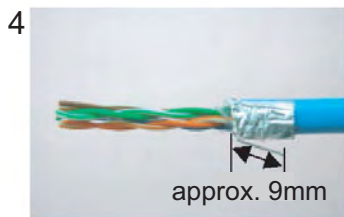
Expose inner vinyl sheath.



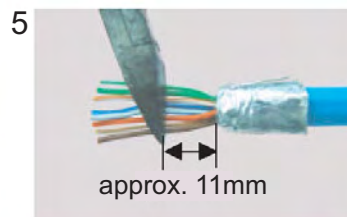
Remove the outer sheath by approx 25 mm. Be careful not to damage inner shield and cores.



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.



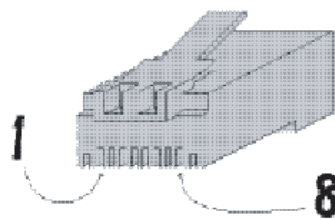
Straighten and flatten the core in order and cut them, leaving 11 mm.



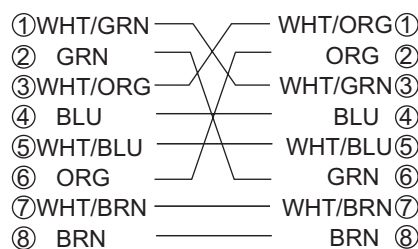
Insert the cable into the modular plug so that the folded part of the shield enters into the plug housing. The drain wire should be located on the tab side of the plug.



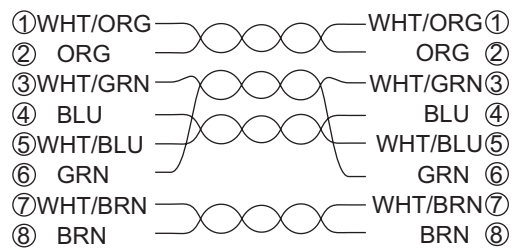
Using special crimping tool MPT5-8 (PANDUIT CORP.), crimp the modular plug. Finally check the plug visually.



[Croze cable]



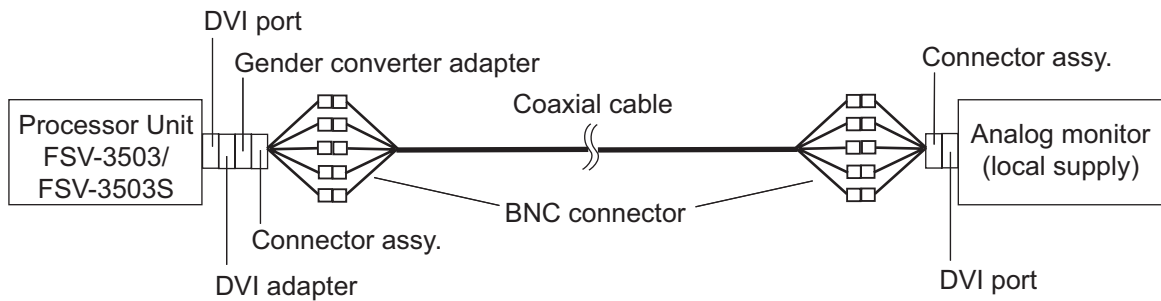
[Straight cable]



### How to extend length of cable for external monitor

If the distance from the control unit to the monitor is more than 10 m, follow the procedure below to lengthen the cable, up to 70 m. The video output is analog so use an analog monitor.

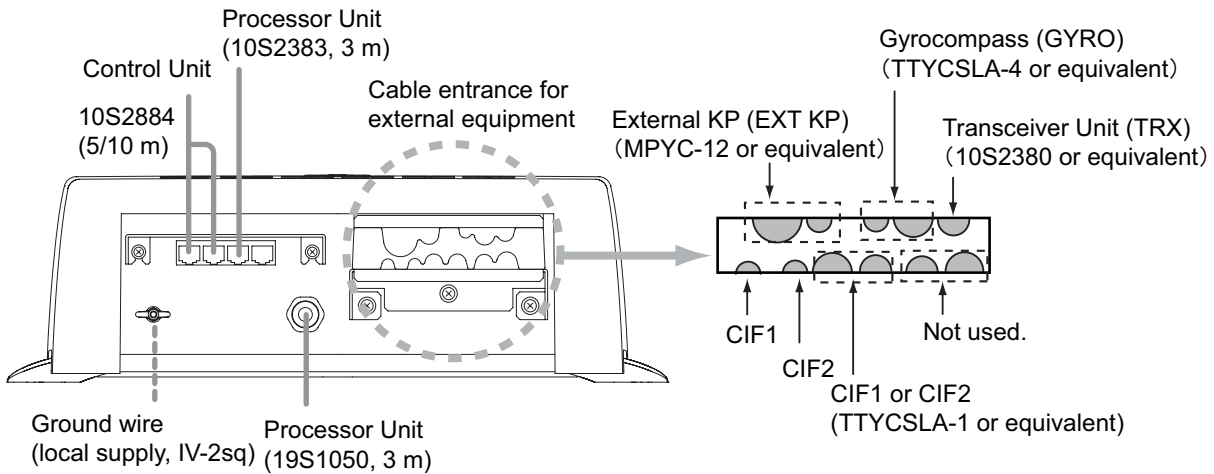
| Part                     | Type              | Code No., Maker | Qty | Remarks                           |
|--------------------------|-------------------|-----------------|-----|-----------------------------------|
| Coaxial cable            | 1.5C2V-3C2V-T-20M | 000-164-049-10  | 1   | 20 m                              |
|                          | 1.5C2V-3C2V-T-30M | 000-164-050-10  |     | 30 m                              |
|                          | 1.5C2V-3C2V-T-70M | 000-164-051-10  |     | 70 m                              |
| Connector assy.          | BNCX5-DSUB15-L400 | 000-159-595-01  | 2   |                                   |
| BNC connector            | BNC-P-3           | 000-500-396     | 6   | For 3C-2V                         |
|                          | BNC-P-1.5V-CR     | DDK             | 4   | Recommended                       |
| DVI adapter              | AD-DV01           | Sanwa Supply    | 1   | Recommended                       |
| Gender converter adapter | AD-D15FTDVM       | Elecom          | 1   | Recommended, D-sub 15 pin, female |



## 2.4 IF Unit

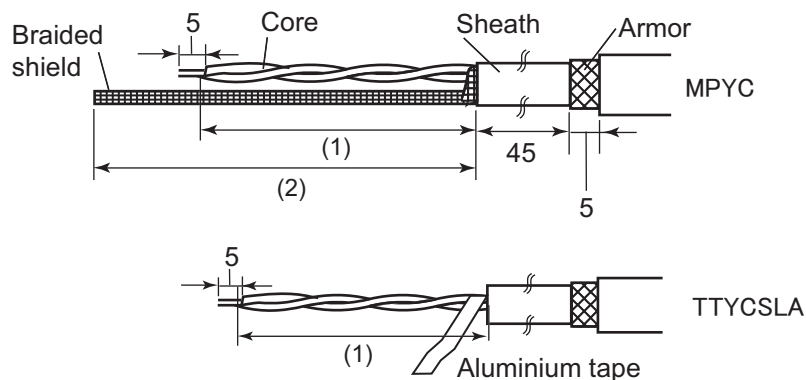
The IF unit installs between the processor unit and the transceiver unit. Connect the cables according to the diagram inscribed on the shield cover of the IF unit. JIS cables and FURUNO cables are available for the connection. To connect the JIS cables, use the larger cable holes as shown below.

Select a location that provides the maintenance space prescribed in the outline drawing. Follow the compass safety distance in the Safety Instructions to prevent interference to a magnetic compass.



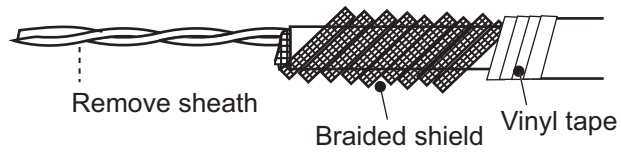
| Connection point | Cable type   | See (1) below | See (2) below | Remarks         |
|------------------|--------------|---------------|---------------|-----------------|
| Ext. KP          | JIS cable*   | 400 mm        | 100 mm        |                 |
|                  | FURUNO cable | 400 mm        | 120 mm        |                 |
| Gyro             | JIS cable*   | 400 mm        | 100 mm        |                 |
|                  | FURUNO cable | 400 mm        | 100 mm        |                 |
| Transceiver Unit | FURUNO cable | 400 mm        | 100 mm        | Standard supply |
| CIF1             | JIS cable*   | 400 mm        | 100 mm        |                 |
|                  | FURUNO cable | 400 mm        | 100 mm        |                 |
| CIF2             | JIS cable*   | 400 mm        | 120 mm        |                 |
|                  | FURUNO cable | 400 mm        | 120 mm        |                 |

\*: JIS=Japan Industrial Standard. See the appendix for equivalent cable.



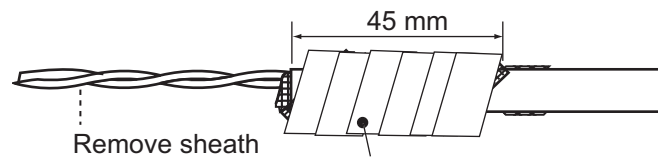
**How to fabricate cables**

Cable for ext. KP, gyro, Transceiver Unit, CIF2



Wrap braided shield around vinyl sheath.  
Cover braided shield with vinyl tape.

Cable for FURUNO CIF1 equipment

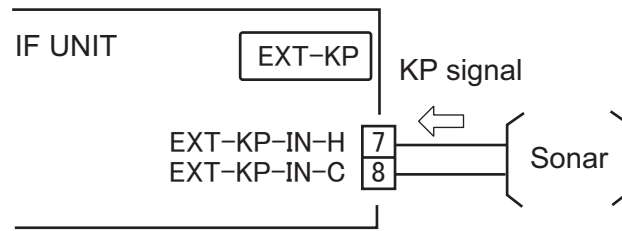


Wrap braided shield around vinyl sheath.  
Cover braided shield with conductive fabric tape.

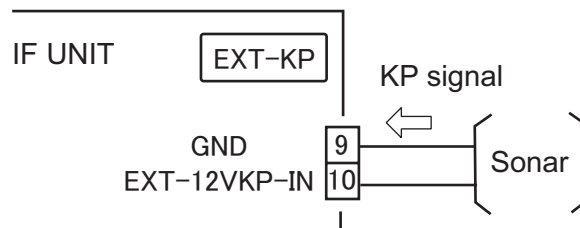
**How to connect external KP**

To synchronize transmission with external sonar, make the connections shown below.

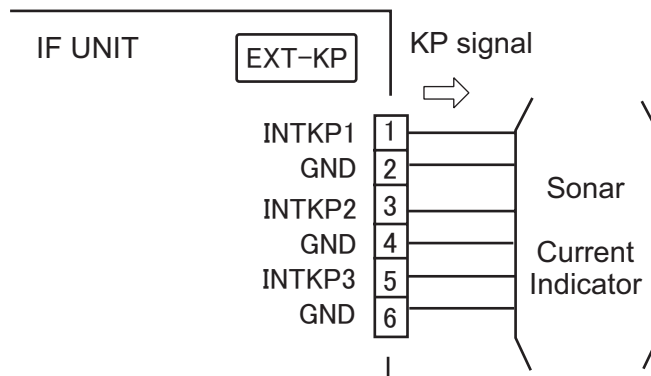
- Current drive KP output



- Voltage drive (12 V) KP output



- Make the connections shown below to output KP for external sonar and current indicator.



## 2.5 Control Unit and Remote Controller

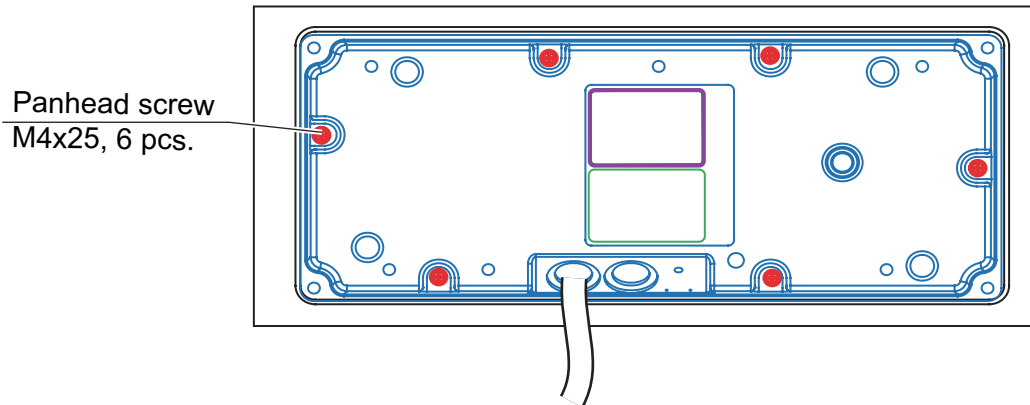
### Ground

Connect a IV-1.25 sq ground wire (local supply) between the ground terminal on the control unit and the ship's ground.

### How to connect the remote controller

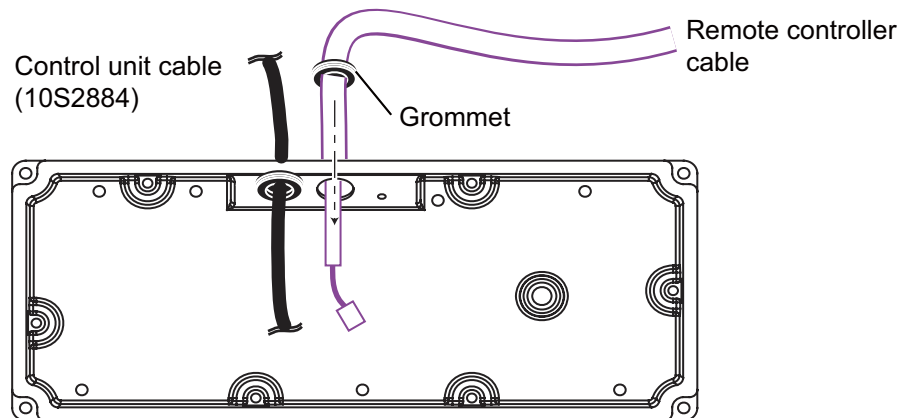
Connect the optional remote controller (FSV-854) as shown below.

1. Unfasten the six panhead screws at the bottom of the control unit to detach the cover.



Rear side of the control unit (cover removed)

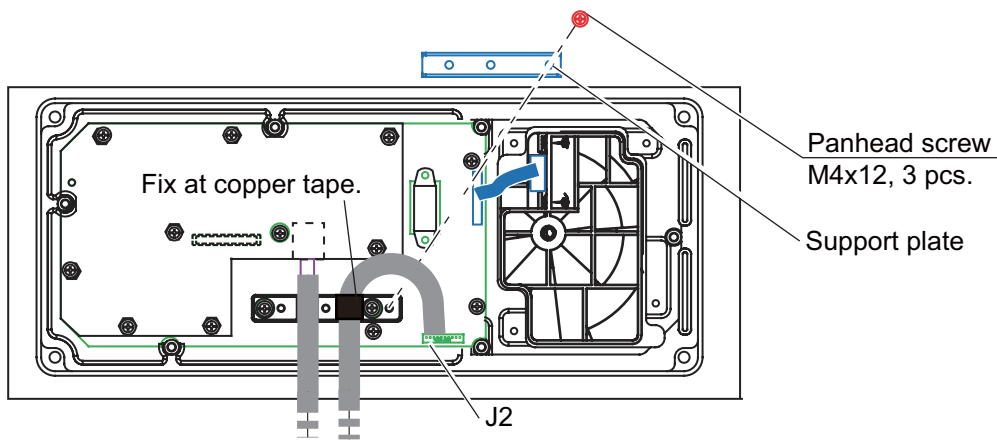
2. Cut a cross in the grommet on the cover then pass the remote controller cable through the grommet.



Rear side of the control unit (cover removed)

## 2. WIRING

3. Connect the remote controller cable to J2 on the control unit and use the support plate to fix the cable.

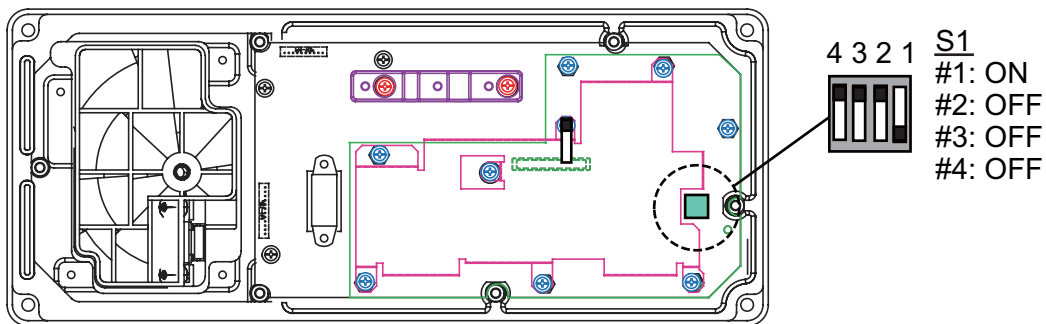


Rear side of the control unit (cover removed)

4. Attach the cover.
5. At a distance of 1 cm from the control unit, attach the supplied EMI core (RFC-6) to the remote controller cable.

### **How to connect No.2 control unit (option)**

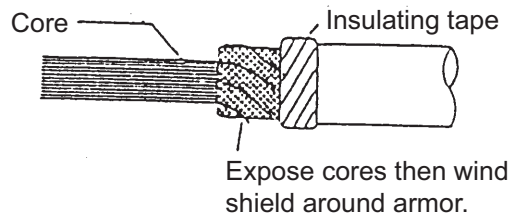
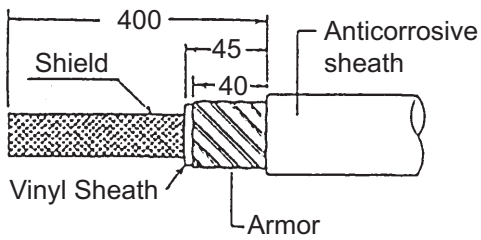
Two control units can be connected. On the No.2 control unit, remove the rear cover and set the DIP switch as shown below.



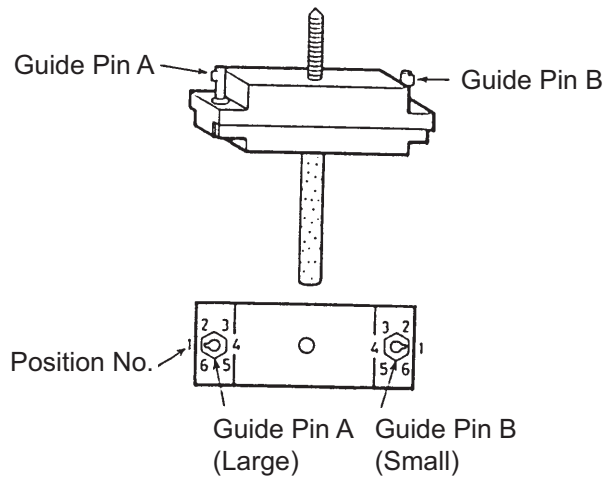
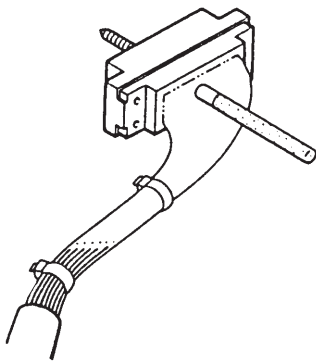


## 2.6 Transceiver Unit

### 2.6.1 How to fabricate the 10P connector (CN-B102)



*How to fabricate 10P connector*

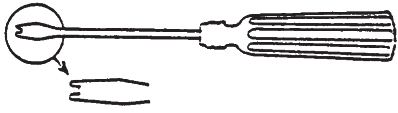


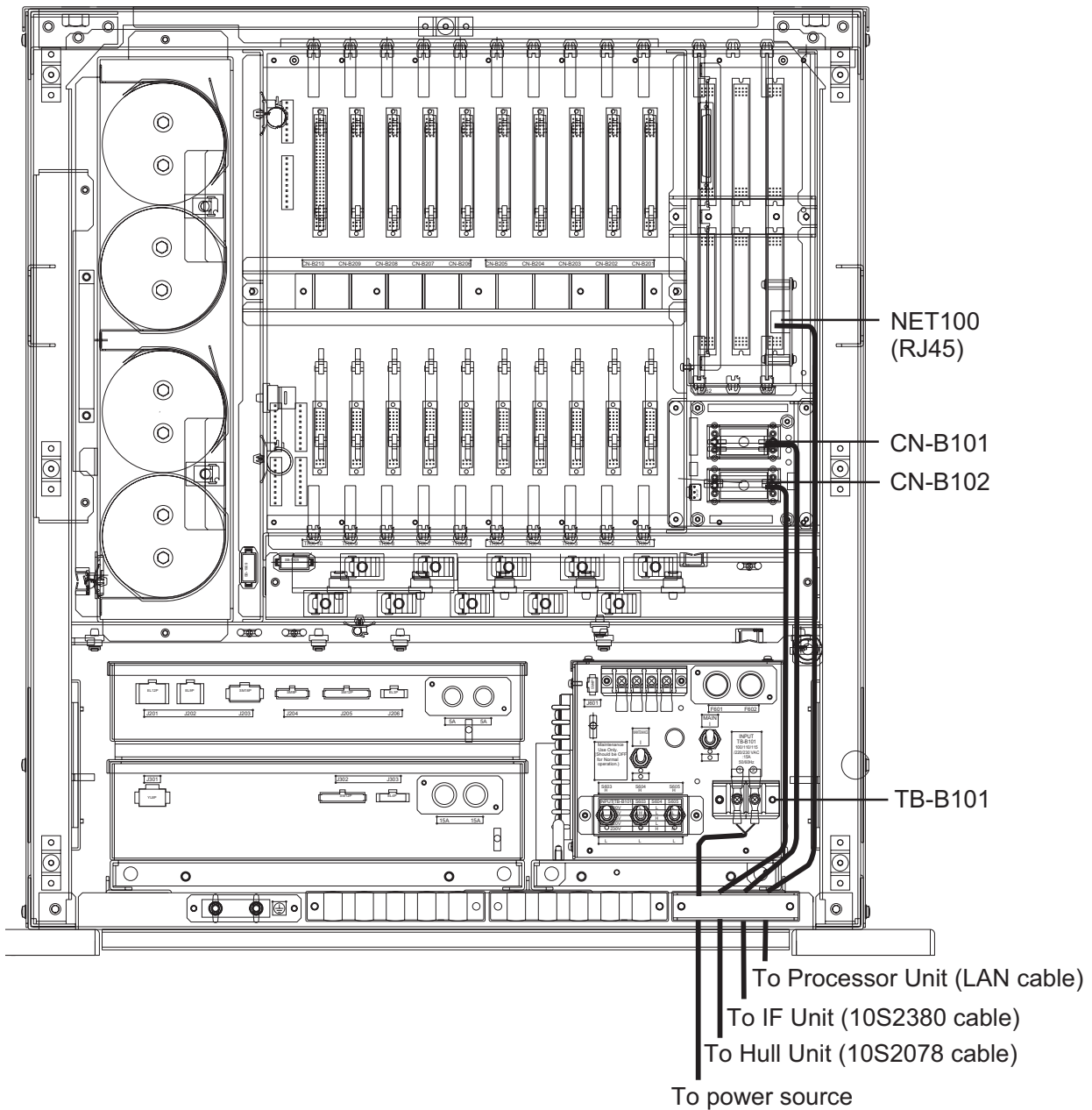
*How to assemble 10P connector*

## 2. WIRING

### How to position guide pins

Use the guide pin insertion tool (Code No. 10-910-0179-0) to correctly insert guide pins to connectors.

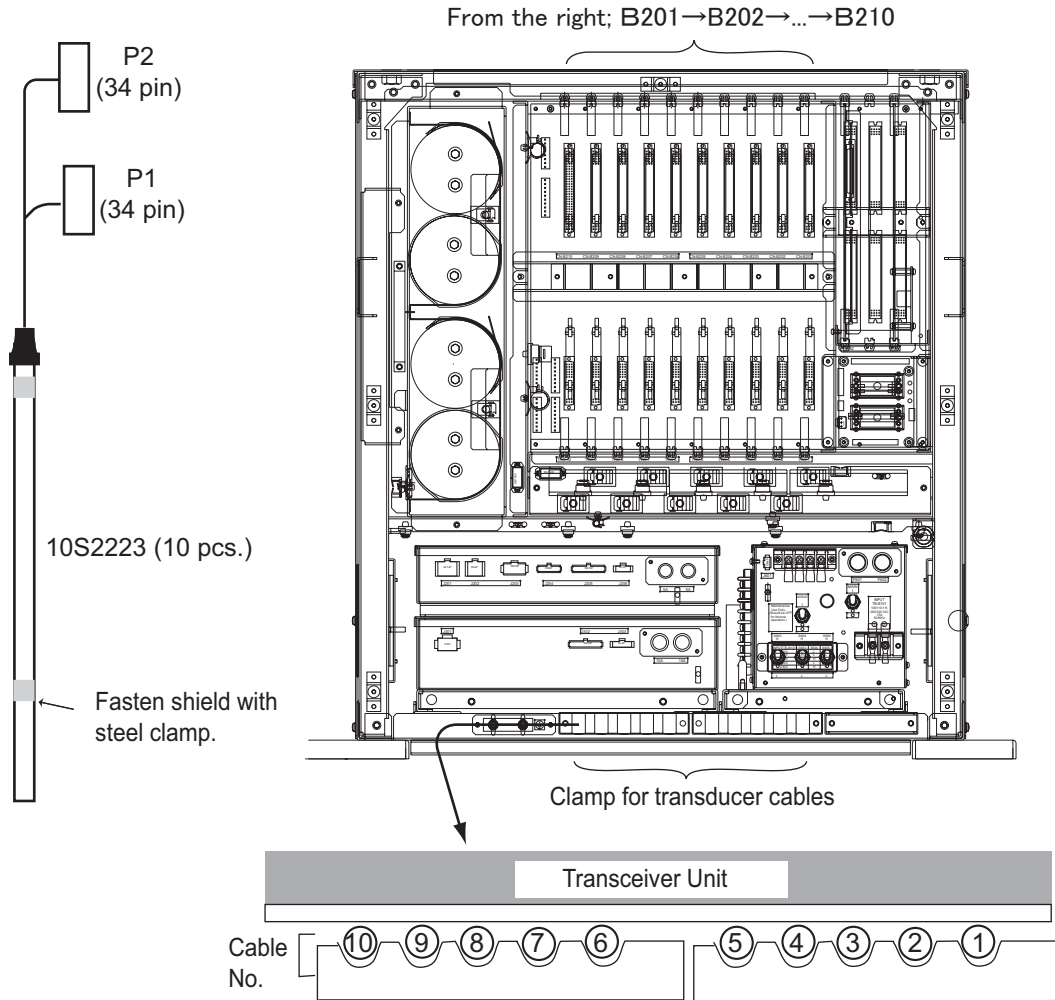
|                     |         |   |
|---------------------|---------|---|
| Connector           | CN-B101 | <br>Tool<br>(Guide pin insertion tool, notch in head) |
| Guide pin           |         |   |
| Guide pin A (large) | 1       |   |
| Guide pin B (small) | 1       |   |



Connect the cable (10S2078) from the control box of the hull unit to the CN-B102.

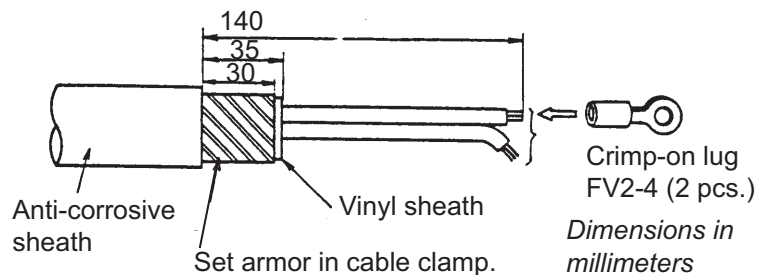
### 2.6.2 Connections inside the transceiver unit

1. Remove the transceiver unit cover.
2. Connect transducer cable (cables from the transducer) referring to cable no. labeled on the chassis and connector no. labeled on each pc board. Connect the XH connector of the cable from the transducer to the TRX board.
3. Arrange the cables in numerical order and fix them with the cable clamp.
4. Remove the metal fixing the transducer cable of the hull unit.



### 2.6.3 Power cable

Connect the power cable DPYCYS-2.5 (or the equivalent) to TB-101 of the transceiver unit. Fabricate the power cable as shown below.



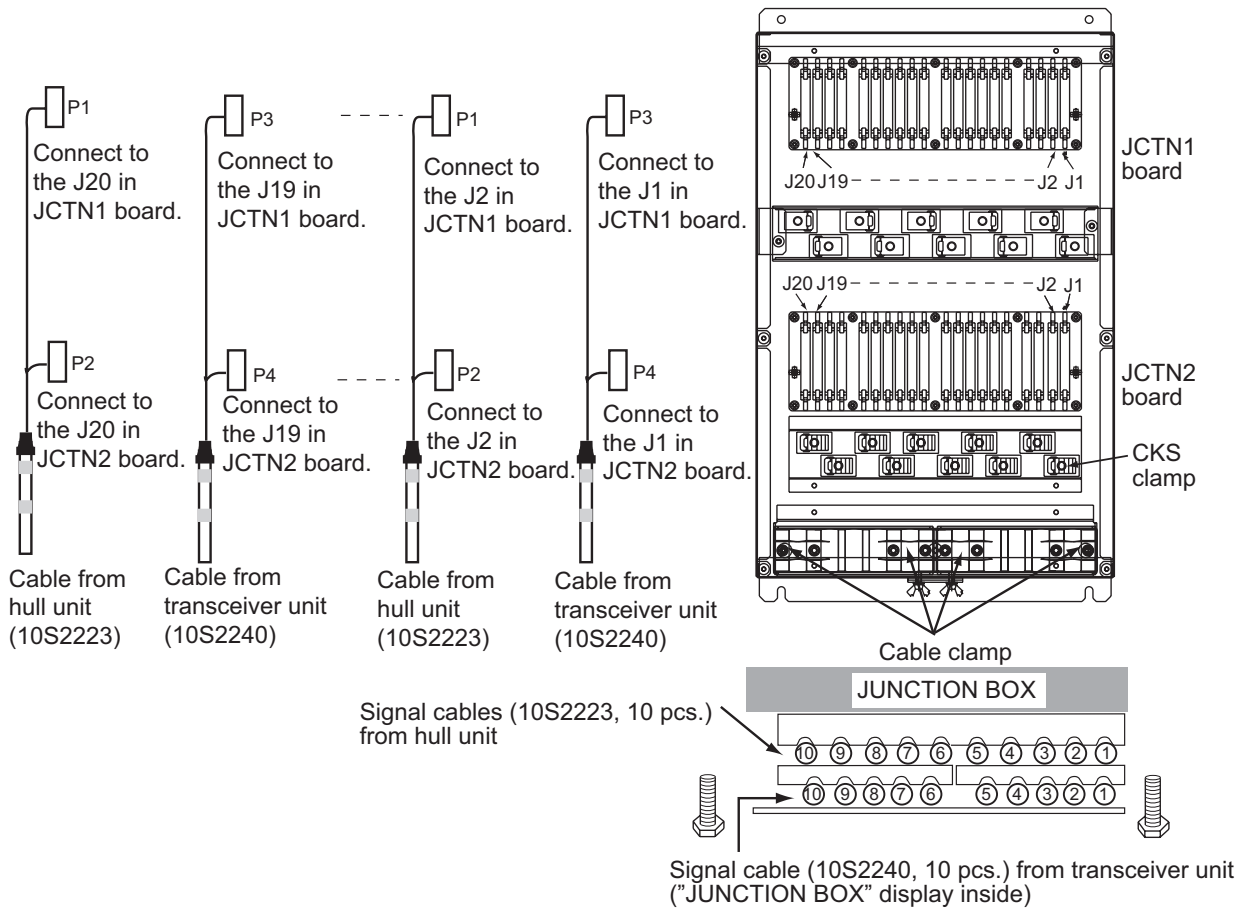
## 2.7 Transducer Cable Extension Kit

The transducer cable (10S2223, 10 pcs.) connects to the junction box of the kit and the junction box is connected to the transducer with a 5 m or 15 m cable (10S2240, 10 pcs.). The cable (10S2078, 8 m) that connects between the hull unit and transceiver unit is replaced with a 12.9 m cable (10S2078) or 22.9 m cable (10S2145), supplied with the kit.

### How to connect the junction box

Connect the extension cable (10S2240, 10 pcs.) and transducer cable (10S2223, 10 pcs.) to the JCTN1 and JCTN2 boards inside the junction box. Connect the cables correctly referring to the interconnection diagram.

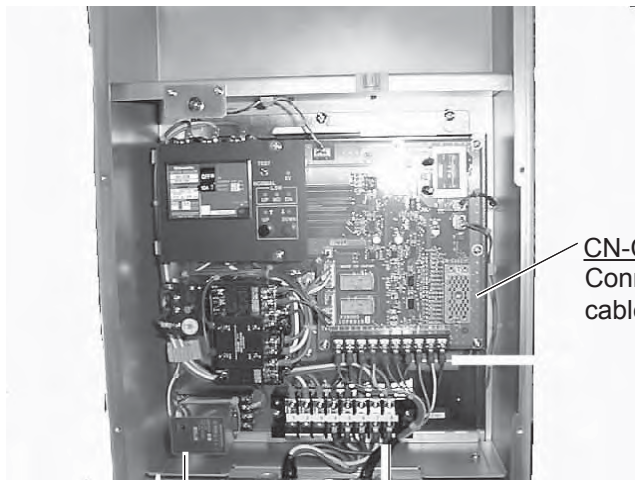
1. Remove the junction box cover.
2. Remove the cable clamp and fixing plate of the board.



3. Pass the signal cables through cable clamp to fix with the CKS clamp.
4. Lay the shield of the signal cables in the cable clamp and fasten them with the cable clamp.

## 2.8 Control Box of Hull Unit

Connect the 3 phase power cable and the transceiver unit cable (10S2078) as shown below.

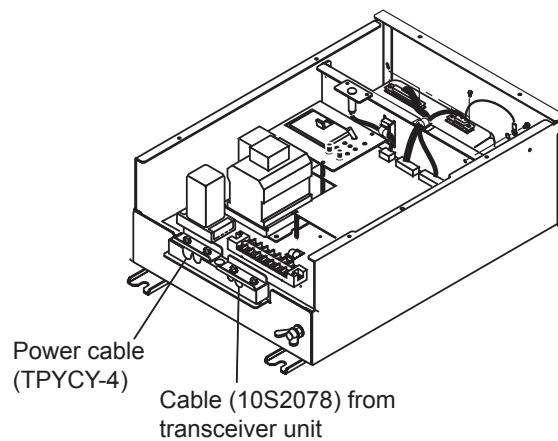


**CN-C101**  
Connect the transceiver cable (10S2078) here.

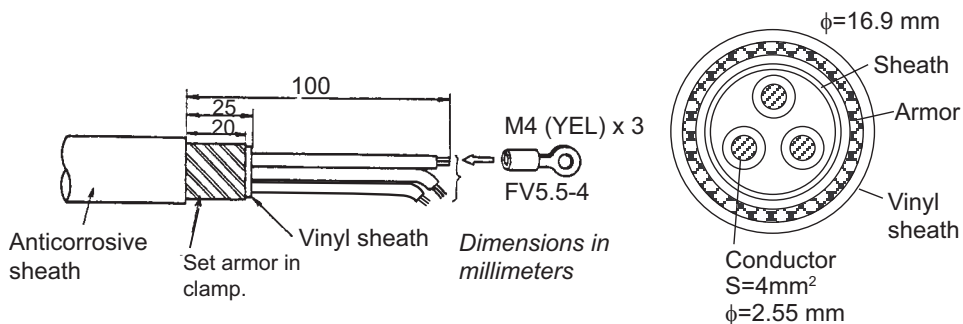
**TB-C101**  
Connect the power cable to this terminal board.  
**LED (red)**  
For detection of phase reversal on 3 phase power cable

Confirm that the LED lights in red after the wiring is completed. If the LED does not light, turn off power cable from the mains switchboard, reconnect any two lines of the power cable, turn on the power, and check if the LED lights. The hull unit does not work when the connection is wrong.

Normal phase: LED lights in red.  
Phase reversal: LED does not light.



Fabricate the power cable as shown below.



## 2.9 Input Voltage and Fuses

The transceiver unit is shipped from the factory with its input voltage set for 230 VAC and a 10 A fuse inserted in F601 and F602. For other voltages, change toggle switch positions and fuses shown below.


### Input voltage and toggle switch

| Input voltage | S603 | S604 | S605 | Default setting |
|---------------|------|------|------|-----------------|
| 100 VAC       | L    | L    | L    | -               |
| 110 VAC       | H    | L    | L    | -               |
| 115 VAC       | H    | H    | L    | -               |
| 220 VAC       | H    | L    | H    | -               |
| 230 VAC       | H    | H    | H    | Default         |

### Fuses

Change the fuse in F601 and F602 according to input voltage, referring to the table below.

| Input Voltage (TB-B101) | F601 | F602 | Default setting |
|-------------------------|------|------|-----------------|
| 100 VAC                 | 20A  | 20A  | -               |
| 110 VAC                 |      |      | -               |
| 115 VAC                 |      |      | -               |
| 220 VAC                 | 10A  | 10A  | -               |
| 230 VAC                 |      |      | Default         |



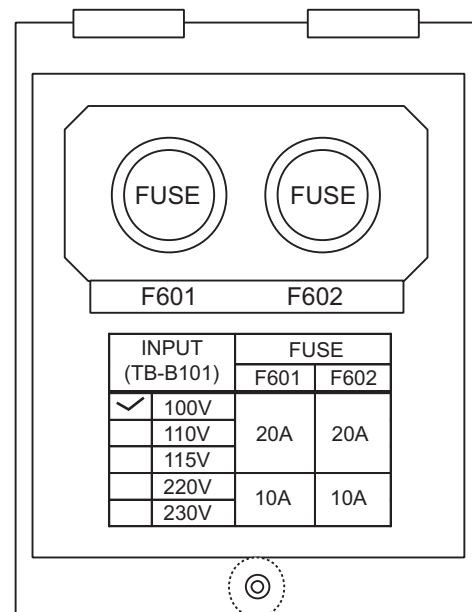
## WARNING

**Use the proper fuse.**

Use of a wrong fuse can result in damage to the equipment or cause fire.

### How to mark the input voltage label

After setting toggle switches and changing the fuses, mark the label on the inside of the cover with the voltage that applies. In the example shown below, 100 V is checked; 20 A fuses are used.



# 3. ADJUSTMENTS AND CHECKS

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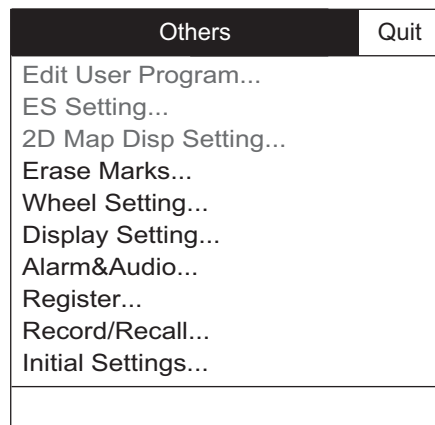
## 3.1 Hull Unit Check

Do not transmit when the vessel is in dry dock.

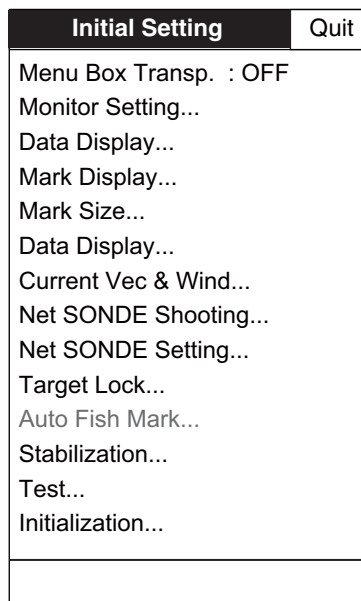
### How to enable transmission

The default transmission state is OFF. Enable transmission as shown in the procedure below. NEVER transmit when the vessel is in dry dock, to prevent damage to the transducer.

1. Turn on the power and press the **MENU/ESC** key to open the menu.
2. Use the trackball to select [Others] then push the left-click button.

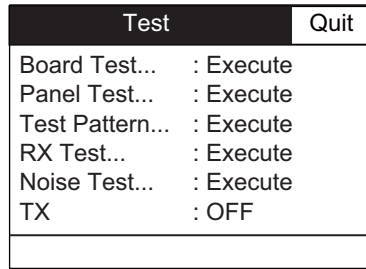


3. Select [Initial Settings] then push the left-click button.
4. Select [Changeable] then push the left-click button.



### 3. ADJUSTMENTS AND CHECKS

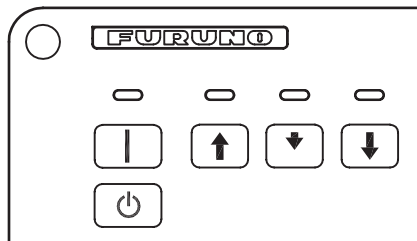
5. Select [Test] then push the left-click button.



6. Select [TX] then push the left-click button.
7. Select [On] then push the left-click button.
8. Long-press the **MENU/ESC** key to quit all menus.

#### **How to check the hull unit**

1. Press the POWER ( | ) switch on the control unit to turn on the system. Check that both the LED lamp above the POWER switch and the are lit.

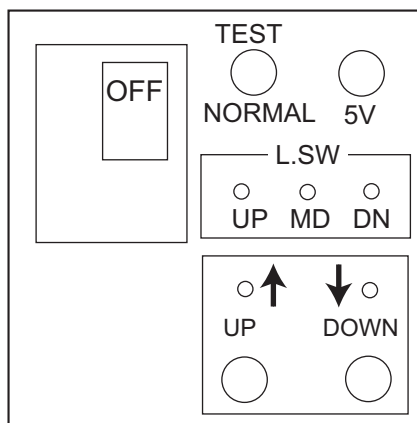


2. Confirm that the 5V and UP LEDs on the control box are lit.
3. Remove the cover of the control box and use a multimeter to measure the following voltages:

| Terminal | Terminal No. | Voltage |
|----------|--------------|---------|
| TB-C101  | (1) - (2)    | 220 VAC |
|          | (2) - (3)    | 220 VAC |
|          | (1) - (3)    | 220 VAC |

4. In the control box, set the TEST/NORMAL switch to [TEST]. Press the DOWN switch to confirm that the transducer lowers. Also, while the transducer is being lowered, check that the MD LED lights when the MD L. SW is pressed.

**Note:** MD L. SW does not stop the transducer when the TEST/NORMAL switch is in the TEST position.





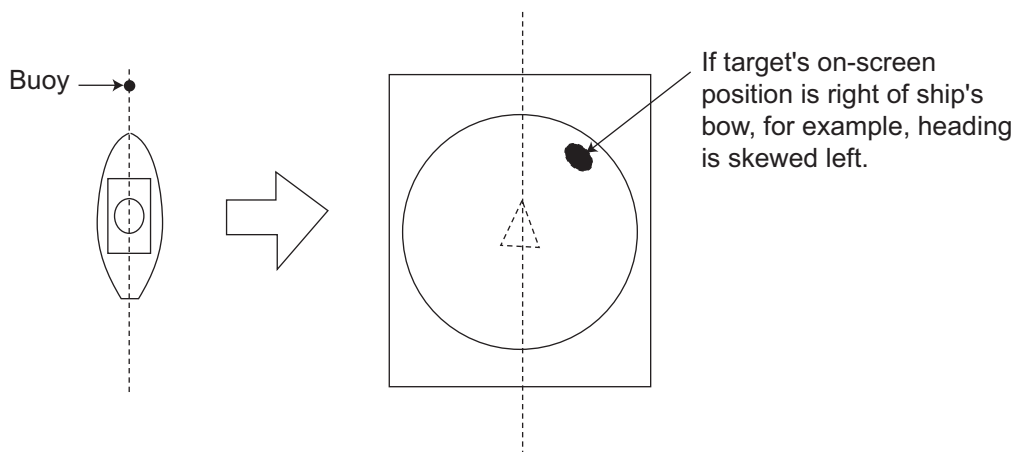
5. Release the [DOWN] switch during lowering to confirm that the transducer stops lowering.
6. Press the [DOWN] switch again to re-start lowering. Confirm that the transducer stops at the moment when the lower limit switch is pressed.
7. Confirm that the [UP] switch operates in a similar manner.
8. Check that LEDs on the panel of the control box light as follows:
  - 1) The UP, MD and DN LEDs light when corresponding limit switch is pressed.
  - 2) The UP and DN LEDs light while UP and DOWN switches are pressed and extinguish when the switches are released.
9. Set the TEST/NORMAL switch to [NORMAL].
10. Check that the transducer is mid-protruded when the ▼ (mid-protrusion position) switch is pressed. Confirm that the LED above the switch blinks while the transducer is being lowered, a short beep sounds and the LED lights when the transducer stops at the mid position.
11. Press the ▼ switch (fully lowered position) and then the ▲ switch. Confirm that the LED above the respective switch blinks while the transducer is being lowered or raised, and a short beep sounds when the transducer is fully lowered or raised.
12. Press the OFF switch. Confirm that the transducer is completely retracted and the power is off.
13. Confirm that the transducer is raised when the ▲ switch or the OFF switch is pressed.

## 3.2 How to Adjust the Heading

### Heading correction at the hull unit

When the BOW mark on the flange of the hull unit can not be directed toward ship's bow perfectly, adjust the heading so an echo which is dead ahead appears dead ahead on the display.

1. Enable transmission as shown in section 3.1.
2. Find a target in the bow direction (buoy, for example) and display it on a near range. If the target appears at 12 o'clock, the heading alignment is correct. If it does not, measure the error and go to next step.



3. If the heading is skewed, measure the skew angle.

### 3. ADJUSTMENTS AND CHECKS

4. While pressing and holding down the **MENU/ESC** key, press **F1**, **F3**, **F5** to show the [System] menu.
5. Select [Others] then push the left-click button.
6. Select [Heading Adjust 1] then push the left-click button.
7. Rotate the scrollwheel to enter the angle measured at step 3. The setting range is -180° to 179°, in one-degree increments.
8. Select [Quit] then push the left-click button.
9. Long-press the **MENU/ESC** key to close all menus.

#### **Heading correction at the motion sensor**

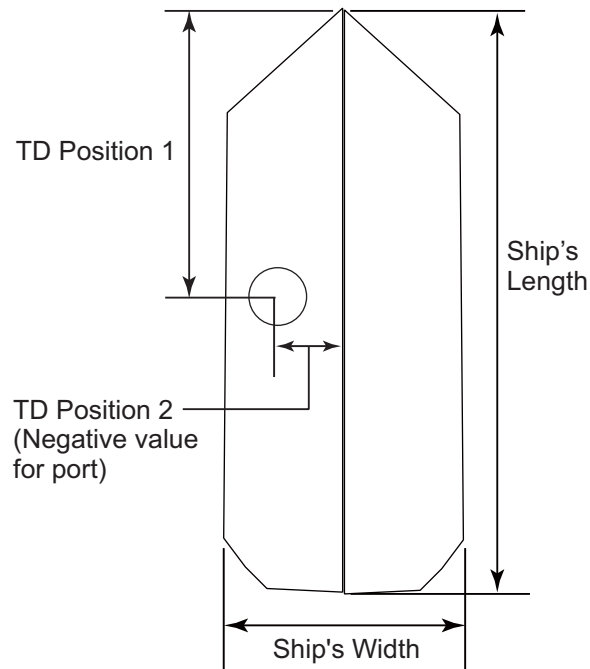
Heading correction at the motion sensor is done with [Heading Adjust 2] on the [Others] menu.

- If the control box is mounted on the hull unit, set the same heading correction as entered for [Heading Adjust 1] (in [Others] menu).
- If the control box is mounted independent of the hull unit, set the angle measured from the bow in the clockwise direction. The angle is 0° if the lid of the control box is directed toward ship's stern precisely.
- If the motion sensor is a GPS gyro, set 0°.

## **3.3 How to Configure the Own Ship Mark**

Set your ship's length and width and the position of the transducer, to accurately display the own ship mark on the screen.

1. Open the [System] menu.
2. Select [Own Ship Mark] then push the left-click button.
3. Select [Ship's Length] then left-click.
4. Use the scrollwheel to set length. The setting range is 15 -150 m.
5. Set the [Ship's Width] and [TD Position 1 (or 2)] similarly.
  - [Ship's Width]: The width of the ship at its widest point. (Setting range 5 -30 m)
  - [TD Position 1]: Distance from transducer to bow. (Setting range: 5 - 50 m)
  - [TD Position 2]: Distance from transducer to keel. Select [+] for starboard, [-] for port. (Setting range: -10 to 10 m)



6. Long-press the **MENU/ESC** key to close all menus.

## 3.4 Others Menu

The [Others] menu sets the equipment according to the external equipment connected.

### 3.4.1 Interface Setting menu

**NMEA1/2 Baud Rate:** Set the transmission rate for the NMEA 1 and NMEA 2 ports. (4800 bps, 9600 bps, 19200 bps, 38400 bps)

**CIF1/2 Baud Rate:** Set the transmission rate for the CIF 1 and CIF 2 ports. (2400 bps, 4800 bps, 9600 bps, 19200 bps)

**EXT KP Input:** Set the input logic of KP from external equipment. (Disable, Enable)  
 Disable: Disable external KP. Enable: Use KP from external equipment.

### 3.4.2 EXT Data Setting menu

**Date&Time:** Select the input format for date and time data. (NONE, CIF, NMEA)

**Heading:** Select the input format for heading data. (NONE, AD10, CIF, NMEA)

**Speed&Course:** Select the input format for ship's speed and course data. (NONE, CIF, NMEA)

**Speed Sensor:** Select the input format for speed data. (NONE, GPS/DR, DOPPLER/DR) If response is slow, select GPS.

**Lat/Lon:** Select the input format for position data. (NONE, CIF, NMEA)

**POS Sensor:** Select the type of the navigator used. Select [Auto Sel] when more than one navigator is connected. The priority for auto selection is GPS/DR> Loran-C. (Loran C, GPS/DR, Auto Sel)

**Water Depth:** Select the input format for water depth. (NONE, CIF, NMEA)

**Water Temp:** Select the input format for water temperature. (NONE, CIF, NMEA)

**Water Current:** Select the input format for water current. (NONE, CIF, NMEA)

**Wind:** Select the input format for wind data. (NONE, CIF, NMEA)

**Net Depth:** Select the input format for net depth data. (NONE, CIF)

**CIF Type:** Select the CIF type to use. (CIF-2000, CS-120A)

### 3.4.3 Others menu

**Trackball Speed:** Select the tracking speed for the trackball. (Slow, Normal, Fast)

**Hull Unit Stroke:** Select the stroke of the hull unit. (1200 mm, 1600 mm)

**Error Code List:** Confirm error codes.

**Explorer:** Confirm and search files.

# 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<sup>2</sup>)* 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** 1 mm Multi core

**TT** 0.75mm twisted pair communications (1Q=quad cable)

## 2. Insulation Type

**P** Ethylene Propylene

**Y** Vinyl

## 3. Sheath Type

**Y** Vinyl

## 4. Armor Type

**C** Steel

## 5. Shielding Type

**Y** Corrosive Resistant

## 6. Core Sheath

**S** All cores in one sheath

**-S** Individually sheathed cores

**SLA** All cores in one sheath, plastic tube sheath w/aluminum tape

**-SLA** Individually sheathed cores, plastic tube sheath w/aluminum tape



DPYC



TPYC



MPYC-5



TTYCS-4

EX: <sup>1 2 3 4 5 6</sup> DPYCS - 1.5      <sup>1 2 3 4</sup> MPYC - 5  
 Designation type      Core Area (mm<sup>2</sup>)      Designation type      # of cores

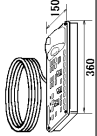


The following reference table lists gives the measurements of JIS cables commonly used with Furuno products:

| Type         | Core               |          | Cable Diameter | Type         | Core                |          | Cable Diameter |
|--------------|--------------------|----------|----------------|--------------|---------------------|----------|----------------|
|              | Area               | Diameter |                |              | Area                | Diameter |                |
| DPYC-1.5     | 1.5mm <sup>2</sup> | 1.56mm   | 11.7mm         | TTYC-7S      | 0.75mm <sup>2</sup> | 1.11mm   | 20.8mm         |
| DPYC-2.5     | 2.5mm <sup>2</sup> | 2.01mm   | 12.8mm         | TTYCSLA-1    | 0.75mm <sup>2</sup> | 1.11mm   | 9.4mm          |
| DPYC-4       | 4.0mm <sup>2</sup> | 2.55mm   | 13.9mm         | TTYCSLA-1Q   | 0.75mm <sup>2</sup> | 1.11mm   | 10.8mm         |
| DPYC-6       | 6.0mm <sup>2</sup> | 3.12mm   | 15.2mm         | TTYCSLA-4    | 0.75mm <sup>2</sup> | 1.11mm   | 15.7mm         |
| DPYCY-2.5    | 2.5mm <sup>2</sup> | 2.01mm   | 14.8mm         | TTYCY-4S     | 0.75mm <sup>2</sup> | 1.11mm   | 17.9mm         |
| DPYCY-4      | 4.0mm              | 2.55mm   | 15.9mm         | TTYCYS-1     | 0.75mm <sup>2</sup> | 1.11mm   | 12.1mm         |
| DPYCYSLA-1.5 | 1.5mm <sup>2</sup> | 1.56mm   | 13.9mm         | TTYCYS-4     | 0.75mm <sup>2</sup> | 1.11mm   | 18.5mm         |
| DPYCYSLA-2.5 | 2.5mm <sup>2</sup> | 2.01mm   | 15.0mm         | TPYCY-1.5    | 1.5mm <sup>2</sup>  | 1.56mm   | 14.5mm         |
| MPYC-2       | 1.0mm <sup>2</sup> | 1.29mm   | 10.0mm         | TPYCY-2.5    | 2.5mm <sup>2</sup>  | 2.01mm   | 15.5mm         |
| MPYC-4       | 1.0mm <sup>2</sup> | 1.29mm   | 11.2mm         | TPYCY-4      | 4.0mm <sup>2</sup>  | 2.55mm   | 16.9mm         |
| MPYC-7       | 1.0mm <sup>2</sup> | 1.29mm   | 13.2mm         | TPYCYSLA-1.5 | 1.5mm <sup>2</sup>  | 1.56mm   | 13.9mm         |
| MPYCY-12     | 1.0mm <sup>2</sup> | 1.29mm   | 19.0mm         |              |                     |          |                |
| MPYCY-19     | 1.0mm <sup>2</sup> | 1.29mm   | 22.0mm         |              |                     |          |                |

# PACKING LIST

100V-X-9851 -0 1/1  
A-1

FSV-8501-J-5/10, E-5/10

| NAME                           | OUTLINE   | DESCRIPTION/CODE No.                         | QTY |
|--------------------------------|---|--|-----|
| <b>UNIT</b>                    |   |  |     |
| ユニット<br>操作部<br>CONTROL UNIT    |  | FSV-8501-J-5/10, E-5/10<br>000-017-117-00 ** | 1   |
| <b>工事材料</b>                    |   |  |     |
| KB取付金具<br>KB FIXTURE ASSEMBLY  |  | CP03-33202<br>001-115-510-00                 | 1   |
| 工事材料<br>INSTALLATION MATERIALS |  | CP10-07201<br>001-112-500-00                 | 1   |

コード番号末尾の[\*]は、選択品の代表コードを表します。  
CODE NUMBER ENDING WITH "\*" INDICATES THE CODE NUMBER OF REPRESENTATIVE MATERIAL.

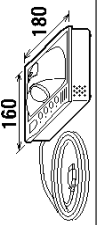

型式コード番号が2段の場合、下段より上段に代わる過渡期品であり、どちらが入っています。なお、品質は変わりません。  
TWO TYPES AND CODES MAY BE LISTED FOR AN ITEM. THE LOWER PRODUCT MAY BE SHIPPED IN PLACE OF THE UPPER PRODUCT. QUALITY IS THE SAME.  
(略図の寸法は、参考値です。DIMENSIONS IN DRAWING FOR REFERENCE ONLY.)

C1335-Z01-A

# PACKING LIST

100V-X-9856 -0 1/1  
A-2

FSV-853

| NAME                           | OUTLINE   | DESCRIPTION/CODE No.         | QTY |
|--------------------------------|---|------------------------------|-----|
| <b>UNIT</b>                    |   |                              |     |
| ユニット<br>簡易操作部<br>CONTROL UNIT  |  | FSV-853<br>000-019-213-00    | 1   |
| <b>工事材料</b>                    |   |                              |     |
| 工事材料<br>INSTALLATION MATERIALS |  | CP10-07501<br>001-135-210-00 | 1   |

型式コード番号が2段の場合、下段より上段に代わる過渡期品であり、どちらが入っています。なお、品質は変わりません。  
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(略図の寸法は、参考値です。DIMENSIONS IN DRAWING FOR REFERENCE ONLY.)

C1335-Z06-A

# PACKING LIST

## FSV-351-E

100W-X-9853 -1 1/1

A-4

| NAME                          | OUTLINE | DESCRIPTION/CODE No. | QTY |
|-------------------------------|---------|----------------------|-----|
| <b>ユニット</b>                   |         |                      |     |
| 送受信装置                         |         | FSV-351              | 1   |
| 予備品                           |         | 000-020-269-00       |     |
| <b>SPARE PARTS</b>            |         |                      |     |
| 予備品                           |         | SP10-03101           | 1   |
| SPARE PARTS                   |         | 007-008-530-00       |     |
| <b>工事材料</b>                   |         |                      |     |
| <b>INSTALLATION MATERIALS</b> |         |                      |     |
| 工事材料                          |         | CP10-06201           | 1   |
| INSTALLATION MATERIALS        |         | 007-008-540-00       |     |
| <b>図書</b>                     |         |                      |     |
| <b>DOCUMENT</b>               |         |                      |     |
| 取扱説明書                         |         | OME-13330-*          | 1   |
| OPERATOR'S MANUAL             |         | 000-175-788-1*       |     |
| 装備要領書                         |         | IME-13330-*          | 1   |
| INSTALLATION MANUAL           |         | 000-175-791-1*       |     |
| 電源設定書                         |         | CI2-00302-*          | 1   |
| VOLTAGE SETTINGS              |         | 000-149-243-1*       |     |

型式コード番号が2段の場合、下段より上段に代わる過渡期品であり、どちらかが入っています。なお、品質は変わりません。  
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 (略図の寸法は、参考値です。DIMENSIONS IN DRAWING FOR REFERENCE ONLY.)

C1333-Z03-B

# PACKING LIST

## FSV-3503/3503S

100W-X-9851 -0 1/1

A-3

| NAME                          | OUTLINE | DESCRIPTION/CODE No. | QTY |
|-------------------------------|---------|----------------------|-----|
| <b>ユニット</b>                   |         |                      |     |
| 制御部                           |         | FSV-3503/S           | 1   |
| 予備品                           |         | 000-020-262-00 **    |     |
| <b>SPARE PARTS</b>            |         |                      |     |
| 予備品                           |         | SP19-00501           | 1   |
| SPARE PARTS                   |         | 001-023-090-00       |     |
| <b>工事材料</b>                   |         |                      |     |
| <b>INSTALLATION MATERIALS</b> |         |                      |     |
| ケーブル組品                        |         | FRUDD-18AFFM-L180    | 1   |
| CABLE ASSEMBLY                |         | 000-164-608-10       |     |
| 工事材料                          |         | CP19-00601           | 1   |
| INSTALLATION MATERIALS        |         | 001-023-100-00       |     |
| <b>図書</b>                     |         |                      |     |
| <b>DOCUMENT</b>               |         |                      |     |
| エラー変更のお願い                     |         | C42-00705-*          | 1   |
| NOTIFICATION DOCUMENT         |         | 000-167-240-1*       |     |

コード番号末尾の[\*\*]は、選択品の代表コードを表します。  
 CODE NUMBER ENDING WITH "\*\*" INDICATES THE CODE NUMBER OF REPRESENTATIVE MATERIAL.

型式コード番号が2段の場合、下段より上段に代わる過渡期品であり、どちらかが入っています。なお、品質は変わりません。  
 TWO TYPES AND CODES MAY BE LISTED FOR AN ITEM. THE LOWER PRODUCT MAY BE SHIPPED IN PLACE OF THE UPPER PRODUCT. QUALITY IS THE SAME.  
 (略図の寸法は、参考値です。DIMENSIONS IN DRAWING FOR REFERENCE ONLY.)

C1333-Z01-A

PACKING LIST  
FSV-351S-E

100W-X-9854 -1 1/1  
A-5

| NAME                                | OUTLINE | DESCRIPTION/CODE No.          | QTY |
|-------------------------------------|---------|-------------------------------|-----|
| <b>ユニット</b>                         |         |                               |     |
| 送受信装置<br>TRANSCEIVER UNIT           |         | FSV-351<br>000-020-269-00     | 1   |
| <b>予備品</b>                          |         |                               |     |
| 予備品<br>SPARE PARTS                  |         | SP10-03101<br>007-008-530-00  | 1   |
| <b>工事材料</b>                         |         |                               |     |
| 工事材料<br>INSTALLATION MATERIALS      |         | CP10-06201<br>007-008-540-00  | 1   |
| <b>図書</b>                           |         |                               |     |
| 取扱説明書 (英)<br>OPERATOR'S MANUAL (EN) |         | OME-13340-*<br>000-175-789-1* | 1   |
| 装束要領書<br>INSTALLATION MANUAL        |         | IME-13330-*<br>000-175-791-1* | 1   |
| 電源設定書<br>VOLTAGE SETTINGS           |         | C12-00302-*<br>000-149-243-1* | 1   |

型式・コト番号が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.)

C1334-Z01-B

PACKING LIST  
FSV-303

100T-X-9853 -3 1/1  
A-6

| NAME                              | OUTLINE | DESCRIPTION/CODE No.              | QTY |
|-----------------------------------|---------|-----------------------------------|-----|
| <b>ユニット</b>                       |         |                                   |     |
| 上下装置<br>HULL UNIT                 |         | FSV-303<br>000-067-068-00         | 1   |
| <b>予備品</b>                        |         |                                   |     |
| 予備品<br>SPARE PARTS                |         | SP10-02603<br>006-921-360-00      | 1   |
| <b>現地組部品</b>                      |         |                                   |     |
| 現地組部品説明<br>LOCAL ASSEMBLING       |         | C12-00202-*<br>000-146-864-1*     | 1   |
| 0リング (V)<br>O-RING                |         | 00 0318A (V585)<br>000-166-370-10 | 1   |
| 7-水板<br>COPPER STRAP              |         | WEA-1004-O ROHS<br>500-310-040-10 | 1   |
| 六角ボルト 全ネジ<br>HEXAGONAL HEAD SCREW |         | M20X120 SUS304<br>000-162-825-10  | 14  |
| 六角ナット 1/2<br>HEX. NUT             |         | M20 SUS304<br>000-167-476-10      | 38  |
| ミカキ丸平座金<br>FLAT WASHER            |         | M20 SUS304<br>000-167-452-10      | 33  |
| ハネ座金<br>SPRING WASHER             |         | M20 SUS304<br>000-167-401-10      | 19  |
| 圧着端子<br>CRIMP-ON LUG              |         | FV5. 5-4 (LF)<br>000-166-744-10   | 3   |

型式・コト番号が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.)

C1323-Z03-D

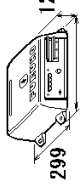





# PACKING LIST

## FSV-8502

100V-X-9852 -2 1/1

A-8

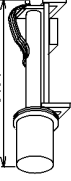

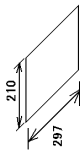

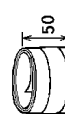
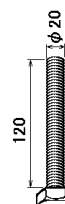



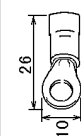
| NAME                   | OUTLINE   | DESCRIPTION/CODE No.         | QTY |
|------------------------|---|------------------------------|-----|
| <b>ユニット</b>            |   |                              |     |
| IFユニット                 |  | FSV-8502                     | 1   |
| INTERFACE UNIT         | 299<br>380  | 000-017-122-00<br>CP10-07300 |     |
| <b>工事材料</b>            |   |                              |     |
| ケーブル(ラミネート)LAN         |  | 10CA2383 *3M*                | 1   |
| CABLE ASSEMBLY (LAN)   | L=3M  | 000-174-158-11               |     |
| ケーブル組品MU               |  | MJ-AGSPP0026-030C            | 1   |
| POWER CABLE ASSEMBLY   | L=3M  | 000-174-486-10               |     |
| 工事材料                   |  | CP10-07301                   | 1   |
| INSTALLATION MATERIALS |   | 001-112-510-00               |     |

100T-X-9854 -3 1/1

A-7

# PACKING LIST

## FSV-304

| NAME                 | OUTLINE   | DESCRIPTION/CODE No. | QTY |
|----------------------|---|----------------------|-----|
| <b>ユニット</b>          |   |                      |     |
| 上下装置                 |    | FSV-304              | 1   |
| HULL UNIT            | 3494  | 000-067-069-00       |     |
| <b>予備品</b>           |   |                      |     |
| 予備品                  |    | SP10-02603           | 1   |
| SPARE PARTS          |   | 006-921-360-00       |     |
| <b>現地組部品</b>         |   |                      |     |
| 現地組部品説明              |    | C12-00202-*          | 1   |
| LOCAL ASSEMBLING     | 210<br>297  | 000-146-864-1*       |     |
| Oリング (V)             |    | CO 0318A (V585)      | 1   |
| O-RING               | φ579  | 000-166-370-10       |     |
| アス板                  |    | WEA-1004-0 ROHS      | 1   |
| COPPER STRAP         | 50<br>L=1.2m  | 500-310-040-10       |     |
| 六角ボルト 全社'            |    | M20X120 SUS304       | 14  |
| HEXAGONAL HEAD SCREW | 120   | 000-162-825-10       |     |
| 六角ナット                |    | M20 SUS304           | 38  |
| HEX. NUT             | 16<br>30  | 000-167-476-10       |     |
| 平丸平座金                |   | M20 SUS304           | 33  |
| FLAT WASHER          | φ40   | 000-167-452-10       |     |
| 平座金                  |  | M20 SUS304           | 19  |
| SPRING WASHER        | 34  | 000-167-401-10       |     |
| 圧着端子                 |  | FV5. 5-4 (LF)        | 3   |
| CRIMP-ON LUG         | 26<br>10  | 000-166-744-10       |     |

型式/コード番号が2段の場合、下段より上段に代わる過渡期品であり、どちらが入っています。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.)

C1323-Z04-D

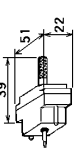



型式/コード番号が2段の場合、下段より上段に代わる過渡期品であり、どちらが入っています。なお、品質は変わりません。  
TWO TYPES AND CODES MAY BE LISTED FOR AN ITEM. THE LOWER PRODUCT MAY BE SHIPPED IN PLACE OF THE UPPER PRODUCT. QUALITY IS THE SAME.  
(略図の寸法は、参考値です。DIMENSIONS IN DRAWING FOR REFERENCE ONLY.)

C1335-Z02-C

|          |                |               |     |
|----------|----------------|---------------|-----|
| CODE NO. | 007-008-540-00 | 100T-X-9401-4 | 1/1 |
| TYPE     | CP10-06201     |               |     |

**工事材料表**

INSTALLATION MATERIALS

| 番号<br>NO. | 名称<br>NAME                          | 略図<br>OUTLINE   | 型名/規格<br>DESCRIPTIONS                           | 数量<br>Q'TY | 用途/備考<br>REMARKS              |
|-----------|-------------------------------------|---|---|------------|-------------------------------|
| 1         | コネクタ (8016)<br>CONNECTOR (8016)     |  | 008016-008-313761HVF<br>CODE NO. 000-159-017-10 | 1          | 送受信装置用<br>FOR TRANSCIVER UNIT |
| 2         | コネクタピン (8017)<br>CONTACT PIN (8017) |  | 60-8017-0313-00339F+<br>CODE NO. 000-159-417-10 | 2          | 送受信装置用<br>FOR TRANSCIVER UNIT |
| 3         | 圧着端子<br>CRIMP-ON LUG                |  | FV2-4<br>CODE NO. 000-157-247-10                | 3          | 送受信装置用<br>FOR TRANSCIVER UNIT |
| 4         | 7-芯板<br>COPPER STRAP                |  | WEA-1004-0 ROHS<br>CODE NO. 500-310-040-10      | 1          | 送受信装置用<br>FOR TRANSCIVER UNIT |

型式/コード番号が2段の場合、下段より上段に代わる通達部品であり、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.)

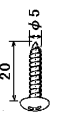
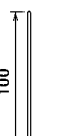
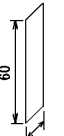
FURUNO ELECTRIC CO., LTD.

|          |                |               |     |
|----------|----------------|---------------|-----|
| CODE NO. | 001-112-510-00 | 100V-X-9402-0 | 1/1 |
| TYPE     | CP10-07301     |               |     |

**工事材料表**

FSV-8502

INSTALLATION MATERIALS

| 番号<br>NO. | 名称<br>NAME                              | 略図<br>OUTLINE   | 型名/規格<br>DESCRIPTIONS                        | 数量<br>Q'TY | 用途/備考<br>REMARKS |
|-----------|---|---|--|------------|------------------|
| 1         | セルフタッピングネジ<br>1/2<br>SELF-TAPPING SCREW |  | 5X20 SUS304<br>CODE NO. 000-162-608-10       | 4          |                  |
| 2         | ケーブルタイ<br>CABLE TIE                     |  | CV-100N<br>CODE NO. 000-162-167-10           | 4          |                  |
| 3         | 導電性布テープ<br>CONDUCTIVE CLOTH TAPE        |  | DK104FR-19 *60MM*<br>CODE NO. 000-173-052-10 | 1          |                  |

型式/コード番号が2段の場合、下段より上段に代わる通達部品であり、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.)

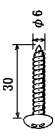
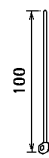
FURUNO ELECTRIC CO., LTD.

**FURUNO**

CODE NO. 001-023-100-00 19AY-X-9401 -3 1/1  
 TYPE CP19-00601

**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      | +15737742 "ボルト" 1個<br>SELF-TAPPING SCREW |  | 6X30 SUS304<br>CODE NO. 000-162-614-10 | 4       |               |
| 2      | ケーブルカス<br>CABLE TIE                      |  | CV-100N<br>CODE NO. 000-162-167-10     | 4       |               |





型式/コード番号が2図の場合、下図より上図に代わる標準部品であり、どちらが入っています。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.

C4446-M01-C

**FURUNO**

CODE NO. 007-008-530-00 10CT-X-9301 -3 1/1  
 TYPE SPI10-03101

| SHIP NO. | SPARE PARTS LIST FOR | U S E | REMARKS/CODE NO.                                 | QUANTITY        |       | DWG. NO. OR TYPE NO. | OUTLINE   | NAME OF PART           | ITEM NO. |
|----------|----------------------|-------|--|-----------------|-------|----------------------|---|------------------------|----------|
|          |                      |       |  | WORKING PER SET | SPARE |                      |   |                        |          |
|          |                      |       |  |                 |       |                      |  | ト-7<br>GLASS TUBE FUSE | 1        |
|          |                      |       | 送受信装置用<br>FOR TRANSCEIVER UNIT<br>000-155-839-10 |                 | 5     | FGB0 250V 10A PBF    |   |                        |          |
|          |                      |       | 送受信装置用<br>FOR TRANSCEIVER UNIT<br>000-157-874-10 |                 | 5     | FGB0 250V 15A PBF    |  | ト-7<br>GLASS TUBE FUSE | 2        |
|          |                      |       | 送受信装置用<br>FOR TRANSCEIVER UNIT<br>000-155-786-10 |                 | 5     | FGB0 250V 20A        |  | ト-7<br>GLASS TUBE FUSE | 3        |
|          |                      |       | 送受信装置用<br>FOR TRANSCEIVER UNIT<br>000-157-570-10 |                 | 5     | FGB0 250V 5A PBF     |  | ト-7<br>GLASS TUBE FUSE | 4        |

|            |                           |         |             |     |
|------------|---------------------------|---------|-------------|-----|
| MFR'S NAME | FURUNO ELECTRIC CO., LTD. | DWG NO. | C1323-P01-D | 1/1 |
|------------|---------------------------|---------|-------------|-----|

(略図の寸法は、参考値です。 DIMENSIONS IN DRAWING FOR REFERENCE ONLY.)  
 型式/コード番号が2図の場合、下図より上図に代わる標準部品であり、どちらが入っています。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**

CODE NO. 001-023-090-00  
 TYPE SPT9-00501  
 19AY-X-9302-2 1/1  
 BOX NO. P

| SHIP NO.                             |                                   | S P A R E P A R T S L I S T F O R |                      |                 |           | U S E               |     | S E T S P E R V E S S E L |  |
|--------------------------------------|-----------------------------------|-----------------------------------|----------------------|-----------------|-----------|---------------------|-----|---------------------------|--|
| ITEM NO.                             | NAME OF PART                      | OUTLINE                           | DWG. NO. OR TYPE NO. | QUANTITY        |           | REMARKS/CODE NO.    |     |                           |  |
|                                      |                                   |                                   |                      | WORKING PER SET | S P A R E |                     |     |                           |  |
| 1                                    | Ca-X <sup>*</sup> GLASS TUBE FUSE |                                   | FGB01 250V 10A PBF   |                 | 4         |                     |     |                           |  |
| 2                                    | Ca-X <sup>*</sup> GLASS TUBE FUSE |                                   | FGB01 250V 20A       |                 | 4         |                     |     |                           |  |
|                                      |                                   |                                   |                      |                 |           |                     |     |                           |  |
|                                      |                                   |                                   |                      |                 |           |                     |     |                           |  |
|                                      |                                   |                                   |                      |                 |           |                     |     |                           |  |
|                                      |                                   |                                   |                      |                 |           |                     |     |                           |  |
|                                      |                                   |                                   |                      |                 |           |                     |     |                           |  |
|                                      |                                   |                                   |                      |                 |           |                     |     |                           |  |
|                                      |                                   |                                   |                      |                 |           |                     |     |                           |  |
|                                      |                                   |                                   |                      |                 |           |                     |     |                           |  |
|                                      |                                   |                                   |                      |                 |           |                     |     |                           |  |
|                                      |                                   |                                   |                      |                 |           |                     |     |                           |  |
|                                      |                                   |                                   |                      |                 |           |                     |     |                           |  |
|                                      |                                   |                                   |                      |                 |           |                     |     |                           |  |
|                                      |                                   |                                   |                      |                 |           |                     |     |                           |  |
| MFR'S NAME FURUNO ELECTRIC CO., LTD. |                                   |                                   |                      |                 |           | DWG NO. C4446-P02-B | 1/1 |                           |  |

(略図の寸法は、参考値です。 DIMENSIONS IN DRAWING FOR REFERENCE ONLY.)  
 型式/ノード番号が2段の場合、下段より上段に代わる過渡期品であり、どちらが入っています。 なお、品質は差  
 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**

CODE NO. 006-921-360  
 TYPE SPT10-02603  
 1000-X-9303 -1 1/1  
 BOX NO. P

| SHIP NO.                             |                        | S P A R E P A R T S L I S T F O R |                      |                 |           | U S E  |     | S E T S P E R V E S S E L |  |
|--------------------------------------|------------------------|-----------------------------------|----------------------|-----------------|-----------|--|-----|---------------------------|--|
| ITEM NO.                             | NAME OF PART           | OUTLINE                           | DWG. NO. OR TYPE NO. | QUANTITY        |           | REMARKS/CODE NO.   |     |                           |  |
|                                      |                        |                                   |                      | WORKING PER SET | S P A R E |  |     |                           |  |
| 1                                    | Ca-X <sup>*</sup> FUSE |                                   | FGB 2A 250V          | 1               | 1         | 上下装置(補助器用) FOR HALL UNIT<br>000-157-497-10<br>000-122-000-00 |     |                           |  |
|                                      |                        |                                   |                      |                 |           |  |     |                           |  |
|                                      |                        |                                   |                      |                 |           |  |     |                           |  |
|                                      |                        |                                   |                      |                 |           |  |     |                           |  |
|                                      |                        |                                   |                      |                 |           |  |     |                           |  |
|                                      |                        |                                   |                      |                 |           |  |     |                           |  |
|                                      |                        |                                   |                      |                 |           |  |     |                           |  |
|                                      |                        |                                   |                      |                 |           |  |     |                           |  |
|                                      |                        |                                   |                      |                 |           |  |     |                           |  |
|                                      |                        |                                   |                      |                 |           |  |     |                           |  |
|                                      |                        |                                   |                      |                 |           |  |     |                           |  |
|                                      |                        |                                   |                      |                 |           |  |     |                           |  |
| MFR'S NAME FURUNO ELECTRIC CO., LTD. |                        |                                   |                      |                 |           | DWG NO. C1318-P04-B  | 1/1 |                           |  |

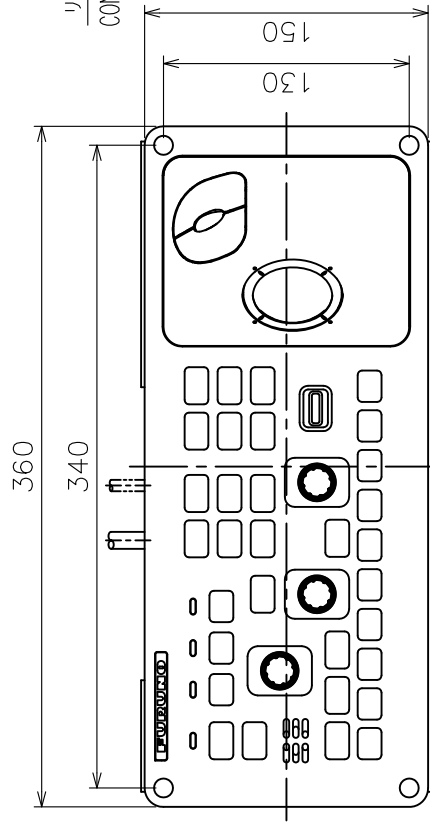
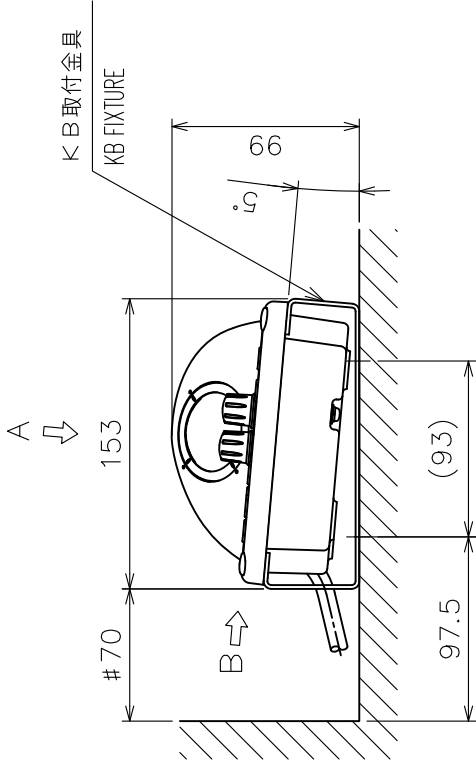
(略図の寸法は、参考値です。 DIMENSIONS IN DRAWING FOR REFERENCE ONLY.)  
 型式/ノード番号が2段の場合、下段より上段に代わる過渡期品であり、どちらが入っています。 なお、品質は差  
 TWO TYPES AND CODES MAY BE LISTED FOR AN ITEM. THE LOWER PRODUCT MAY BE SHIPPED IN PLACE OF THE  
 UPPER PRODUCT. QUALITY IS THE SAME.

表 1 TABLE 1

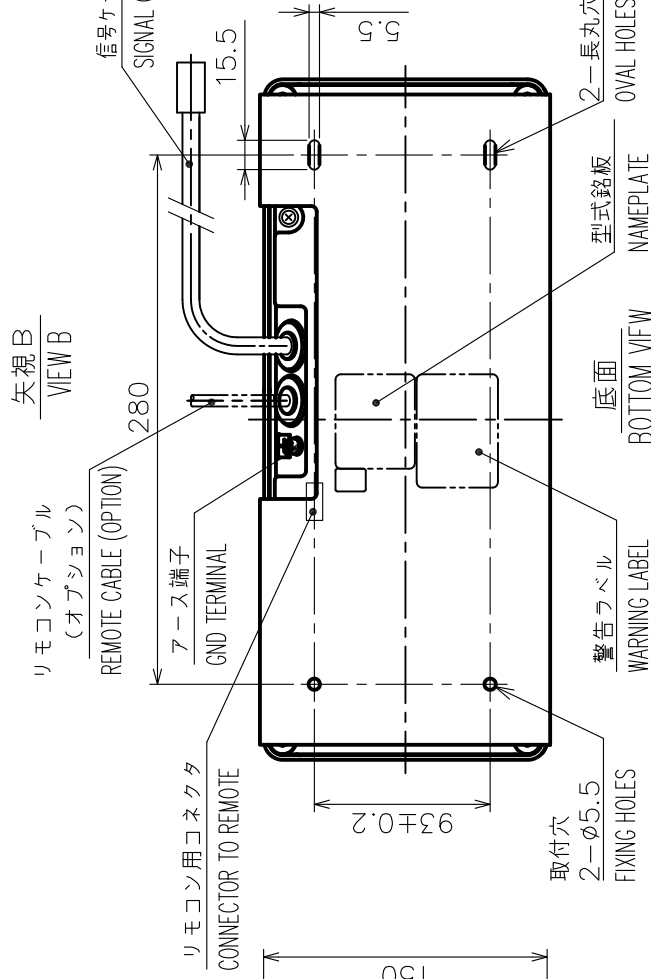
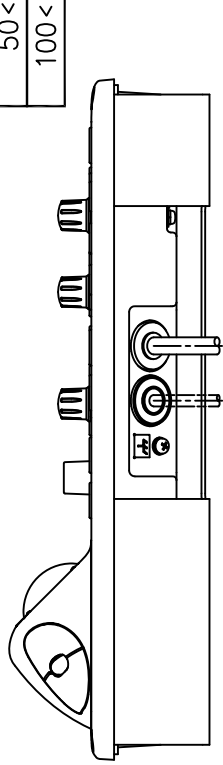
| 寸法区分 (mm)<br>DIMENSION | 公差 (mm)<br>TOLERANCE |
|------------------------|----------------------|
| $L \leq 50$            | $\pm 1.5$            |
| $50 < L \leq 100$      | $\pm 2.5$            |
| $100 < L \leq 500$     | $\pm 3$              |

表 2 TABLE 2

| ケーブル長さ<br>CABLE LENGTH (m) | 5   | 10  |
|----------------------------|-----|-----|
| 質量 MASS (kg $\pm$ 10%)     | 3.8 | 4.3 |



矢視 A  
VIEW A



注 記

- 1) 指定外の寸法公差は表 1 による
- 2) # 印寸法は最小サービス空間寸法とする
- 3) 取付用ネジは + バインドレットピン 1 シュ呼び径 5 × 2.0 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  $\phi$ 5x2.0 FOR FIXING THE UNIT.

|          |                                   |                               |               |
|----------|-----------------------------------|-------------------------------|---------------|
| DRAWN    | 9/Sep/2011 T.YAMASAKI             | TITLE                         | FSV-8501      |
| CHECKED  | 9/Sep/2011 H.MAKI                 | 名称                            | 操作部 (卓上装備)    |
| APPROVED | 13/Sep/2011 Y.NISHIYAMA           | NAME                          | 外寸図           |
| SCALE    | 1/4<br># MASS 表之参照<br>SEE TABLE 2 | CONTROL UNIT (TABLETOP MOUNT) |               |
| DWG.No.  | C1335-G04-C                       | REF.No.                       | 10-088-251G-1 |
|          |                                   | OUTLINE DRAWING               |               |

表 1 TABLE 1

| 寸法区分 (mm)<br>DIMENSION | 公差 (mm)<br>TOLERANCE |
|------------------------|----------------------|
| L ≤ 50                 | ±1.5                 |
| 50 < L ≤ 100           | ±2.5                 |
| 100 < L ≤ 500          | ±3                   |

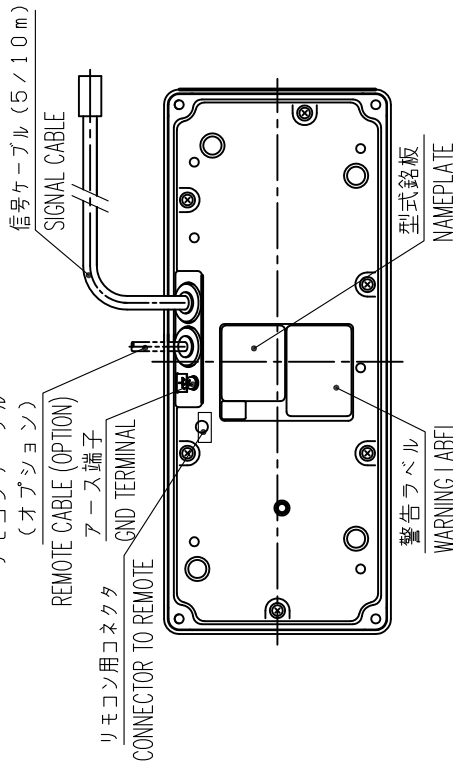
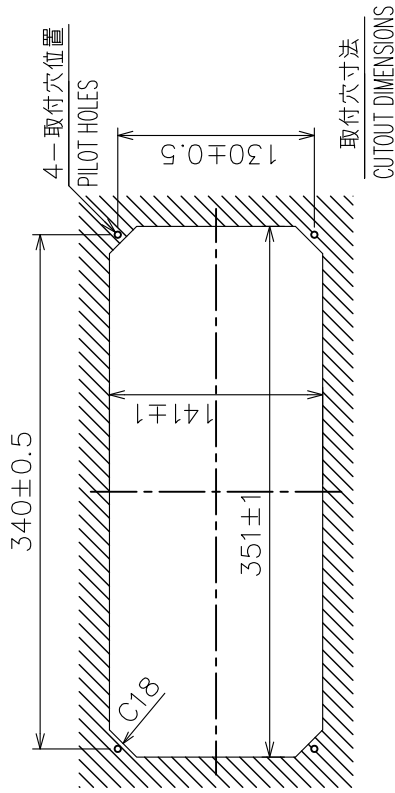
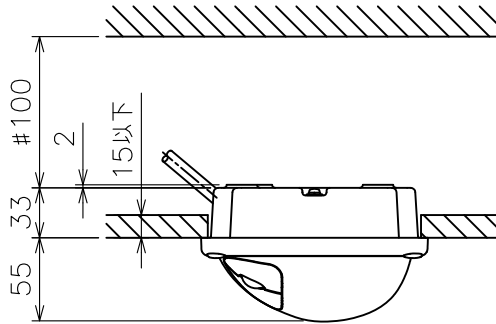
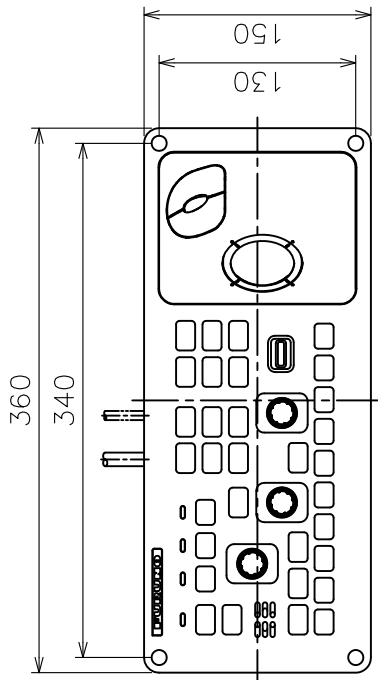
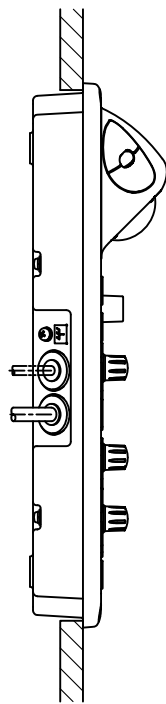


表 2 TABLE 2

| ケーブル長さ<br>CABLE LENGTH (m) | 5   | 10  |
|----------------------------|-----|-----|
| 質量<br>MASS (kg±10%)        | 2.8 | 3.2 |

注 記

- 指定外の寸法公差は表 1 による
- #印寸法は最小サービス空間寸法とする
- 取付用ネジは + バインド タップピン 1 シュ呼び径 5 × 2.0 を使用のこと

NOTE

- TABLE 1 INDICATES TOLERANCE OF DIMENSIONS WHICH IS NOT SPECIFIED.
- #: MINIMUM SERVICE CLEARANCE.
- USE TAPPING SCREWS  $\phi 5 \times 2.0$  FOR FIXING THE UNIT.

| DRAWN    | 9/Sep/2011 I.YAMASAKI          | TITLE   | FSV-8501                   |
|----------|--------------------------------|---------|----------------------------|
| CHECKED  | 9/Sep/2011 H.MAKI              | 名称      | 操作部 (埋込装備)                 |
| APPROVED | 13/Sep/2011 Y.NISHIYAMA        | 外寸図     |                            |
| SCALE    | 1/5 MASS 表 2 参照<br>SEE TABLE 2 | NAME    | CONTROL UNIT (FLUSH MOUNT) |
| DWG.No.  | C1335-G03-D                    | REF.No. | 10-088-250G-2              |

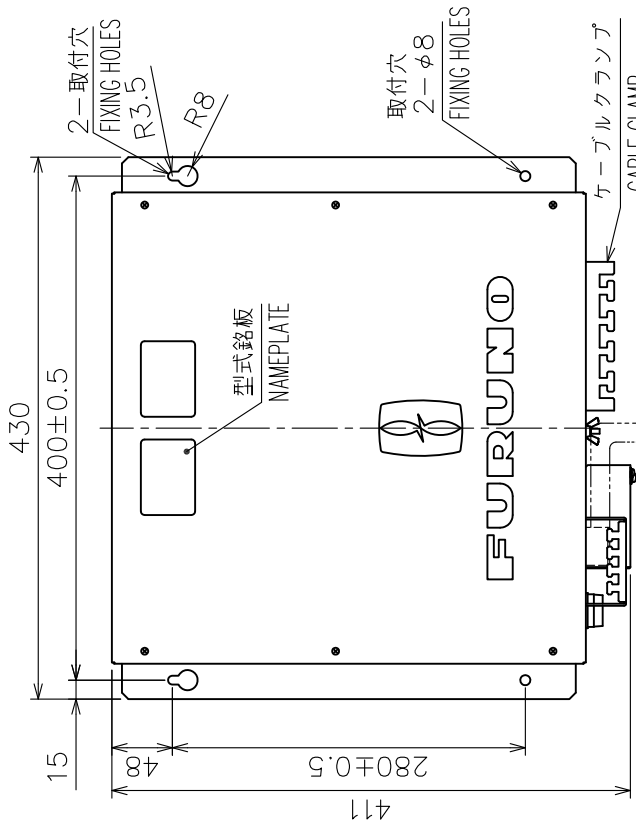
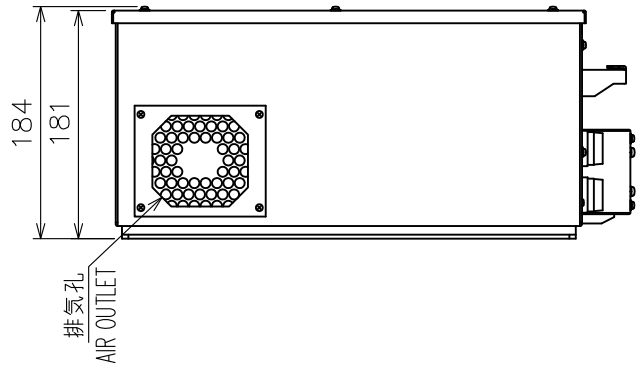
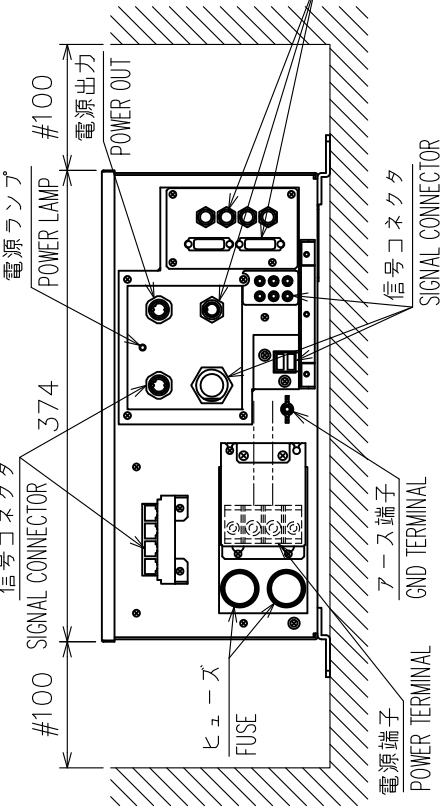
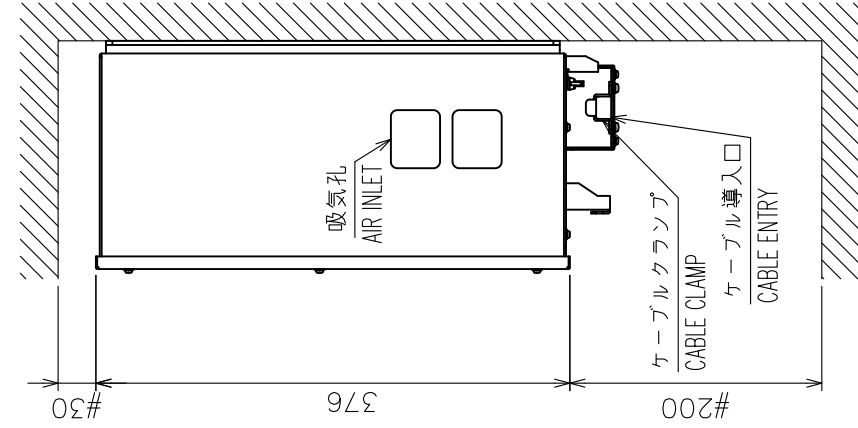


表 1 TABLE 1

| 寸法区分 (mm)<br>DIMENSION | 公差 (mm)<br>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) # 印寸法は最小サージ空間寸法とする。
- 3) 取付にはトラスタツピピンネジ呼び径6×30 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 Ø6x30 FOR FIXING THE UNIT.

|          |             |              |                |                     |
|----------|-------------|--------------|----------------|---------------------|
| DRAWN    | 28/Jun/2012 | T. YAMASAKI  | TITLE          | FSV-3503/3503S/8503 |
| CHECKED  | 28/Jun/2012 | H. MAKI      | 名称             | 制御部                 |
| APPROVED | 5/Nov/2010  | Y. NISHIYAMA | NAME           | FSV-35/35S/85/85L   |
| SCALE    | 1/6         | 15<br>kg     | PROCESSOR UNIT | 外寸図                 |
| DWG.No.  | C1335-G01-C | REF.No.      | 10-088-360G-1  | OUTLINE DRAWING     |

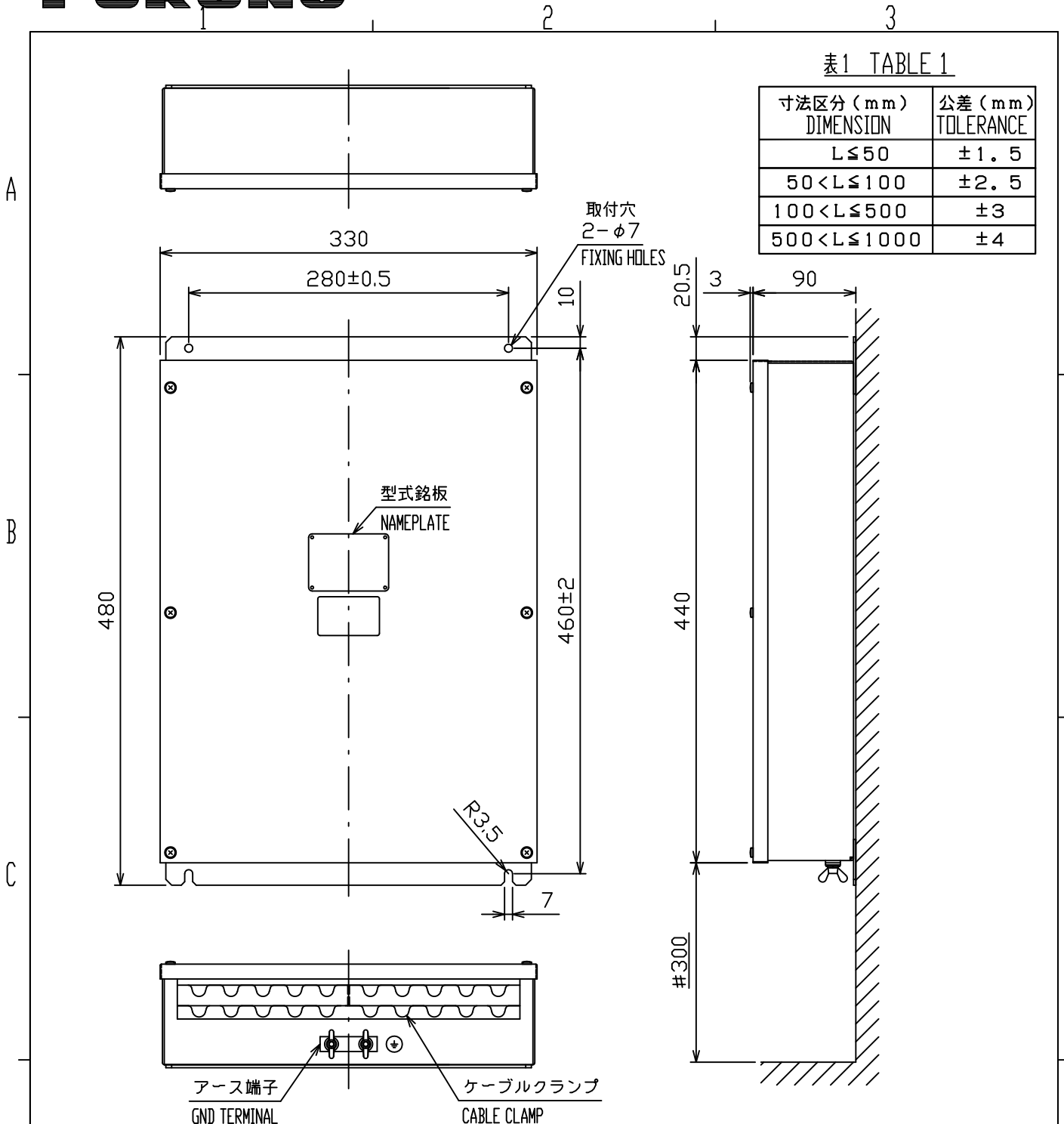


表1 TABLE 1

| 寸法区分 (mm)<br>DIMENSION | 公差 (mm)<br>TOLERANCE |
|------------------------|----------------------|
| $L \leq 50$            | $\pm 1.5$            |
| $50 < L \leq 100$      | $\pm 2.5$            |
| $100 < L \leq 500$     | $\pm 3$              |
| $500 < L \leq 1000$    | $\pm 4$              |

**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) 取付はM6ボルトを使用のこと。

**NOTE**

1. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS WHICH IS NOT SPECIFIED.
2. # MINIMUM SERVICE CLEARANCE.
3. USE M6 BOLTS FOR FIXING THE UNIT.

|          |                        |                   |                   |
|----------|------------------------|-------------------|-------------------|
| DRAWN    | 18/Oct/2011 T.YAMASAKI | TITLE             | FSV-305           |
| CHECKED  | 18/Oct/2011 H.MAKI     | 名称                | 接続箱               |
| APPROVED | Y. Hatai               | FSV-30/30S/35/35S | 外寸図               |
| SCALE    | 1/5                    | MASS              | 7.5 $\pm 10\%$ kg |
| DWG. No. | C1323-G04-C            | REF. No.          | 10-079-700G-1     |
|          |                        | NAME              |                   |
|          |                        | JUNCTION BOX      |                   |
|          |                        | OUTLINE DRAWING   |                   |



表1 TABLE 1

| 寸法区分 (mm)<br>DIMENSION | 公差 (mm)<br>TOLERANCE |
|------------------------|----------------------|
| L ≤ 50                 | ±1.5                 |
| 50 < L ≤ 100           | ±2.5                 |
| 100 < L ≤ 500          | ±3                   |
| 500 < L ≤ 1000         | ±4                   |
| 1000 < L ≤ 2000        | ±5                   |
| 2000 < L ≤ 4000        | ±7                   |

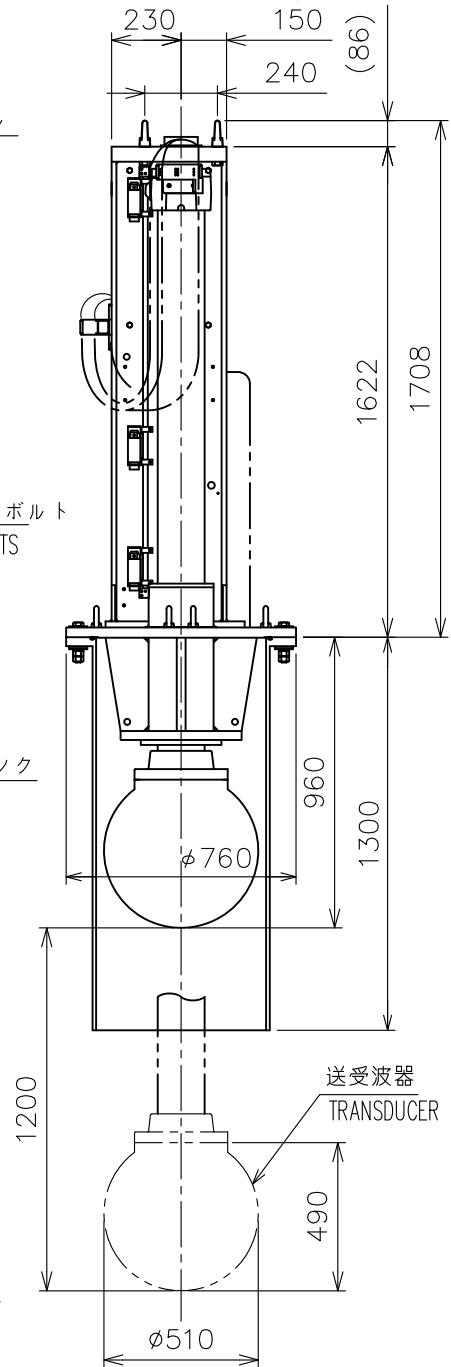
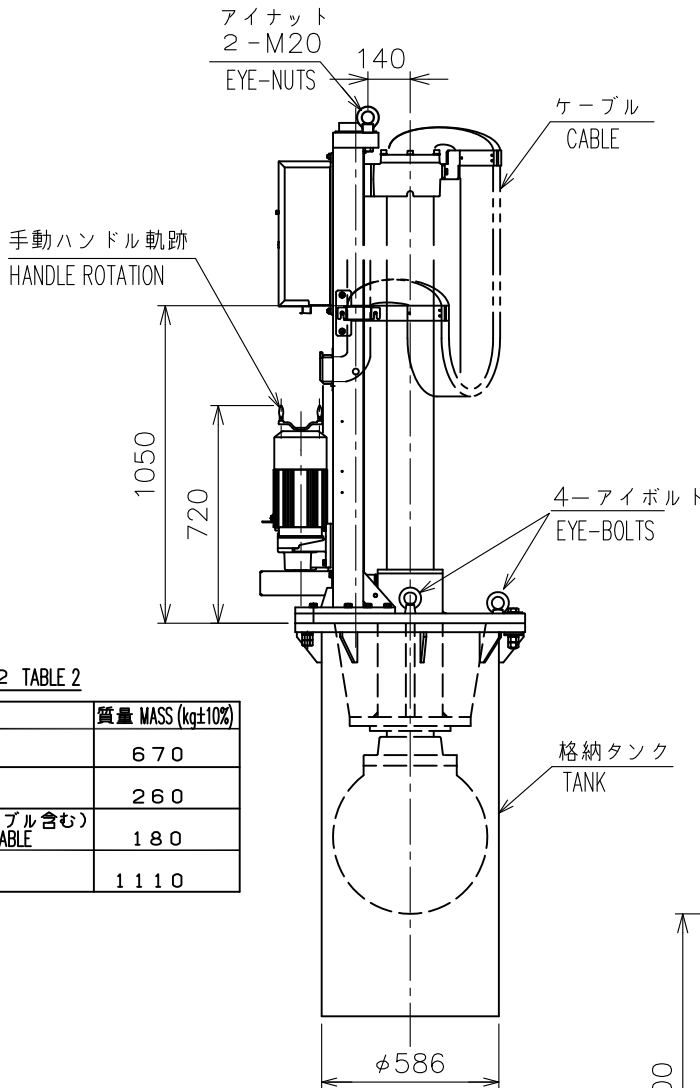
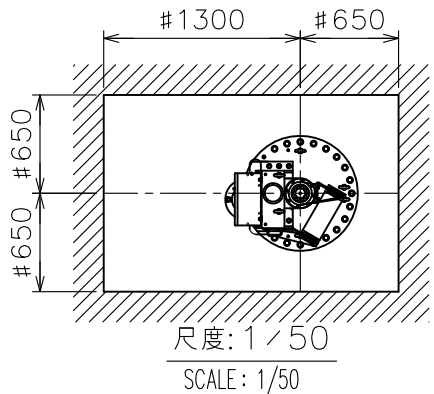
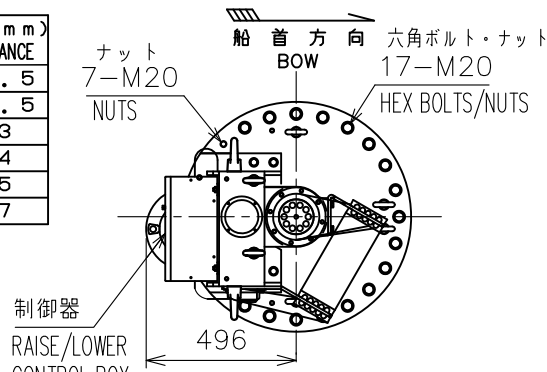


表2 TABLE 2

| 品名 ITEM                              | 質量 MASS (kg±10%) |
|--------------------------------------|------------------|
| 上下装置本体<br>HULL UNIT                  | 670              |
| 格納タンク<br>TANK                        | 260              |
| 送受波器 (ケーブル含む)<br>TRANSDUCER W/ CABLE | 180              |
| 総質量<br>TOTAL                         | 1110             |

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) 取付はM20ボルト及びナットを使用のこと。

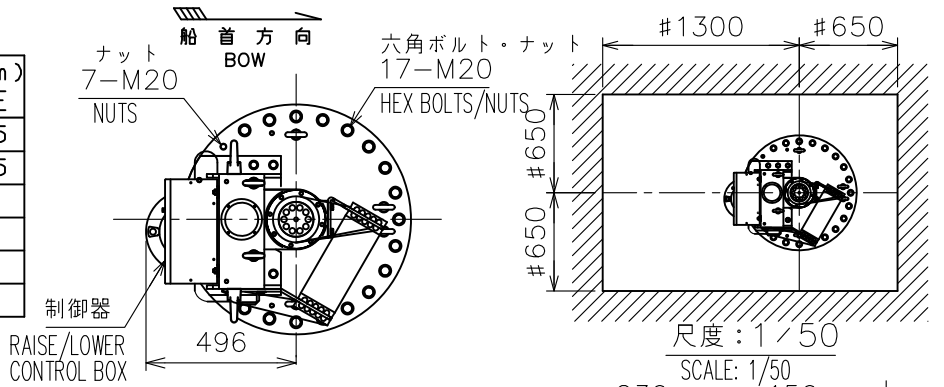
NOTE

1. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS WHICH IS NOT SPECIFIED.
2. #: MINIMUM SERVICE CLEARANCE.
3. USE M20 BOLTS AND NUTS FOR FIXING THE UNIT.

|                                     |                           |                                   |
|-------------------------------------|---------------------------|-----------------------------------|
| DRAWN<br>17/Apr/2013 T.YAMASAKI     |                           | TITLE<br>FSV-303                  |
| CHECKED<br>17/Apr/2013 H.MAKI       |                           | 名称<br>上下装置 (1200mmストローク)          |
| APPROVED<br>23/Apr/2013 Y.NISHIYAMA | FSV-30/35                 | 外寸図                               |
| SCALE<br>1/25                       | MASS 表2参照<br>SEE TABLE 2  | NAME<br>HULL UNIT (1200mm TRAVEL) |
| DWG. No.<br>C1323-G01-D             | REF. No.<br>10-079-500G-4 | OUTLINE DRAWING                   |

表1 TABLE 1

| 寸法区分 (mm)<br>DIMENSION | 公差 (mm)<br>TOLERANCE |
|------------------------|----------------------|
| $L \leq 50$            | $\pm 1.5$            |
| $50 < L \leq 100$      | $\pm 2.5$            |
| $100 < L \leq 500$     | $\pm 3$              |
| $500 < L \leq 1000$    | $\pm 4$              |
| $1000 < L \leq 2000$   | $\pm 5$              |
| $2000 < L \leq 4000$   | $\pm 7$              |



手動ハンドル軌跡  
HANDLE ROTATION

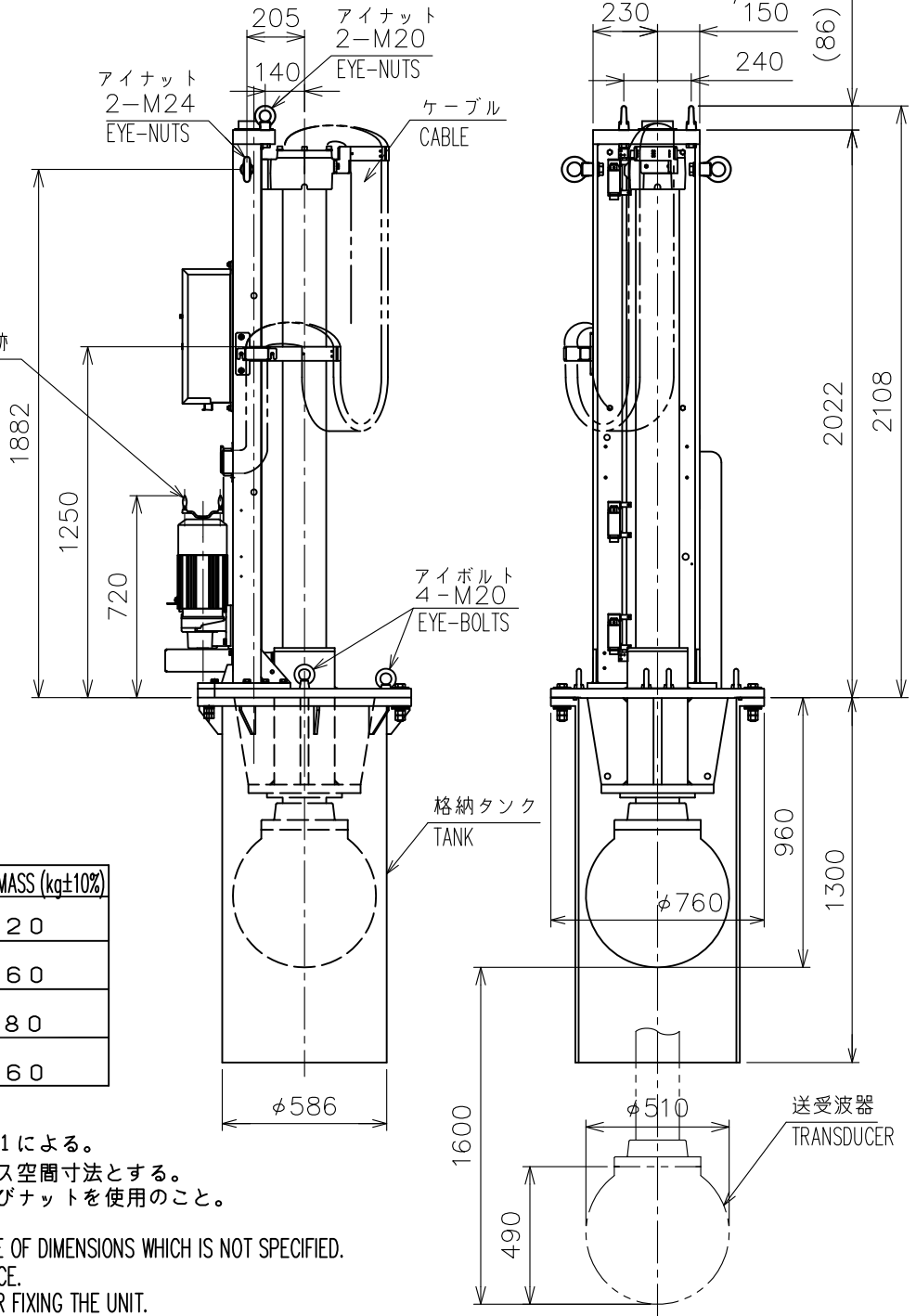


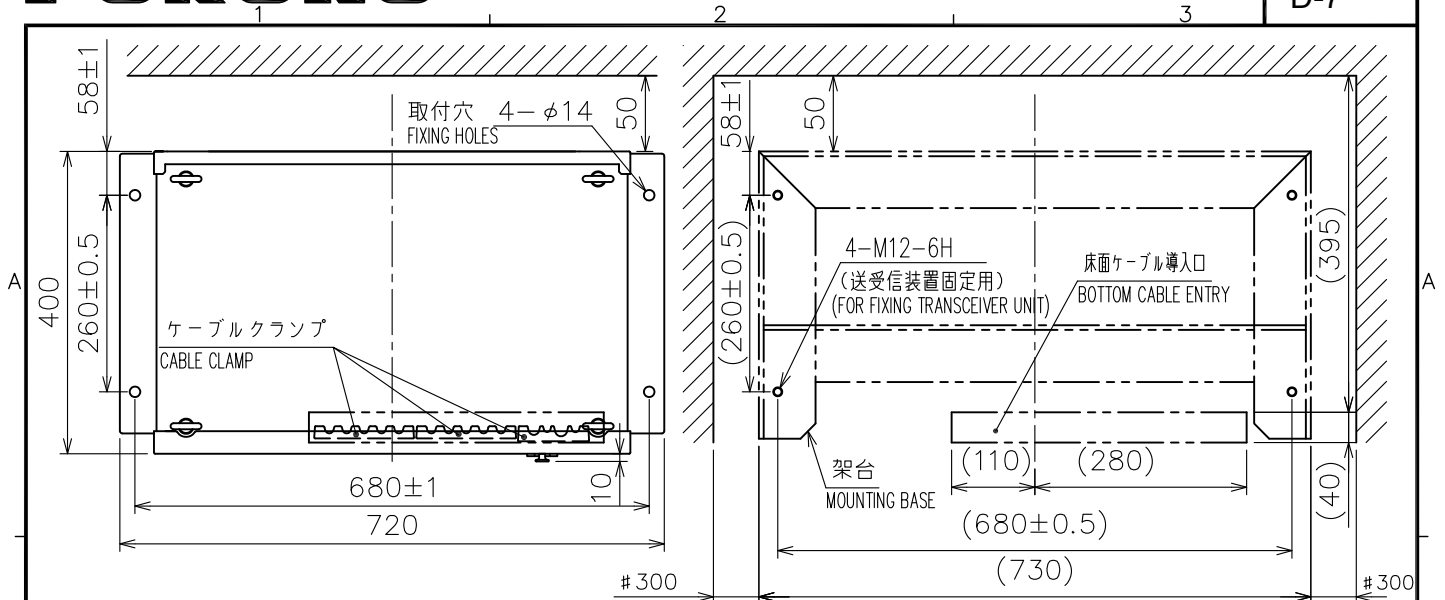
表2 TABLE 2

| 品目 ITEM                              | 質量 MASS (kg±10%) |
|--------------------------------------|------------------|
| 上下装置本体<br>HULL UNIT                  | 720              |
| 格納タンク<br>TANK                        | 260              |
| 送受波器 (ケーブル含む)<br>TRANSDUCER W/ CABLE | 180              |
| 総質量<br>TOTAL                         | 1160             |

- 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) 取付はM20ボルト及びナットを使用のこと。

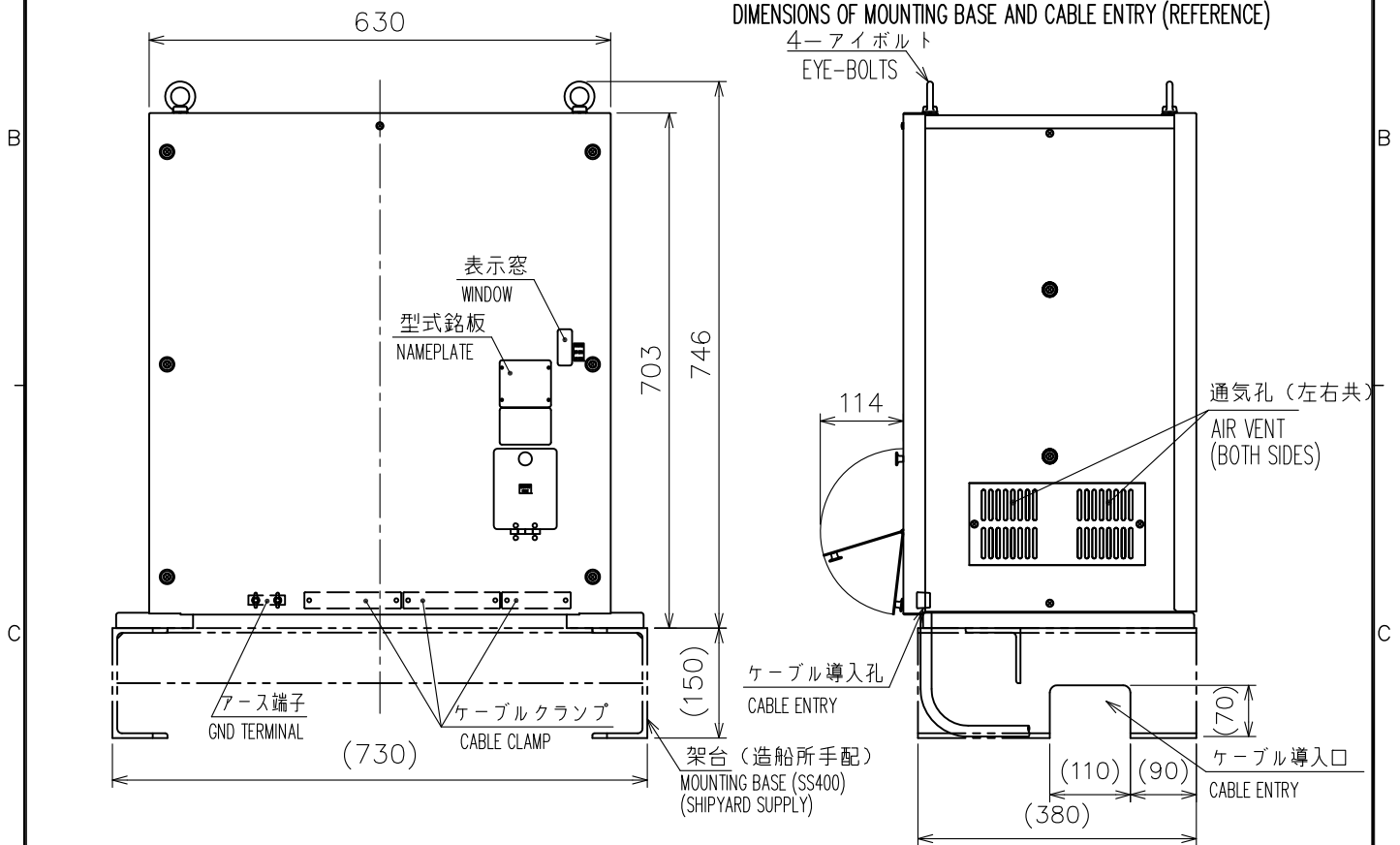
- NOTE 1. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS WHICH IS NOT SPECIFIED.  
 2. #: MINIMUM SERVICE CLEARANCE.  
 3. USE M20 BOLTS AND NUTS FOR FIXING THE UNIT.

|                                     |                                   |
|-------------------------------------|-----------------------------------|
| DRAWN<br>23/Apr/2013 T.YAMASAKI     | TITLE<br>FSV-304                  |
| CHECKED<br>23/Apr/2013 H.MAKI       | 名称<br>上下装置 (1600mmストローク)          |
| APPROVED<br>23/Apr/2013 Y.NISHIYAMA | FSV-30/35<br>外寸図                  |
| SCALE<br>1/25                       | NAME<br>HULL UNIT (1600mm TRAVEL) |
| DWG. No.<br>C1323-G02-D             | REF. No.<br>10-079-510G-3         |
| MASS<br>表2参照<br>SEE TABLE 2         | OUTLINE DRAWING                   |



架台及び床面導入口寸法図 (参考)

DIMENSIONS OF MOUNTING BASE AND CABLE ENTRY (REFERENCE)



- 注 記 1) 指定外の寸法公差は表 1 による。  
 2) #印寸法は最小サービス空間寸法とする。  
 3) 取付用ネジはM12ボルト (材質: SUS304) を使用のこと。  
 4) 直接床置きの場合のみ床面にケーブル導入口を設ける。

- NOTE 1. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS WHICH IS NOT SPECIFIED.  
 2. #: MINIMUM SERVICE CLEARANCE.  
 3. USE M12 BOLTS (SS304) FOR FIXING THE UNIT.  
 4. CABLE ENTRY ON DECK REQUIRED FOR DIRECT MOUNTING ONLY.

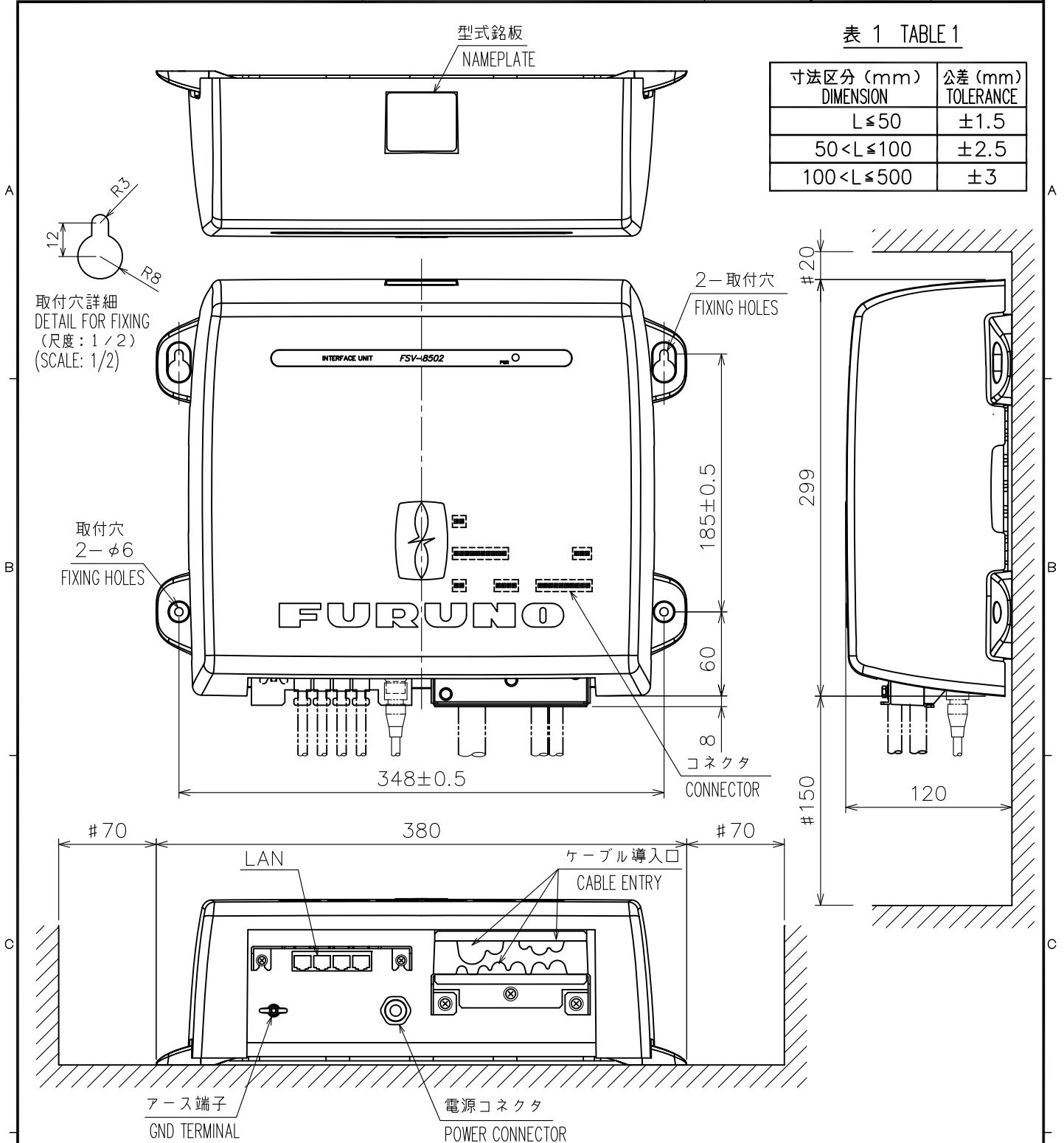
表1 TABLE 1

| 寸法区分 (mm)<br>DIMENSION | 公差 (mm)<br>TOLERANCE |
|------------------------|----------------------|
| L ≤ 50                 | ±1.5                 |
| 50 < L ≤ 100           | ±2.5                 |
| 100 < L ≤ 500          | ±3                   |
| 500 < L ≤ 1000         | ±4                   |

|          |                         |          |                  |
|----------|-------------------------|----------|------------------|
| DRAWN    | 9/Sep/2011 T.YAMASAKI   | TITLE    | F5V-351          |
| CHECKED  | 9/Sep/2011 H.MAKI       | 名称       | 送受信装置            |
| APPROVED | 13/Sep/2011 Y.NISHIYAMA |          | 外寸図              |
| SCALE    | 1/10 MASS 98 ±10%<br>kg | NAME     | TRANSCEIVER UNIT |
| DWG. No. | C1333-G01-A             | REF. No. | 10-088-610G-0    |
|          |                         |          | OUTLINE DRAWING  |

表 1 TABLE 1

| 寸法区分 (mm)<br>DIMENSION | 公差 (mm)<br>TOLERANCE |
|------------------------|----------------------|
| L ≤ 50                 | ±1.5                 |
| 50 < L ≤ 100           | ±2.5                 |
| 100 < L ≤ 500          | ±3                   |



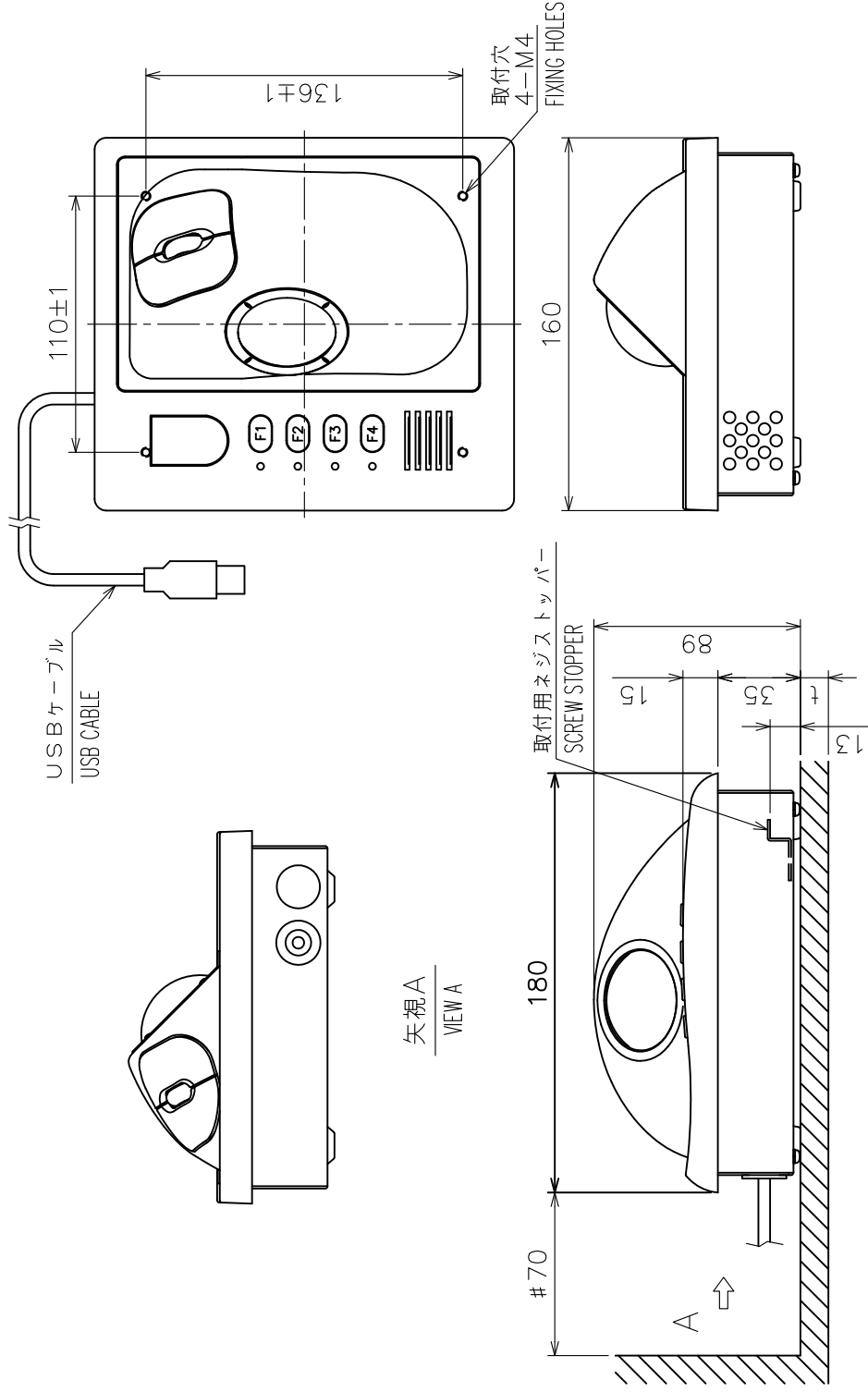
- 注 記 1) 指定外の寸法公差は表 1 による。  
 2) # 印寸法は最小サービス空間寸法とする。  
 3) 取付用ネジはトラスタッピンネジ呼び径5×20を使用のこと。

- NOTE 1. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS WHICH IS NOT SPECIFIED.  
 2. #: MINIMUM SERVICE CLEARANCE.  
 3. USE TAPPING SCREWS  $\phi 5 \times 20$  FOR FIXING THE UNIT.

|          |                         |                 |                |
|----------|-------------------------|-----------------|----------------|
| DRAWN    | 9/Sep/2011 T.YAMASAKI   | TITLE           | FSV-8502       |
| CHECKED  | 9/Sep/2011 H.MAKI       | 名称              | インターフェイスユニット   |
| APPROVED | 13/Sep/2011 Y.NISHIYAMA |                 | 外寸図            |
| SCALE    | 1/4 MASS 3.4 ±10%<br>kg | NAME            | INTERFACE UNIT |
| DWG. No. | C1335-G02-C             | REF. No.        | 10-088-350G-2  |
|          |                         | OUTLINE DRAWING |                |

表 1 TABLE 1

| 寸法区分 (mm)<br>DIMENSION | 公差 (mm)<br>TOLERANCE |
|------------------------|----------------------|
| $L \leq 50$            | $\pm 1.5$            |
| $50 < L \leq 100$      | $\pm 2.5$            |
| $100 < L \leq 500$     | $\pm 3$              |



矢視 A  
VIEW A

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クリアランスとする。
- 3) 取付用ネジはセムスB (M4×12) を使用のこと。取付面板厚は最小2 最大5とする。  
またはネジ長さ (+7.8, 8) ±2 のセムスBを使用のこと。

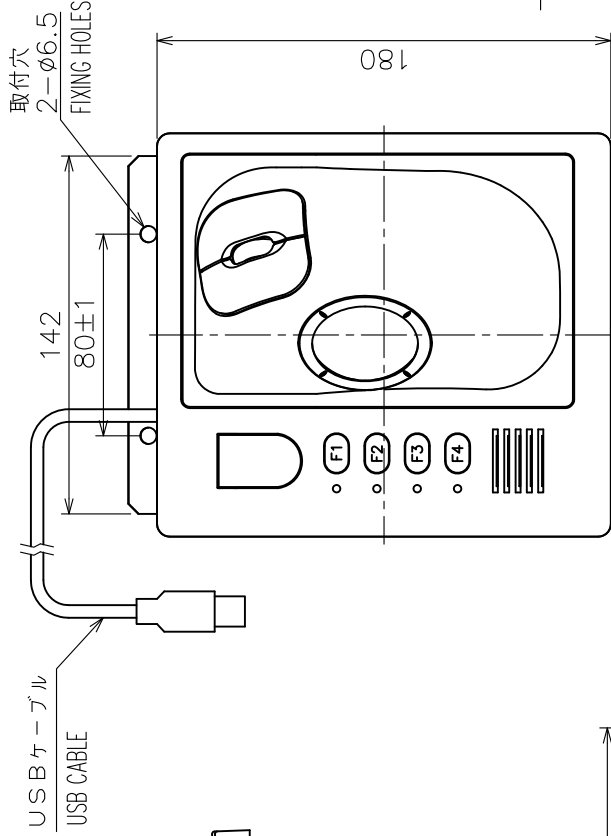
NOTE

1. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS WHICH IS NOT SPECIFIED.
2. #: MINIMUM SERVICE CLEARANCE.
3. USE SEMS B SCREWS (M4×12) FOR FIXING THE UNIT. MOUNT BOARD THICKNESS (t):  $2 \leq t \leq 5$ .  
OR SCREW LENGTH SHOULD BE (+7.8)±2 FOR THICKER ONE.

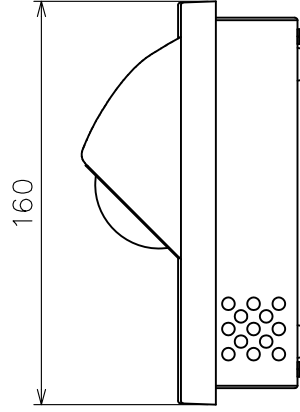
|          |             |   |               |                  |
|----------|-------------|---|---------------|------------------|
| DRAWN    | 9/Sep/2011  | T. YAMASAKI   | TITLE         | FSV-653          |
| CHECKED  | 9/Sep/2011  | H. MAKI   | 名称            | 簡易操作部            |
| APPROVED | 13/Sep/2011 | Y. NISHIYAMA  | 外寸図           |                  |
| SCALE    | 1/3         | 質量 1.4 kg<br>質量はケーブル (5m) を含む。<br>MASS INCLUDES CABLE (5m). | NAME          | SUB CONTROL UNIT |
| DWG No.  | C1335-G05-D | REF. No.  | 10-088-851G-1 | OUTLINE DRAWING  |

表 1 TABLE 1

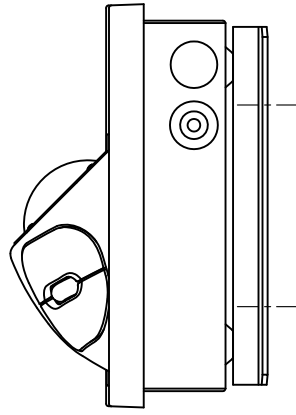
| 寸法区分 (mm)<br>DIMENSION | 公差 (mm)<br>TOLERANCE |
|------------------------|----------------------|
| L ≤ 50                 | ± 1.5                |
| 50 < L ≤ 100           | ± 2.5                |
| 100 < L ≤ 500          | ± 3                  |



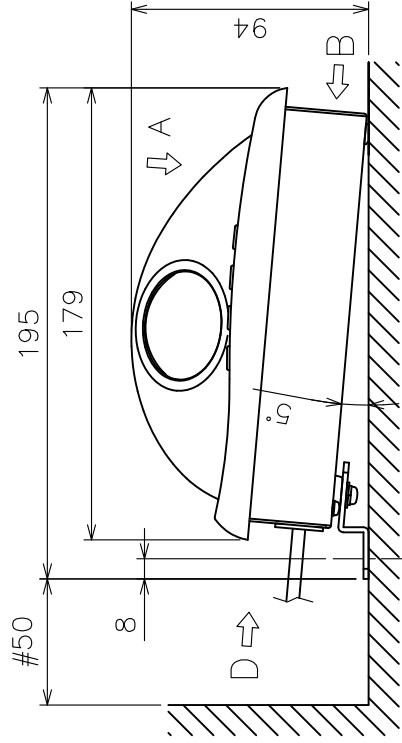
矢視 A  
VIEW A



矢視 B  
VIEW B

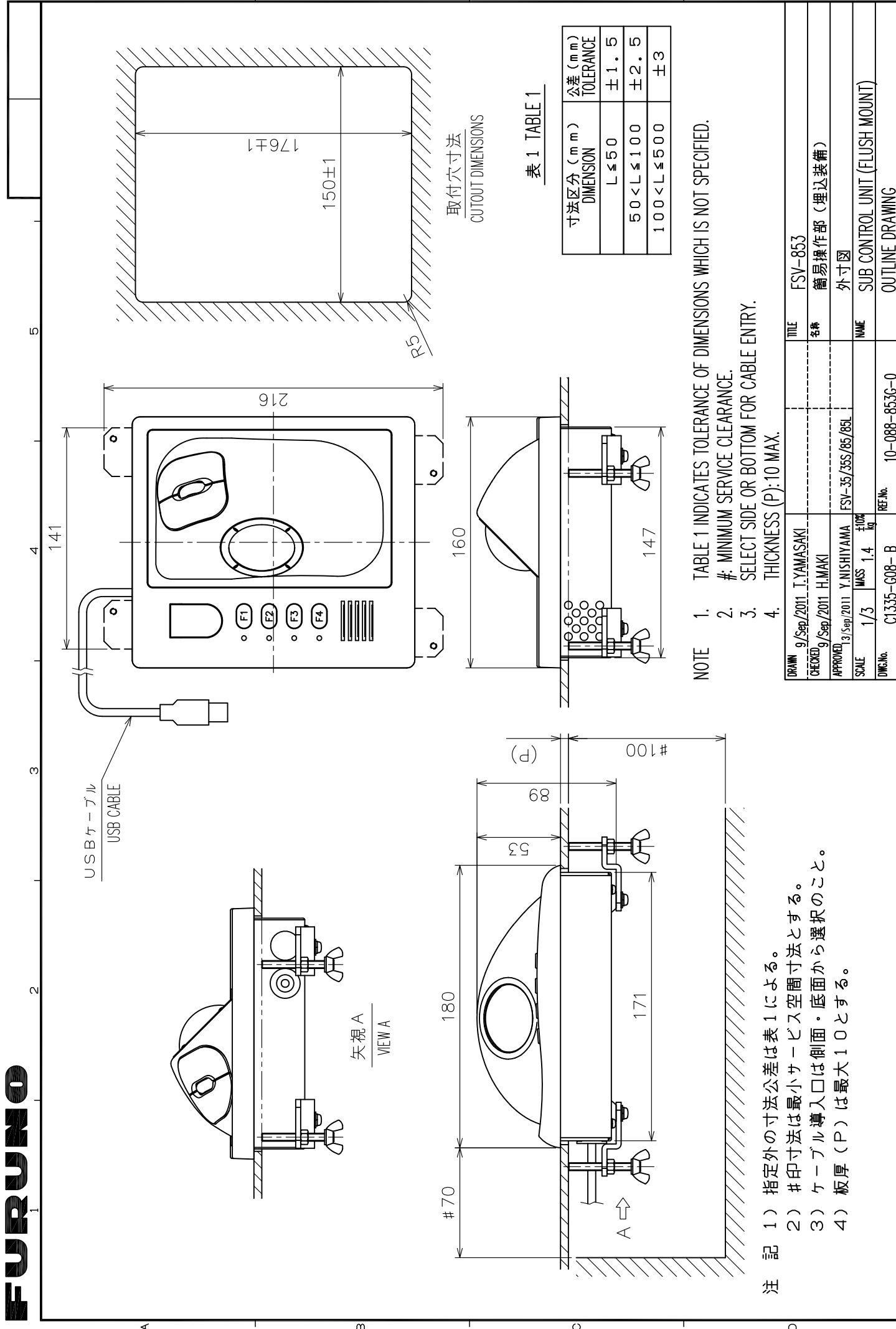


矢視 D  
VIEW D



- 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ペース寸法とする。  
 3) 取付用ネジはトラスタップネジ呼び径 6、または M6 ボルトを使用のこと。
- NOTE 1. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS WHICH IS NOT SPECIFIED.  
 2. #: MINIMUM SERVICE CLEARANCE.  
 3. USE TAPPING SCREWS  $\phi 6$  OR M6 BOLTS FOR FIXING THE UNIT.

|          |             |  |         |                               |
|----------|-------------|--|---------|-------------------------------|
| DRAWN    | 9/Sep/2011  | I.YAMASAKI                                   | TITLE   | FSV-853                       |
| CHECKED  | 9/Sep/2011  | H.MAKI                                       | 名称      | 簡易操作部 (取付金具)                  |
| APPROVED | 13/Sep/2011 | Y.NISHIYAMA                                  | 外寸図     |                               |
| SCALE    | 1/3         | 質量 1.4 kg                                    | NAME    | SUB CONTROL UNIT (W/ FIXTURE) |
| DWG.No.  | C1335-G07-B | 質量はケーブル (5m) を含む。<br>MASS INCLUDES 5m CABLE. | REF.No. | 10-088-853G-0                 |
|          |             |  |         | OUTLINE DRAWING               |



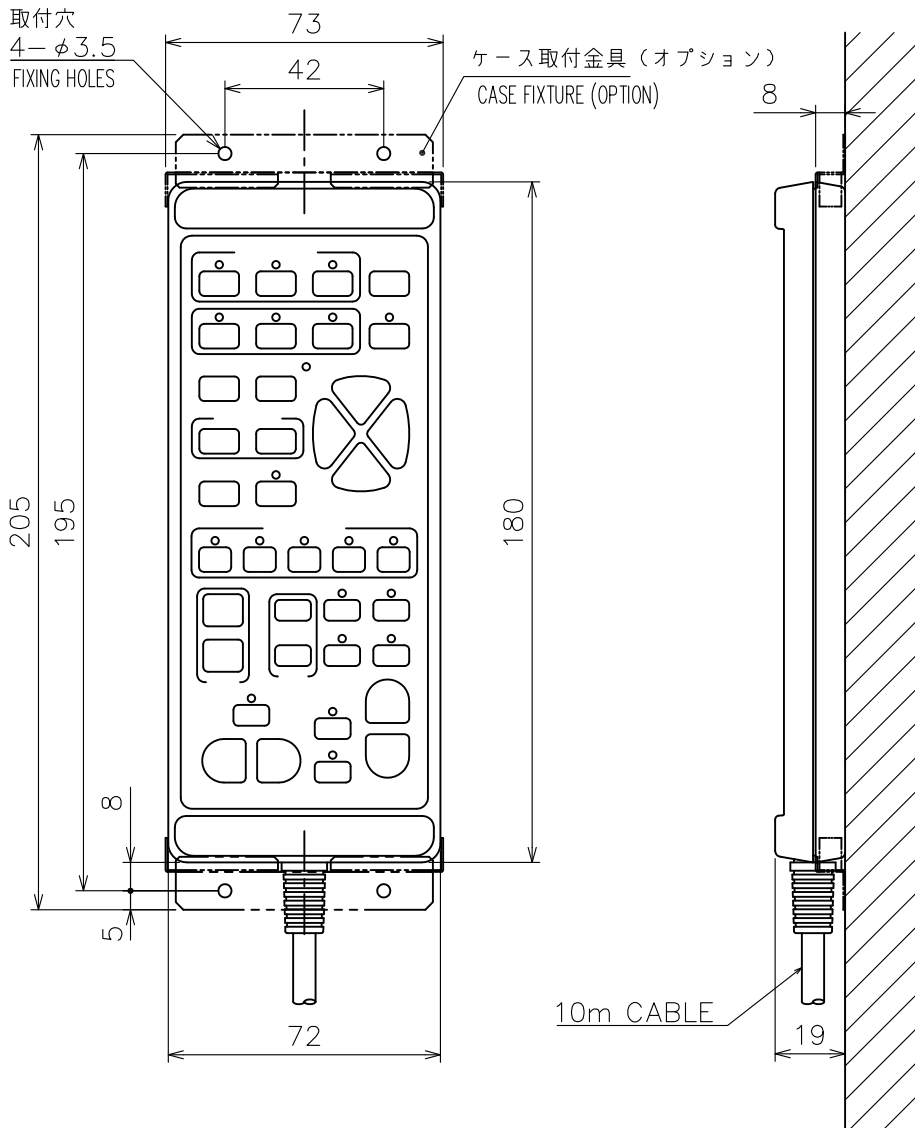
NOTE 1. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS WHICH IS NOT SPECIFIED.  
 2. #: MINIMUM SERVICE CLEARANCE.  
 3. SELECT SIDE OR BOTTOM FOR CABLE ENTRY.  
 4. THICKNESS (P): 10 MAX.

|          |             |             |               |                                |
|----------|-------------|-------------|---------------|--------------------------------|
| DRAWN    | g/Sep/2011  | T.YAMASAKI  | TITLE         | FSV-853                        |
| CHECKED  | g/Sep/2011  | H.MAKI      | 名称            | 簡易操作部 (埋込装備)                   |
| APPROVED | 13/Sep/2011 | Y.NISHIYAMA | 外寸図           |                                |
| SCALE    | 1/3         | MASS 1.4 kg | NAME          | SUB CONTROL UNIT (FLUSH MOUNT) |
| DWG.No.  | C1335-G08-B | REF.No.     | 10-088-853G-0 | OUTLINE DRAWING                |

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) ケーブル導入口は側面・底面から選択のこと。  
 4) 板厚 (P) は最大 10 とする。

表 1 TABLE 1

| 寸法区分 (mm)<br>DIMENSION | 公差 (mm)<br>TOLERANCE |
|------------------------|----------------------|
| $L \leq 50$            | $\pm 1.5$            |
| $50 < L \leq 100$      | $\pm 2.5$            |
| $100 < L \leq 500$     | $\pm 3$              |



注 記

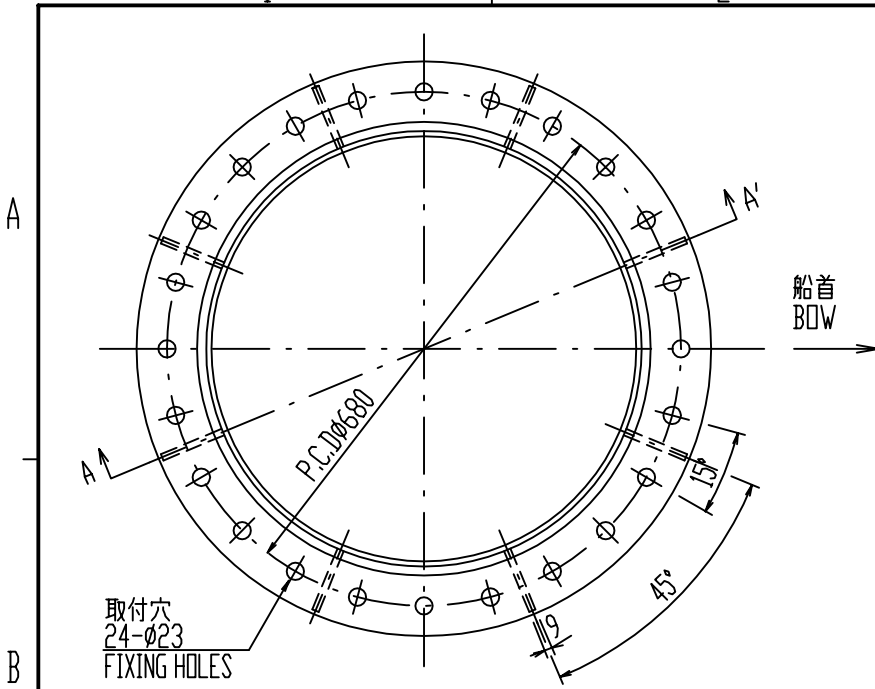
- 1) 指定外の寸法公差は表 1 による
- 2) 取付用ネジは+バインドタッピン 1 シュ呼び径 3 × 20 を使用のこと

NOTE

1. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS WHICH IS NOT SPECIFIED.
2. USE TAPPING SCREWS  $\phi 3 \times 20$  FOR FIXING THE UNIT.

|          |                         |                                     |                                      |
|----------|-------------------------|-------------------------------------|--------------------------------------|
| DRAWN    | 9/Sep/2011 T.YAMASAKI   | TITLE                               | FSV-854                              |
| CHECKED  | 9/Sep/2011 H.MAKI       | 名称                                  | リモートコントローラ                           |
| APPROVED | 13/Sep/2011 Y.NISHIYAMA | 外寸図                                 |                                      |
| SCALE    | 1/2                     | MASS                                | 0.68 ±10% kg                         |
|          |                         | 質量はケーブルを含む。<br>MASS INCLUDES CABLE. |                                      |
| DWG. No. | C1335-G06-C             | REF. No.                            | 10-088-860G-1                        |
|          |                         | NAME                                | REMOTE CONTROLLER<br>OUTLINE DRAWING |



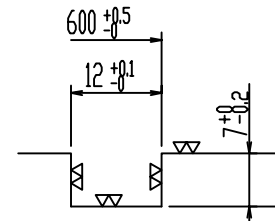
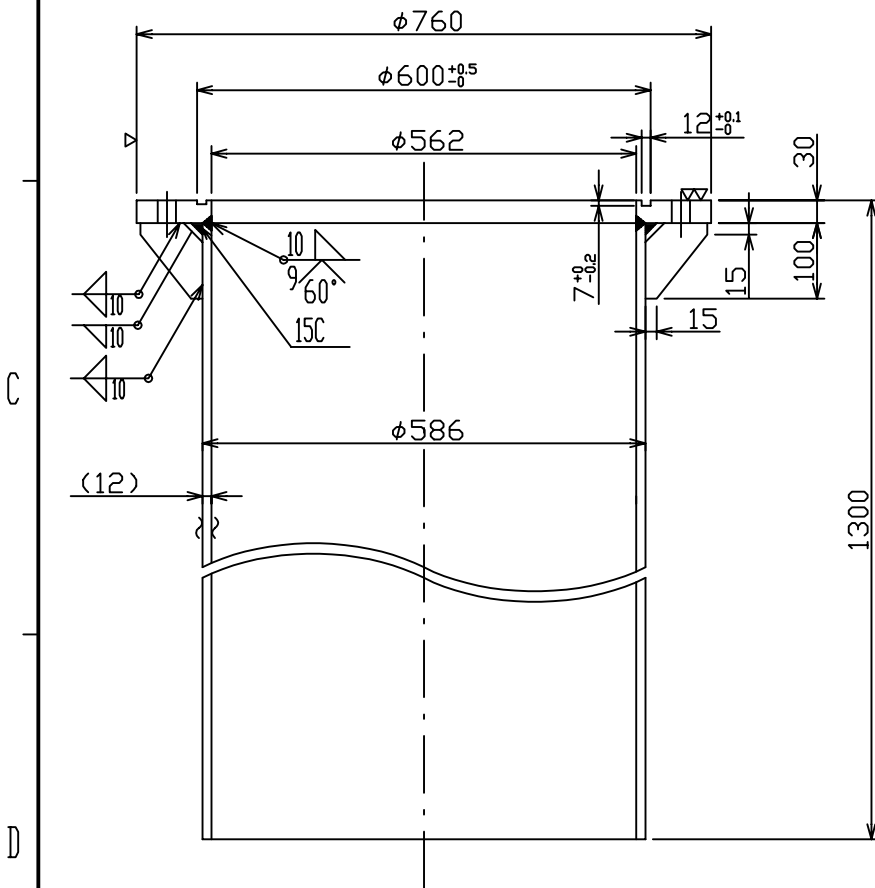


注記

1) 装備時24個のボルト穴のうち適当な1個を船首方向に一致させる。

NOTE

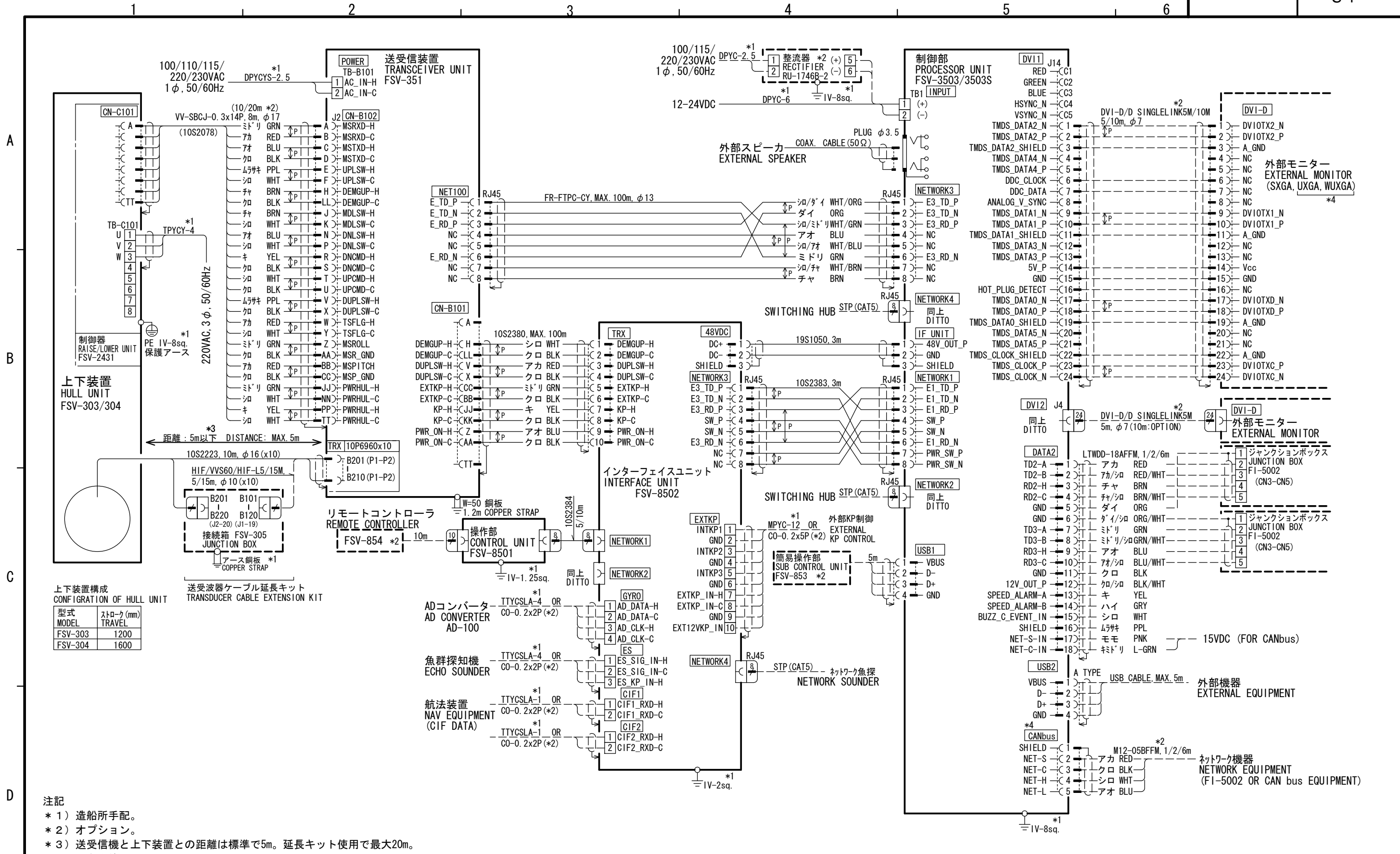
1. ONE OF 24 BOLT HOLES SHOULD BE FACED DEAD AHEAD.



○リング溝の仕上げ図  
FINISHING OF O-RING GROOVE  
(尺度 SCALE 1/1)

A-A' 断面図  
SECTION A-A'

|                             |                        |                         |
|-----------------------------|------------------------|-------------------------|
| DRAWN<br>Aug. 22 '03 H.MAKI |                        | TITLE<br>10-077-5501    |
| CHECKED<br>Takahashi T.     |                        | 名称<br>格納タンク             |
| APPROVED<br>Y. Hatai        | FSV-24/30              | 外寸図                     |
| SCALE<br>1/10               | MASS<br>260 ±10%<br>kg | NAME<br>RETRACTION TANK |
| DWG.No.<br>C1318-G16-B      | 10-077-5501-0          | OUTLINE DRAWING         |



上下装置構成  
CONFIGURATION OF HULL UNIT

| 型式<br>MODEL | ストローク (mm)<br>TRAVEL |
|-------------|----------------------|
| FSV-303     | 1200                 |
| FSV-304     | 1600                 |

- 注記  
\* 1) 造船所手配。  
\* 2) オプション。  
\* 3) 送受信機と上下装置との距離は標準で5m。延長キット使用で最大20m。  
\* 4) 現在未使用。
- NOTE  
\*1: SHIPYARD SUPPLY.  
\*2: OPTION.  
\*3: DISTANCE BETWEEN TRANSCIEVER UNIT AND HULL UNIT: 5 m STANDARD. CABLE EXTENSION KIT MAY EXTEND TO 20 m MAXIMUM.  
\*4: FOR FUTURE USE.

CO-0. 2x2P: CO-SPEVV-SB-C 0. 2x2P, φ10. 5  
CO-0. 2x5P: CO-SPEVV-SB-C 0. 2x5P, φ13. 5

|                                      |                              |
|--------------------------------------|------------------------------|
| DRAWN<br>19/Dec/2012 T. YAMASAKI     | TITLE<br>FSV-35/35S          |
| CHECKED<br>19/Dec/2012 H. MAKI       | 名称<br>カラスキャニングソナー            |
| APPROVED<br>20/Dec/2012 Y. NISHIYAMA | 相互結線図                        |
| SCALE<br>MASS kg                     | NAME<br>COLOR SCANNING SONAR |
| DWG No.<br>C1333-C01-C               | REF. No.<br>10-088-0200-0    |
| INTERCONNECTION DIAGRAM              |                              |