FURUNO

Installation Manual
Color Scanning Sonar
Model FSV-35/FSV-35S

FURUNO ELECTRIC CO., LTD.

www.furuno.com

ECF
(Elemental Chlorine Free)
The paper used in this manual
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SAFETY INSTRUCTIONS

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

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

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.

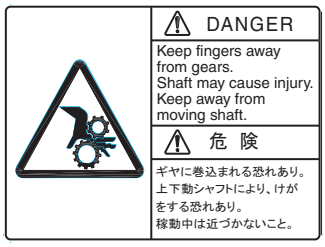
⚠ WARNING

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.



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

⚠ CAUTION

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

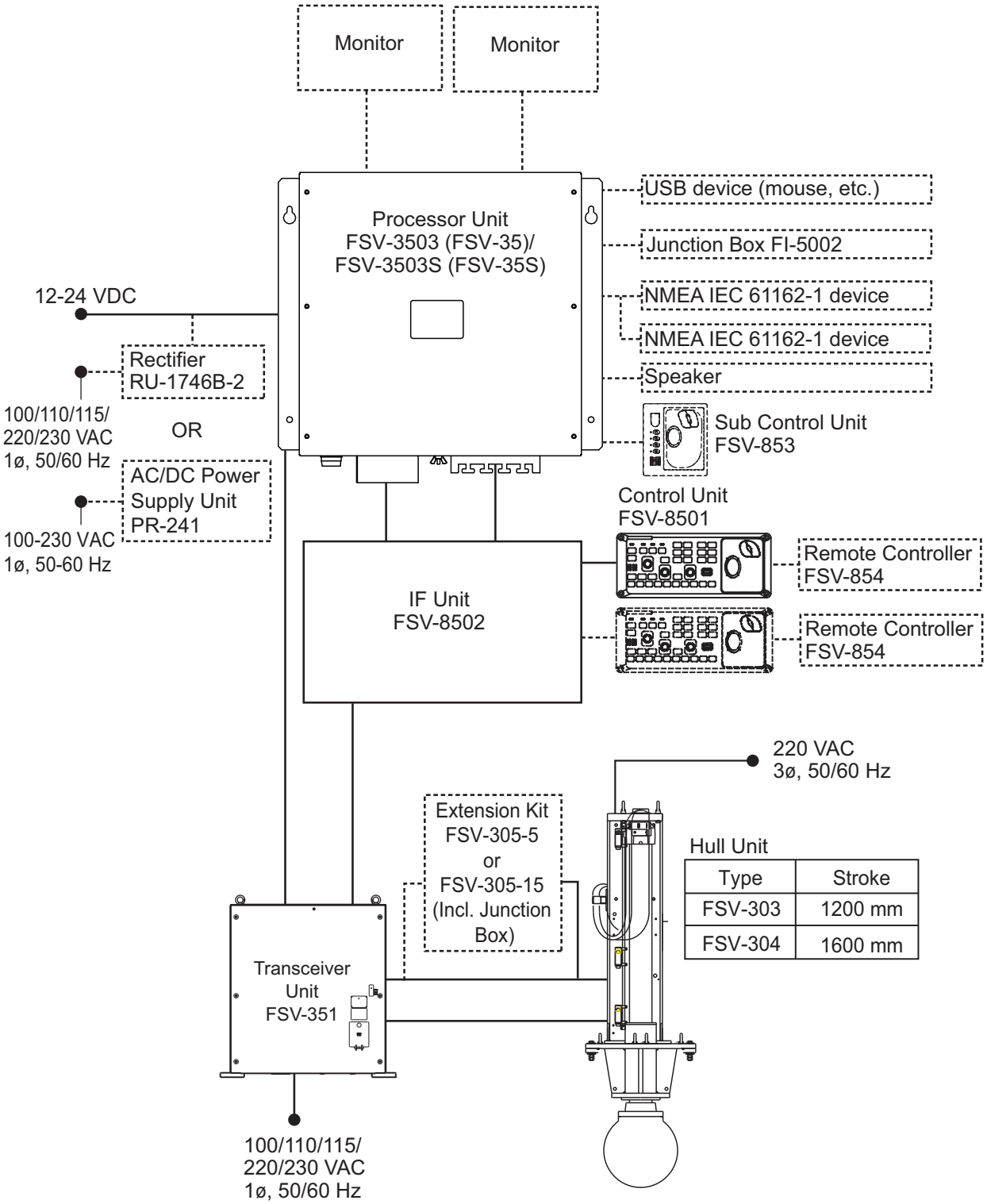
	Projected	Raising/ Lowering
1200 mm stroke	Max. 18 kn	Max. 15 kn
1600 mm stroke	Max. 15 kn	Max. 12 kn

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

SYSTEM CONFIGURATION



Type	Stroke
FSV-303	1200 mm
FSV-304	1600 mm

------- : 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	
AC/DC Power Supply Unit	PR-241	-	
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
Ferrite Core	OP86-11	001-594-450	For PR-241
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

1.1 Hull Unit

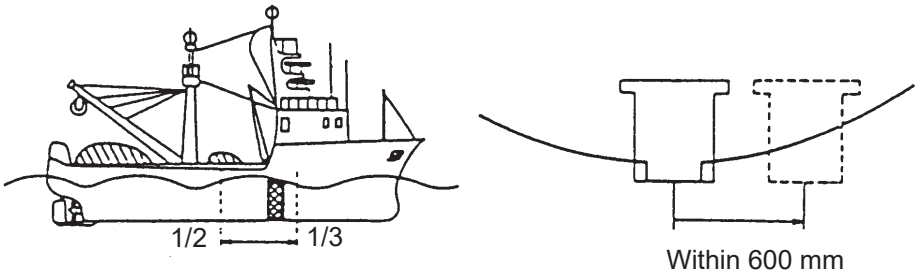
Note 1: The control box on the hull unit contains a inertial measurement unit. Handle the hull unit carefully.

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

1.1.1 Installation considerations

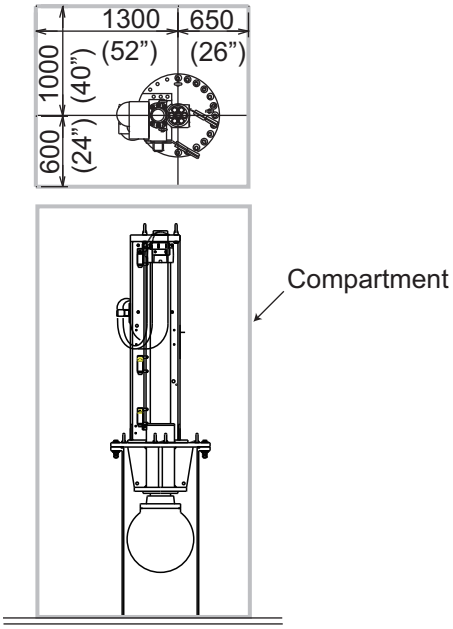
Decide the location of the hull unit through consultation with the dockyard and ship owner. When deciding the location, the following points should be taken into account.

- 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.

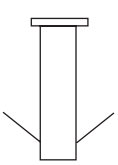
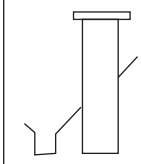
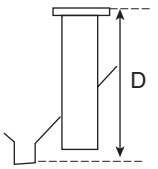
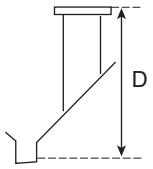
- If the ambient temperature around the unit will be below 0°C, provide the sonar compartment with a heater to keep the temperature above 0°C.



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 loss than 290 mm from the bottom.			
			The length "D" must be less than 1150 mm.	

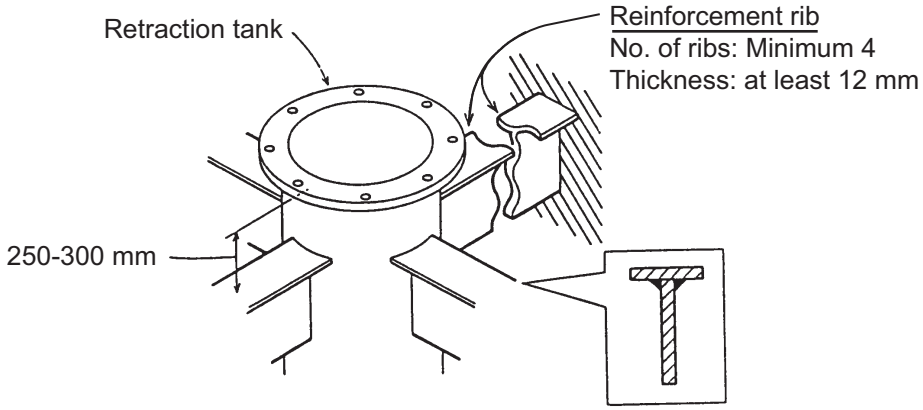
Note 1: For the 1200 mm stroke hull unit, the transducer will not fully protrude unless the tank is shorted by at least 280 mm from the bottom, and can not be fully retracted if more than 290 mm.

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.

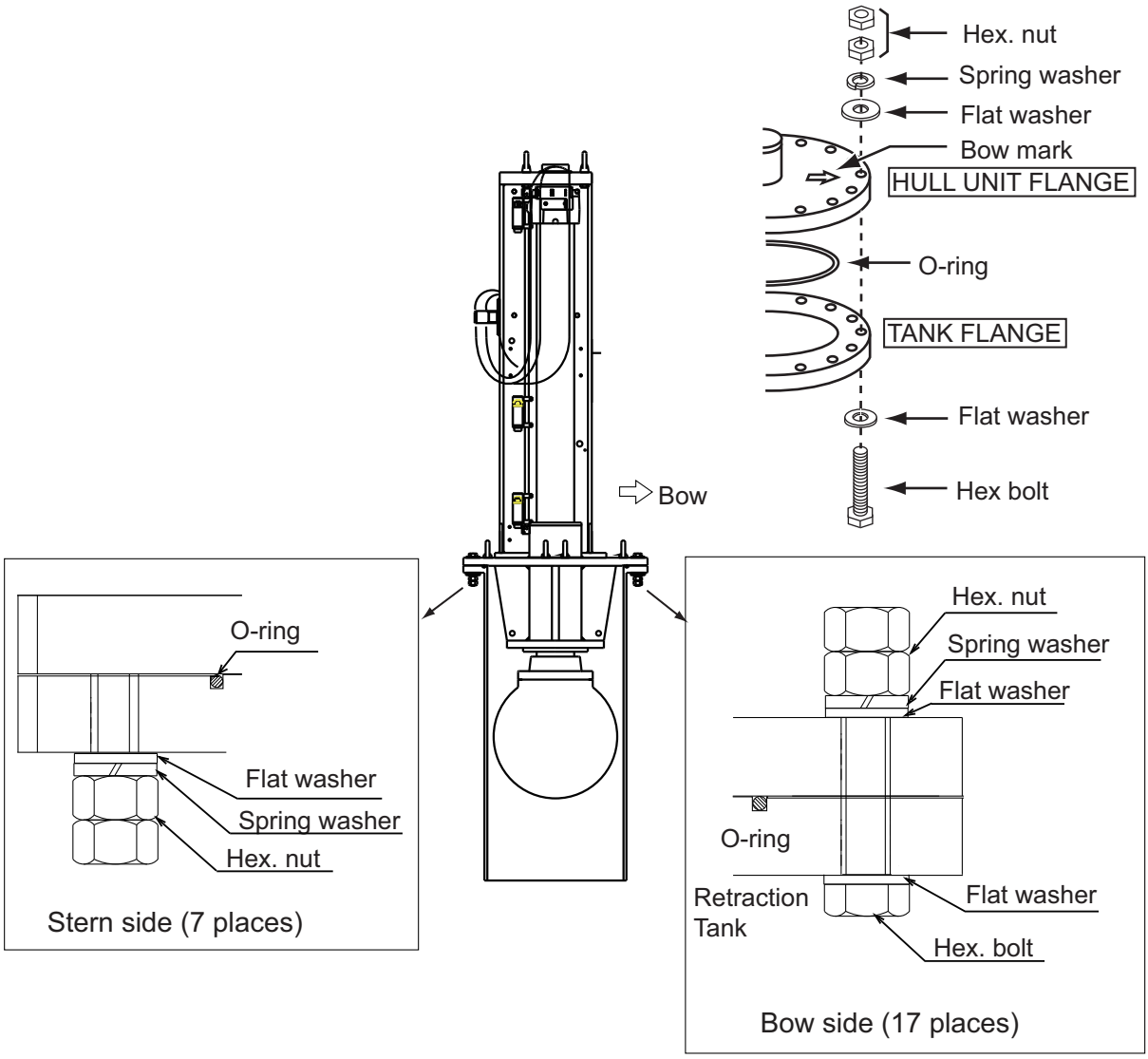
1.1.3 How to install the Hull Unit on the retraction tank

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

Prepare the materials and tools as shown below.

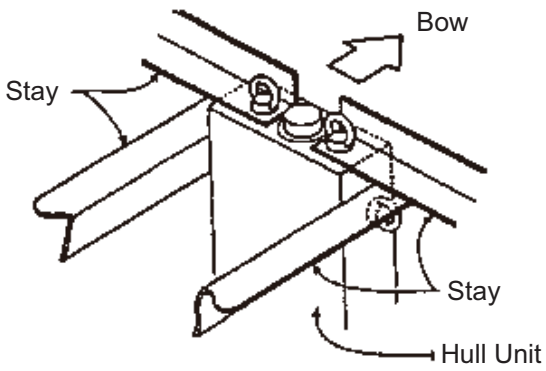
Name	Remarks
Screw wrench	M20 (opposite side 30 mm)
Ethyl alcohol	99.5%
Waste cloths	
Lithium grease	For O-ring Common lithium grease (the equivalent of Daphne Grease MP #2 (IDEMITSU KOSAN CO.,LTD.)
Molytone grease	For drive shaft Molytone grease #2 (by SUMICO LUBRICANT CO., LTD)

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.

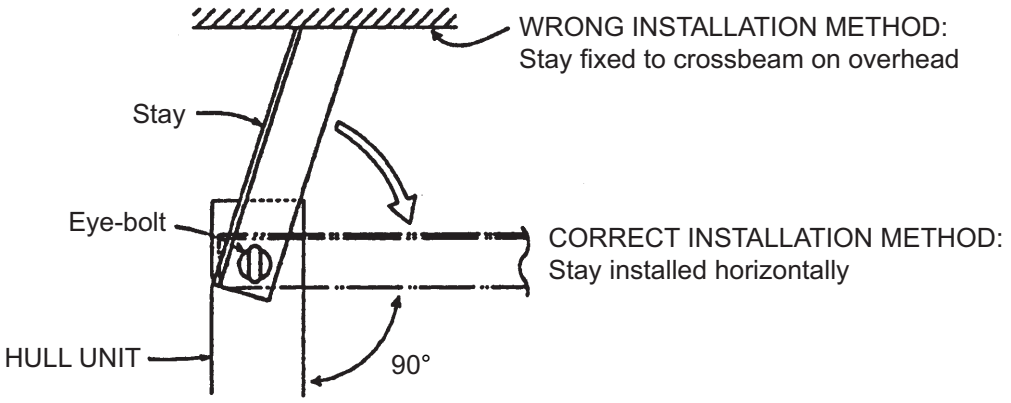


How to install the stays (anti-vibration measure)

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.



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

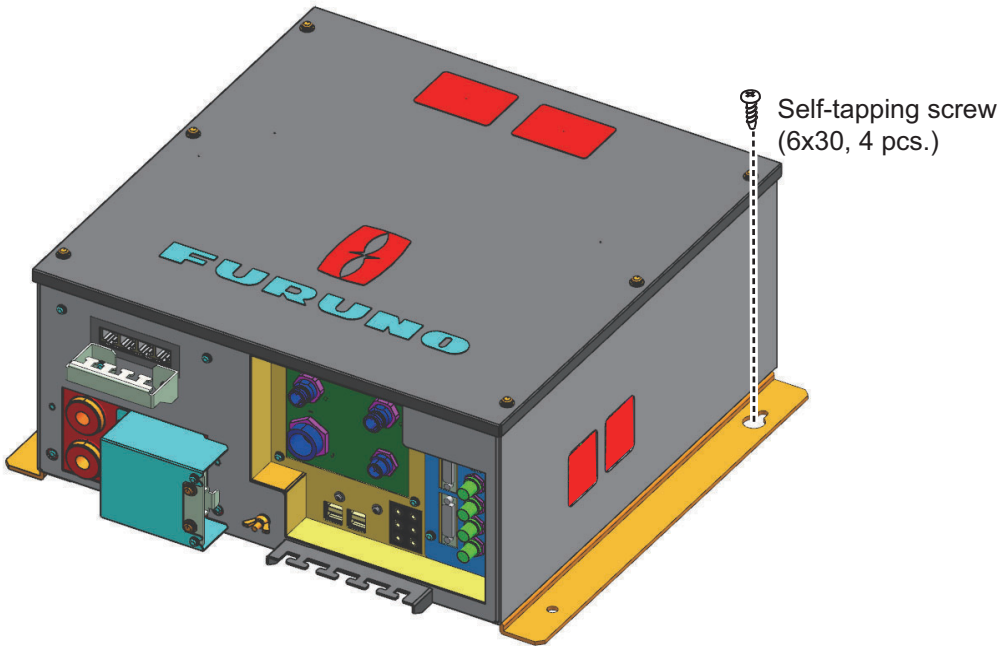
Follow the points below to select an installation location.

- 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

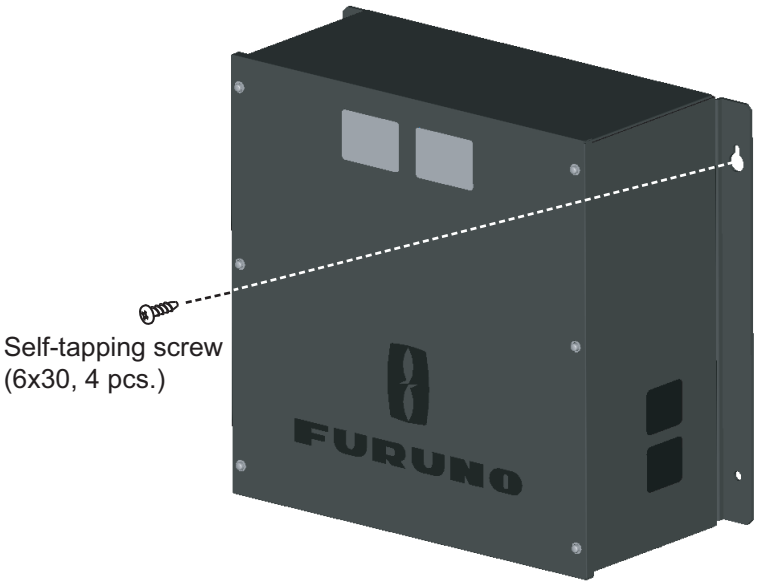
Desktop installation

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

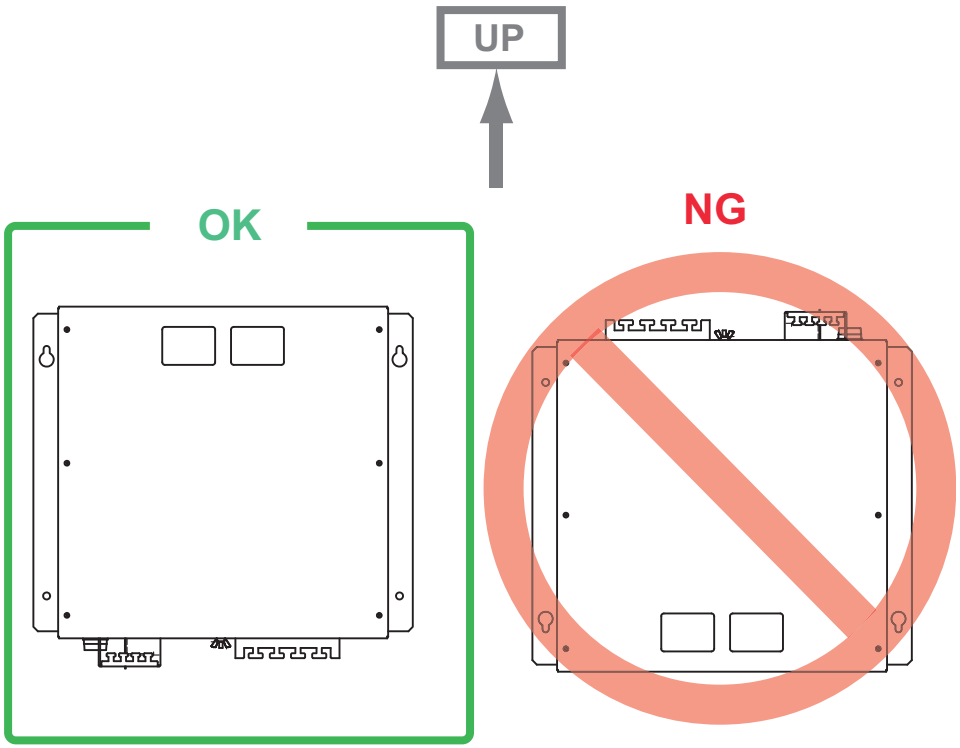


Bulkhead installation

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

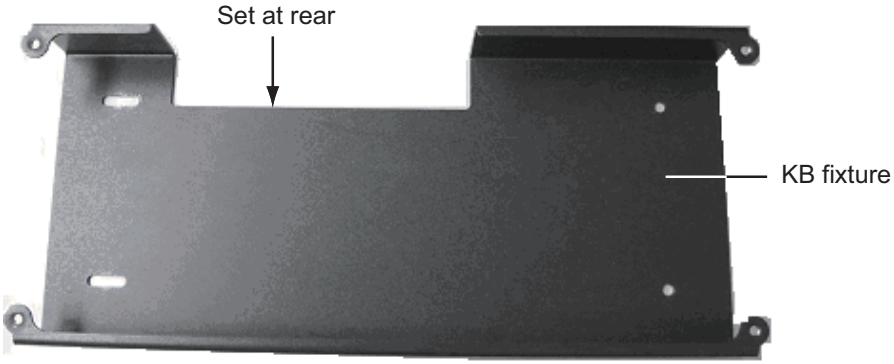
The control unit can be installed in a console (flush mount) or on a desktop (with KB fixture). Select a location considering the following points.

- 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

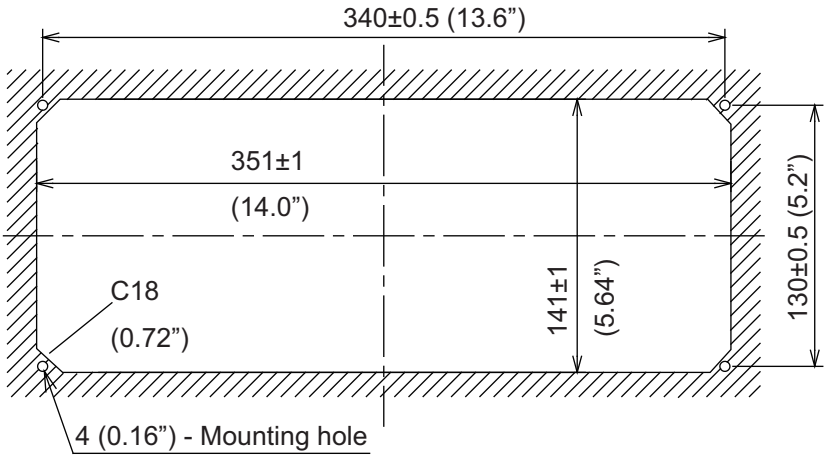
1. Fasten the KB fixture to the selected location with four self-tapping screws (M5x20).



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.



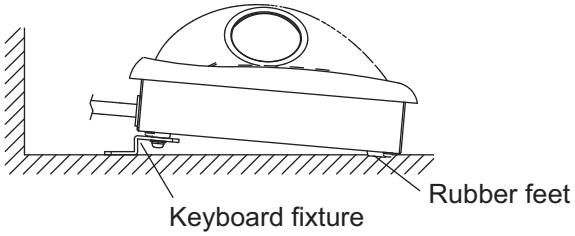
2. Make holes for four self-tapping screws (M5x20).
3. Peel the tape from the F mount gasket then attach the gasket to the rear of the control unit.
4. Connect a ground wire (1.25sq, local supply) between the ground terminal at the bottom of the unit and ship's ground.
5. Set the unit to the cutout and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

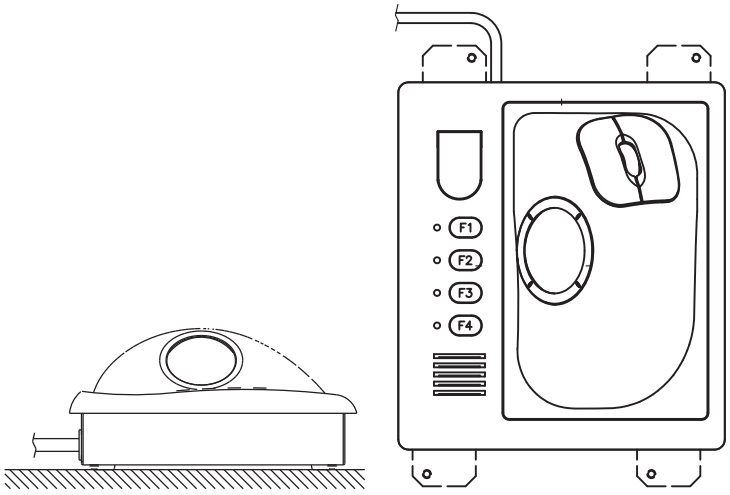
Name	Type	Code No.	Qty
Keyboard fixture	03-163-7821-1	100-306-291-10	1
Washer head screw	M4x12 C2700W MBN12	000-163-192-10	6
Rubber foot	M5x40	000-162-682-10	2

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.)

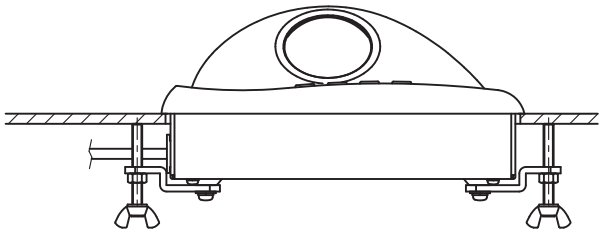


Flush mount (option)

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

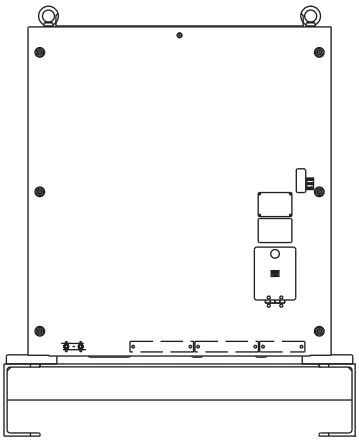
Name	Type	Code No.	Qty
Mounting plate	03-163-7531	100-306-261	4
Hex nut	M5	000-863-108	4
Wing screw	M5x40	000-162-682-10	4
Pan head screw	M4x12	000-163-192-10	4

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.

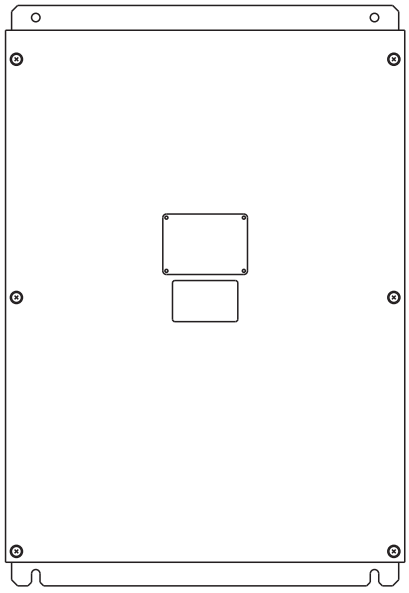
Extension Kit (Type: FSV-305-5, Code No.: 000-067-072)

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)

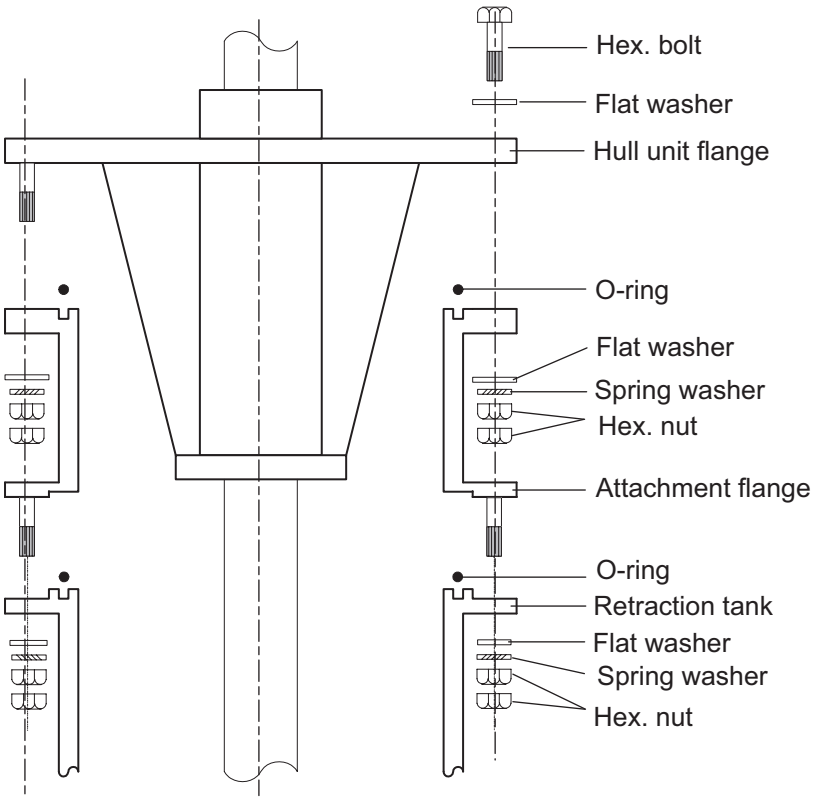
The attachment kit permits use of the retraction tank for the CSH-20 series using the 1200 mm stroke transducer.

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.



Note: Inscribe the bow mark to the attachment flange.

1.9 Attachment Kit (option)

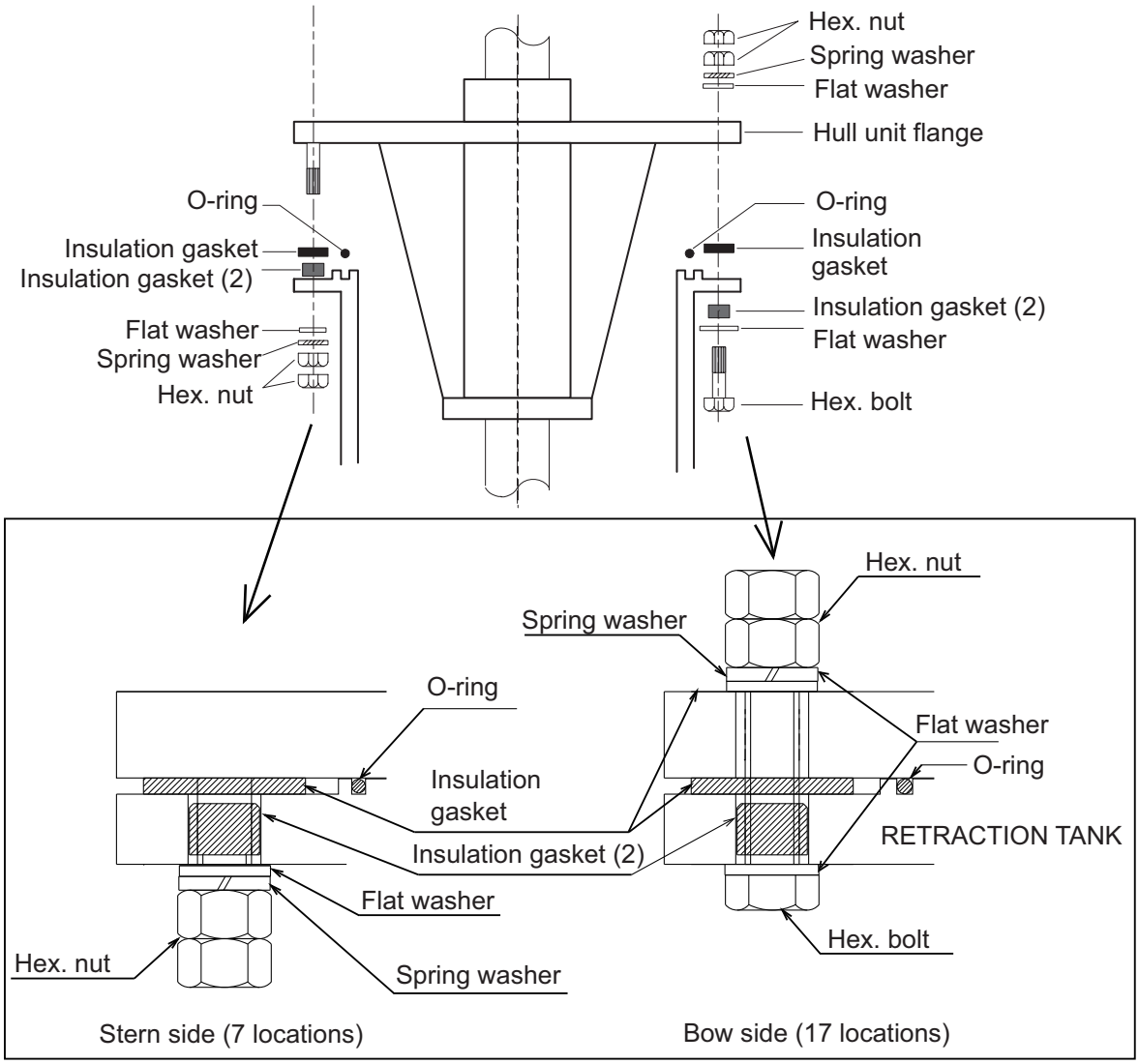
The attachment kit permits use of the retraction tank for the CSH-20 series using the 1600 mm stroke transducer and hull unit FSV-243E/244E.

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.



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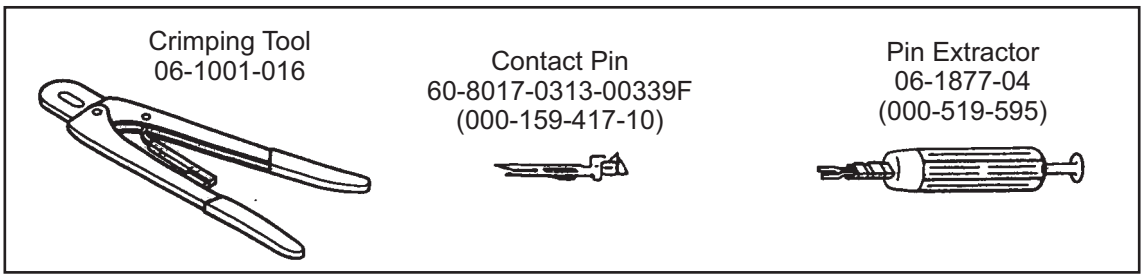
2. WIRING

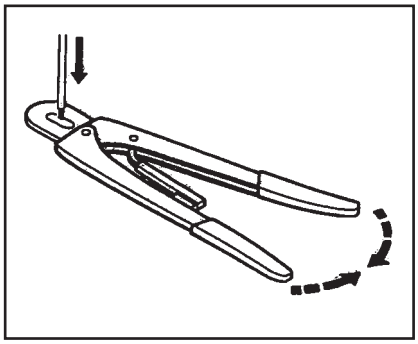
2.1 How to Use the Crimping Tool, Pin Extractor

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 rachet 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.)

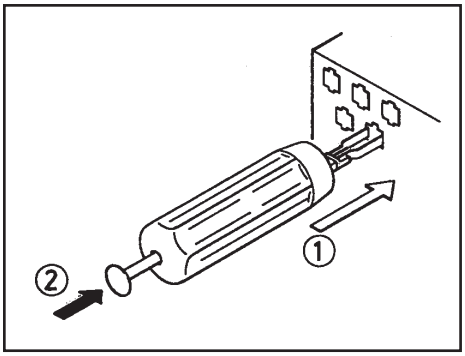


4. With crimping completed, pull the wire while holding the contact pin to make sure that the wire is held firmly by the contact pin.

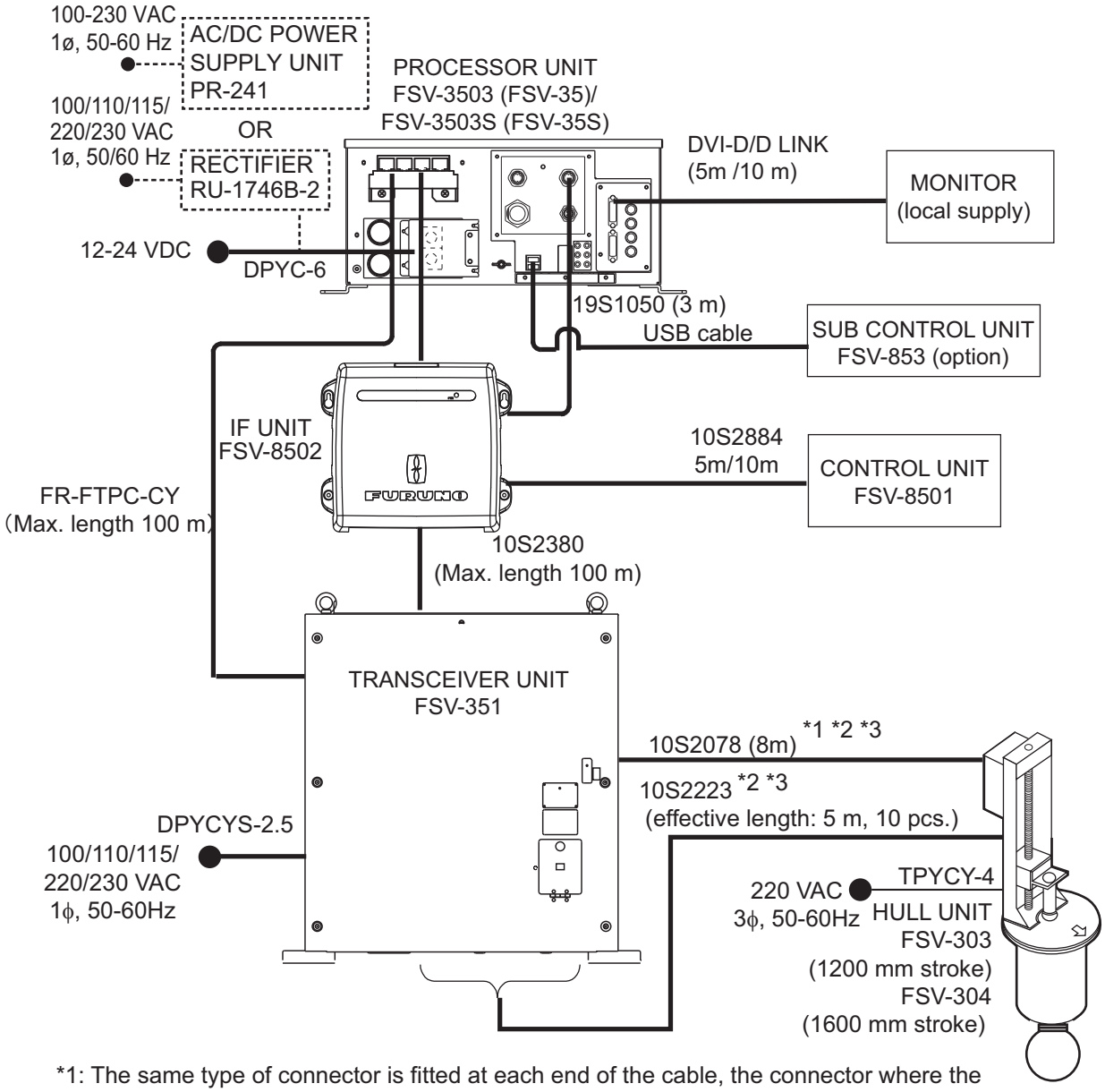
2.1.2 How to use the pin extractor

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

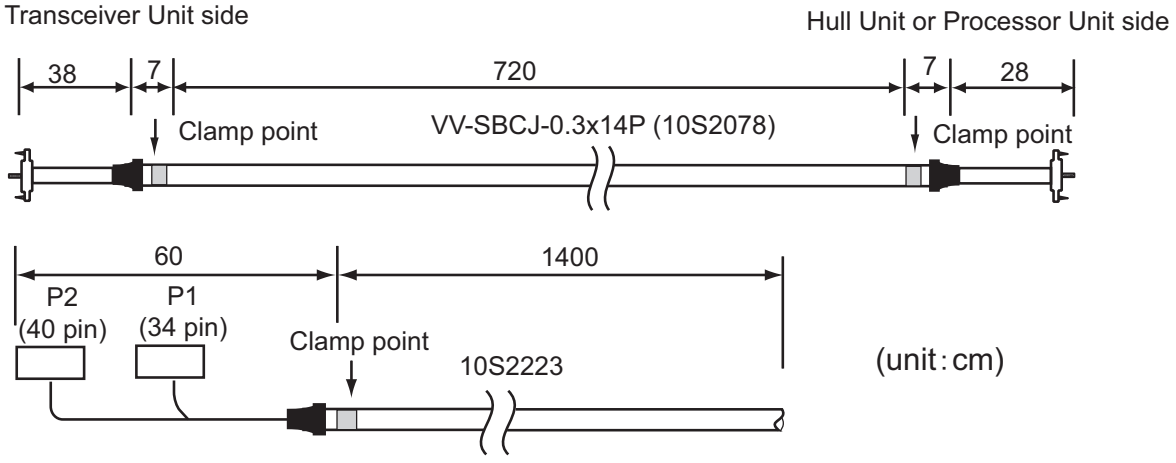
1. Push the pin extractor into the pin hole from the side opposite to the pin inserting side.
2. Push in the head of the pin extractor. The retaining spring comes free and the contact pin can be removed.



2.2 How to Connect Units

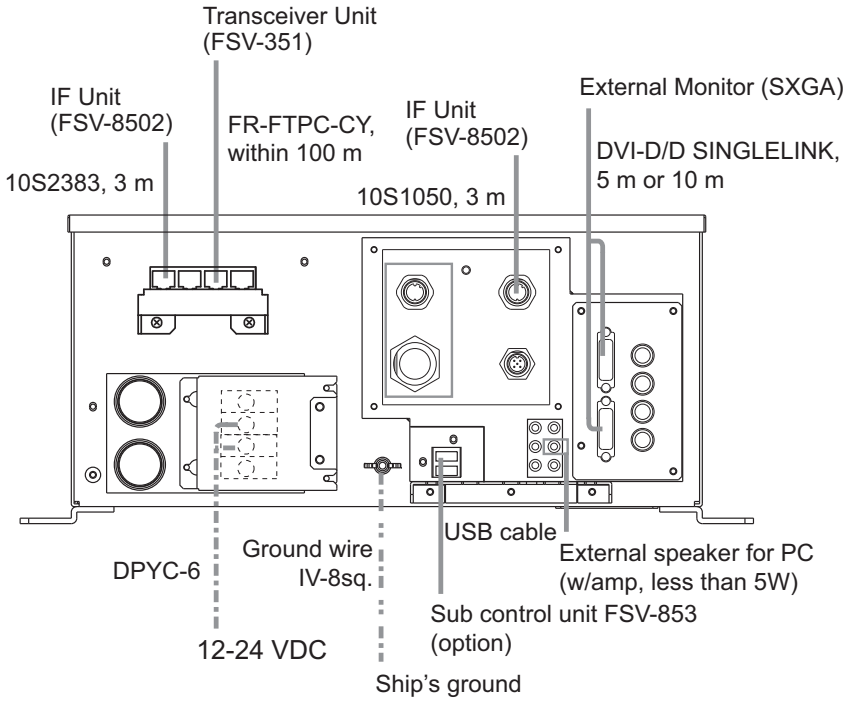


*1: The same type of connector is fitted at each end of the cable, the connector where the amount of sheath removed is greater should be connected to the transceiver unit.
*2: The details of the cable is shown below.
*3: When using cable for extension kit, the length of the cable between the transceiver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



2.3 Processor Unit

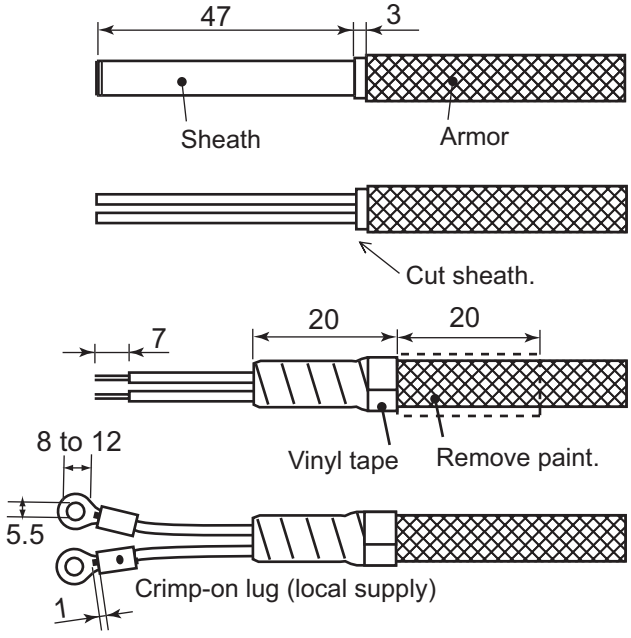
Connect the cables of other equipment at the rear of the processor unit.

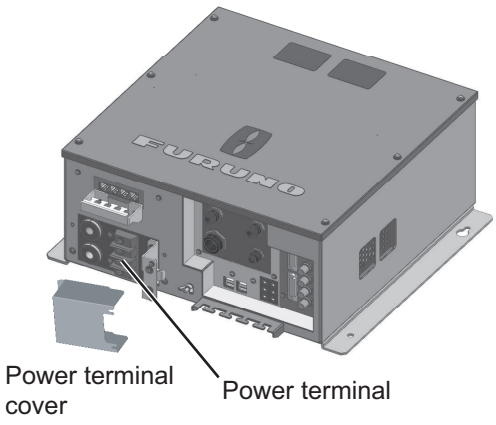


Power cable

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

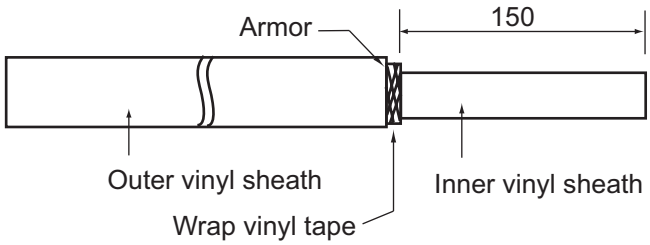
1. Fabricate the cable as shown below.
2. Open the power terminal cover on the processor unit. Connect the power cable: top terminal, +, bottom terminal, -.
3. Close the power terminal cover.





LAN cable

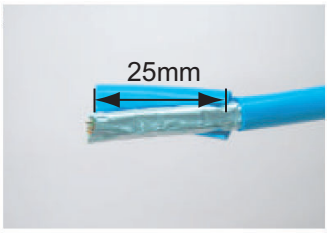
Fabricate the supplied LAN cable (FR-FTPC-CY, 10/20/30/50/100 m) as shown below. Cut the vinyl sheath and armor to the lengths shown below and attach the modular connector.



1

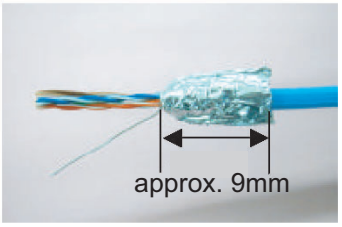
Expose inner vinyl sheath.

2



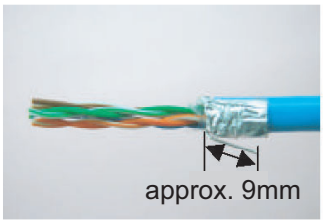
Remove the outer sheath by approx 25 mm. Be careful not to damage inner shield and cores.

3



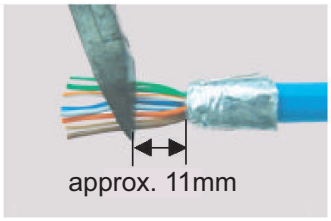
Fold back the shield, wrap it onto the outer sheath and cut it, leaving 9 mm.

4



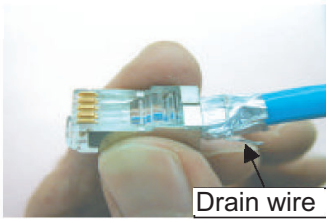
Fold back drain wire and cut it, leaving 9 mm.

5



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

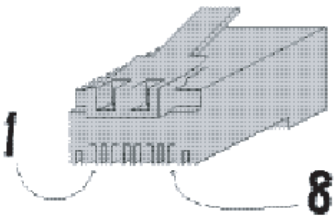
6



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

7

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



[Crose cable]

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

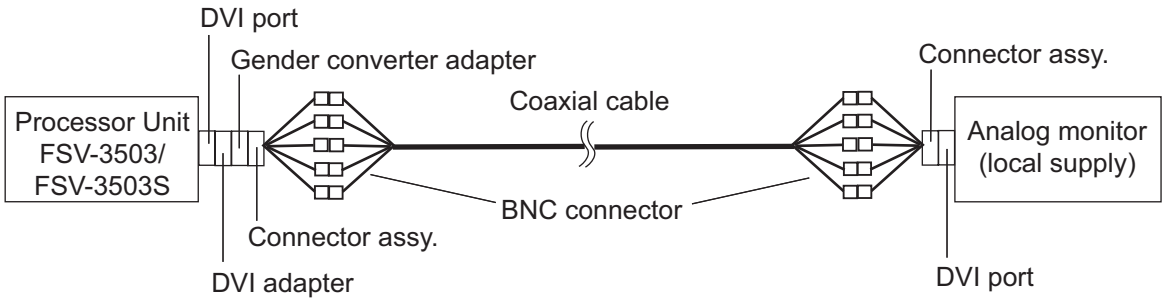
[Straight cable]

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

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.

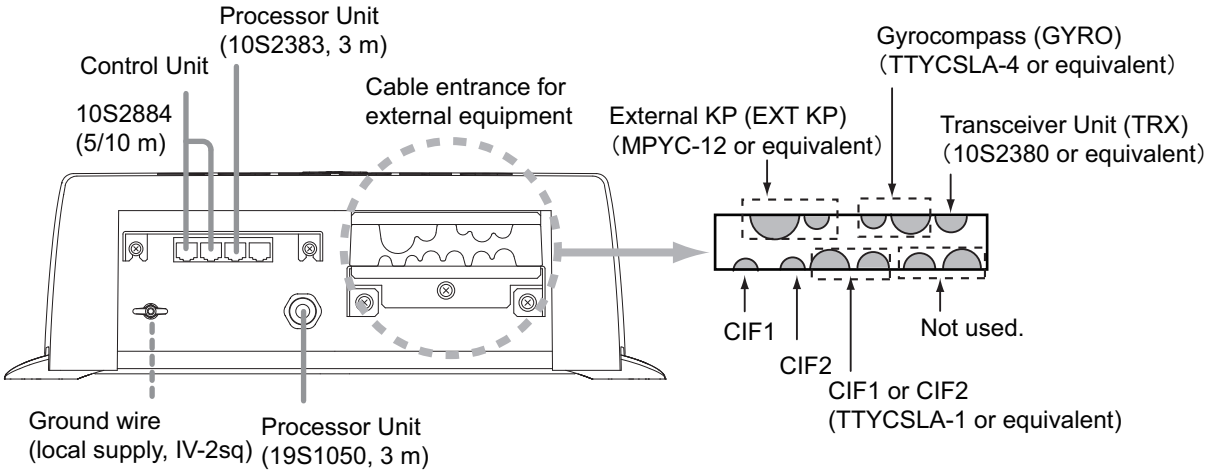
Part	Type	Code No., Maker	Qty	Remarks
Coaxial cable	1.5C2V-3C2V-T-20M	000-164-049-10	1	20 m
	1.5C2V-3C2V-T-30M	000-164-050-10		30 m
	1.5C2V-3C2V-T-70M	000-164-051-10		70 m
Connector assy.	BNCX5-DSUB15-L400	000-159-595-01	2	
BNC connector	BNC-P-3	000-500-396	6	For 3C-2V
	BNC-P-1.5V-CR	DDK	4	Recommended
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

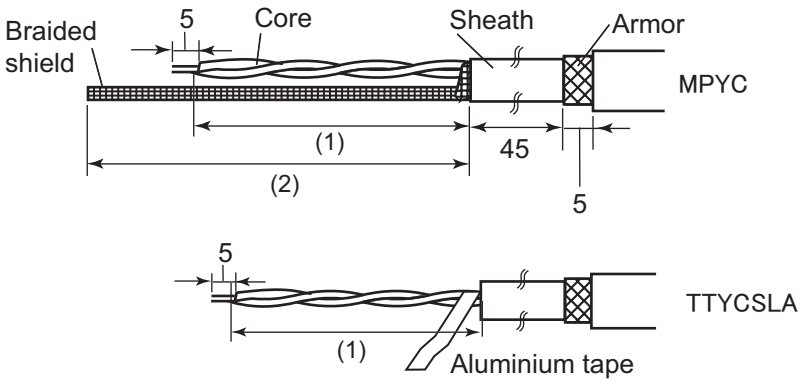
The IF unit installs between the processor unit and the transceiver unit. Connect the cables according to the diagram inscribed on the shield cover of the IF unit. JIS cables and FURUNO cables are available for the connection. To connect the JIS cables, use the larger cable holes as shown below.

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.



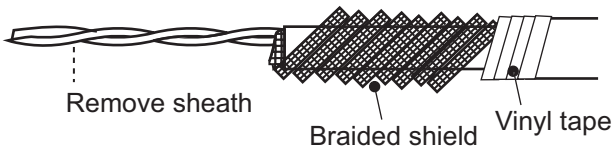
Connection point	Cable type	See (1) below	See (2) below	Remarks
Ext. KP	JIS cable*	400 mm	100 mm	
	FURUNO cable	400 mm	120 mm	
Gyro	JIS cable*	400 mm	100 mm	
	FURUNO cable	400 mm	100 mm	
Transceiver Unit	FURUNO cable	400 mm	100 mm	Standard supply
CIF1	JIS cable*	400 mm	100 mm	
	FURUNO cable	400 mm	100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

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



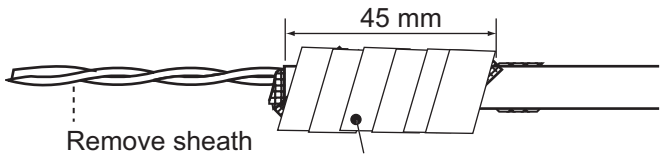
How to fabricate cables

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

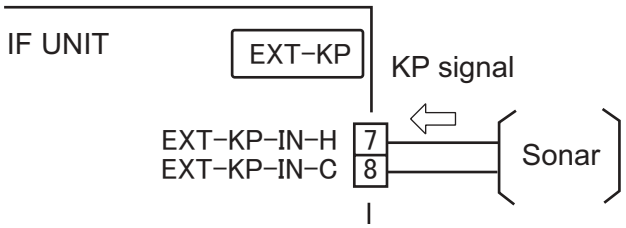


Wrap braided shield around vinyl sheath.
Cover braided shield with conductive fabric tape.

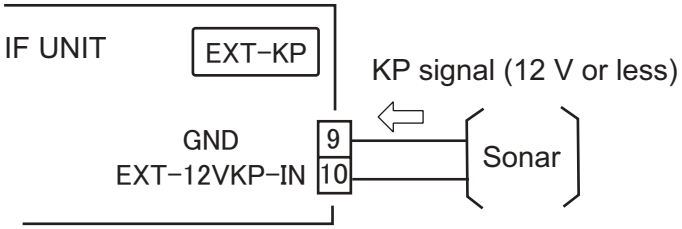
How to connect external KP

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

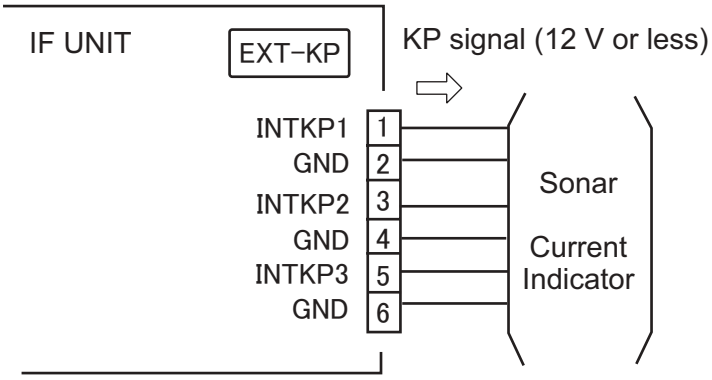
Current drive KP output



Voltage drive KP output



Make the connections shown below to output KP for external sonar and current indicator. This sonar transmits a keying pulse (KP) to connected external sensors when this sonar is connected and running.



2.5 Control Unit and Remote Controller

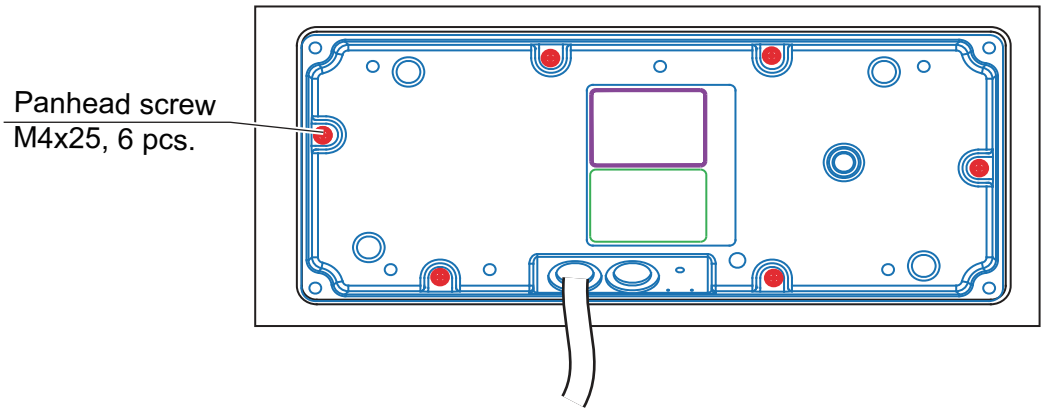
Ground

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

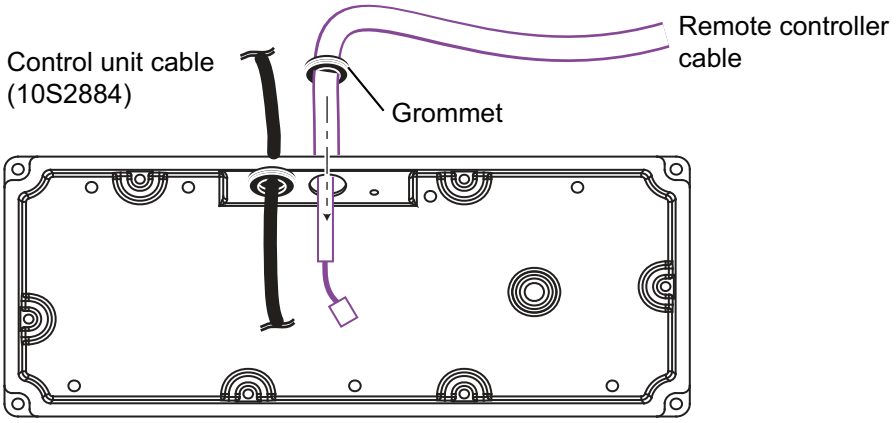
Connect the optional remote controller (FSV-854) as shown below.

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



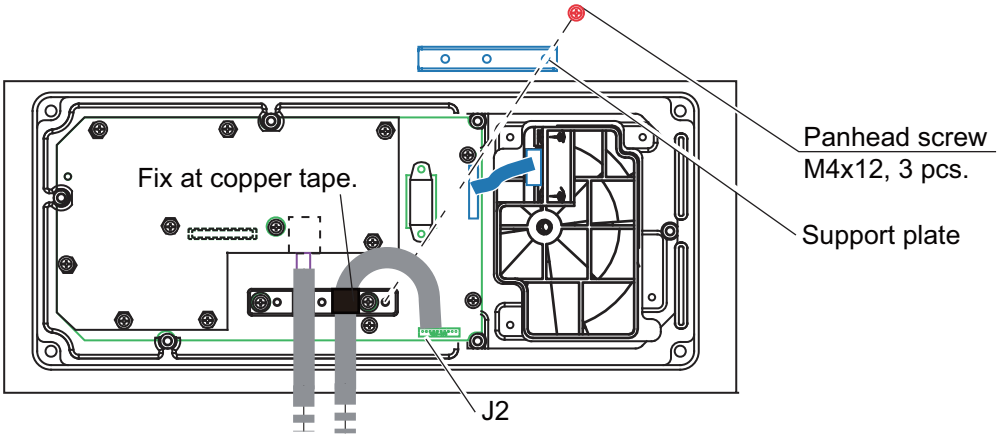
Rear side of the control unit (cover removed)

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)

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

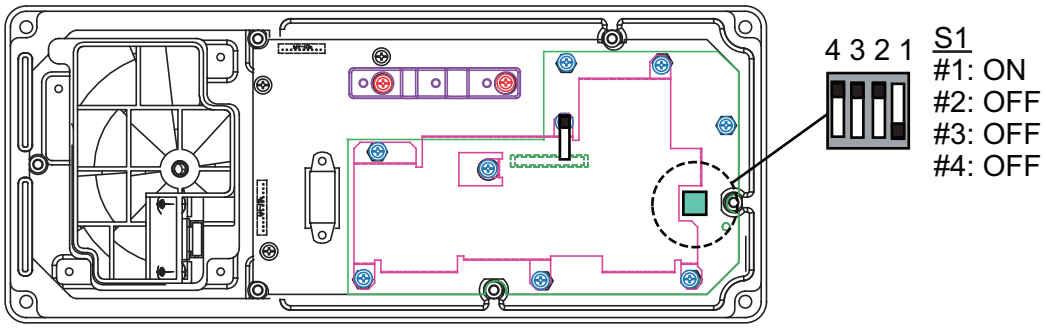


Rear side of the control unit (cover removed)

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

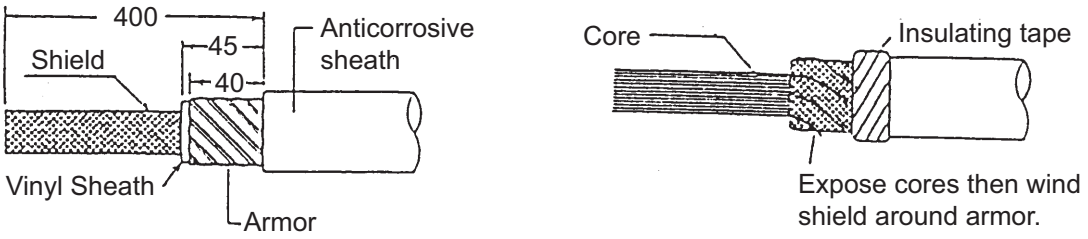
How to connect No.2 control unit (option)

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

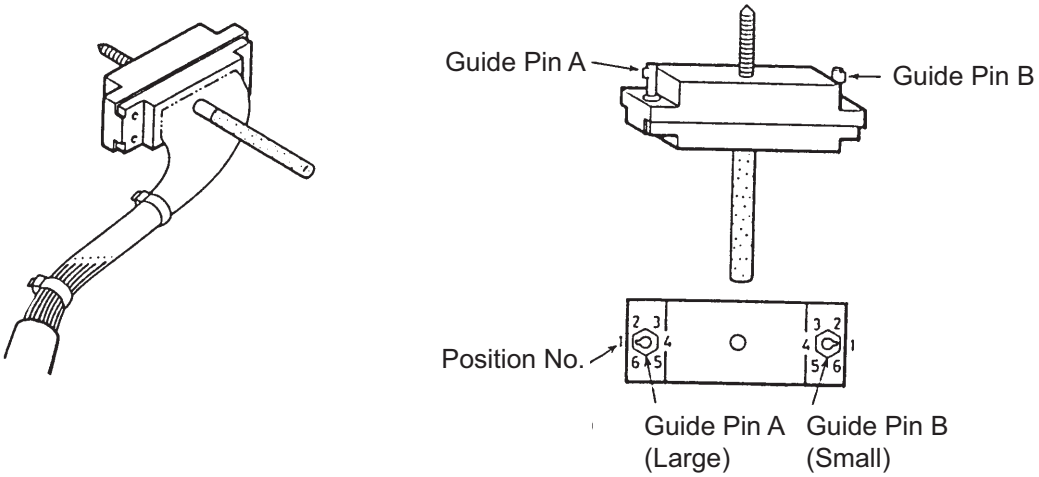


2.6 Transceiver Unit

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



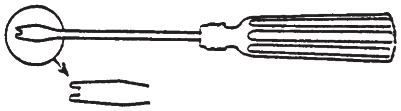
How to fabricate 10P connector

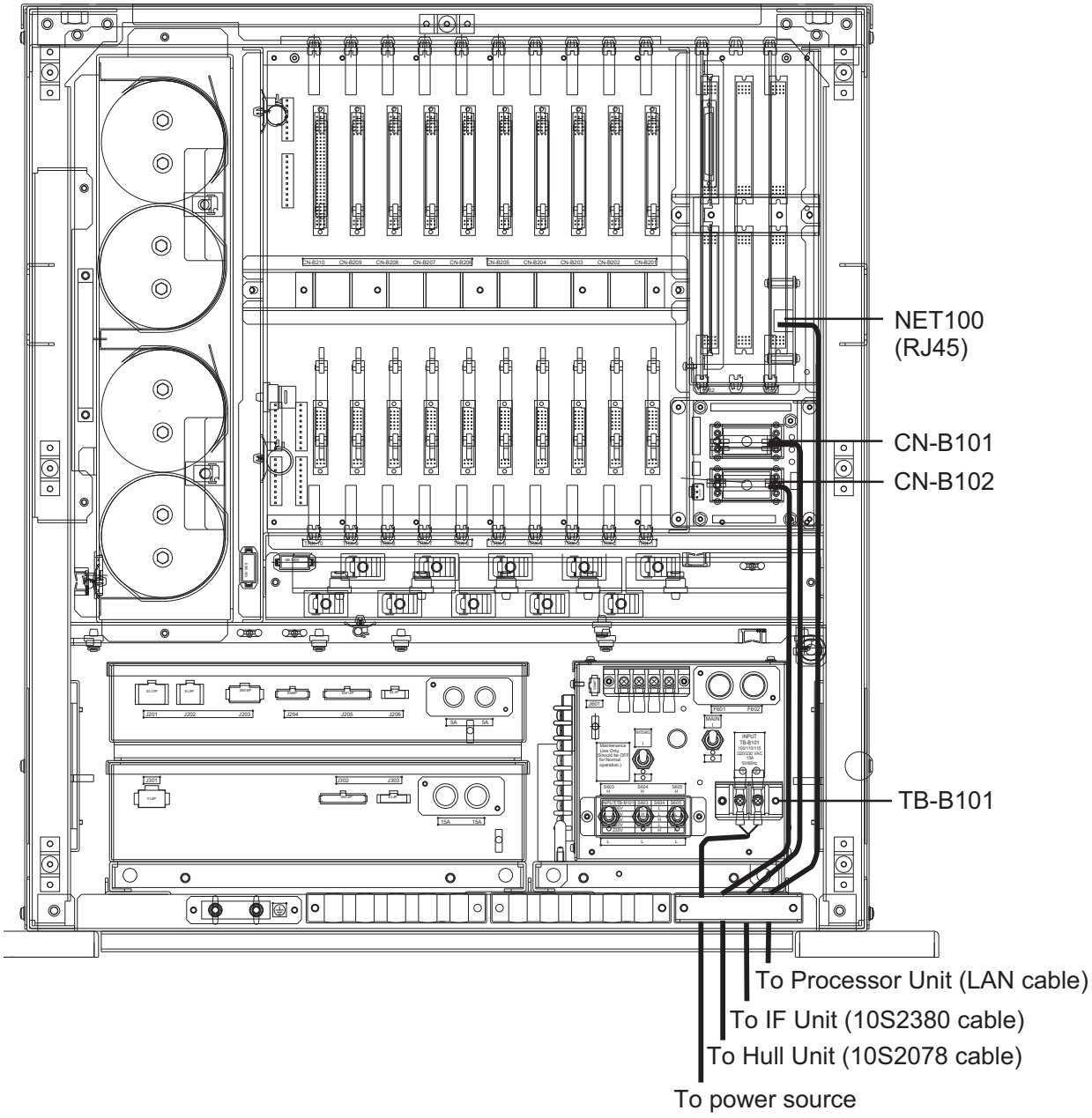


How to assemble 10P connector

How to position guide pins

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

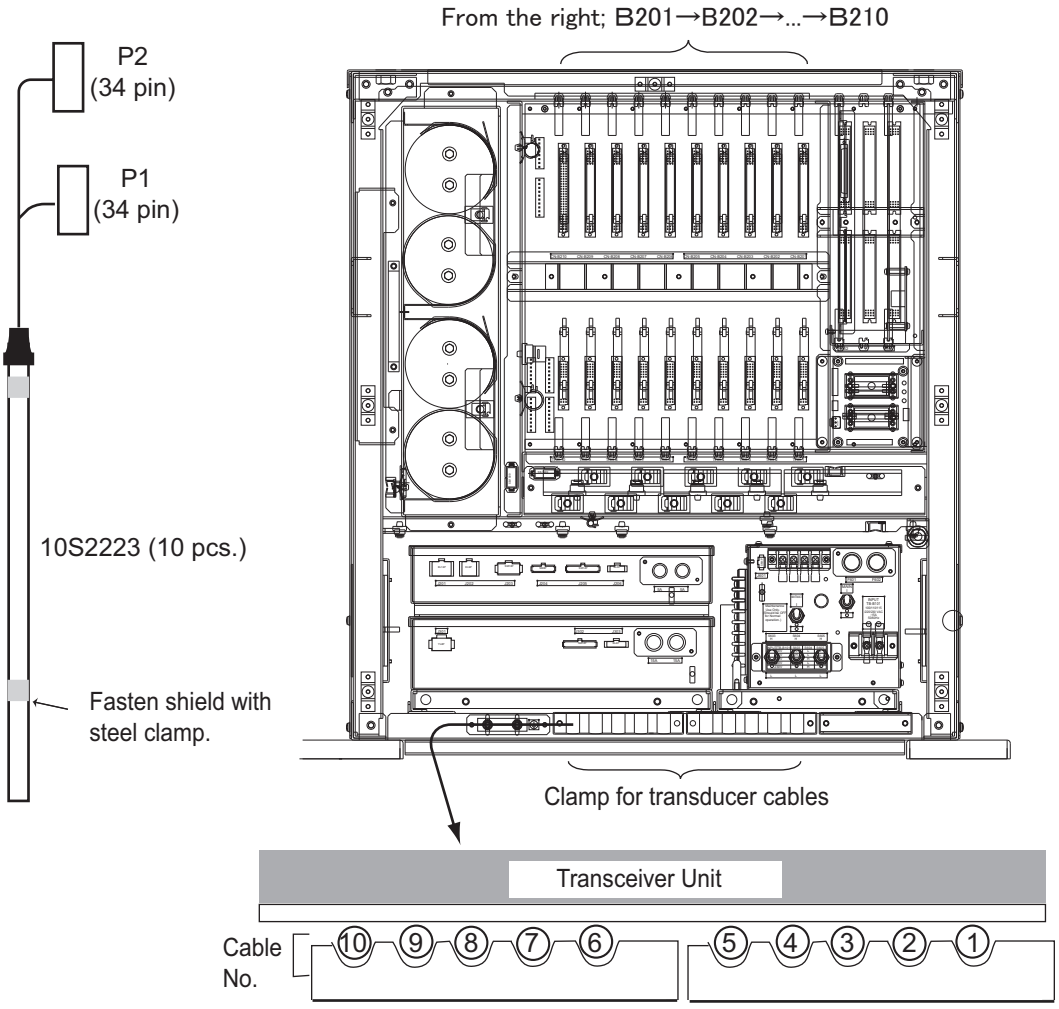
Connector / Guide pin	CN-B101	Tool
Guide pin A (large)	1	
Guide pin B (small)	1	(Guide pin insertion tool, notch in head)



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

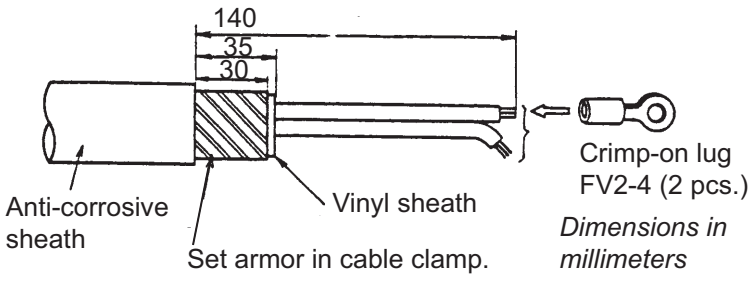
2.6.2 Connections inside the transceiver unit

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.



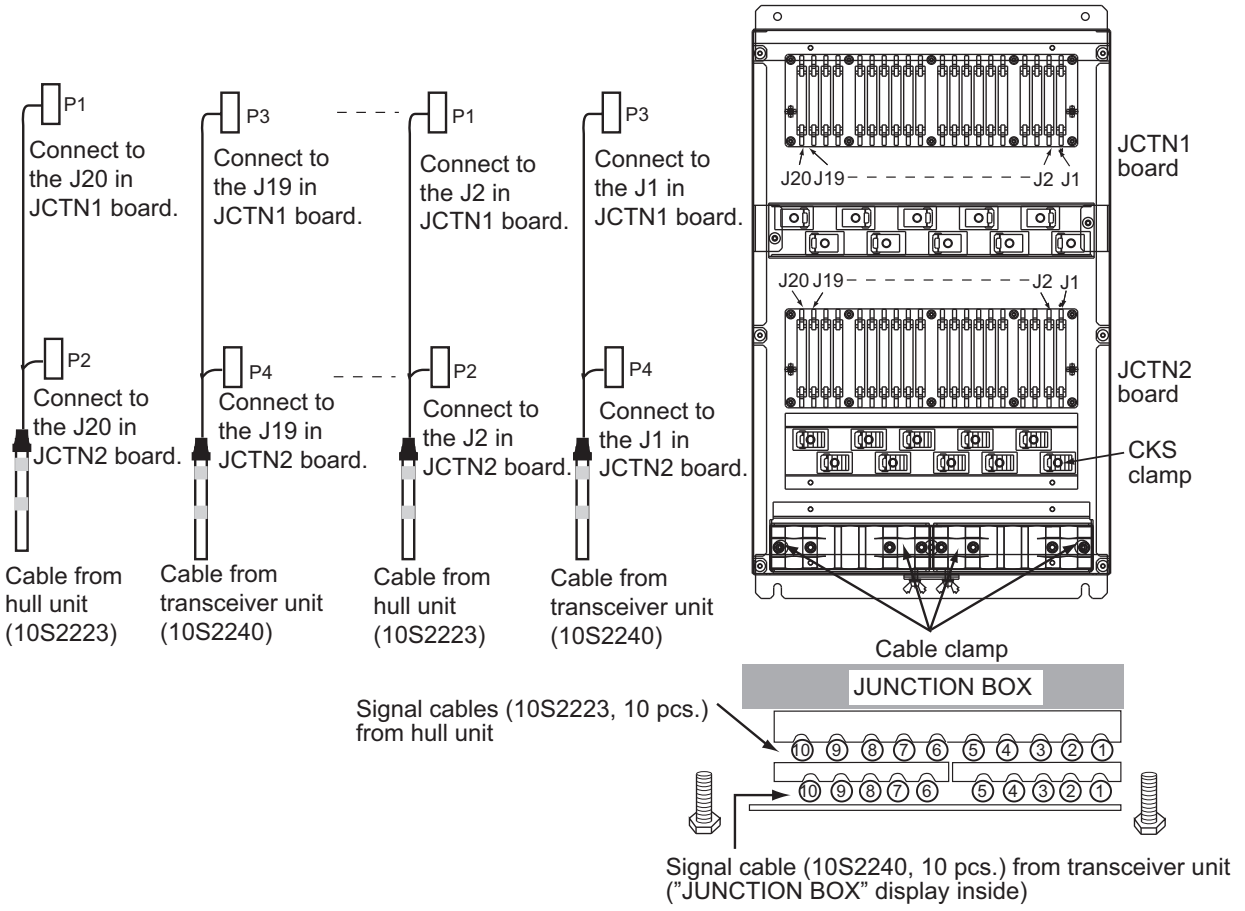
2.7 Transducer Cable Extension Kit

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.

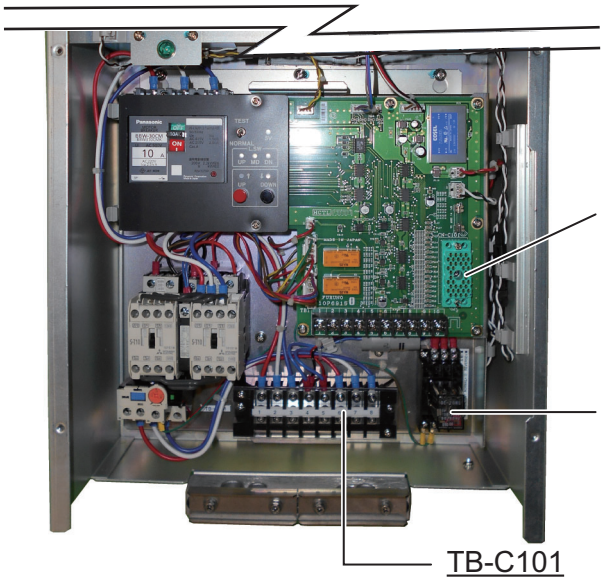
1. Remove the junction box cover.
2. Remove the cable clamp and fixing plate of the board.



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.

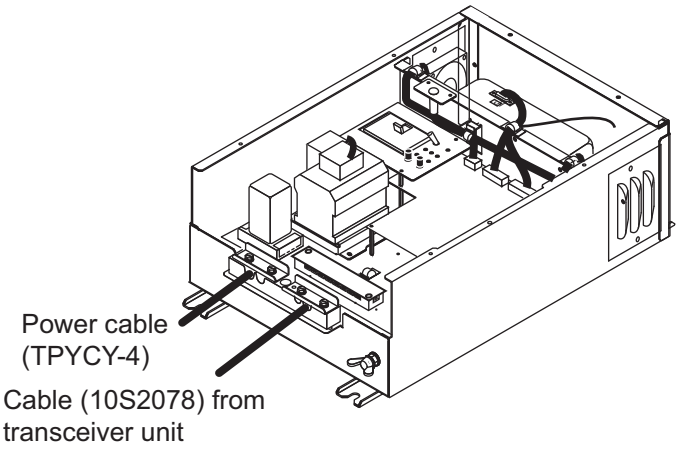
2.8 Control Box of Hull Unit

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

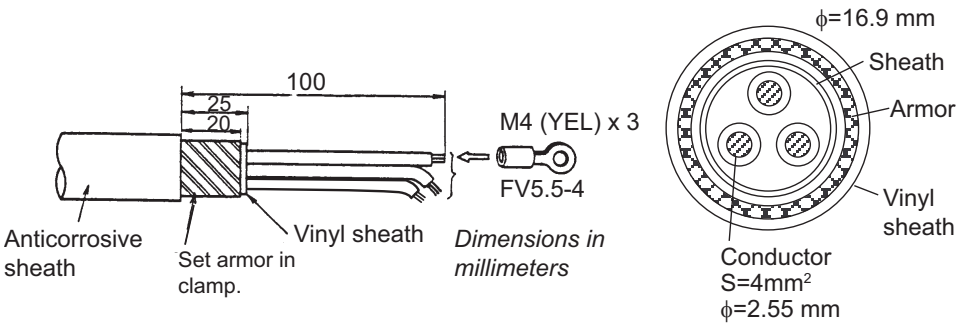


Confirm that the LED lights in red after the wiring is completed. If the LED does not light, turn off power cable from the mains switchboard, reconnect any two lines of the power cable, turn on the power, and check if the LED lights. The hull unit does not work when the connection is wrong.

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

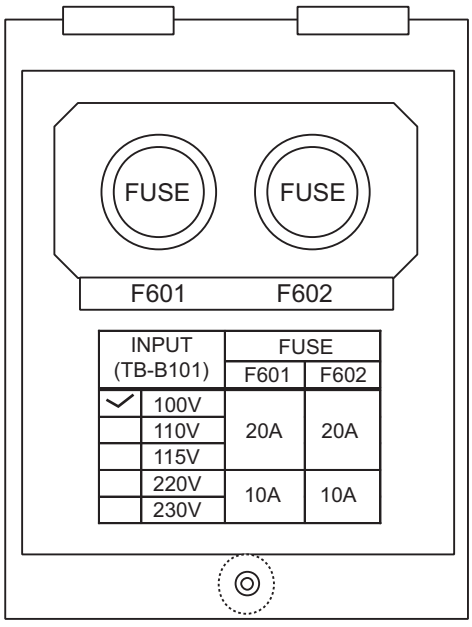
⚠ WARNING

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

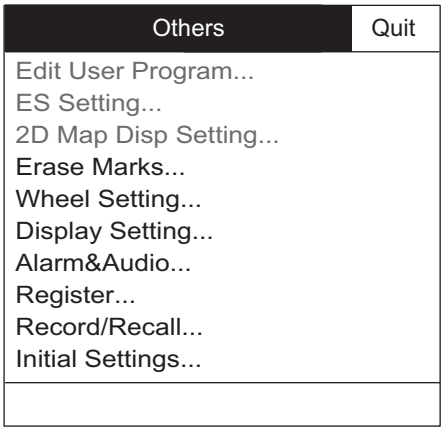
3.1 Hull Unit Check

Do not transmit when the vessel is in dry dock.

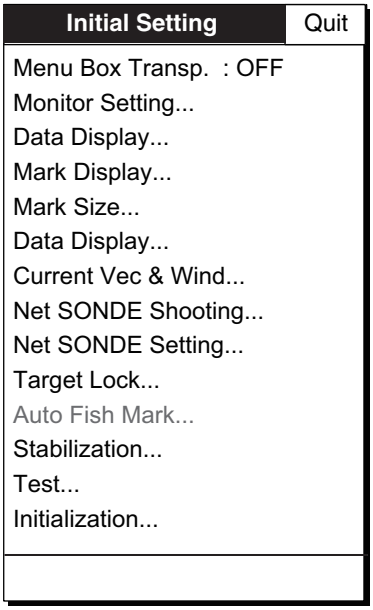
How to enable transmission

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.

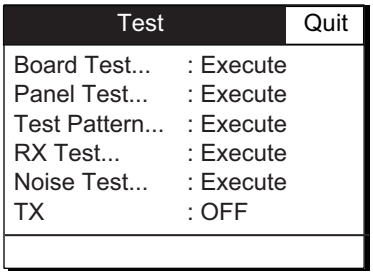
1. Turn on the power and press the **MENU/ESC** key to open the menu.
2. Use the trackball to select [Others] then push the left-click button.



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



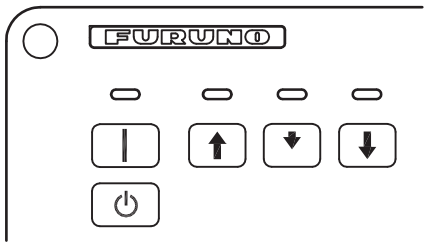
5. Select [Test] then push the left-click button.



6. Select [TX] then push the left-click button.
7. Select [On] then push the left-click button.
8. Click [Quit] on the setting box.
9. Long-press the **MENU/ESC** key to quit all menus. (All menus can also be closed by long-clicking [Quit].)

How to check the hull unit

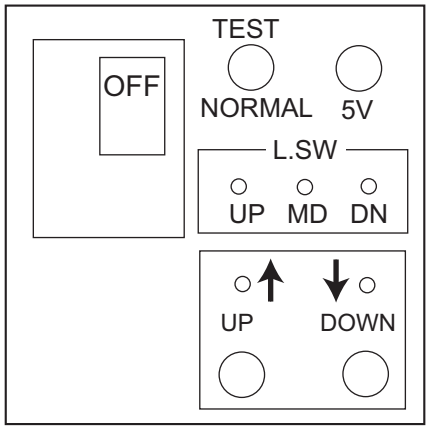
1. Press the POWER (⏽) switch on the control unit to turn on the system. Check that both the LED lamp above the POWER switch and the ⬆ are lit.



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) (2) - (3) (1) - (3)	220 VAC 220 VAC 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.



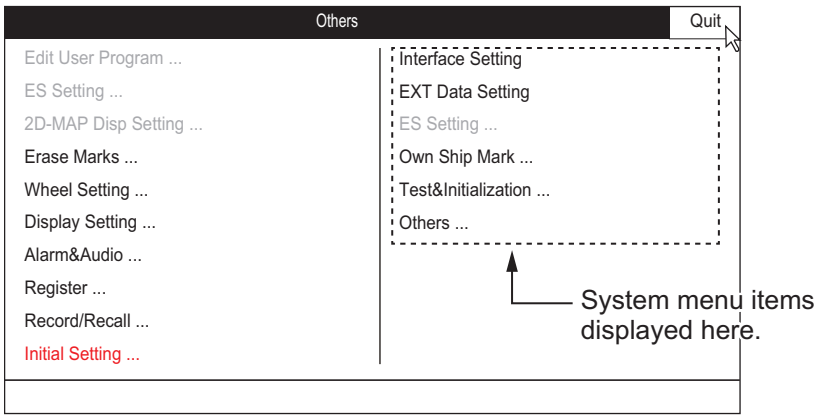
5. Release the [DOWN] switch during lowering to confirm that the transducer stops lowering.
6. Press the [DOWN] switch again to re-start lowering. Confirm that the transducer stops at the moment when the lower limit switch is pressed.
7. Confirm that the [UP] switch operates in a similar manner.
8. Check 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 Show the System Menu

The system menu provides setting and maintenance items for the serviceman. The menu is hidden to prevent unauthorized access. To ac

1. Turn on the system.
2. WIth the menu closed, press the **F1**, **F3** and **F5** keys in order while pressing down the **MENU/ESC** key.
3. Press the **MENU/ESC** key twice.

4. Click [Others] to show the system menu, to the right of the [Others] menu.



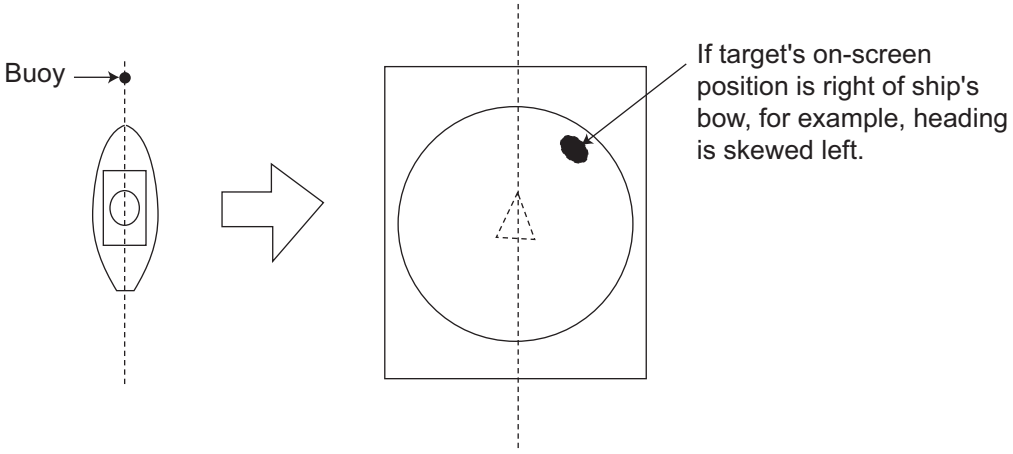
To close the system menu, repeat the procedure.

3.3 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.
4. Refer to section 3.2 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 quit all menus. (All menus can also be closed by long-clicking [Quit].

Heading correction at the inertial measurement unit

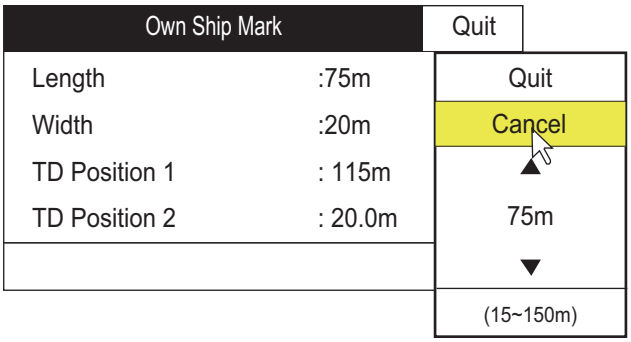
Heading correction at the inertial measurement unit is done with [Heading Adjust 2] on the [Others] menu.

- 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 inertial measurement unit is a GPS gyro, set 0°.

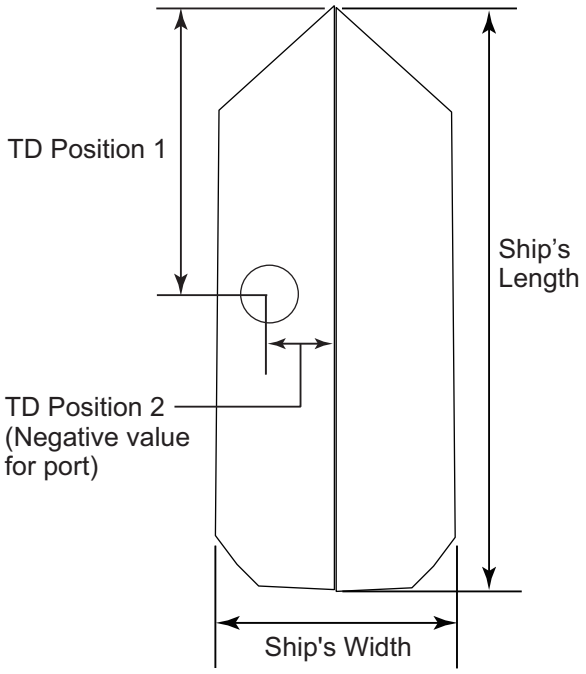
3.4 How to Configure the Own Ship Mark

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

1. Refer to section 3.2 to show the system menu.
2. Select [Own Ship Mark] then push the left-click button.
3. Select [Ship's Length] then left-click.



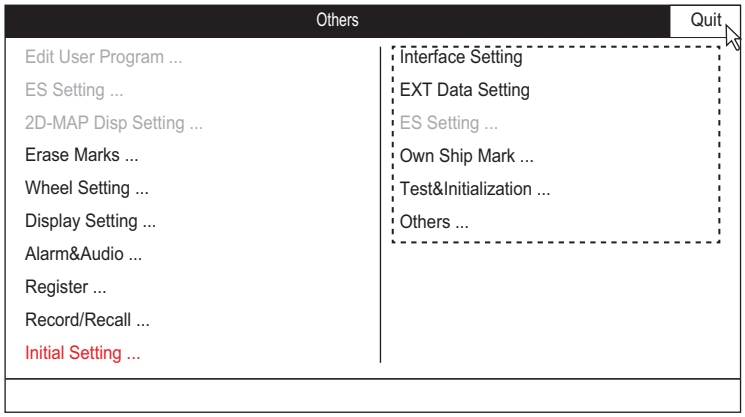
4. Click ▲ or ▼ to set. The setting range is 15 -150 m.
5. Click [Quit] on the setting box.
6. Set the [Ship's Width] and [TD Position 1 (or 2)] similarly.
   - [Ship's Width]: The width of the ship at its widest point. (Setting range 5 -30 m)
   - [TD Position 1]: Distance from transducer to bow. (Setting range: 5 - 50 m)
   - [TD Position 2]: Distance from transducer to keel. Select [+] for starboard, [-] for port. (Setting range: -10 to 10 m)



7. Long-press the **MENU/ESC** key to quit all menus. (All menus can also be closed by long-clicking [Quit].

3.5 Others Menu

This section provides information on the items of the system menu not mentioned in other sections. For how to display the system menu, see section 3.2.



3.5.1 Interface Setting menu

The [Interface Setting] menu sets up the external equipment connected to this sonar.

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.

PC Connection: Enable, disable PC connection. This menu item is greyed out; selection is not available.

3.5.2 EXT Data Setting menu

The [EXT Data Setting] menu sets up the external equipment connected to this sonar.

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)

3.5.3 Test&Initialization menu

The [Test&Initialization] menu provides diagnostic tests and the means to restore default settings. This menu is not used in the installation of this sonar.

3.5.4 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)

T_parameter: Debugging facility. For the serviceman.

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^2)* of the core wire(s) in the cable. For core types M and TT, the numerical designation indicates the *number of core wires* in the cable.

1. Core Type

D Double core power line

T Triple core power line

M 1 mm Multi core

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

2. Insulation Type

P Ethylene Propylene

3. Sheath Type

Y Vinyl

4. Armor Type

C Steel

5. Shielding Type

Y Corrosive Resistant

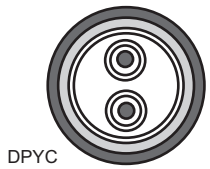
6. Core Sheath

S All cores in one sheath

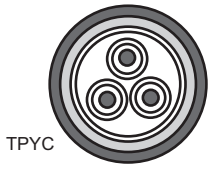
-S Individually sheathed cores

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

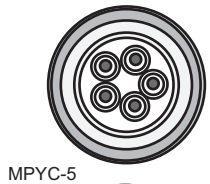
-SLA Individually sheathed cores, plastic tube sheath w/aluminum tape



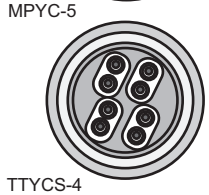
DPYC



TPYC



MPYC-5



TTYCS-4

1 2 3 4 5 6

EX: DPYCYS - 1.5 MPYC - 5

1 2 3 4

Designation type — Core Area (mm^2) — Designation type — # of cores

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

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

PACKING LIST

10CV-X-9851 -0 1/1

A-1

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

NAME	OUTLINE	DESCRIPTION/CODE No.	Q'TY
ユニット UNIT			
操作部 CONTROL UNIT		FSV-8501-J-5/10, E-5/10 000-017-117-00 **	1
工事材料 INSTALLATION MATERIALS		**CP10-07200**	
KB取付金具 KB FIXTURE ASSEMBLY		CP03-33202 001-115-510-00	1
工事材料 INSTALLATION MATERIALS		CP10-07201 001-112-500-00	1

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

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

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

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

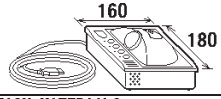
C1335-Z01-A

PACKING LIST

10CV-X-9856 -0 1/1

A-2

FSV-853

NAME	OUTLINE	DESCRIPTION/CODE No.	Q'TY
ユニット UNIT			
簡易操作部 CONTROL UNIT		FSV-853 000-019-213-00	1
工事材料 INSTALLATION MATERIALS			
工事材料 INSTALLATION MATERIALS		CP10-07501 001-135-210-00	1

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

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

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

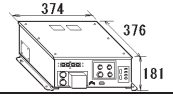
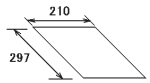
C1335-Z06-A

PACKING LIST

10CW-X-9851 -0 1/1

A-3

FSV-3503/3503S

NAME	OUTLINE	DESCRIPTION/CODE No.	Q'TY
ユニット UNIT			
制御部 PROCESSOR UNIT		FSV-3503/S 000-020-262-00 **	1
予備品 SPARE PARTS			
予備品 SPARE PARTS		SP19-00501 001-023-090-00	1
工事材料 INSTALLATION MATERIALS		**CP19-00600**	
ｹｰﾌﾞﾙ組品 CABLE ASSEMBLY		FRUDD-18AFFM-L180 000-164-608-10	1
工事材料 INSTALLATION MATERIALS		CP19-00601 001-023-100-00	1
図書 DOCUMENT			
ﾋｭｰｽﾞ変更のお願い NOTIFICATION DOCUMENT		C42-00705-* 000-167-240-1*	1

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

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

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

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

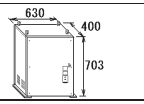
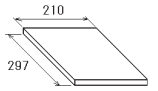
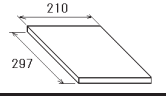
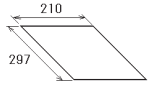
C1333-Z01-A

PACKING LIST

10CW-X-9853 -1 1/1

A-4

FSV-351-E

NAME	OUTLINE	DESCRIPTION/CODE No.	Q'TY
ユニット UNIT			
送受信装置 TRANSCEIVER UNIT		FSV-351 000-020-269-00	1
予備品 SPARE PARTS			
予備品 SPARE PARTS		SP10-03101 007-008-530-00	1
工事材料 INSTALLATION MATERIALS			
工事材料 INSTALLATION MATERIALS		CP10-06201 007-008-540-00	1
図書 DOCUMENT			
取扱説明書 OPERATOR'S MANUAL		OME-13330-* 000-175-788-1*	1
装備要領書 INSTALLATION MANUAL		IME-13330-* 000-175-791-1*	1
電源設定書 VOLTAGE SETTINGS		C12-00302-* 000-149-243-1*	1

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

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

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

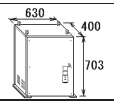
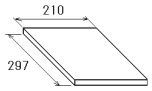
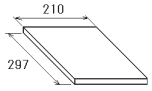
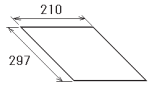
C1333-Z03-B

PACKING LIST

10CW-X-9854 -1 1/1

FSV-351S-E

A-5

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

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

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

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

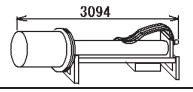
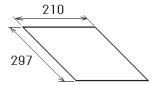
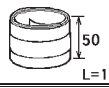
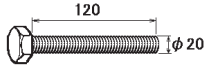
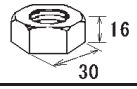
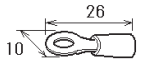
C1334-Z01-B

PACKING LIST

10CT-X-9853 -4 1/1

FSV-303

A-6

NAME	OUTLINE	DESCRIPTION/CODE №	Q'TY
ユニット UNIT			
上下装置 HULL UNIT		FSV-303 000-067-068-00	1
予備品 SPARE PARTS			
予備品 SPARE PARTS		SP10-02603 006-921-360-00	1
現地組部品 LOCAL ASSEMBLING PARTS			
現地組部品説明 LOCAL ASSEMBLING		C12-00202-* 000-146-864-1*	1
ｵﾘﾝｸﾞ(V) O-RING		CO 0318A(V585) 000-166-370-10	1
ｱｰｽ板 COPPER STRAP		WEA-1004-0 ROHS 500-310-040-10	1
六角ﾎﾞﾙﾄ 全ﾈｼﾞ HEXAGONAL HEAD SCREW		M20X120 SUS304 000-162-825-10	14
六角ﾅｯﾄ 1ｼｭ HEX.NUT		M20 SUS304 000-167-476-10	38
ﾐｶﾞｷ丸平座金 FLAT WASHER		M20 SUS304 000-167-452-10	33
ﾊﾞﾈ座金 SPRING WASHER		M20 SUS304 000-167-401-10	19
圧着端子 CRIMP-ON LUG		FV5.5-4(LF) YEL K 000-166-744-11	3

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

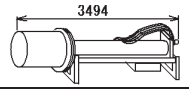
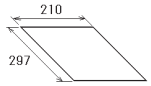
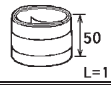
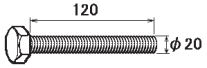
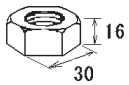
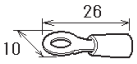
C1323-Z03-E

PACKING LIST

10CT-X-9854 -4 1/1

FSV-304

A-7

NAME	OUTLINE	DESCRIPTION/CODE Nº	Q'TY
ユニット UNIT			
上下装置 HULL UNIT		FSV-304 000-067-069-00	1
予備品 SPARE PARTS			
予備品 SPARE PARTS		SP10-02603 006-921-360-00	1
現地組部品 LOCAL ASSEMBLING PARTS			
現地組部品説明 LOCAL ASSEMBLING		C12-00202-* 000-146-864-1*	1
ｏﾘﾝｸﾞ(V) O-RING		CO 0318A(V585) 000-166-370-10	1
ｱｰｽ板 COPPER STRAP		WEA-1004-0 ROHS 500-310-040-10	1
六角ﾎﾞﾙﾄ 全ﾈｼﾞ HEXAGONAL HEAD SCREW		M20X120 SUS304 000-162-825-10	14
六角ﾅｯﾄ 1ｼｭ HEX.NUT		M20 SUS304 000-167-476-10	38
ﾐｶﾞｷ丸平座金 FLAT WASHER		M20 SUS304 000-167-452-10	33
ﾊﾞﾈ座金 SPRING WASHER		M20 SUS304 000-167-401-10	19
圧着端子 CRIMP-ON LUG		FV5.5-4(LF) YEL K 000-166-744-11	3

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

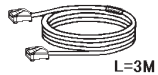
C1323-Z04-E

PACKING LIST

10CV-X-9852 -5 1/1

FSV-8502

A-8

NAME	OUTLINE	DESCRIPTION/CODE No.	Q'TY
ユニット UNIT			
IFﾕﾆｯﾄ INTERFACE UNIT		FSV-8502 000-017-122-00	1
工事材料 INSTALLATION MATERIALS		**CP10-07300**	
ｹｰﾌﾞﾙ(ｸﾐﾋﾝ)LAN CABLE ASSEMBLY(LAN)		10CA2383 *3M* 000-174-158-13	1
ｹｰﾌﾞﾙ組品MJ POWER CABLE ASSEMBLY		MJ-A3SPF0026-030C 000-174-486-11	1
工事材料 INSTALLATION MATERIALS		CP10-07301 001-112-510-00	1

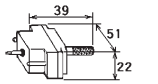
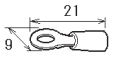
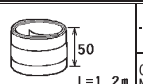
(略図の寸法は、参考値です。 DIMENSIONS IN DRAWING FOR REFERENCE ONLY.)

C1335-Z02-F

FURUNO

CODE NO.	007-008-540-00	10CT-X-9401 -6
TYPE	CP10-06201	1/1

工事材料表
INSTALLATION MATERIALS

番号 NO.	名称 NAME	略図 OUTLINE	型名／規格 DESCRIPTIONS	数量 Q'TY	用途／備考 REMARKS
1	ｺﾈｸﾀ(8016) CONNECTOR(8016)		008016-038-313761HVF CODE NO. 000-159-017-11	1	送受信装置用 FOR TRANSCEIVER UNIT
2	ｺﾝﾀｸﾄﾋﾟﾝ(8017) CONTACT PIN(8017)		60-8017-0313-00339F+ 60-8017-0313-00339F+ CODE NO. 000-159-417-11 000-159-417-10	2	送受信装置用 FOR TRANSCEIVER UNIT
3	圧着端子 CRIMP-ON LUG		FV2-4 BLU K CODE NO. 000-157-247-11	3	送受信装置用 FOR TRANSCEIVER UNIT
4	ｱｰｽ板 COPPER STRAP		WEA-1004-0 ROHS CODE NO. 500-310-040-10	1	送受信装置用 FOR TRANSCEIVER UNIT

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

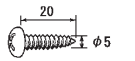
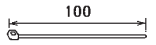
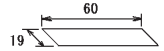
TWO TYPES AND CODES MAY BE LISTED FOR AN ITEM. THE LOWER PRODUCT MAY BE SHIPPED IN PLACE OF THE UPPER PRODUCT.
QUALITY IS THE SAME.

FURUNO

CODE NO.	001-112-510-00	10CV-X-9402 -1
TYPE	CP10-07301	1/1

工事材料表
INSTALLATION MATERIALS

FSV-8502

番号 NO.	名称 NAME	略図 OUTLINE	型名／規格 DESCRIPTIONS	数量 Q'TY	用途／備考 REMARKS
1	ﾅﾄﾗｽﾀｯﾋﾟﾝﾈｼﾞ 1ｼｭ SELF-TAPPING SCREW		5X20 SUS304 CODE NO. 000-162-608-10	4	
2	ｺﾝﾍﾞｯｸｽ CABLE TIE		CV-100N CODE NO. 000-162-167-10	4	
3	導電性布ﾃｰﾌﾟ CONDUCTIVE CLOTH TAPE		DK020FR-19 *60MM* CODE NO. 000-193-613-10	1	

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

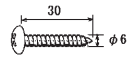
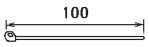
FURUNO

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

工事材料表

INSTALLATION MATERIALS

MPU-001, FSV-8503, FSV-3503/3503S

番号 NO.	名称 NAME	略図 OUTLINE	型名／規格 DESCRIPTIONS	数量 Q'TY	用途／備考 REMARKS
1	ﾄﾗｽﾀｯﾋﾟﾝﾈｼﾞ 1ｼｭ SELF-TAPPING SCREW		6X30 SUS304 CODE NO. 000-162-614-10	4	
2	ｺﾝﾍﾞｯｸｽ CABLE TIE		CV-100N CODE NO. 000-162-167-10	4	

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

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

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

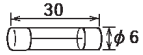
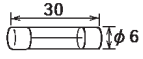
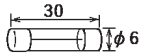
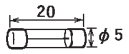
FURUNO ELECTRIC CO ., LTD.

C4446-M01-C

FURUNO

CODE NO.	007-008-530-00	10CT-X-9301-5 1/1
TYPE	SP10-03101	BOX NO. P

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

ITEM NO.	NAME OF PART	OUTLINE	DWG. NO. OR TYPE NO.	QUANTITY WORKING PER SET	QUANTITY WORKING PER VES	QUANTITY SPARE	REMARKS/CODE NO.
1	ﾋｭｰｽﾞ GLASS TUBE FUSE		FGBO 250V 20A PBF	0	0	5	送受信装置用 FOR TRANSCEIVER UNIT 000-155-786-10
2	ﾋｭｰｽﾞ GLASS TUBE FUSE		FGBO-A 250V 10A PBF	3	3	5	送受信装置用 FOR TRANSCEIVER UNIT 000-155-839-10
3	ﾋｭｰｽﾞ GLASS TUBE FUSE		FGBO-A 250V 15A PBF	2	2	5	送受信装置用 FOR TRANSCEIVER UNIT 000-157-874-10
4	ﾋｭｰｽﾞ GLASS TUBE FUSE		FGMB-A 250V 5A PBF	2	2	5	送受信装置用 FOR TRANSCEIVER UNIT 000-157-570-10

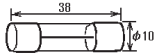
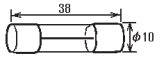
MFR'S NAME	FURUNO ELECTRIC CO.,LTD.	DWG NO.	C1323-P01-F	1/1

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

FURUNO

CODE NO.	001-023-090-00	19AY-X-9302-3 1/1
TYPE	SP19-00501	BOX NO. P

SHIP NO.	SPARE PARTS LIST FOR	U S E	SETS PER VESSEL
	MPU-001, FSV-8503, FSV-3503/3503S		

ITEM NO.	NAME OF PART	OUTLINE	DWG. NO. OR TYPE NO.	QUANTITY WORKING PER SET	QUANTITY WORKING PER VES	QUANTITY SPARE	REMARKS/CODE NO.
1	ﾋｭｰｽﾞ GLASS TUBE FUSE		FGB01 250V 10A PBF	4	4	4	000-155-787-10
2	ﾋｭｰｽﾞ GLASS TUBE FUSE		FGB01 250V 20A PBF	2	2	4	000-155-775-10

MFR'S NAME	FURUNO ELECTRIC CO.,LTD.	DWG NO.	C4446-P02-C	1/1

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

FURUNO

CODE NO.	006-921-360-00	10C0-X-9303-2 1/1
TYPE	SP10-02603	BOX NO. P

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

ITEM NO.	NAME OF PART	OUTLINE	DWG. NO. OR TYPE NO.	QUANTITY WORKING PER SET	QUANTITY WORKING PER VES	QUANTITY SPARE	REMARKS/CODE NO.
1	ﾋｭｰｽﾞ GLASS TUBE FUSE		FGMB-A 250V 2A PBF	1	1	1	上下装置(制御器用) FOR HALL UNIT 000-157-497-10

MFR'S NAME	FURUNO ELECTRIC CO.,LTD.	DWG NO.	C1318-P04-C	1/1

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

FURUNO

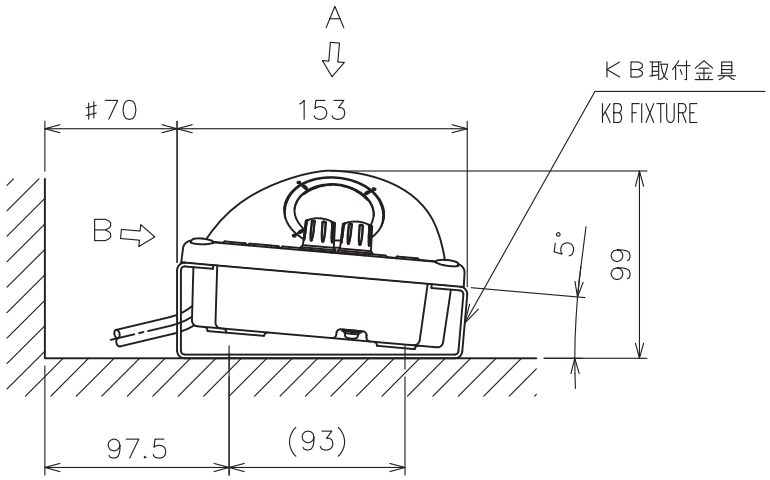
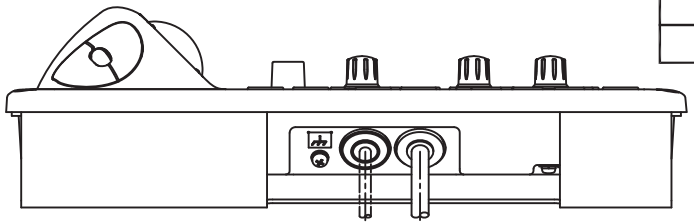


表2　TABLE 2

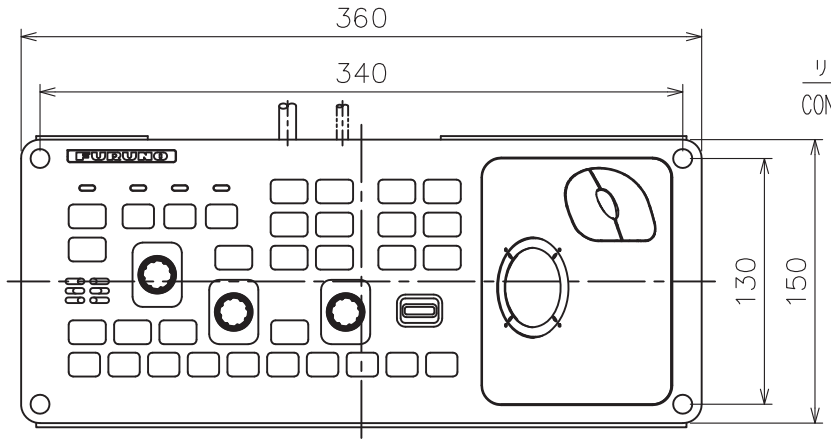
ケーブル長さ CABLE LENGTH (m)	5	10
質量 MASS (kg±10%)	3.8	4.3

表 1　TABLE 1

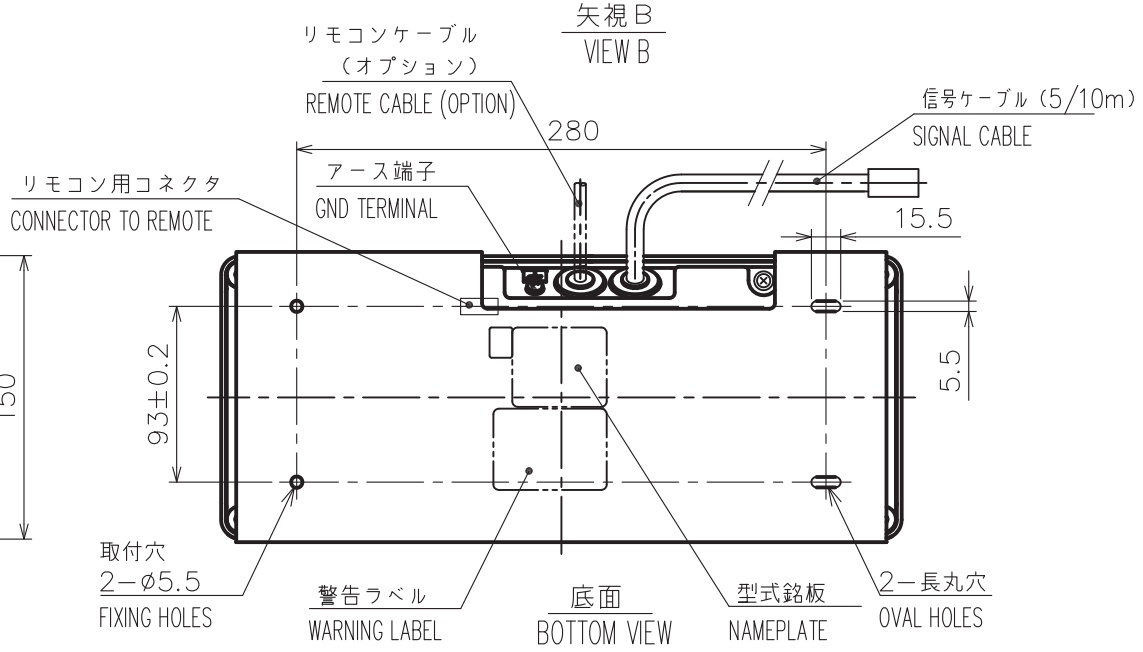
寸法区分（mm） DIMENSION	公差（mm） TOLERANCE
L≦50	±1.5
50<L≦100	±2.5
100<L≦500	±3



矢視 B
VIEW B



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＋バインドタッピン１シュ呼び径５×２０を使用のこと

NOTE

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

DRAWN 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	FSV-35/35S/85/85L		外寸図
SCALE 1/4	MASS 表2参照 SEE TABLE 2	NAME	CONTROL UNIT (TABLETOP MOUNT)
DWG.No. C1335-G04- C	REF.No. 10-088-251G-1		OUTLINE DRAWING

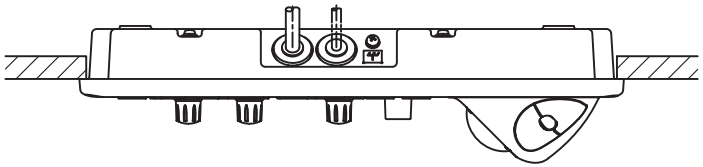
D-1

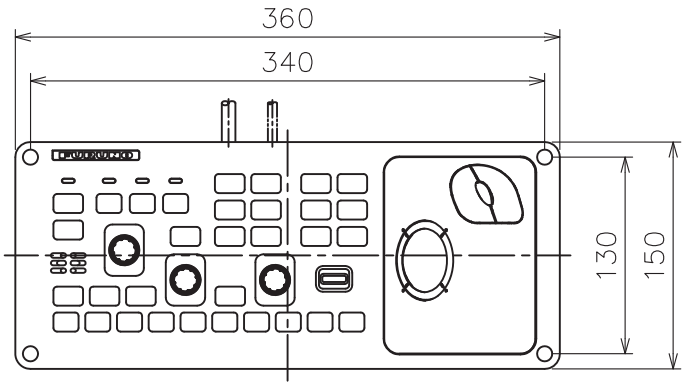
FURUNO ELECTRIC CO., LTD.

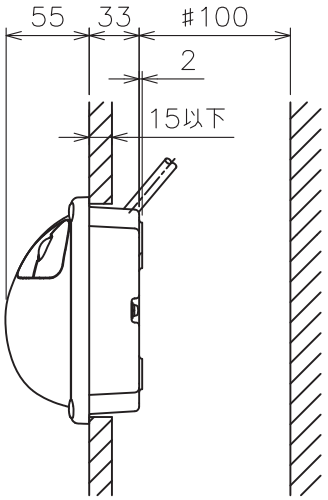
FURUNO

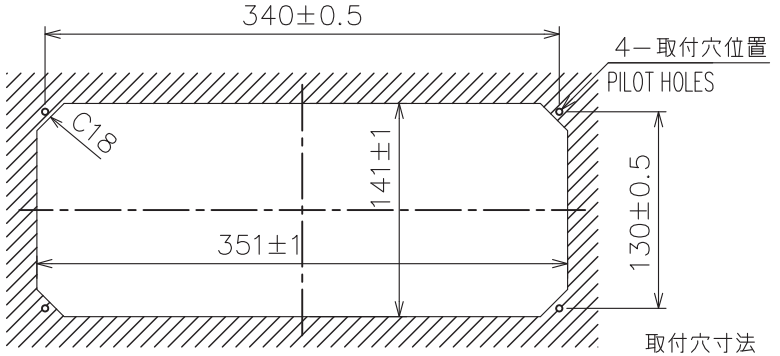
表 1　TABLE 1

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









取付穴寸法
CUTOUT DIMENSIONS

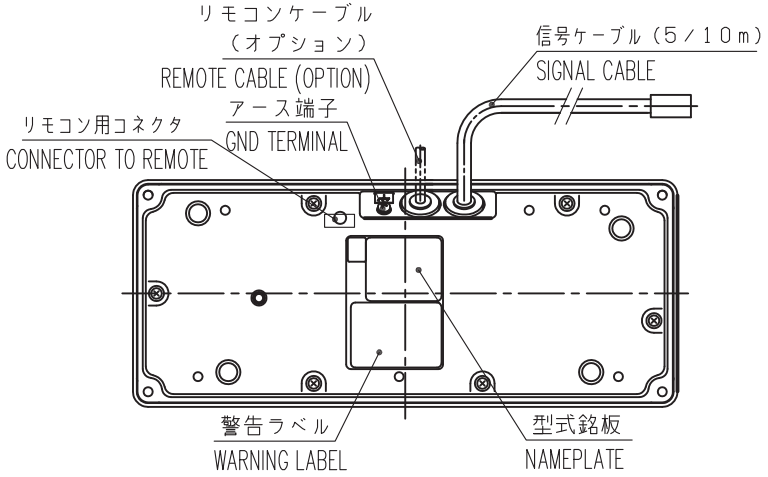


表2　TABLE 2

ケーブル長さ CABLE LENGTH (m)	5	10
質量 MASS (kg±10%)	2.8	3.2

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＋バインドタッピン１シュ呼び径５×２０を使用のこと

NOTE

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

DRAWN 9/Sep/2011 T.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	FSV-35/35S/85/85L		外寸図
SCALE 1/5 MASS 表2参照 SEE TABLE 2		NAME	CONTROL UNIT (FLUSH MOUNT)
DWG.No. C1335-G03- D	REF.No. 10-088-2506-2		OUTLINE DRAWING

D-2

FURUNO ELECTRIC CO., LTD.

FURUNO

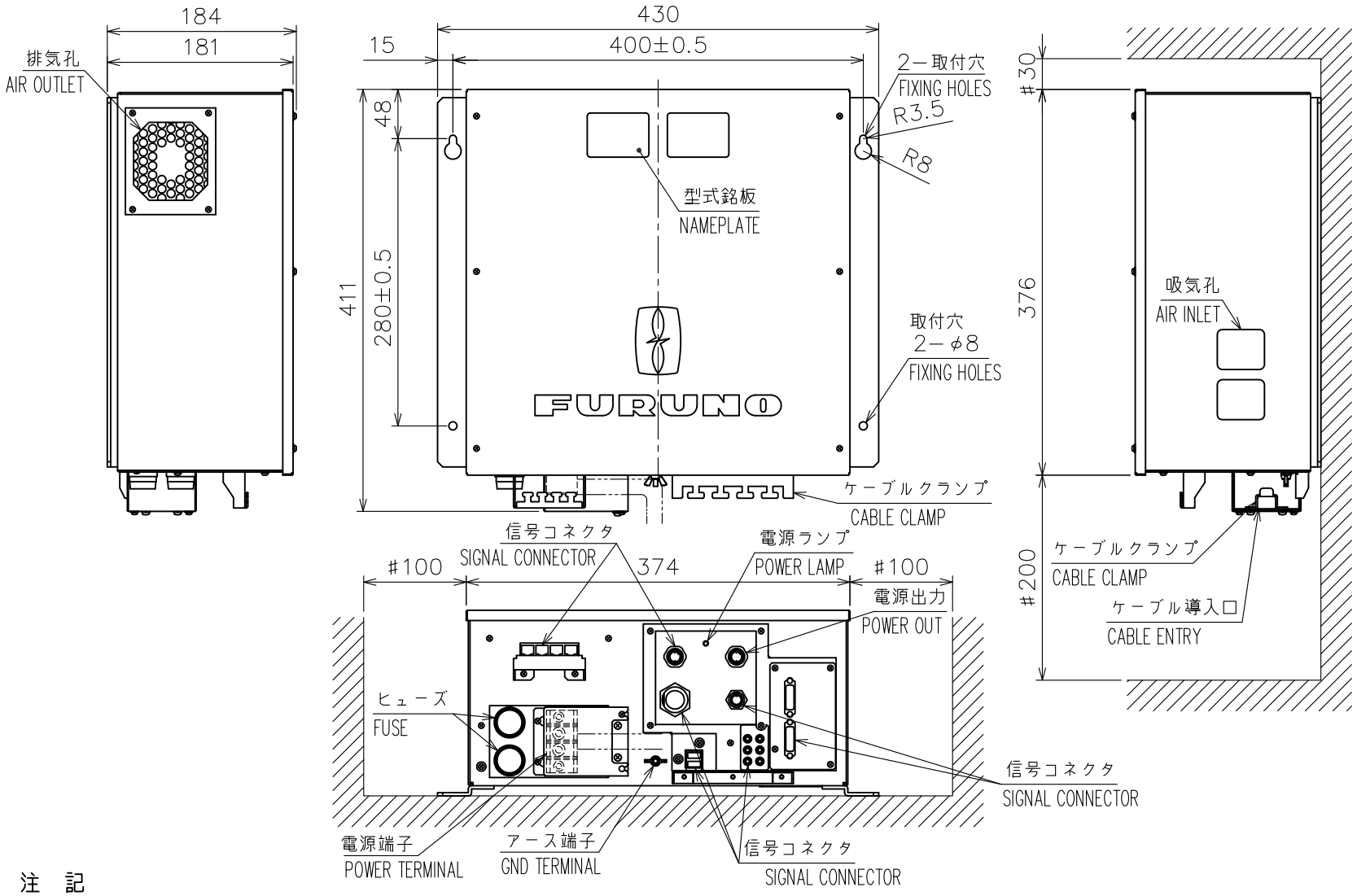


表 1 TABLE 1

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

注 記

1） 指定外の寸法公差は表１による。
2） ＃印寸法は最小サービス空間寸法とする。
3） 取付にはトラスタッピンネジ呼び径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.

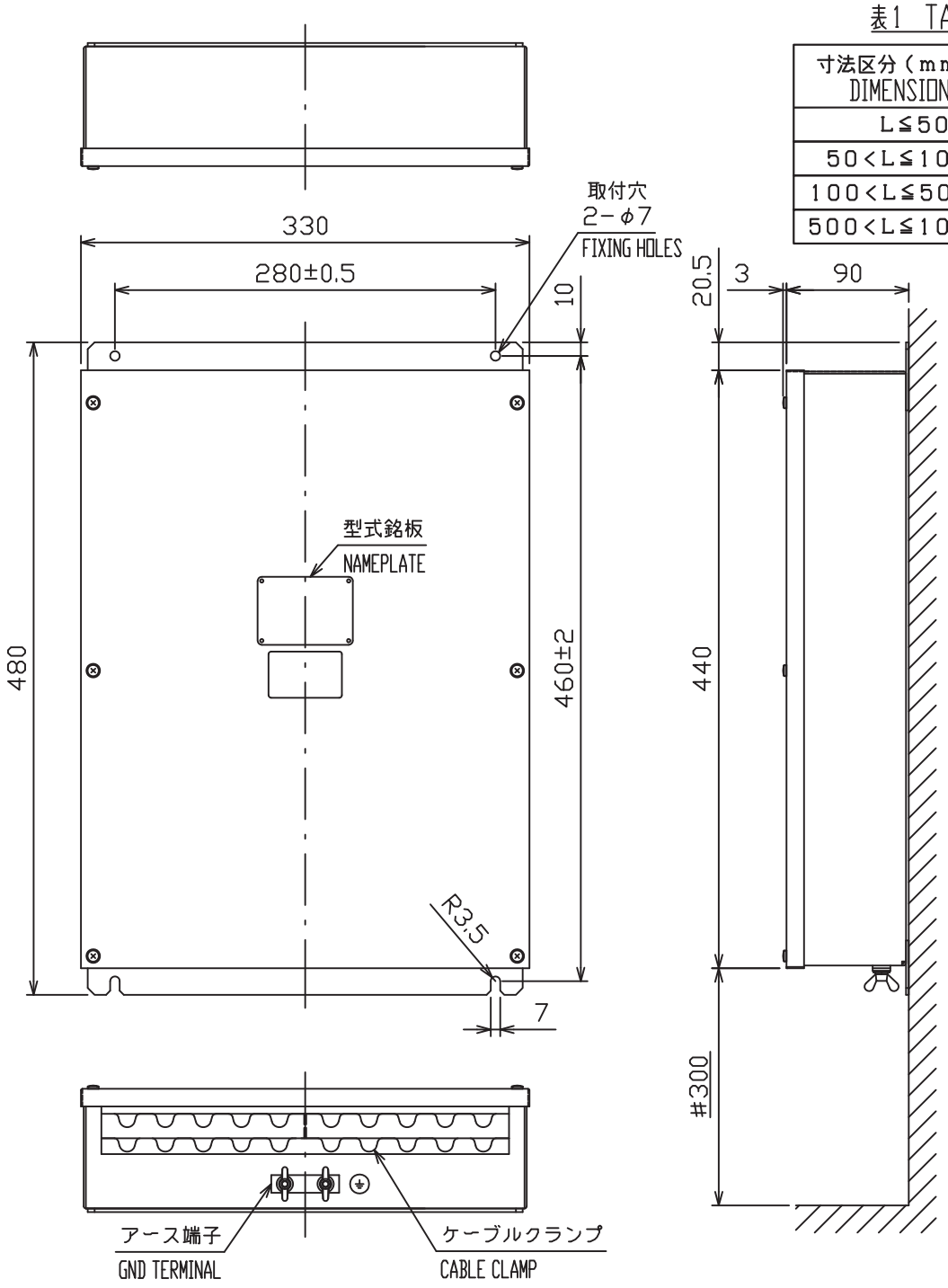
DRAWN 8/Feb/2019 T.YAMASAKI		TITLE	FSV-3503/3503S/8503
CHECKED 8/Feb/2019 H.MAKI		名称	制御部
APPROVED 8/Feb/2019 H.MAKI	FSV-35/35S/85/85L		外寸図
SCALE 1/6 MASS 15 ±10% kg		NAME	PROCESSOR UNIT
DWG.No. C1335-G01- D	REF.No. 10-088-360G-2		OUTLINE DRAWING

FURUNO ELECTRIC CO., LTD.

FURUNO

表1 TABLE 1

寸法区分（mm） DIMENSION	公差（mm） TOLERANCE
L≦50	±1．5
50<L≦100	±2．5
100<L≦500	±3
500<L≦1000	±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 ±10% kg	NAME	JUNCTION BOX
DWG. No. C1323-G04- C	REF. No. 10-079-700G-1		OUTLINE DRAWING

表1 TABLE 1

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

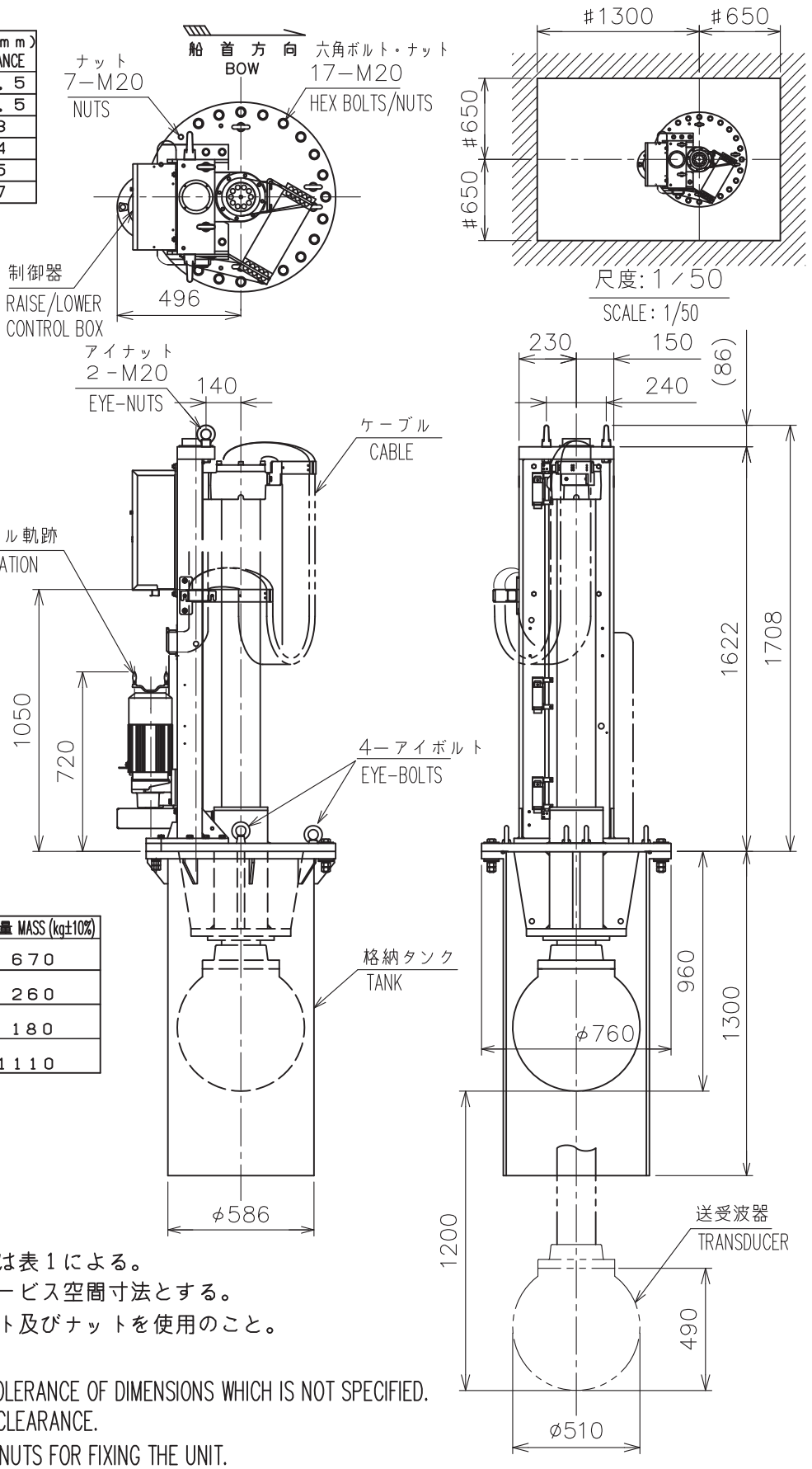


表2 TABLE 2

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

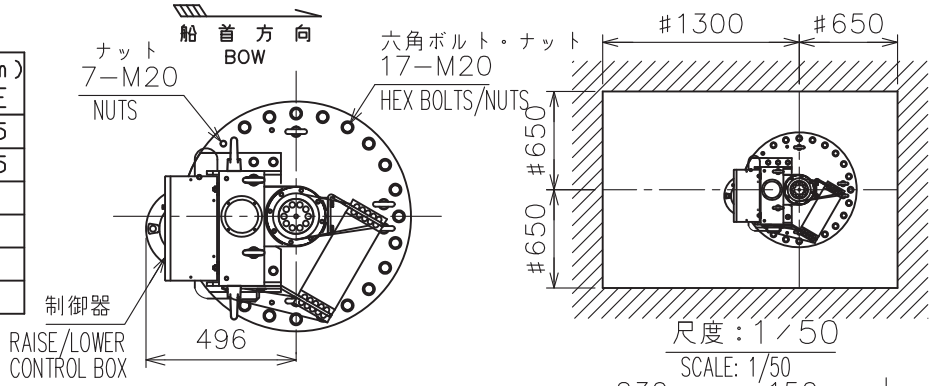
NOTE

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

表１ TABLE 1

寸法区分（ｍｍ） DIMENSION	公差（ｍｍ） TOLERANCE
Ｌ≦５０	±１．５
５０<Ｌ≦１００	±２．５
１００<Ｌ≦５００	±３
５００<Ｌ≦１０００	±４
１０００<Ｌ≦２０００	±５
２０００<Ｌ≦４０００	±７



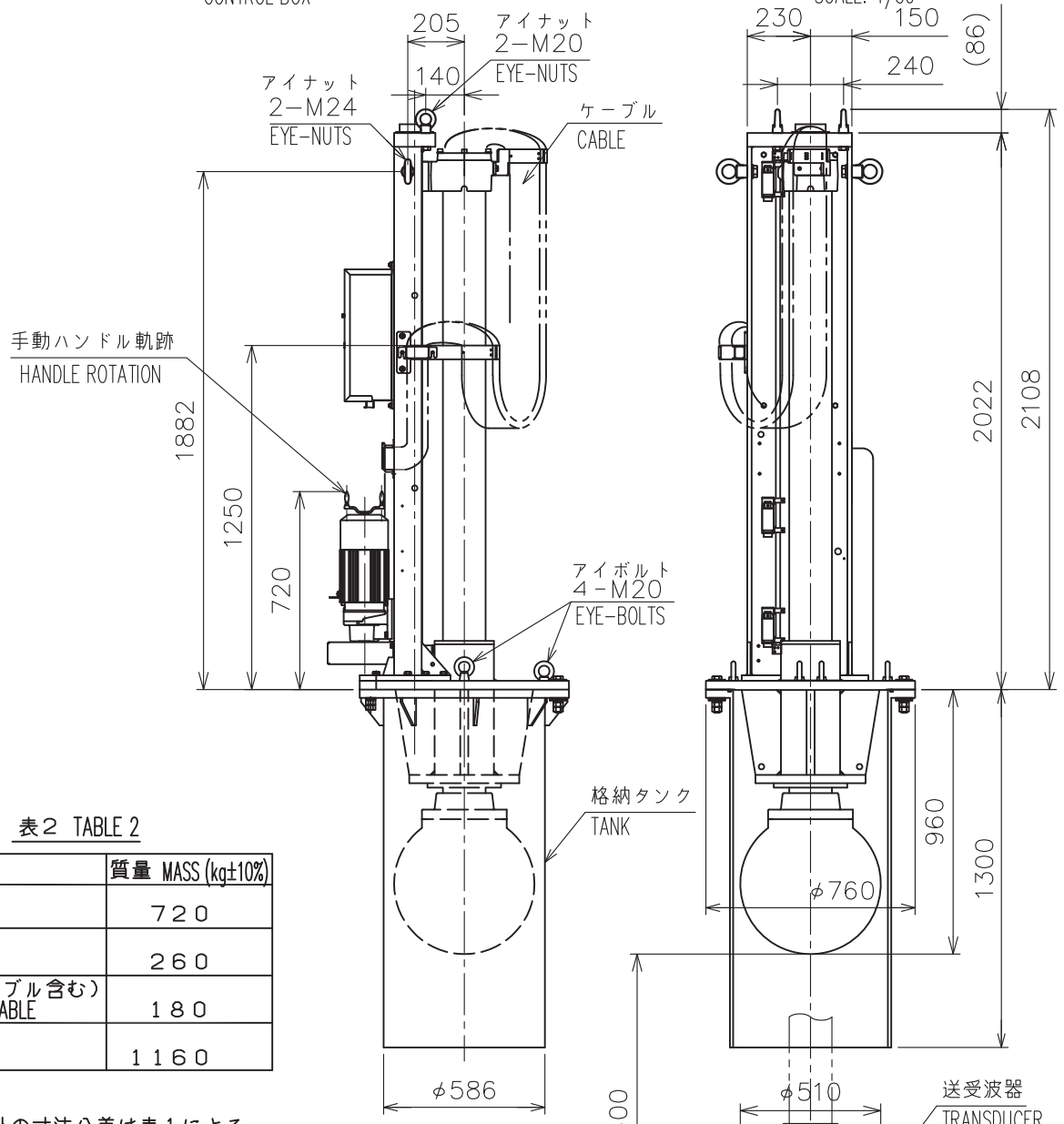


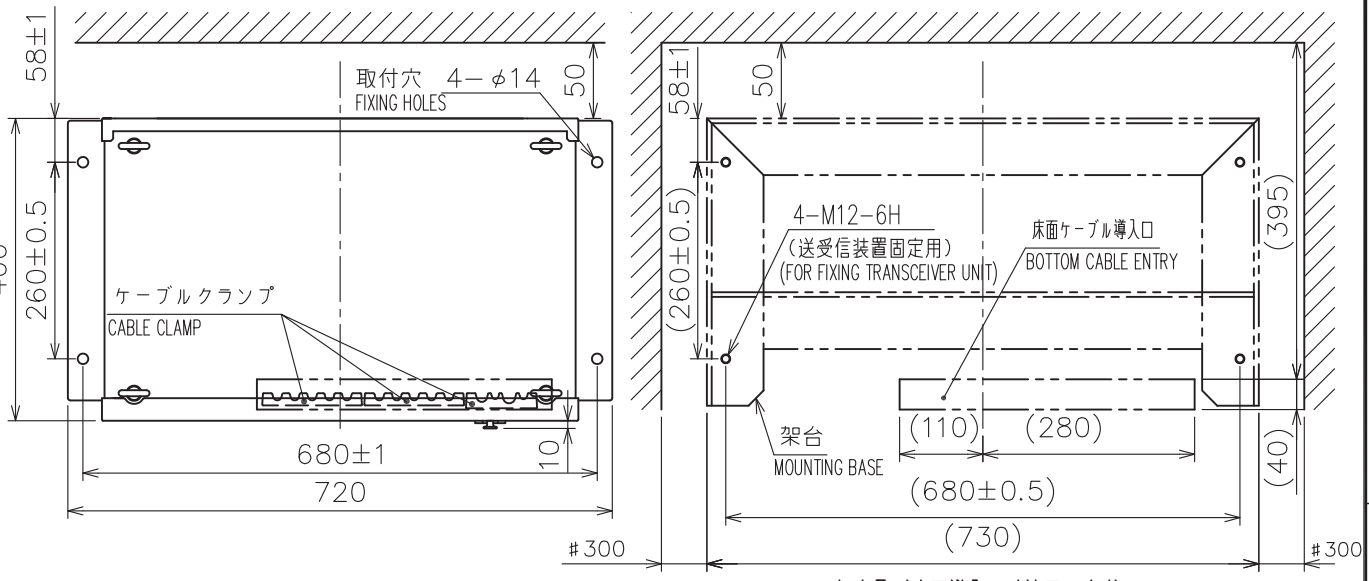
表２ TABLE 2

品　目 ITEM	質量 MASS (kg±10%)
上下装置本体 HULL UNIT	７２０
格納タンク TANK	２６０
送受波器（ケーブル含む） TRANSDUCER W/ CABLE	１８０
総質量 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。

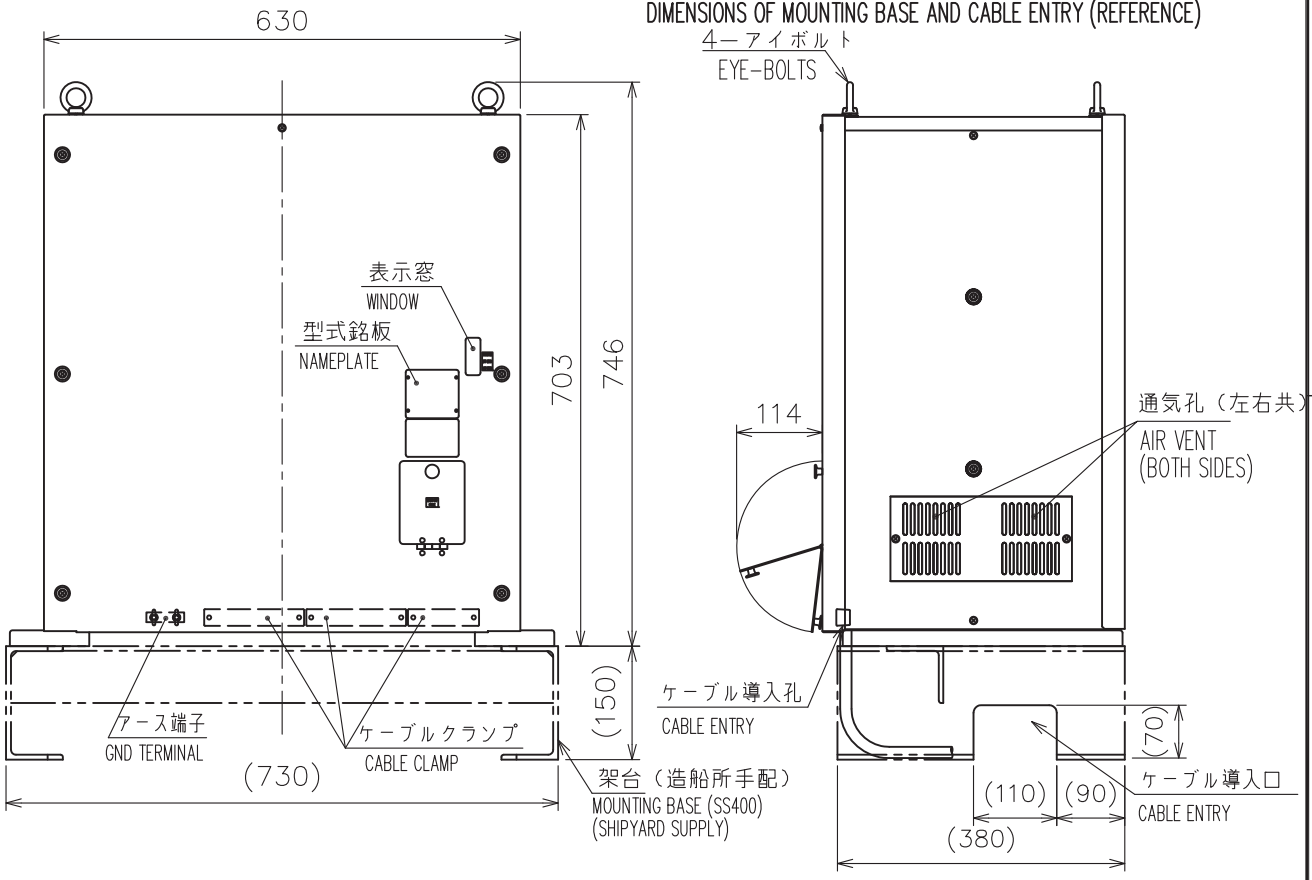
NOTE 1. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS WHICH IS NOT SPECIFIED.
2. #: MINIMUM SERVICE CLEARANCE.
3. USE M20 BOLTS AND NUTS FOR FIXING THE UNIT.

DRAWN 23/Apr/2013 T.YAMASAKI		TITLE	FSV−304
CHECKED 23/Apr/2013 H.MAKI		名称	上下装置（1600mmストローク）
APPROVED 23/Apr/2013 Y.NISHIYAMA	FSV−30/35		外寸図
SCALE 1/25 MASS 表2参照 SEE TABLE 2		NAME	HULL UNIT (1600mm TRAVEL)
DWG. No. C1323−G02− D	REF. No. 10−079−510G−3		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） DIMENSION	公差（mm） 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	FSV-351
CHECKED 9/Sep/2011 H.MAKI		名称	送受信装置
APPROVED 13/Sep/2011 Y.NISHIYAMA	FSV-35/35S		外寸図
SCALE 1/10 MASS 98 ±10% kg		NAME	TRANSCEIVER UNIT
DWG. No. C1333-G01- A	REF. No. 10-088-610G-0		OUTLINE DRAWING

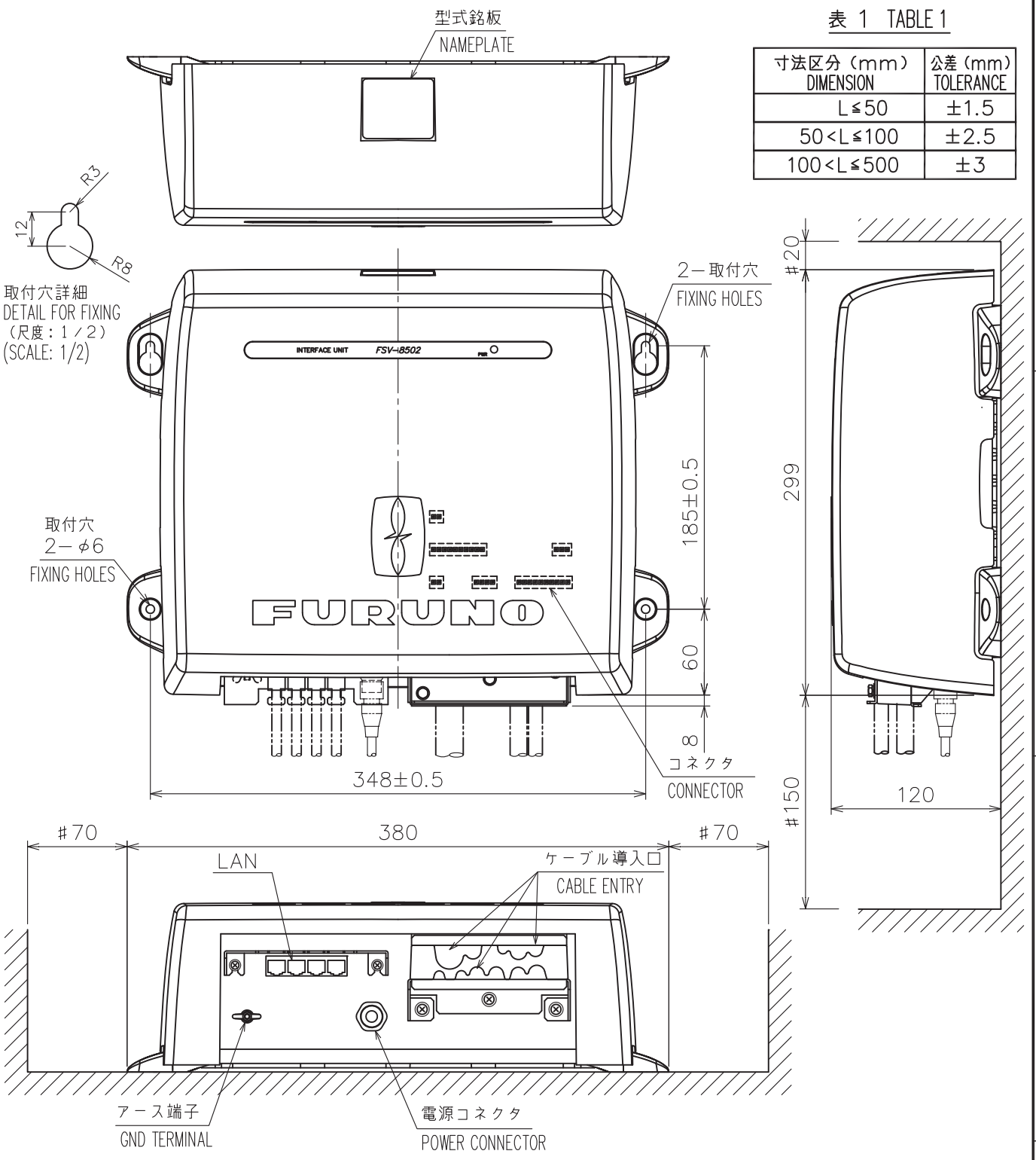


表 1　TABLE 1

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

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

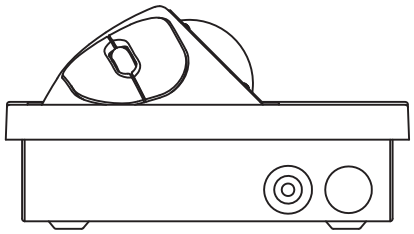
NOTE　1.　TABLE 1 INDICATES TOLERANCE OF DIMENSIONS WHICH IS NOT SPECIFIED.
　　2.　#: MINIMUM SERVICE CLEARANCE.
　　3.　USE TAPPING SCREWS ø5x20 FOR FIXING THE UNIT.

DRAWN 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	FSV-35/35S/85/85L		外寸図
SCALE 1/4 MASS 3.4 ±10% kg		NAME	INTERFACE UNIT
DWG. No. C1335-G02- C	REF. No. 10-088-350G-2		OUTLINE DRAWING

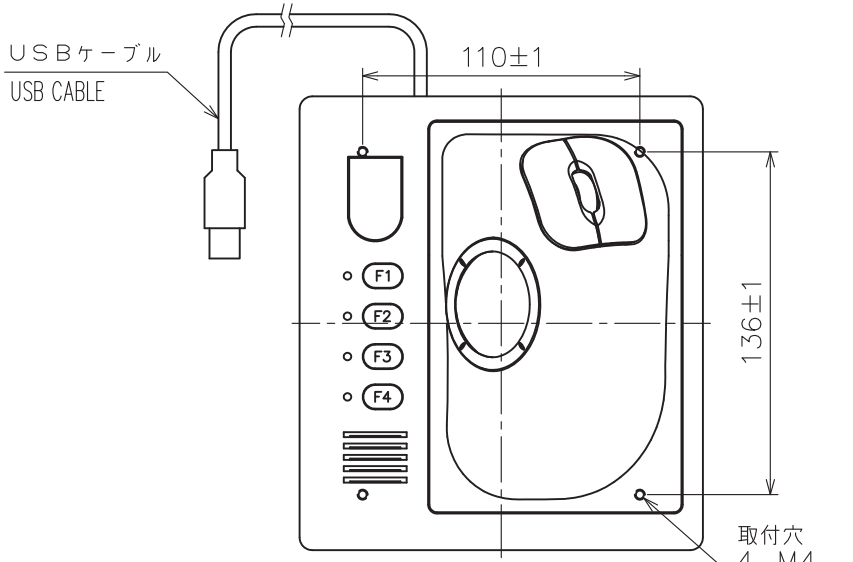
FURUNO

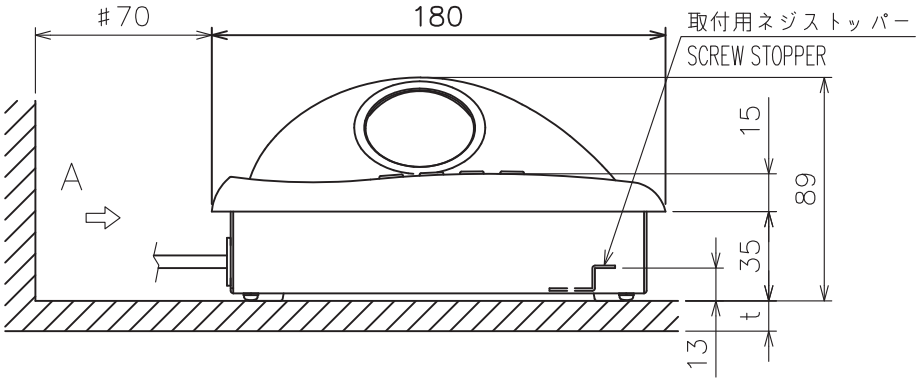
表１　TABLE 1

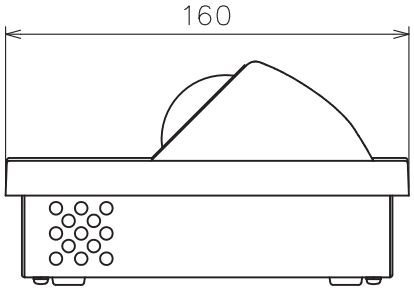
寸法区分（ｍｍ） DIMENSION	公差（ｍｍ） TOLERANCE
Ｌ≦５０	±１．５
５０<Ｌ≦１００	±２．５
１００<Ｌ≦５００	±３



矢視Ａ
VIEW A







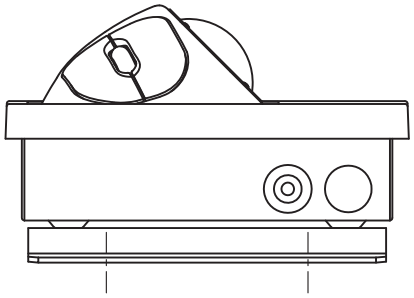
注　記
１）指定外の寸法公差は表１による。
２）＃印寸法は最小サービス空間寸法とする。
３）取付用ネジはセムスＢ（Ｍ４Ｘ１２）を使用のこと。取付面板厚は最小２最大５とする。
　　またはネジ長さ（ｔ＋７．８）±２ のセムスＢを使用のこと。

NOTE
1. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS WHICH IS NOT SPECIFIED.
2. #: MINIMUM SERVICE CLEARANCE.
3. USE SEMS B SCREWS (M4x12) FOR FIXING THE UNIT. MOUNT BOARD THICKNESS (t): 2≦t≦5. OR SCREW LENGTH SHOULD BE (t+7.8)±2 FOR THICKER ONE.

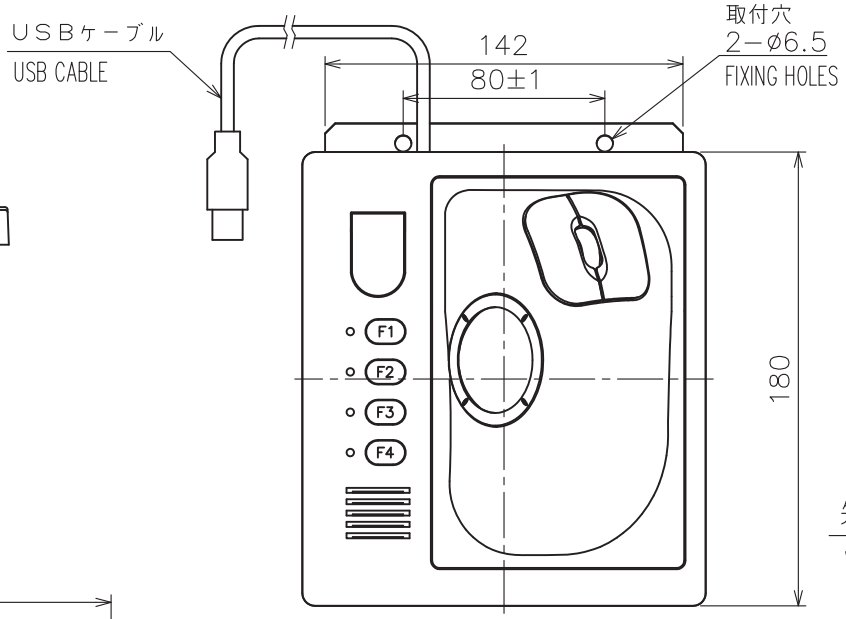
DRAWN 9/Sep/2011 T.YAMASAKI		TITLE	FSV-853
CHECKED 9/Sep/2011 H.MAKI		名称	簡易操作部
APPROVED 13/Sep/2011 Y.NISHIYAMA	FSV-35/35S/85/85L		外寸図
SCALE 1/3 MASS 1.4 ±10% kg	質量はケーブル（5m）を含む。 MASS INCLUDES CABLE(5m).	NAME	SUB CONTROL UNIT
DWG.No. C1335-G05- D	REF.No. 10-088-851G-1		OUTLINE DRAWING

FURUNO ELECTRIC CO., LTD.

FURUNO



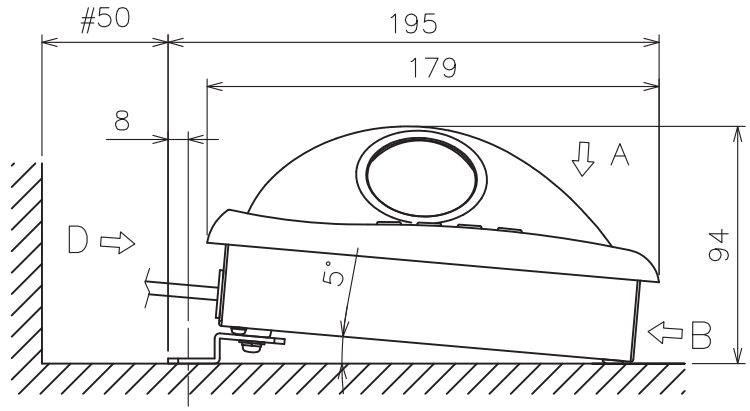
矢視D
VIEW D

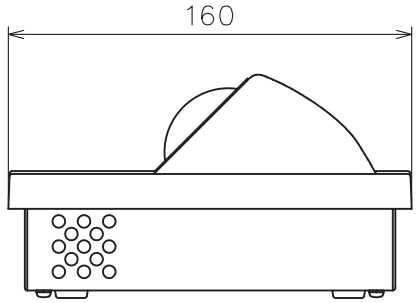


矢視A
VIEW A

表1 TABLE 1

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





矢視B
VIEW B

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 ø6 OR M6 BOLTS FOR FIXING THE UNIT.

DRAWN 9/Sep/2011 T.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	FSV-35/35S/85/85L		外寸図
SCALE 1/3 MASS 1.4 ±10% kg	質量はケーブル（5m）を含む。 MASS INCLUDES 5m CABLE.	NAME	SUB CONTROL UNIT (W/ FIXTURE)
DWG.No. C1335-G07- B	REF.No. 10-088-853G-0		OUTLINE DRAWING

FURUNO ELECTRIC CO., LTD.

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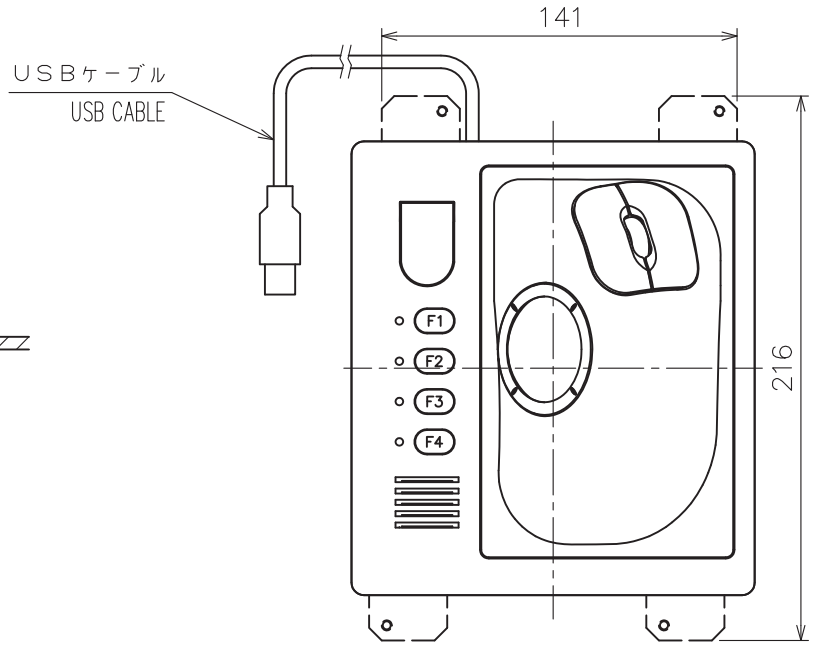
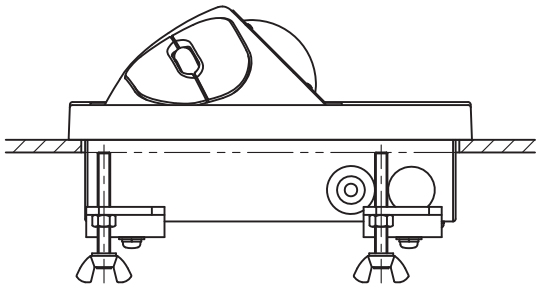
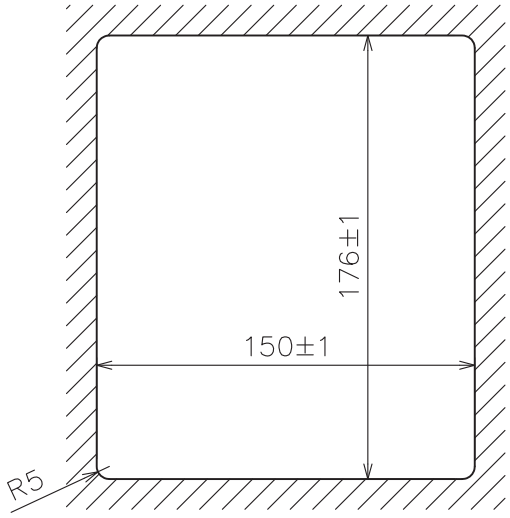
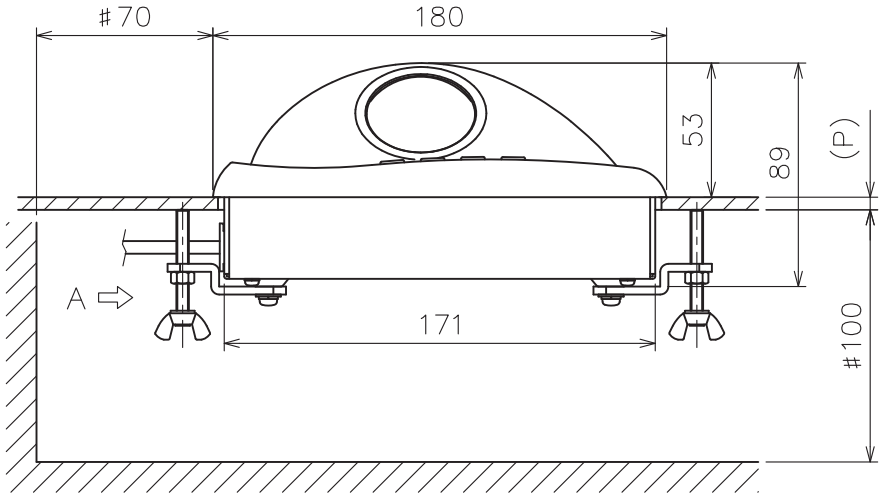




矢視A
VIEW A



取付穴寸法
CUTOUT DIMENSIONS



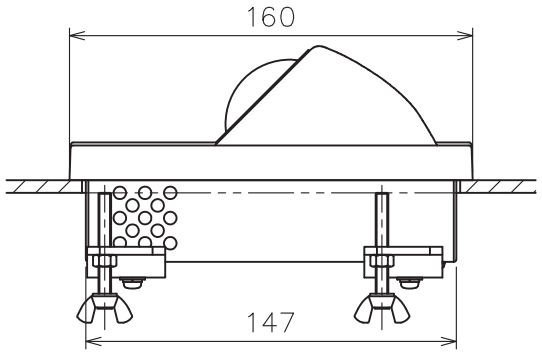


表1 TABLE 1

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

注　記　1）指定外の寸法公差は表1による。
　　2）＃印寸法は最小サービス空間寸法とする。
　　3）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。

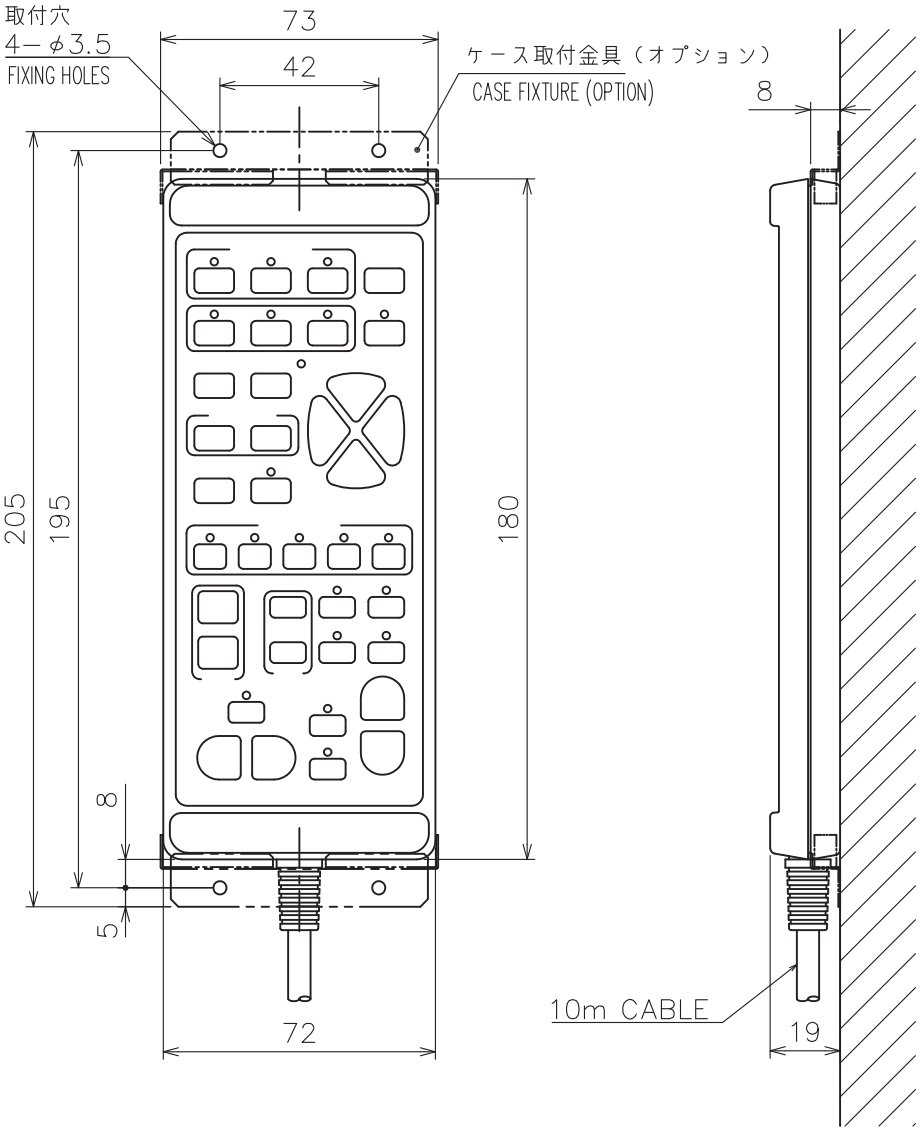
NOTE
1. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS WHICH IS NOT SPECIFIED.
2. #: MINIMUM SERVICE CLEARANCE.
3. SELECT SIDE OR BOTTOM FOR CABLE ENTRY.
4. THICKNESS (P):10 MAX.

DRAWN 9/Sep/2011 T.YAMASAKI		TITLE	FSV-853
CHECKED 9/Sep/2011 H.MAKI		名称	簡易操作部（埋込装備）
APPROVED 13/Sep/2011 Y.NISHIYAMA	FSV-35/35S/85/85L		外寸図
SCALE 1/3 MASS 1.4 ±10% kg		NAME	SUB CONTROL UNIT (FLUSH MOUNT)
DWG.No. C1335-G08- B	REF.No. 10-088-853G-0		OUTLINE DRAWING

FURUNO ELECTRIC CO., LTD.

表 1　TABLE 1

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



注　記

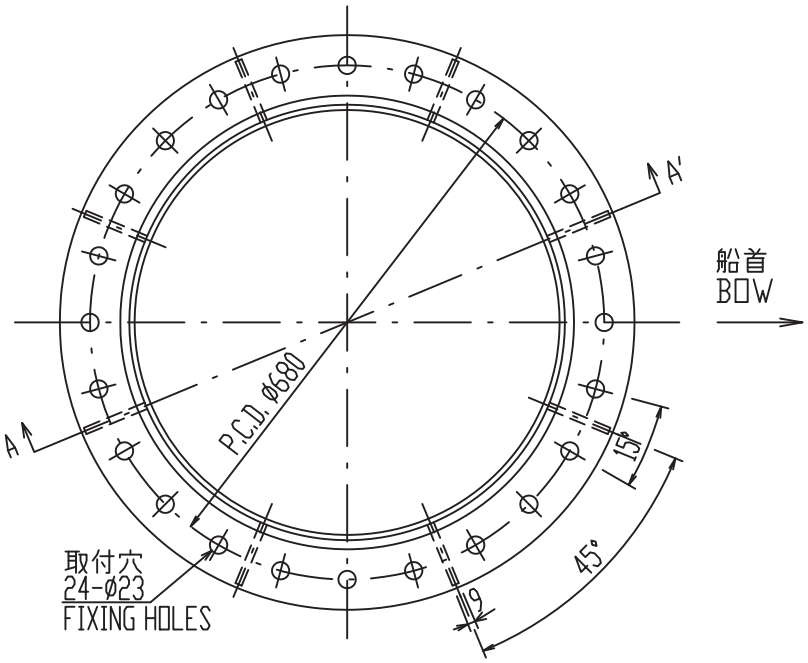
1）　指定外の寸法公差は表 1 による

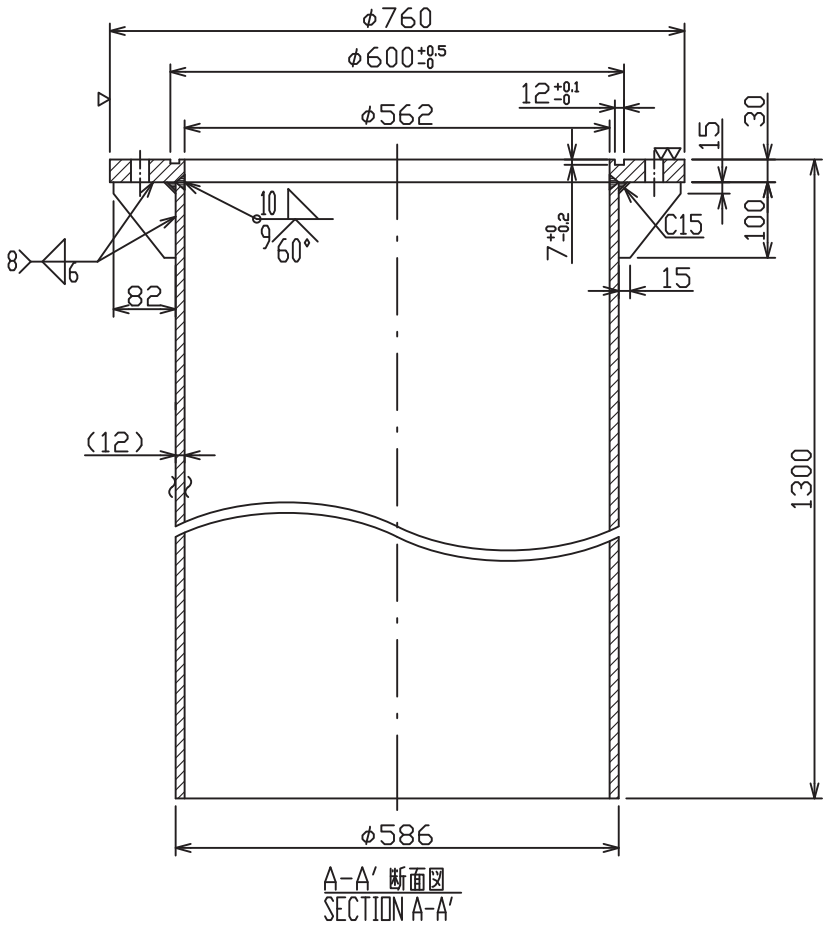
2）　取付用ネジは＋バインドタッピン 1 シュ呼び径３×２０を使用のこと

NOTE

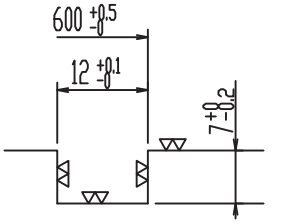
1. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS WHICH IS NOT SPECIFIED.
2. USE TAPPING SCREWS ø3x20 FOR FIXING THE UNIT.

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	FSV-35/35S/85/85L		外寸図
SCALE 1/2 MASS 0.68 ±10% kg	質量はケーブルを含む。 MASS INCLUDES CABLE.	NAME	REMOTE CONTROLLER
DWG. No. C1335-G06- C	REF. No. 10-088-860G-1		OUTLINE DRAWING





A-A' 断面図
SECTION A-A'



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

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。

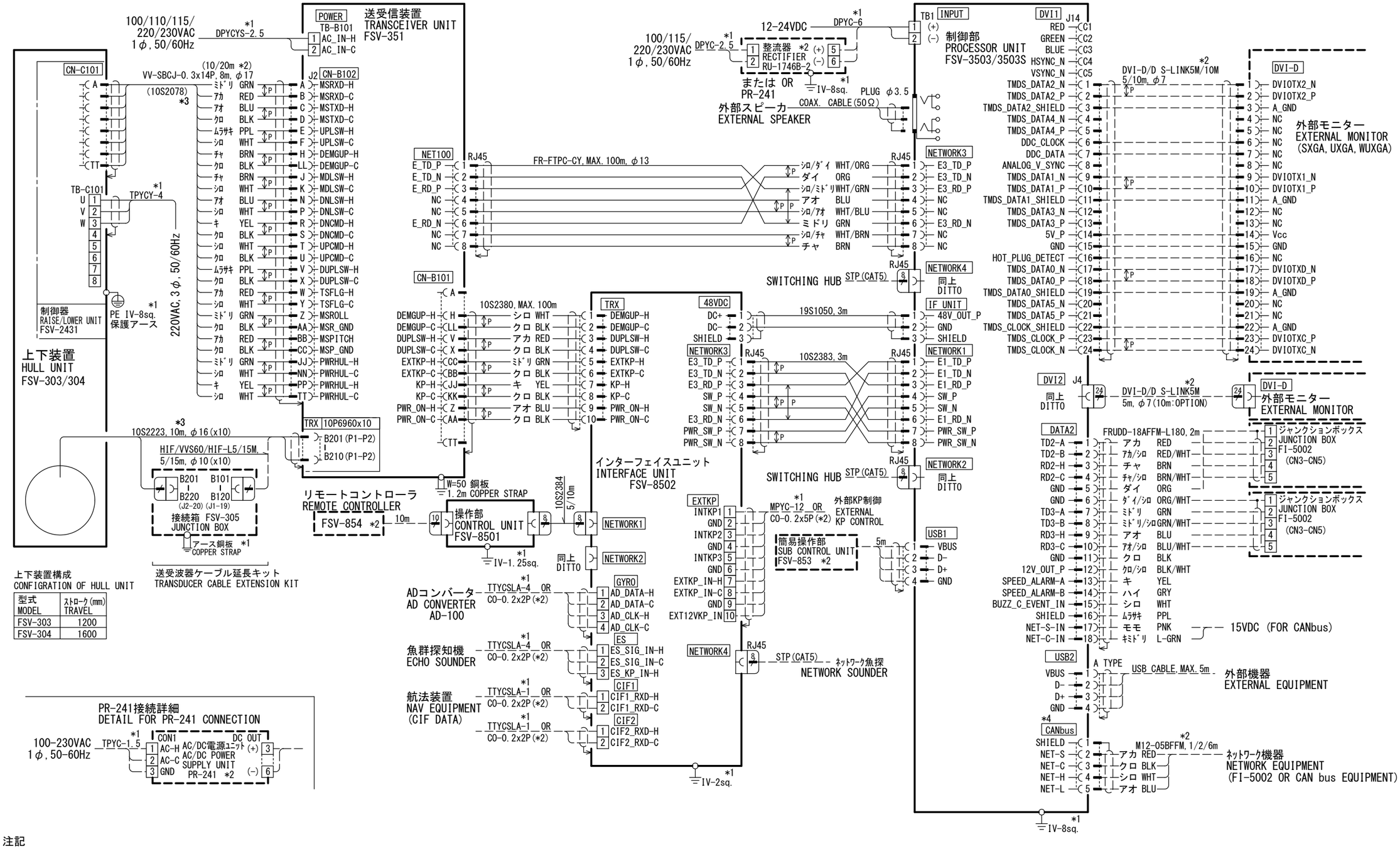
NOTE　1.　ONE OF 24 BOLT HOLES SHOULD BE FACED DEAD AHEAD.

DRAWN 11/Nov/2013 T.YAMASAKI		TITLE	10-077-5501
CHECKED 11/Nov/2013 H.MAKI		名称	格納タンク
APPROVED 11/Nov/2013 H.MAKI	FSV-24/25/30/35		外寸図
SCALE 1/10 MASS 260 ±10% kg		NAME	RETRACTION TANK
DWG. No. C1318-G16- C	REF. No. 10-077-5501-0		OUTLINE DRAWING

FURUNO ELECTRIC CO., LTD.

FURUNO

S-1



注記
＊１）造船所手配。
＊２）オプション。
＊３）上下装置からの有効ケーブル長は約7m。

NOTE
*1: SHIPYARD SUPPLY.
*2: OPTION.
*3: EFFECTIVE CABLE LENGTH FROM HULL UNIT: 7 m APPROX.

CO-0.2x2P: CO-SPEVV-SB-C 0.2x2P, φ10.5
CO-0.2x5P: CO-SPEVV-SB-C 0.2x5P, φ13.5

DRAWN 22/Feb/2021 T.YAMASAKI		TITLE	FSV-35/35S
CHECKED 22/Feb/2021 H.MAKI		名称	カラースキャニングソナー
APPROVED 24/Feb/2021 H.MAKI			相互結線図
SCALE	MASS kg	NAME	COLOR SCANNING SONAR
DWG No. C1333-C01- F	REF. No. 10-088-0200-0		INTERCONNECTION DIAGRAM

FURUNO ELECTRIC CO., LTD.