FURUNO

Installation Manual
LCD SEARCHLIGHT SONAR CH-270

FURUNO ELECTRIC CO., LTD.

www.furuno.co.jp

ECF
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The paper used in this manual
is elemental chlorine free.

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(DAMI) CH-270

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⚠ SAFETY INSTRUCTIONS

⚠ WARNING

ELECTRICAL SHOCK HAZARD
Do not open the equipment.

Only qualified personnel should work inside the equipment.

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

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

Do not install the display unit or transceiver unit where it may get wet from rain or water splash.

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

⚠ WARNING

Be sure no water leaks in at the transducer installation site.

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 tank doesn't strike an object.

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

⚠ CAUTION

Observe the following compass safe distances to prevent deviation of a magnetic compass:

	Standard	Steering
CH-252/ MU-100C	0.80 m	0.55 m
CH-273	0.60 m	0.35 m
IF-8000	0.95 m	0.65 m

Keep hands away from the raise/lower shaft of the hull unit when it is working.

Injury to hands may result if they become caught in the shaft.

During sea trials, do not exceed 20 knots when operating the equipment and do not exceed 15 knots when raising or lowering the transducer.

The transducer shaft may become damaged.

Do not turn on the equipment with the transducer exposed to air as this may damage the transducer.

Do not swing the soundome by holding the transducer cable.

The cable and soundome may become damaged.

⚠ CAUTION

WORKING WITH THE SONAR OIL

Precautions
Keep oil away from eyes. Wear protective goggles when working with the oil. The oil can cause inflammation of the eyes.

Do not touch the oil. Wear protective gloves when working with the oil. The oil can cause inflammation of the skin.

Do not ingest the oil. Diarrhea or vomiting can result.

Keep the oil out of reach of children.

Emergency
If the oil enters eyes, flush with clean water about 15 min. Consult a physician.

If the oil contacts skin, wash with soap and water.

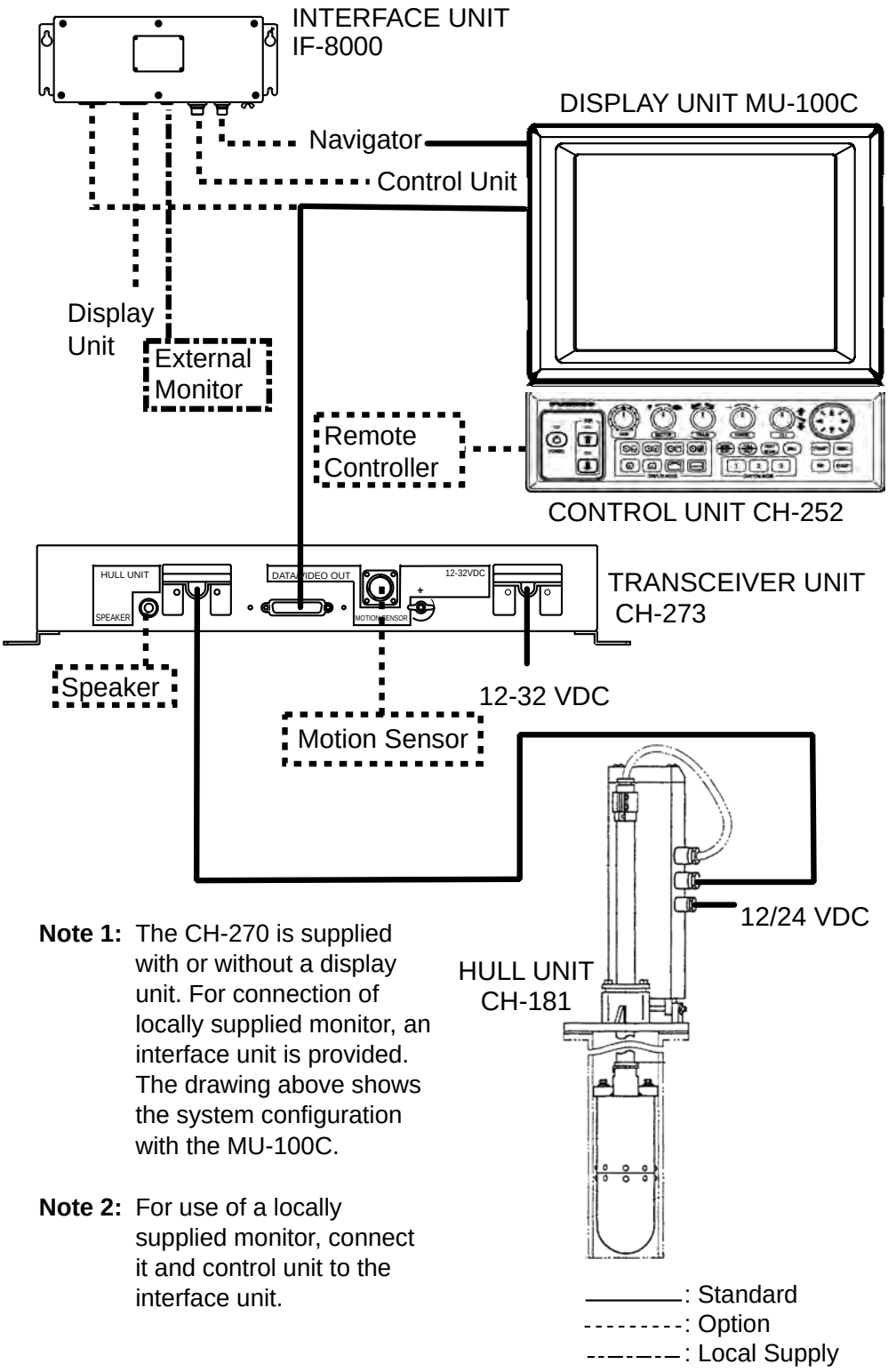
If the oil is ingested, see a physician immediately.

Disposal of oil and its container
Dispose of oil and its container in accordance with local regulations. For further details, contact place of purchase.

Storage
Seal container to keep out foreign material. Store in dark place.

SYSTEM CONFIGURATION

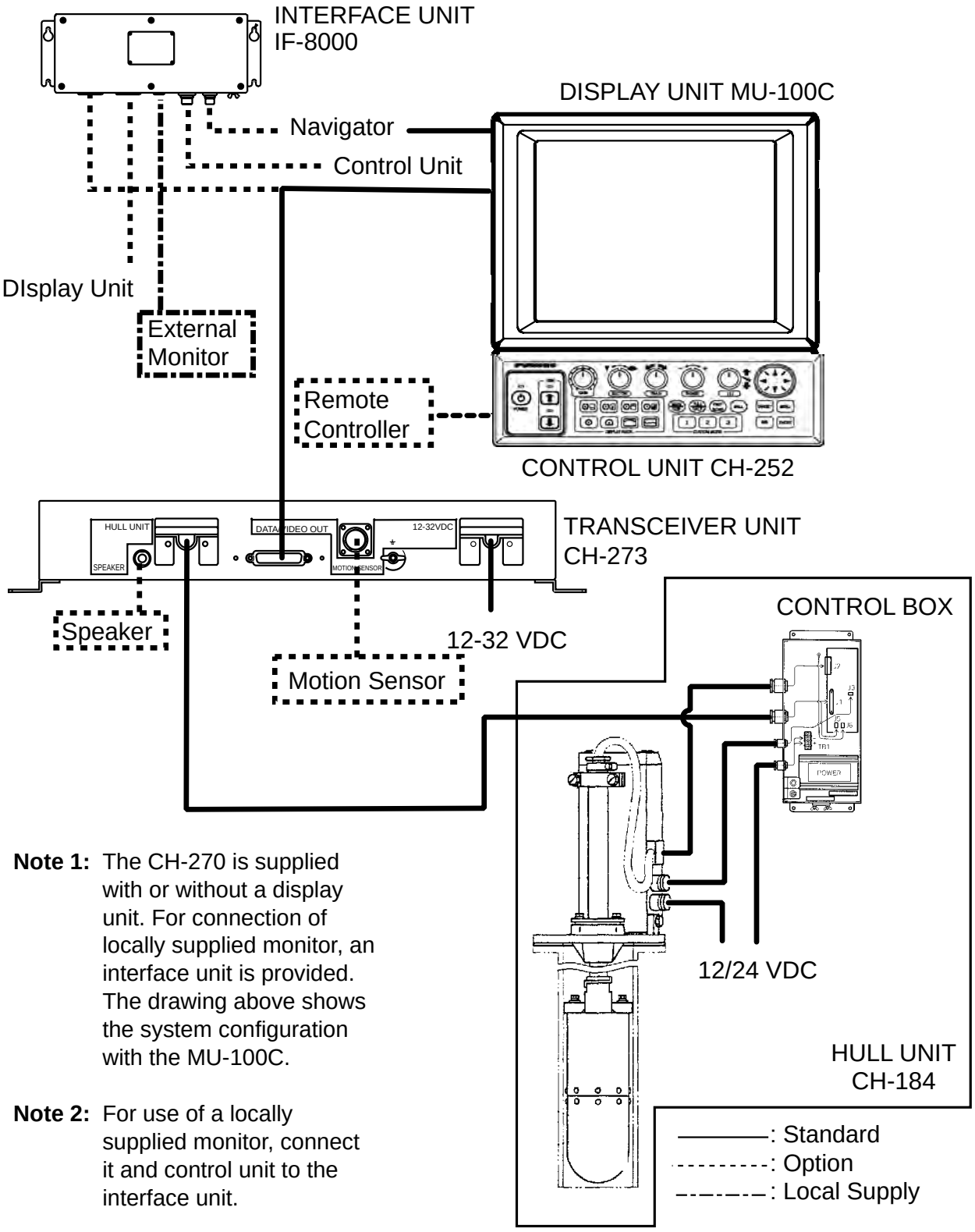
CH-270 (350 stroke)



Note 1: The CH-270 is supplied with or without a display unit. For connection of locally supplied monitor, an interface unit is provided. The drawing above shows the system configuration with the MU-100C.

Note 2: For use of a locally supplied monitor, connect it and control unit to the interface unit.

CH-270 (250 stroke)



Note 1: The CH-270 is supplied with or without a display unit. For connection of locally supplied monitor, an interface unit is provided. The drawing above shows the system configuration with the MU-100C.

Note 2: For use of a locally supplied monitor, connect it and control unit to the interface unit.

EQUIPMENT LISTS

Standard supply

Name	Type	Code No.	Qty	Remarks	
Control Unit/ Display Unit	CH-252/MU-100C	—	1	System with FURUNO-supplied monitor	
Control Unit	CH-252	—	1	System with locally supplied monitor	
Interface Unit	IF-8000	—	1		
Transceiver Unit	CH-273	—	1		
Hull Unit	CH-181-270	—	1	350 stroke	See table on next page for hull units.
	CH-184-270	—		250 stroke	
Spare Parts	SP06-01201*	006-559-590	1	For Hull Unit	
	SP06-01102*	006-556-210	1		
Installation Materials	See page ix.		1 set	Three types of cables	
	CP06-00403	006-573-730	1 set	For CH-184-270	
	CP06-06600	000-012-474	1	For CH-252/MU-100C	
	CP02-06610	000-012-480	1	MJ-A10SPF0002-015	Choose either one.
	CP02-06620	000-012-481	1	MJ-A10SPF0002-050	
Accessories	FP02-05101	000-012-474	1	FP06-01102*, FP02-05101* For display unit	
	FP06-01120*	006-556-260		For system with locally supplied monitor	
	06-021-2121	100-320-101	1	Hard cover For system with locally supplied monitor	

* See packing list at back of manual for details.

Hull Unit (CH-181-270)

<table>
<tr><th rowspan="2">Type</th><th colspan="4">Specifications</th></tr>
<tr><th>Cable Length</th><th>Shaft Length</th><th>Power</th><th>Stroke</th></tr>
<tr><td>CH-181-1-11-24</td><td>2.4 m</td><td rowspan="2">1.17 m</td><td rowspan="5">12 VDC</td><td rowspan="10">350 mm</td></tr>
<tr><td>CH-181-1-11-35</td><td rowspan="2">3.5 m</td></tr>
<tr><td>CH-181-1-22-35</td><td rowspan="2">2.2 m</td></tr>
<tr><td>CH-181-1-22-52</td><td rowspan="2">5.2 m</td></tr>
<tr><td>CH-181-1-38-52</td><td>3.8 m</td></tr>
<tr><td>CH-181-2-11-24</td><td>2.4 m</td><td rowspan="2">1.17 m</td><td rowspan="5">24 VDC</td></tr>
<tr><td>CH-181-2-11-35</td><td rowspan="2">3.5 m</td></tr>
<tr><td>CH-181-2-22-35</td><td rowspan="2">2.2 m</td></tr>
<tr><td>CH-181-2-22-52</td><td rowspan="2">5.2 m</td></tr>
<tr><td>CH-181-2-38-52</td><td>3.8 m</td></tr>
</table>

Hull Unit (CH-184-270)

<table>
<tr><th rowspan="2">Type</th><th colspan="4">Specifications</th></tr>
<tr><th>Cable Length</th><th>Shaft Length</th><th>Power</th><th>Stroke</th></tr>
<tr><td>CH-184-1-11-52</td><td>5.2 m</td><td rowspan="2">1.17 m</td><td rowspan="4">12 VDC</td><td rowspan="8">250 mm</td></tr>
<tr><td>CH-184-1-11-80</td><td>8 m</td></tr>
<tr><td>CH-184-1-22-52</td><td>5.2 m</td><td rowspan="2">2.2 m</td></tr>
<tr><td>CH-184-1-22-80</td><td>8 m</td></tr>
<tr><td>CH-184-2-11-52</td><td>5.2 m</td><td rowspan="2">1.17 m</td><td rowspan="4">24 VDC</td></tr>
<tr><td>CH-184-2-11-80</td><td>8 m</td></tr>
<tr><td>CH-184-2-22-52</td><td>5.2 m</td><td rowspan="2">2.2 m</td></tr>
<tr><td>CH-184-2-22-80</td><td>8 m</td></tr>
</table>

Hull Unit Shipped Configuration (CH-181-270)

Name	Type	Code No.	Qty	Remarks		
Raise/Lower Drive Assy.	CH-1811-1	—	1 set	12 VDC		
	CH-1811-2	—		24 VDC		
Train/Tilt Assy.	CH-1812-1-24	—	1 set	2.4 m	12 VDC	
	CH-1812-1-35	—		3.5 m		
	CH-1812-1-52	—		5.2 m		
	CH-1812-2-24	—		2.4 m	24 VDC	
	CH-1812-2-35	—		3.5 m		
	CH-1812-2-52	—		5.2 m		
Soundome (D) Assy.	CH-1813	006-541-410	1			
Main Body Flange Assy.	CH-1814	006-541-420	1 set	Flange, Grease cotton		
Assembling Kit for Field	CH-1815-11	006-546-420	1 set	Shaft length 1.17 m		See next table
	CH-1815-22	006-546-430		Shaft length 2.2 m/3.8 m		
Main Shaft	06-008-1021	100-028-501	1	1.17 m		
	SHJ-0006	661-000-062		2.2 m		
	06-007-1572	600-715-721		3.8 m		
Sonar Oil	4-liter can	000-824-033	1			

Hull Unit Shipped Configuration (CH-184-270)

Name	Type	Code No.	Qty	Remarks	
Control Box	CH-1841-1	—	1 set	12 VDC	
	CH-1841-2	—		24 VDC	
Raise/Lower Drive Assy.	CH-1842-1	—	1 set	See Raise/lower drive assy.	
	CH-1842-2	—			
Train/Tilt Assy.	CH-1812-1-52	—	1 set	5.2 m	12 VDC
	CH-1812-1-80	—		8 m	
	CH-1812-2-52	—		5.2 m	24 VDC
	CH-1812-2-80	—		8 m	
Soundome (D) Assy.	CH-1813	006-541-420	1		
Main Body Flange Assy.	CH-1844	006-573-720	1 set	Flange, Grease cotton	
Assembling Kit for Field	CH-1845-11	006-546-380	1 set	Shaft length 1.17 m	See next table
	CH-1845-22	006-546-410		Shaft length 2.2 m	
Main Shaft	06-008-1021	100-028-500	1	1.17 m	
	SHJ-0006-1	661-000-061		2.2 m	
Sonar Oil	4-liter can	000-824-033	1		
Installation Materials	CP06-00403	006-573-730	1	For CH-184-270, includes Ground plate WEA-1004 (Code No. 006-543-980) Cable assy. 06S4054 (Code No. 000-122-879)	

Installation Materials

Type	Code No.	Specifications (Cable between units)		Crimp-on Lug
		Display Unit (or I/F Unit) ↔ Transceiver Unit	Transceiver Unit ↔ Hull Unit	
CP06-01300	000-068-593	06S4078 *5m*	06S4086*10m*	CP06-01301*
CP06-01310	000-068-594		06S4086*15m*	CP06-01301*
CP06-01320	000-068-595		06S4086*20m*	CP06-01301*
CP06-01330	000-068-596		06S4086*30m*	CP06-01301*
CP06-01340	000-068-597	06S4078 *10m*	06S4086*10m*	CP06-01301*
CP06-01350	000-068-598		06S4086*15m*	CP06-01301*
CP06-01360	000-068-599		06S4086*20m*	CP06-01301*
CP06-01370	000-068-600		06S4086*30m*	CP06-01301*

Control Unit Cable

Type	Code No.	Qty	Remarks	
CP02-06600*	000-012-486	1	MJ-A10SPF0002-0015, For system with FURUNO-supplied monitor	
CP02-06610*	000-012-480	1	MJ-A10SPF0002-015, 1.5 m	Select one, for system with locally supplied monitor
CP02-06620*	000-012-481		MJ-A10SPF0002-050, 5 m	

*: See packing list at back of manual for details.

Option

Name	Type	Code No.	Qty	Remarks
Monitor	MU-150C	—	1 set	
	MU-100C	—		
Control Unit	CH-252	—	1 set	
Remote Controller	CH-256-E	—	1 set	
Interface Unit	IF-8000	—	1 set	
Motion Sensor	MS-100	—	1 set	
Clinometer	BS-704	—	1 set	
Speaker	SC-05WR	000-136-156	1	
Signal Cable	S06-9-5	006-556-270	1	Speaker extension cable, 5 m
Cable Assy.	MJ-A6SPF0012-050	000-134-424	1	6 pin-6 pin, 5 m
	MJ-A6SPF0012-100	000-133-817	1	6 pin-6 pin, 10 m
	MJ-A6SPF0011-050	000-132-244	1	6 pin-4 pin, 5 m
	MJ-A6SPF0011-100	000-132-336	1	6 pin-4 pin, 10 m
Installation Kit for Separate Type Control Unit	OP06-15-1.5 NEW	006-559-140	1	With 1.5-m cable, for desktop mounting
	OP06-15-5 NEW	006-559-150	1	With 5 m cable, for desktop mounting
	OP02-83-1.5	001-413-600	1	With 1.5 m cable, for flush mounting
	OP02-83-5	001-413-610	1	With 5 m cable, for flush mounting
Flush Mount Kit for Display Unit/Control Unit (integrated)	OP06-16	006-556-300	1	For display unit and control unit
Flush Mount Kit for Display Unit (separate)	OP06-17	006-556-310	1	For display unit
Flush Mount Kit for Control Unit	OP06-18	006-556-320	1	
Rectifier	RU-1746B-2	000-030-439	1	
Retraction Tank	06-013-2501	100-099-192	1	Steel, 1 m
	06-013-2502	100-100-322	1	Steel, 1.8 m
	06-013-2503	100-100-332	1	Steel, 3.5 m
	06-022-2201	100-306-180	1	FRP, 1 m
	06-022-2202	100-306-200	1	FRP, 1.8 m

1. MOUNTING

1.1 Display Unit, Control Unit

This searchlight sonar is available in two configurations: one with the FURUNO-supplied display unit or one with no display unit and an interface unit (with which to connect a monitor, locally supplied). For installation of the system which uses a locally supplied monitor, see paragraph 1.1.3 on page 6 for monitor requirements and installation information.

The control unit can be installed together with the display unit, or independently, using the optional mounting kit. These units may be installed on a desktop or flush mounted in a console.

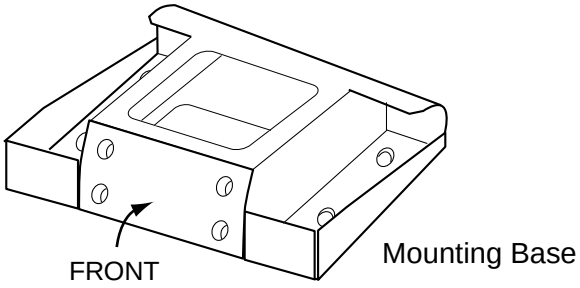
1.1.1 General mounting considerations

- Keep the units out of direct sunlight.
- Select a location where the units can easily be operated while observing the fishing ground or area surrounding the vessel.
- For maintenance and checking purposes, leave sufficient space at the sides and rear of the units and leave slack in cable. (Refer to the outline drawing at the back of this manual for recommended maintenance space.)
- A magnetic compass will be affected if the display unit (or control unit when it is installed separately) is placed too close to the compass. Observe the following compass safe distances to prevent deviation to the compass: Standard compass: 0.80 m, Steering compass: 0.55 m.

1.1.2 Mounting the FURUNO-supplied display unit MU-100C

Desktop mounting

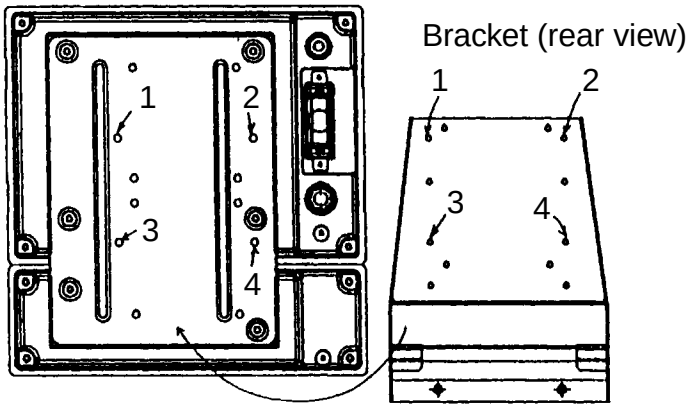
1. Fasten the mounting base to the mounting location with four tapping screws.



2. Do one of the following:

   ♦ **Mounting the display unit and control unit together:**

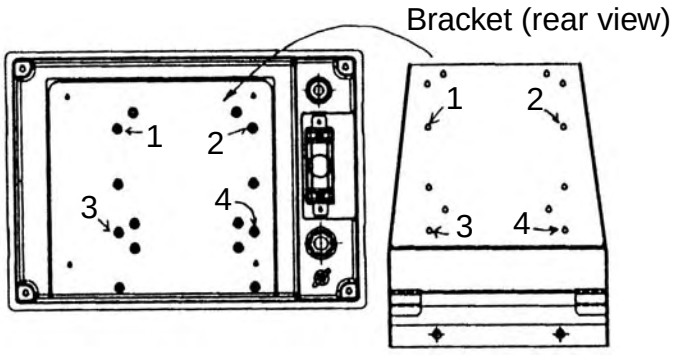
   1)Fasten the bracket at the rear of monitor and control units with four binding screws (M4X10).



   ♦ **Mounting the display unit separately from the control unit:**

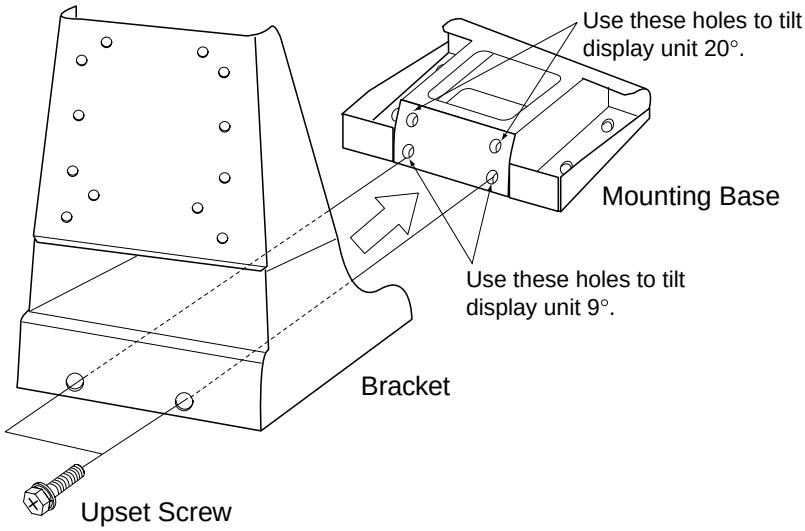
   1)Dismount the coupling plate at the rear of the display unit to separate the display unit from the control unit.

   2)Attach the bracket at the rear of the display unit with four binding screws (M4X10).



3. Coat threads of upset screws (M6X16, 2 pcs.), which are used to fasten the bracket to the mounting base, with grease.

4. Fasten the bracket to the mounting base with two upset screws: Use the upper holes to tilt the display unit 20°; lower holes to tilt it 9°.



Mounting the control unit separate from the display unit

The optional control unit mounting kit is required. See the outline drawing at the back of this manual for mounting details.

Control Unit Mounting Kit
Type: OP06-15-1.5 NEW (Code no. 006-559-140, with 1.5 m cable)
Type: OP06-15-5 NEW (Code no. 006-559-150, with 5 m cable)

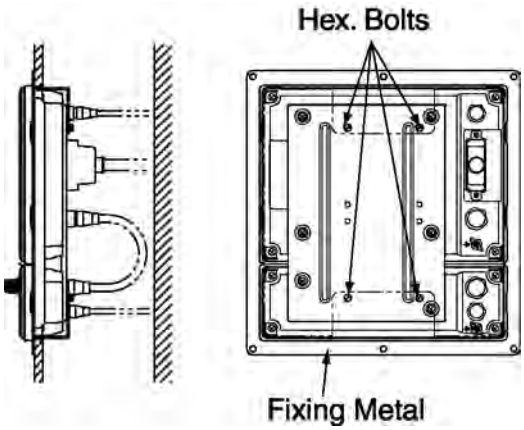
Name	Type	Code No.	Qty	Remarks
Cable	MJ-A10SPF0002-015	000-142-878	1	For 1.5 m cable
	MJ-A10SPF0002-050	000-131-411		For 5 m cable
Bracket	06-021-2112	100-281-880	1	
Mounting Plate	06-021-2111	100-279-740	1	
Tapping Screw	5X20	000-802-081	2	
Cosmetic Cap	DP-687	000-808-417	2	
Hex. Screw	M4X12	000-882-040	4	

Flush mounting the display unit together with control unit

Flush Mount Kit for Display Unit/Control Unit
(Type OP06-16, Code no. 006-556-300)

Name	Type	Code No.	Qty	Remarks
Fixing Metal	06-021-1311	100-279-611	1	
Tapping Screw	5X20	000-802-840	6	
Hex. Bolt	M4X12	000-882-040	4	

1. Cut out hole (297(H) X 287(W)) in mounting location.
2. Fasten the fixing metal to the display and control units with four hex. bolts (M4X12).



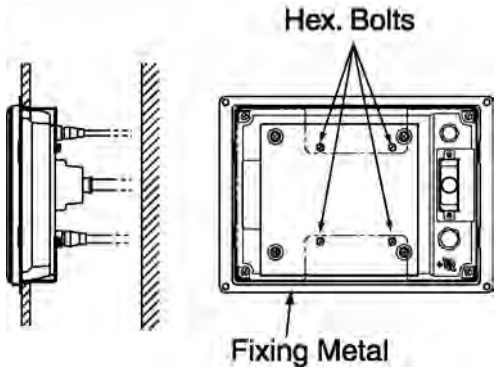
3. Using four tapping screws (5X20), fasten the fixing metal attached at step 2 to the mounting location.

Flush mounting the display unit

Flush Mount Kit for Display Unit
(Type OP06-17, Code no. 006-556-310)

Name	Type	Code No.	Qty	Remarks
Fixing Metal	06-021-1321	100-279-622	1	
Tapping Screw	5X20	000-802-840	4	
Hex. Bolt	M4X12	000-882-040	4	

1. Cut out hole (207(H) X 287(W)) in mounting location.
2. Fasten the fixing metal to the display unit with four hex. bolts (M4X12).



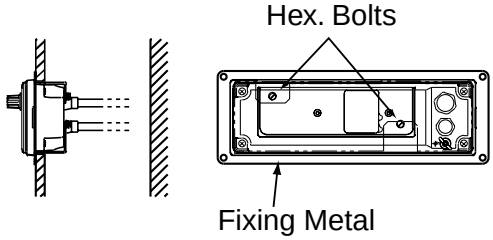
3. Using four tapping screws (5X20), fasten the fixing metal attached at step 2 to the mounting location.

Flush mounting the control unit

Flush mount kits for control unit
Type OP02-83-1.5, Code no. 001-413-600 (1.5 m cable)
Type OP03-83-5, Code no. 001-413-610 (5 m cable)
Type OP06-18, Code no. 006-556-320 (no cable)

Name	Type	Code No.	Qty	Remarks	
Fixing Metal	06-021-2101	100-279-731	1		
Tapping Screw	5X20	000-802-840	4		
Hex. Bolt	M4X12	000-882-040	2		
Cable Assy.	MJ-A10SPF0002-015	000-142-878	1	1.5 m	Choose either one.
	MJ-A10SPF0002-050	000-131-411		5 m	

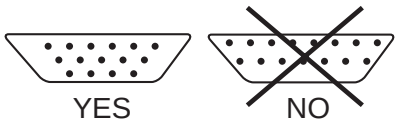
1. Cut out hole (87(H) X 287(W)) in mounting place.
2. Fasten the fixing metal to the control unit with two hex. bolts (M4X12).
3. Using four tapping screws (5X20), fasten the fixing metal assembled at step 2 to the mounting location.



1.1.3 System with locally supplied monitor

Monitor requirements

This system requires a standard VGA monitor, connected to the interface unit IF-8000. Supply monitor and interconnection cable locally. A D-sub 15P connector is required for connection to the DATA/VIDEO OUT port on the IF-8000. Use the three rows-type D-sub connector; not the two rows-type.



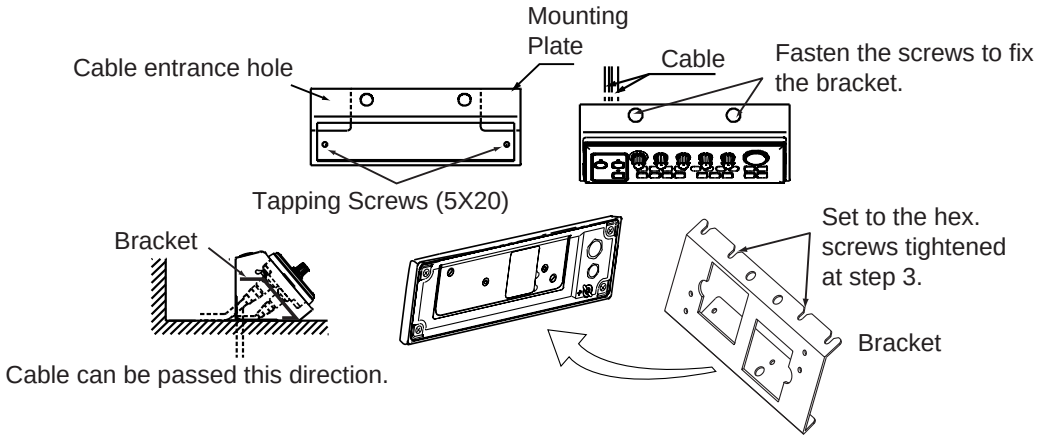
The monitor should satisfy the specifications shown below.

- VGA type
- ANALOG RGB 0.7 Vpp, positive polarity
- TLL level H, V, negative polarity

Mounting the control unit on a desktop

For the system which uses a locally supplied monitor, fix the control unit to the mounting plate (supplied as accessories) as shown below. See the parts list FP06-01120 and outline drawings at the back of this manual for details.

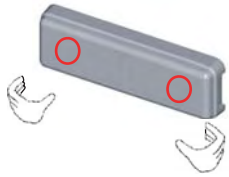
1. Fix the mounting plate to the mounting location with two tapping screws (5X20).
2. Fix the bracket to the control unit with two hex. screws (M4X12).
3. Insert screwdriver from the top of the mounting plate holes and then loosely fasten two hex. screws (M4X12).
4. Attach the control unit to the mounting plate and then tightly fasten two hex. screws.
5. Attach two cosmetic caps to holes at the top of the mounting plate.



6. Attach hard cover to protect the control unit.

How to remove the hard cover

Place your thumbs at the locations shown with circles in the illustration at right, and then lift the cover while pressing it with your thumbs.



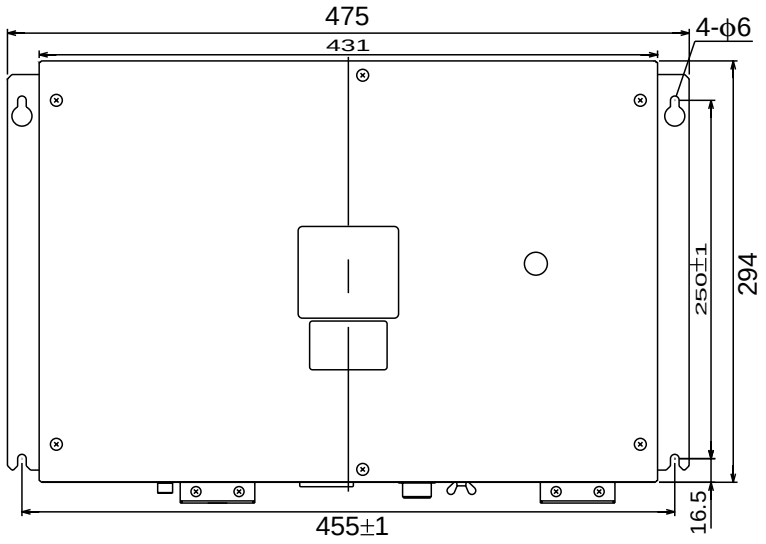
1.2 Transceiver Unit

1.2.1 General mounting considerations

- The mounting location should be well ventilated and dry.
- The unit can be mounted on a bulkhead or a desktop. For bulkhead mounting, be sure the bulkhead is strong enough to support the weight of the unit under the vibration normally experienced onboard the vessel. If necessary, reinforce the mounting location.
- Secure maintenance space for ease of maintenance and service, referring to the outline drawing for recommended maintenance space.
- The maximum length of the cable between the transceiver unit and the raise/lower drive assy. is 30 m.
- The maximum length of the cable between the transceiver unit and the display unit (or interface) is 10 m.
- A magnetic compass will be affected if the transceiver unit is placed too close to the compass. Observe the following compass safe distances to prevent deviation to the compass: Standard compass: 0.60 m, Steering compass: 0.35 m.

1.2.2 Mounting procedure

The transceiver unit may be mounted a desktop or a bulkhead. Fasten the unit to the mounting location with four tapping screws (5 mm diameter, local supply).



For bulkhead mounting:

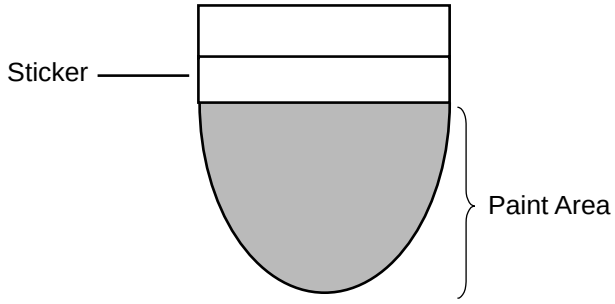
1. Screw in upper tapping screws, leaving 5 mm gap between bottom of screw head and bulkhead as shown right.
2. Set the unit to the tapping screws and tighten screws.
3. Screw in lower tapping screws.

1.3 Hull Unit

1.3.1 General handling considerations

> **⚠ CAUTION**
>
> **Do not turn on the equipment with the transducer exposed to air as this may damage the transducer.**

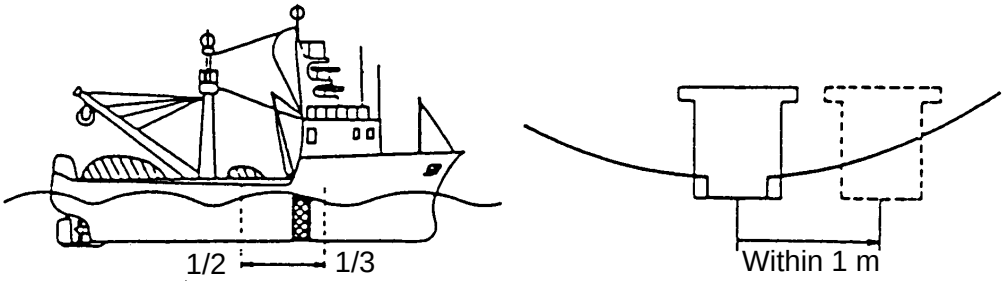
The soundome may be painted with antifouling paint to keep marine life of the transducer. Use “Marine Star 20,” manufactured by Chugoku Marine Co., Ltd., or equivalent. Paint only the portion below the sticker. Painting metal parts will cause corrosion.



1.3.2 Installation position considerations

Discussion and agreement are required with the dockyard and ship owner in deciding the location for the hull unit. When deciding the location, take into account the following points:

- Select an area where propeller noise, cruising noise, bubbles and interference from turbulence are minimal. Generally, the point at 1/3 to 1/2 of the ship’s length from the bow or near the keel is the best. On-the-keel installation is advantageous for minimizing oil consumption in comparison with of-the-keel. If the hull unit cannot be installed on the keel, the center of the retraction tank should be within 1 m of the keel to prevent a rolling effect.

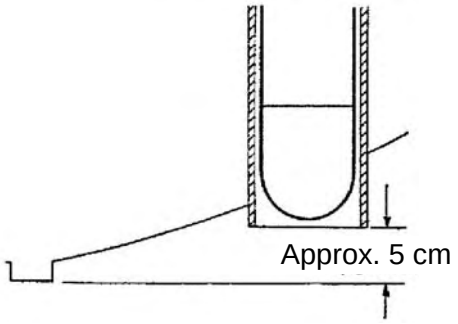


- Select a place where interference from the transducers of other sounding equipment is minimal. The hull unit should be at least 2.5 m away from the transducers of other sounding equipment.
- An obstacle in the fore direction not only causes a shadow zone but also aerated water, resulting in poor sonar performance. Be sure to locate the transducer well away from any obstacle in the fore direction.

1.3.3 Mounting the retraction tank

Mounting method

Careful attention should be paid to safety (strength, watertightness, etc.) of the tank and also the ease of maintenance and checking. In the off-the-keel installation, it is recommended that the retraction tank protrude through the hull down to 5 cm above the keel for minimizing the effects of air bubbles.



Determining tank length

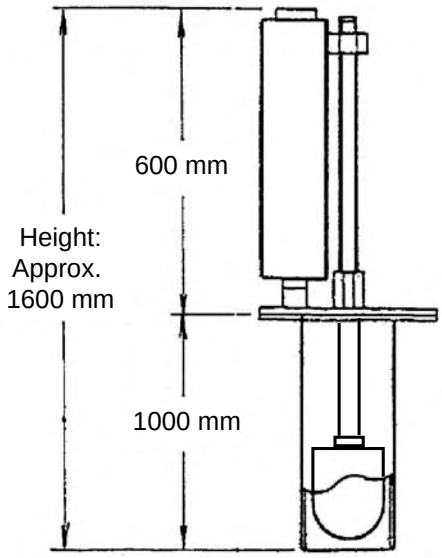
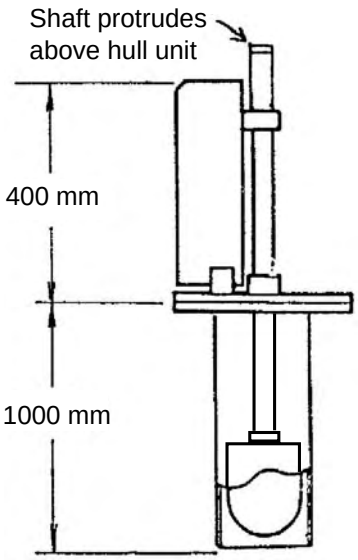
The mounting method determines the necessary tank length “Lt,” and any excess portion should be cut. In addition, the tank length is necessary as the reference value for cutting the main shaft, so make a note of the length.

CH-181-270 (350 mm stroke)

It is not necessary to cut the main shaft or tank when the standard combination (main shaft: 1.17 m, tank: 1 m) is used. If you wish to position the top of the tank above the water line, use the optional 2.2 or 3.8 m long main shaft. In this case, determine the shaft length (Ls) and the tank length (Lt) as follows: Ls = Lt + 170 mm

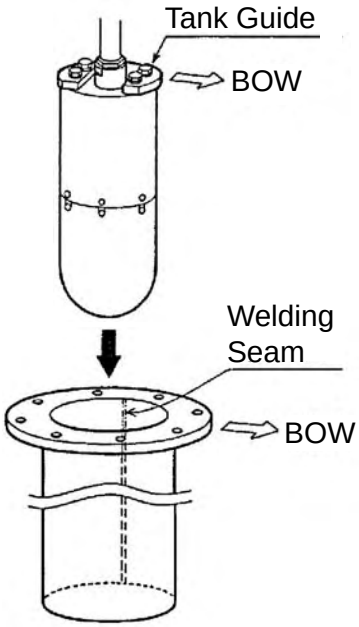
CH-184-270 (250 mm stroke

It is not necessary to cut the main shaft or tank when the standard combination (main shaft: 1.17 m, tank: 1 m) is used. However, the shaft protrudes slightly above the hull unit. If it is necessary to position the top of the tank above the water line, use the optional 2.2 m long main shaft. In this case, determine the shaft length (Ls) and the tank length (Lt) as follows:
Ls = Lt - 17 mm

CH181-270	
CH184-270	

Installing the retraction tank

Install the retraction tank referring to outline drawing for the retraction tank.

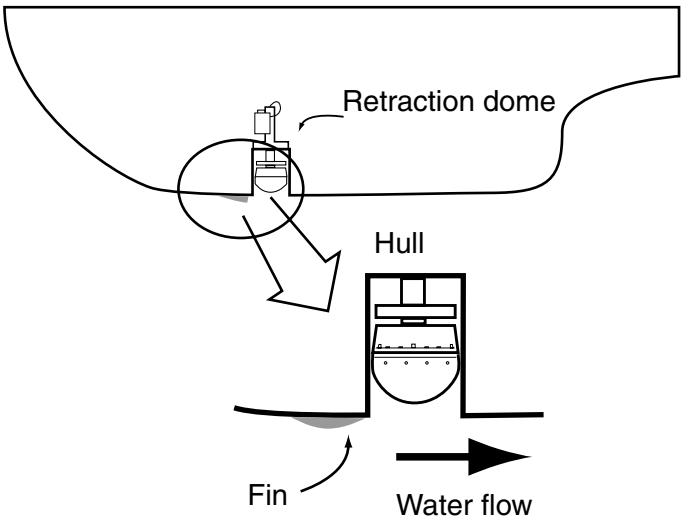


Note 1: The seam of the tank should be positioned either at the port or starboard side, otherwise the tank guide on the soundome will contact the welded portion of the retraction tank, preventing smooth retraction.

Note 2: When the retraction tank is locally made, it is recommended that the seamless pipe STPG38-S-C (carbon steel pipe, for pressure release) or equivalent be used.

Installation on an FRP vessel

The retraction tank is usually installed vertical to the ship's draft line. For a small FRP vessel tilt it 2°. However, since this method increases water pressure in the tank because of resistance at the rear of the tank well, install a fin at the location shown below to provide smooth water flow.



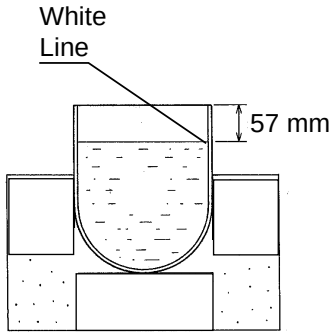
The fin creates a rise of 1-1.5 cm at the front side of the retraction tank. This allows water to flow smoothly along the ship's hull, eliminating swirls.

1.3.4 Assembling and installation of hull unit

The hull unit is ship disassembled. Follow the procedure below to assemble and install the hull unit.

Assembling of soundome

1. Stand the soundome vertically and fill to the white line inside the soundome with the sonar oil.



2. Remove the vinyl cap from the train/tilt assy. Confirm that the O-ring is properly seated in its groove.
3. Set the upper dome assy. to the lower dome assy., aligning screw holes.

⚠ CAUTION

WORKING WITH THE SONAR OIL

Precautions
Keep oil away from eyes. Wear protective gloves when working with the oil. The oil can cause inflammation of the eyes.

Do not touch the oil. Wear protective gloves when working with the oil. The oil can cause inflammation of the skin.

Do not ingest the oil. Diarrhea or vomiting can result.

Keep the oil out of reach of children.

Emergency
If the oil enters eyes, flush with clean water about 15 min. Consult a physician.

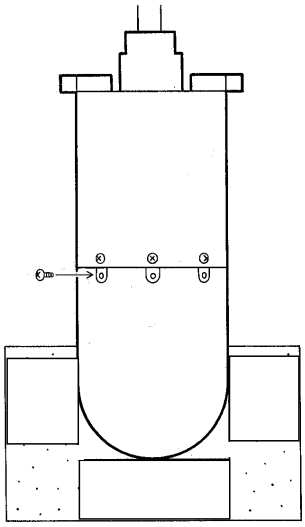
If the oil contacts skin, wash with soap and water.

If the oil is ingested, see a physician immediately.

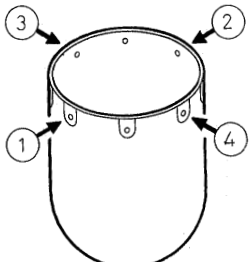
Disposal of oil and its container
Dispose of oil and its container in accordance with local regulations. For further details, contact place of purchase.

Storage
Seal container to keep out foreign material. Store in dark place.

4. While pressing down on the upper dome assy., temporarily set two self-locking screws to diagonal holes in the soundome assy. Note that the self-locking screws do not require washers.



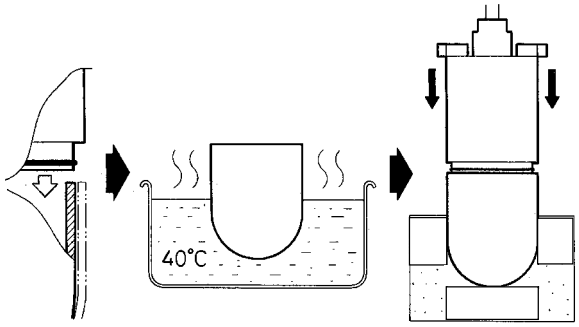
5. Fit remaining eight self-locking screws, fastening the screws in diagonal order. This is especially important for the first four screws.



IMPORTANT!

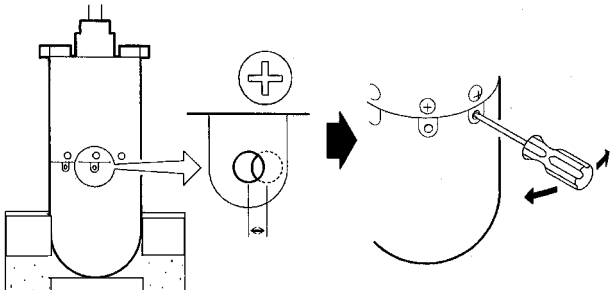
When the soundome is installed in a low ambient temperature

The soundome may shrink and become difficult to fit to the upper dome assy. To prevent this, warm it in water of approx 40°C (104°F) or leave it in room temperature above 20°C (68°F) for at least one hour.



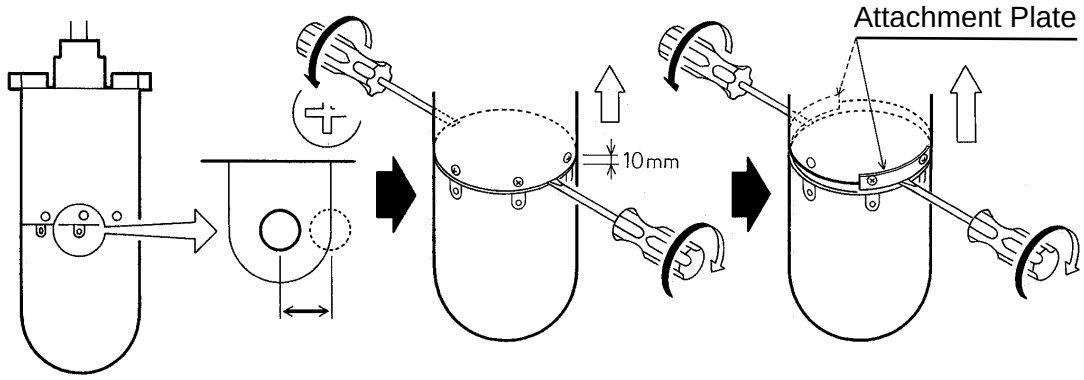
When screw holes are not aligned

When screw holes on the soundome are not aligned with screw holes on the upper dome assy., insert a screwdriver in holes to align them.



When screw holes are totally out of alignment, detach the soundome as shown below and then reattach it

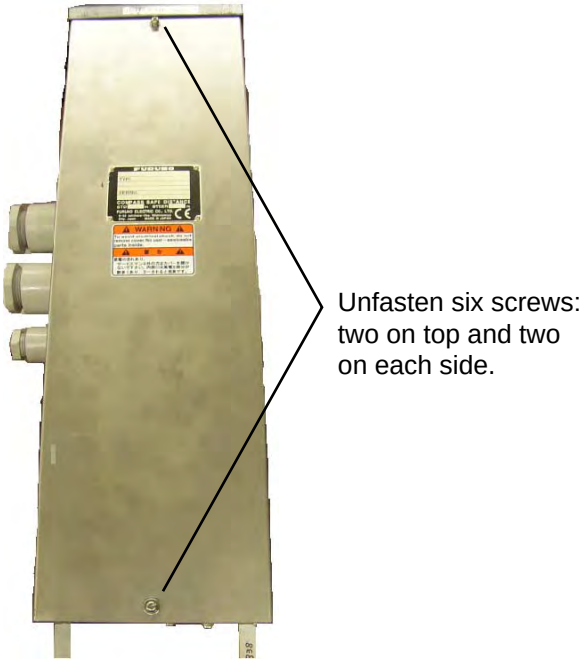
1. Orient the soundome vertically.
2. Insert two screwdrivers having blade width of 7 to 10 mm in the slits on the soundome as shown below and rotate them in the opposite directions of each other. The upper dome assy. should slide up by the width of the blade.
3. Insert the screwdrivers between the attachment plates and the slits on the soundome and rotate them. The upper dome assy. is pushed upward further in increments of about 10 mm and will become loose enough to be removed by hand.



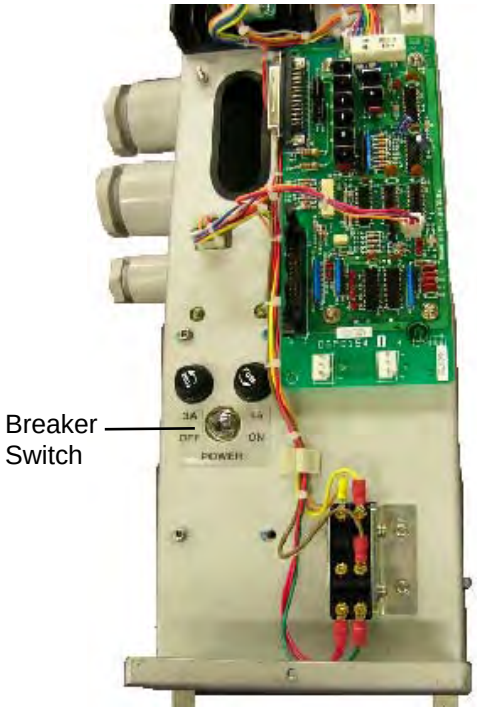
Assembling of Hull Unit CH-181-270 (350 mm stroke)

BEFORE beginning the installation turn off the breaker inside the hull unit as shown below. Turn it on after completing the installation section.

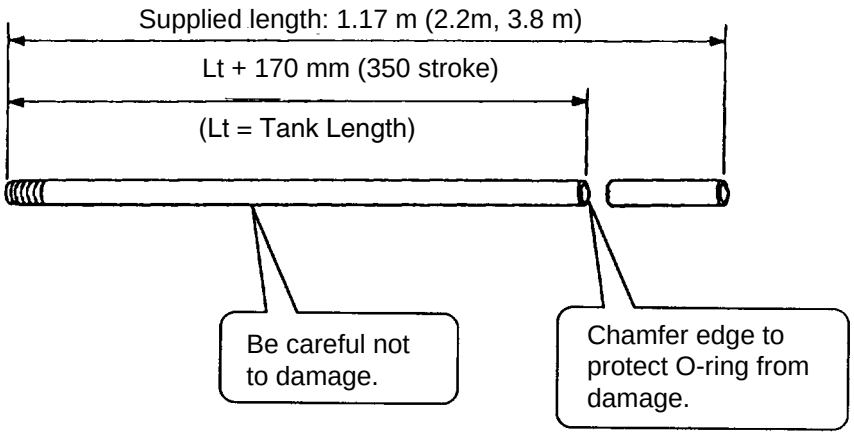
1. Unfasten six screws to remove the cover from the hull unit.



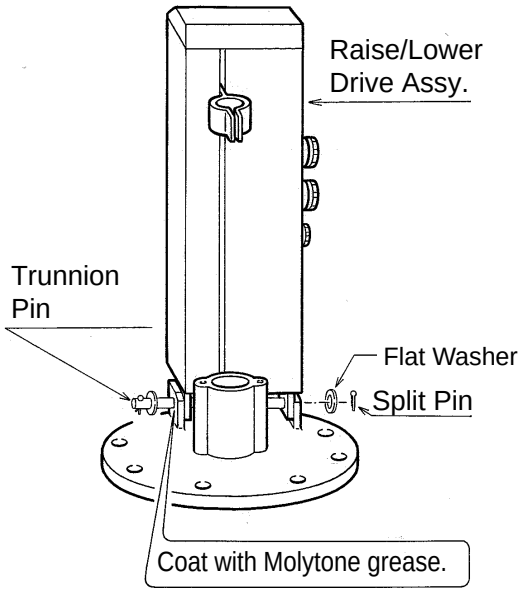
2. Turn off the breaker switch. Close the cover.



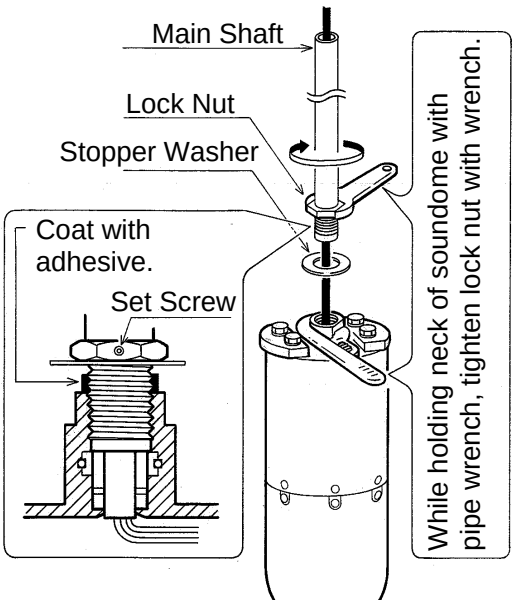
3. Calculate the length of the main shaft according to tank length “Lt.”



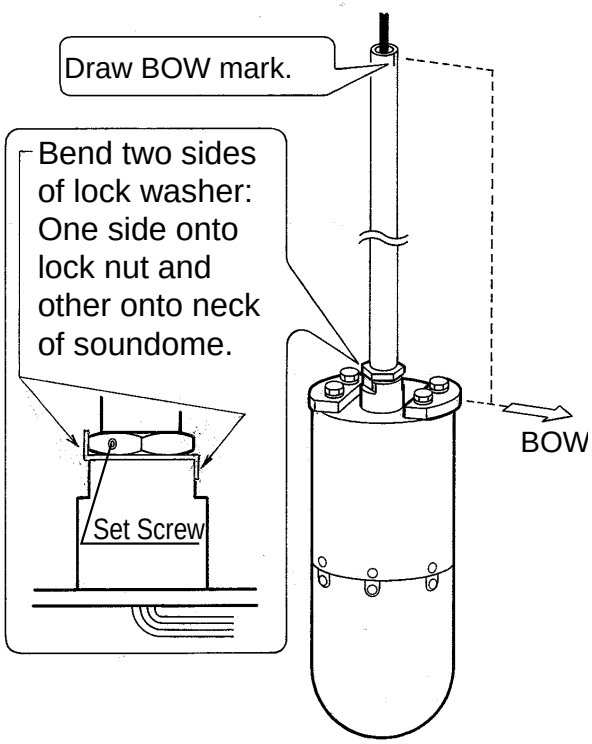
4. Set the raise/lower drive assy. on the main body flange assy. and insert trunnion pin.



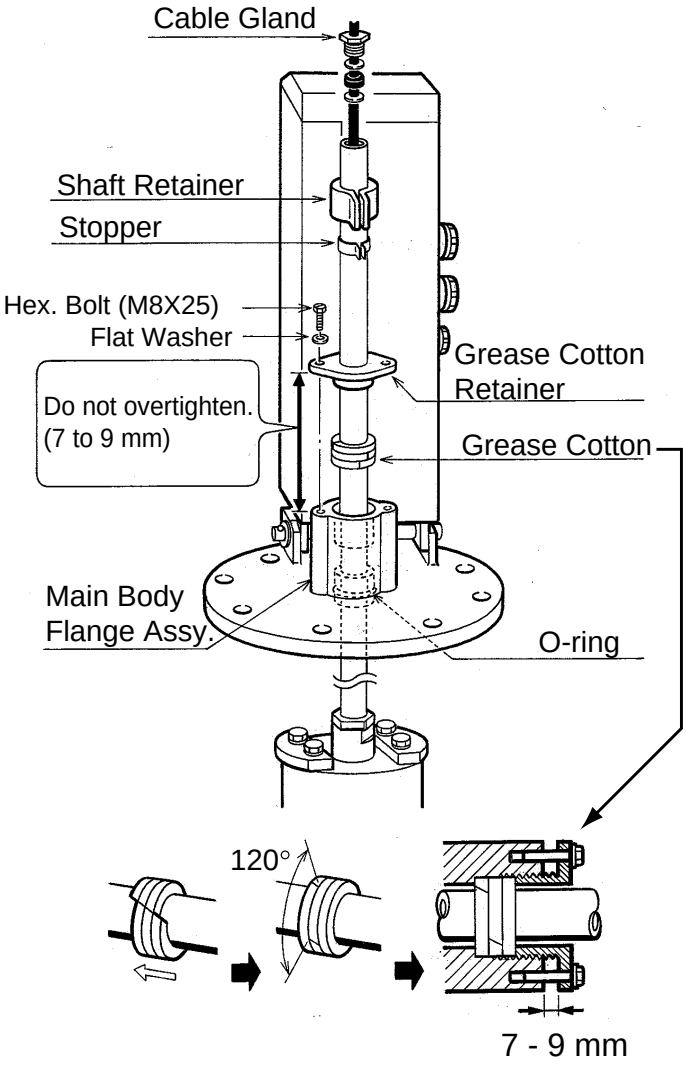
5. Slide lock nut and stopper washer onto the main shaft and transducer cable into the main shaft.
6. Screw main shaft tightly into the neck of the soundome. Unscrew the shaft by five turns and coat threads with adhesive.
7. Fasten main shaft completely and tighten lock nut with wrench.



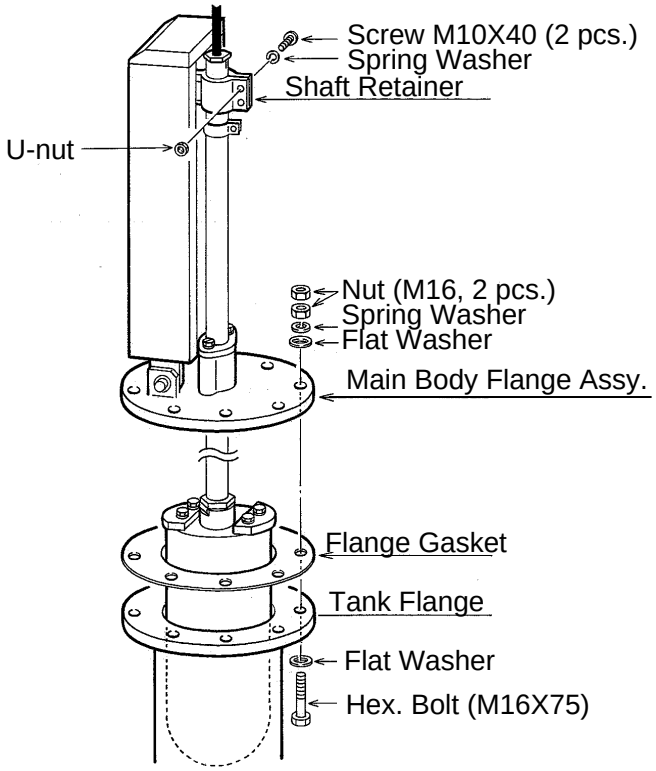
8. Tighten set screw on lock nut.
9. Using a hammer, bend two sides of lock washer: One side upward onto lock washer and other side downward on main shaft.
10. Mark bow mark on the main shaft with felt tip pen.



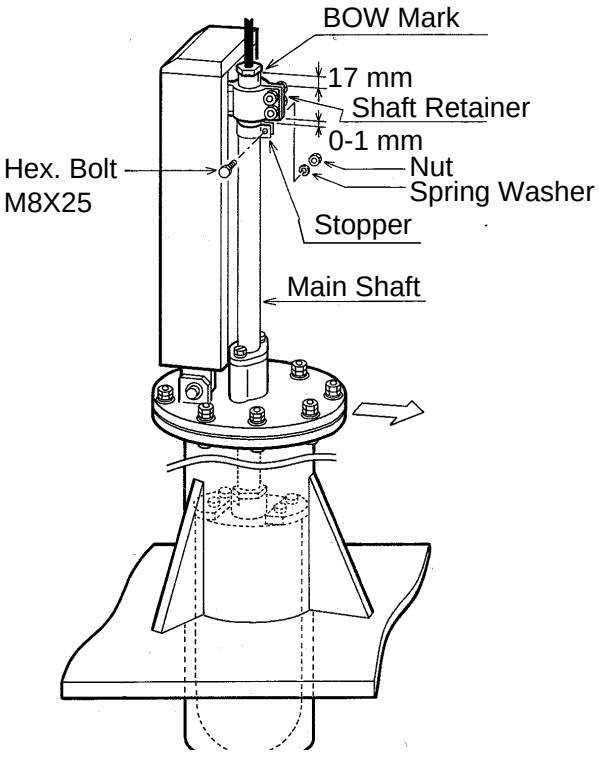
11. Make sure that the O-ring is correctly positioned on the main body flange assy.
12. Pass the main shaft thru the main body flange assy., grease cotton retainer, stopper and shaft retainer.
13. Wind grease cotton onto the main shaft, mark on grease cotton where to cut, remove grease cotton from shaft and then cut it as marked. Discard unnecessary grease cotton. (Cut the grease cotton **AFTER** removing it from the main shaft to prevent damage to the shaft.)
14. Set three pieces of grease cotton on the main shaft so their joints are spaced 120° and then set them to the grease cotton retainer.
15. **For 1.17 m shaft,** pass washer, gasket and cable gland onto shaft. Tighten gland until it contacts shaft.
    For other shaft lengths, screw pipe cap onto the main shaft instead of above-mentioned parts.



16. Temporarily fix the shaft retainer to the main shaft with two bolts. Tighten it referring to Note 3 on the next page, after completing this procedure.
17. Place the flange gasket and hull unit on the tank flange and temporarily fix them with bolts and nuts.
18. Using the hand crank, manually raise and lower the soundome to check that it moves smoothly without hitting the tank. If it does not move smoothly, adjust the position of the hull unit by sliding it on the tank. See Note 1 on the next page.
19. Securely fasten nuts and bolts temporarily fastened at step 17.

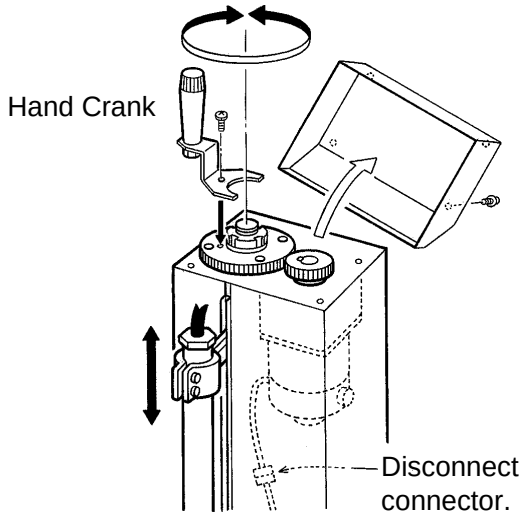


20. Orient the main shaft so that the BOW mark is facing ship's bow. Tighten the shaft retainer.
21. Fix the stopper.

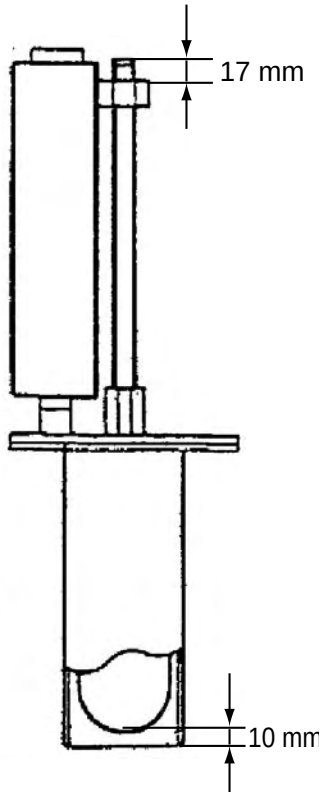


Note 1: Manual raising and lowering of transducer

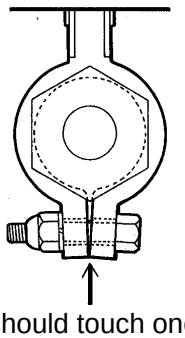
Remove the top cover of the raise/lower drive assy. and set the hand crank as shown left. Turn off the power switch and disconnect the connector from the motor lead wires on the hull unit before using the hand crank. The soundome can be easily raised and lowered manually because the motor which works as a generator is isolated from the load.



Note 2: The bottom of the soundome is placed 10 mm above the bottom of the retraction tank when the top of the shaft retainer is fastened 17 mm below the top of the main shaft.



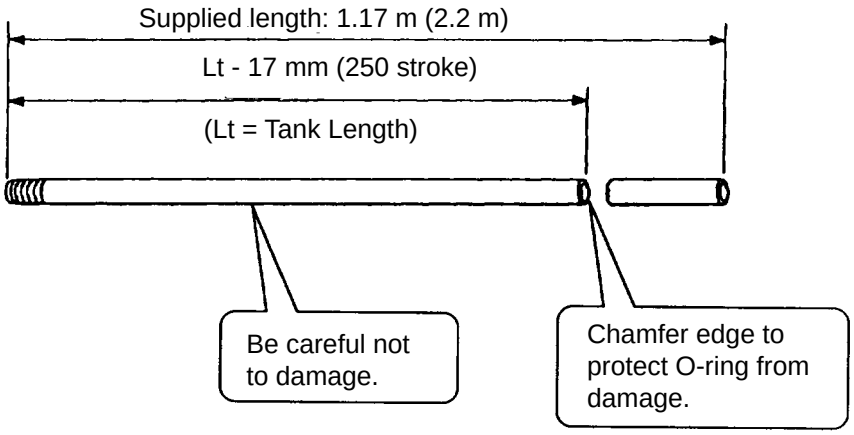
Note 3: The shaft retainer should be securely fastened. It is recommended to use a wrench with a length of approx. 300 mm. The torque should be 20-25 Nm.



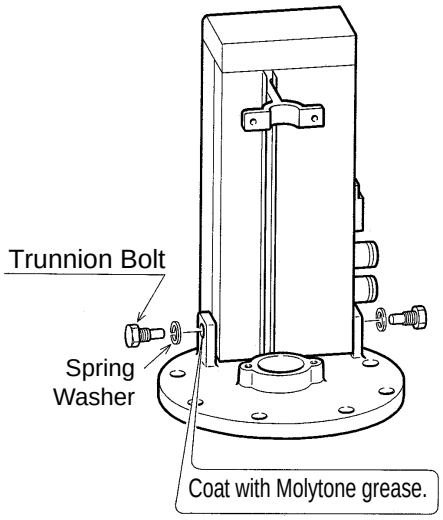
Assembling of Hull Unit CH-184-270 (250 mm stroke)

See Note 1 on page 22 **BEFORE** starting the installation.

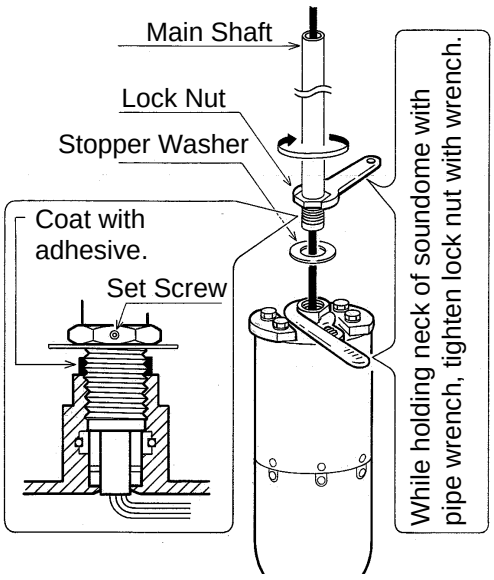
1. Calculate the length of the main shaft according to tank length “Lt.”



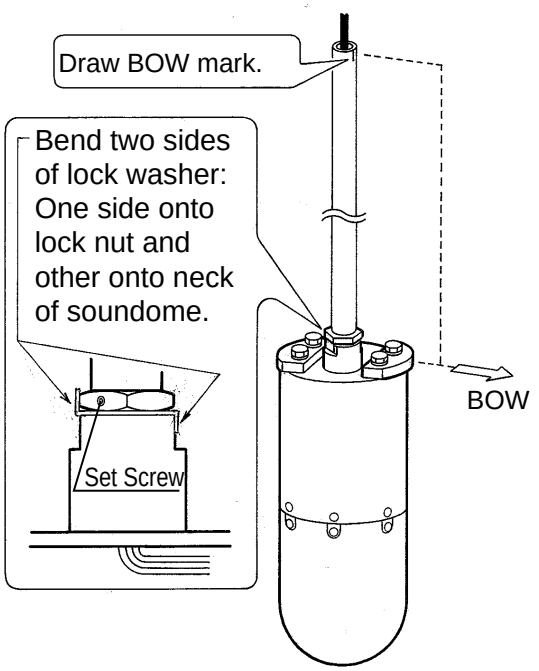
2. Set the raise/lower drive assy. on the main body flange assy. and insert trunnion pin.



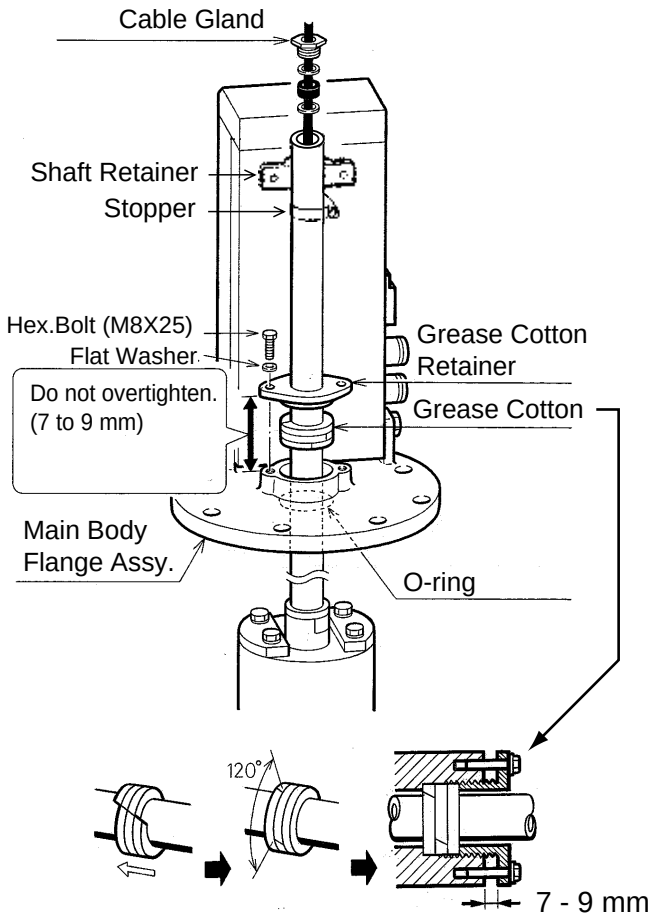
3. Slide lock nut and stopper washer onto the main shaft.
4. Screw main shaft tightly into the neck of the soundome. Unscrew the shaft by five turns and coat threads with adhesive.
5. Fasten main shaft completely and tighten lock nut with wrench.



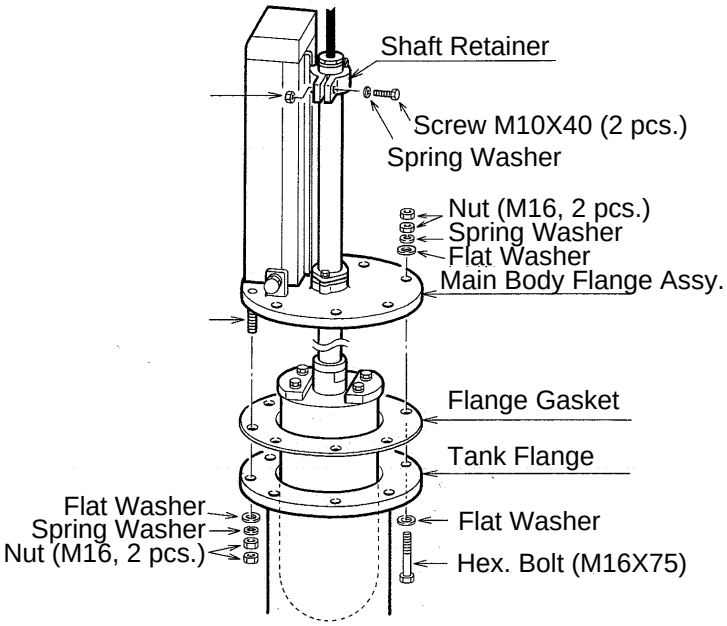
6. Tighten set screw on lock nut.
7. Using a hammer, bend two sides of lock washer: One side upward onto lock washer and other side downward on main shaft.
8. Mark bow mark on the main shaft with felt tip pen.



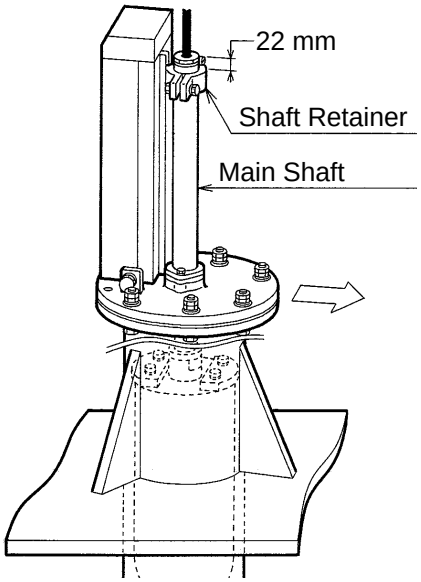
9. Make sure that the O-ring is correctly positioned on the main body flange assy.
10. Pass the main shaft thru the main body flange assy., grease cotton retainer, stopper and shaft retainer.
11. Wind grease cotton onto the main shaft, mark on grease cotton where to cut, remove grease cotton from shaft and then cut it as marked. Discard unnecessary grease cotton. (Cut the grease cotton **AFTER** removing it from the main shaft to prevent damage to the shaft.)
12. Set three pieces of grease cotton on the main shaft so their joints are spaced 120° and then set them to the grease cotton retainer.
13. **For 1.17 m shaft,** pass washer, gasket and cable gland onto shaft. Tighten gland until it contacts shaft.
    For other shaft lengths, screw pipe cap onto the main shaft instead of above-mentioned parts.



14. Temporarily fix the shaft retainer to the main shaft with two bolts. Tighten it referring to Note 4 on the next page, after completing this procedure.
15. Place the flange gasket and hull unit on the tank flange and temporarily fix them with bolts and nuts.
16. Lift and lower the shaft by hand to check that it rises and lowers smoothly.
17. Securely fasten nuts and bolts temporarily fastened at step 15.

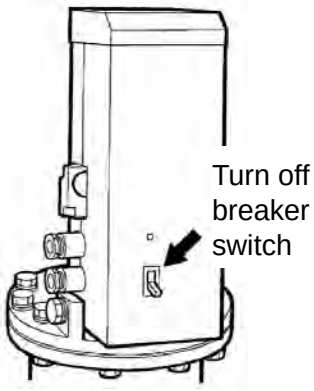


18. Orient the main shaft so that the BOW mark is facing ship's bow. Tighten the shaft retainer.
19. Fix the stopper.

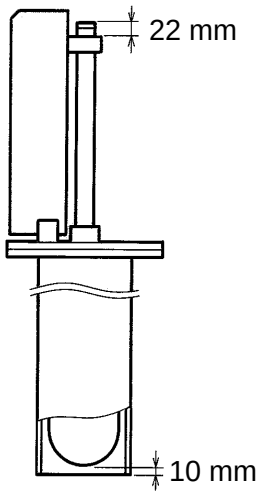


Note 1: Turn off the breaker switch and cover it with packing tape before starting work on the hull unit. Bodily injury can result if the hull unit is powered while work on it is being performed. Be sure to turn it on after completing this section.

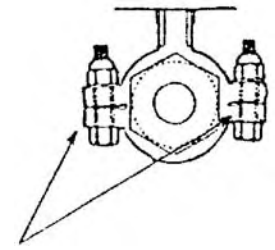
Note 2: Manual raising and lowering cannot be performed. This is because the motor brakes itself when the power is not applied. Check raising and lowering by turning on the breaker switch. Also, confirm that no obstructions exist along the travel of the main shaft. Raising or lowering cannot be stopped once initiated.



Note 3: The bottom of the soundome is placed 10 mm above the bottom of the retraction tank when the top of the shaft retainer is 22 mm below the top of the main shaft.



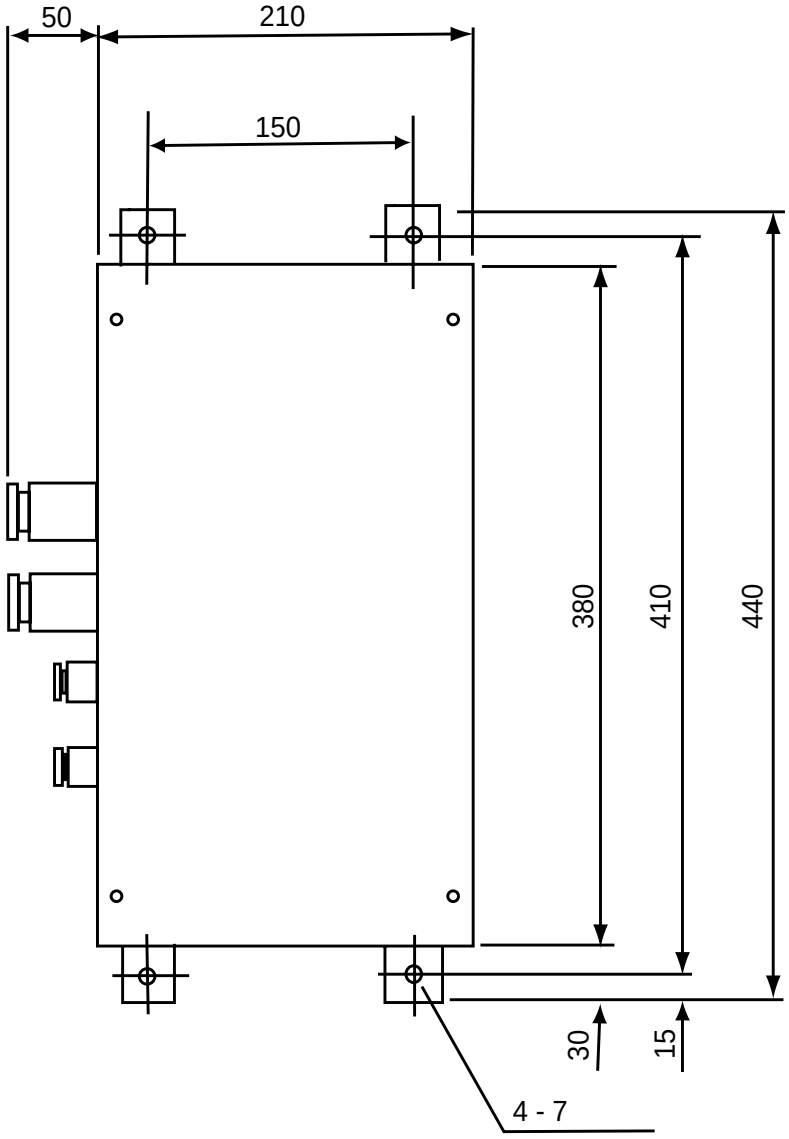
Note 4: Securely fasten the shaft retainer.
Use a wrench having a length of approx. 300 mm.
Torque: 20-25 Nm



Gap should be nearly equal.

1.4 Control Box (for Hull Unit CH-184)

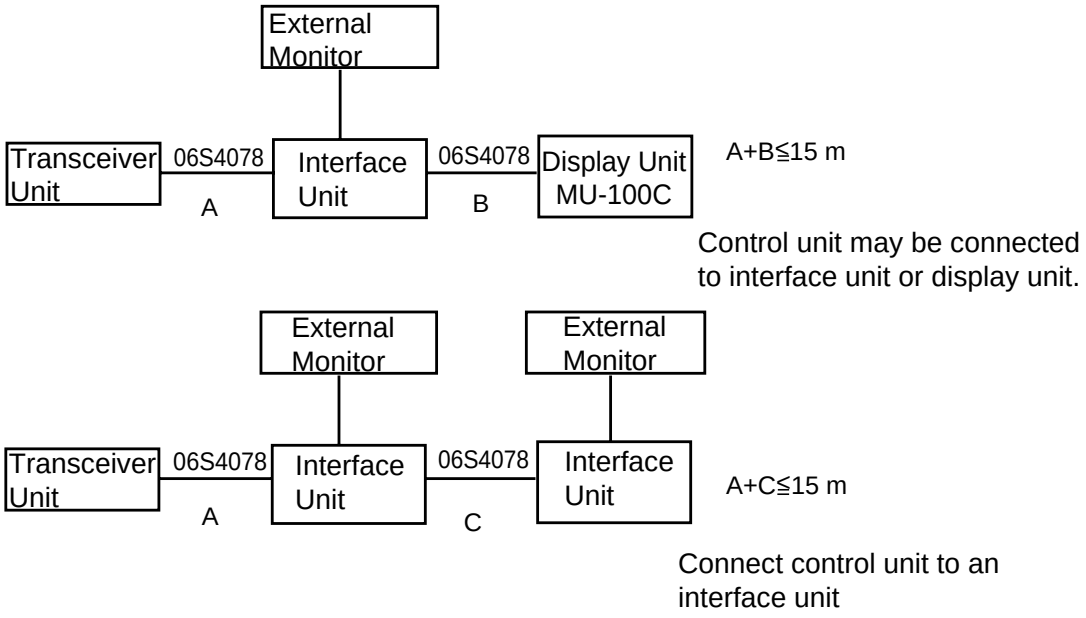
Install the Control Box close to the hull unit. The length of the connection cable between the Control Box and the soundome assy. is 5.2 or 8 m long and the connection cable from the hull unit is 5 m long. Keep those lengths in mind when choosing a mounting location for the Control Box. Be sure to ground the unit with the copper strap (supplied).



1.5 Interface Unit

The interface unit is supplied as standard equipment in the system which uses a locally supplied monitor. Mount the unit referring to the outline drawing at the back of this manual and the mounting considerations below.

- Choose a location not subject to rain or water splash
- The location should be low in humidity and well ventilated.
- The unit may be mounted on the deck or a bulkhead.
- If the interface unit is connected to the Display Unit MU-100C or two interface units are connected in parallel to the transceiver unit, note the cable lengths shown in the illustration below. Note that the lengths of the two cables type 06S4078 must not exceed 10 m each.
- A magnetic compass will be affected if the interface unit is placed too close to the compass. Observe the following compass safe distances to prevent deviation to a magnetic compass: Standard compass: 0.95 m, Steering compass: 0.65 m.



Mounting procedure

- Use four tapping screws (5 mm diameter) to fix the unit to the mounting location.
- **For bulkhead mounting,** screw in the top two tapping screws in the mounting location, leaving 5 mm gap between the bulkhead and the bottom of screw head. Set the unit to the screws and tighten screws. Screw in the lower two tapping screws.

1.6 Motion Sensor, Clinometer

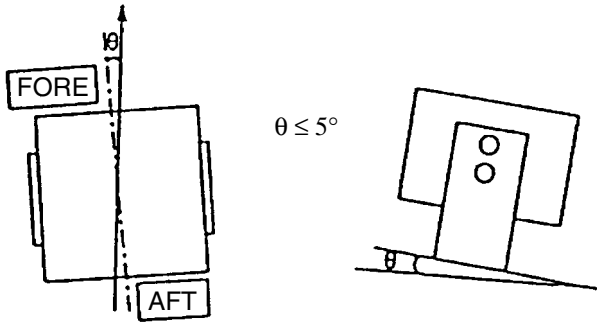
1.6.1 Motion sensor

The motion sensor can be installed almost anywhere, taking into account the following mounting considerations.

- Choose a place where vibration is minimal.
- The ambient temperature of the mounting location should not be more than 50°C (122°F).
- Do no install the equipment in the engine room, or fix it to a thin wall or the overhead.
- The usual mounting location is on the deck in the bridge. Refer to the outline drawing for the motion sensor for mounting dimensions.

Mounting procedure

Orient the FORE mark on the unit toward ship's bow. Mount the unit level within 5° in all directions. For adjustment see paragraph 3.3.



1.6.2 Clinometer

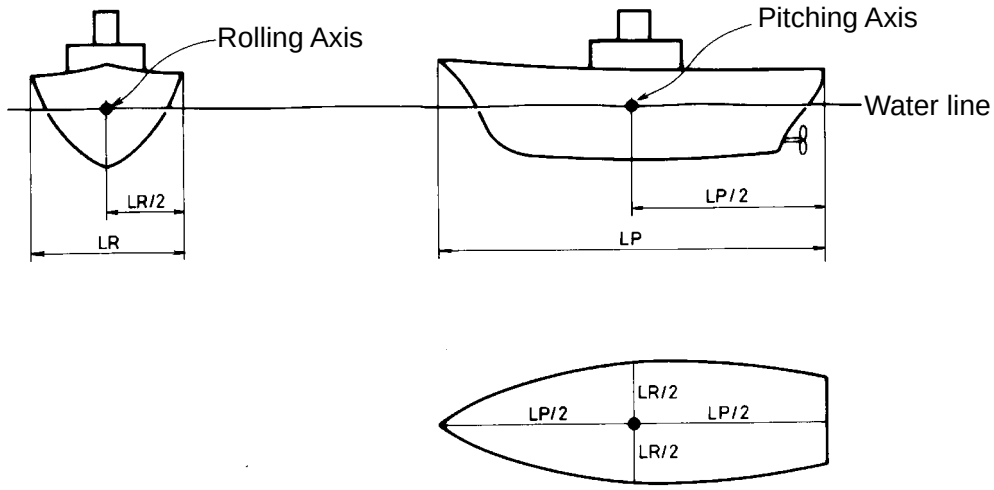
The clinometer detects ship's inclination caused by ship's rolling and pitching and its output is used to stabilize the sonar beam against rolling and pitching.

The clinometer is, in principle, a pendulum. It measures the inclination of the ship by sensing the direction of gravity acted on it and therefore when installed on a ship, it should be placed on or near the rotation axes of the ship's rolling and pitching. If it is placed away upward from the axes, the measured value becomes larger than the actual value. On the hand, if it is placed below the axes, the measured value is smaller than actual value. The same can be said when it is placed far to the left or right from the axes.

The rotation axes of pitching and rolling are theoretically considered to be located on the level of the ship's draft and in the center of the ship. In other words, as follows:

1) Vertical position of the pitching and rolling axels is on the draft level of the ship.
2) Horizontal position of the rolling axis is in the center of the ship's port-starboard line.
3) Horizontal position of the pitching axis is in the center of the ship's fore-aft line.

From 1), 2) and 3) above, the crossing point of the two axes is indicated by the black dots in the illustration below. The clinometer should be mounted as close as possible to this point.



Note 1: The vicinity of the hull unit is too low to install the Clinometer and should be avoided, since the polarity of the measured value is reversed.

Note 2: When it is impossible to install the clinometer on the intersection point of both rolling and pitching rotational axes, a special effort should be made to install it at a place where the vertical distance to the intersecting point is minimum.

Note 3: Install the clinometer with the bow mark pointing toward ship's bow.

Note 4: Be sure to adjust the clinometer following the procedure in paragraph 3.4.

2. WIRING

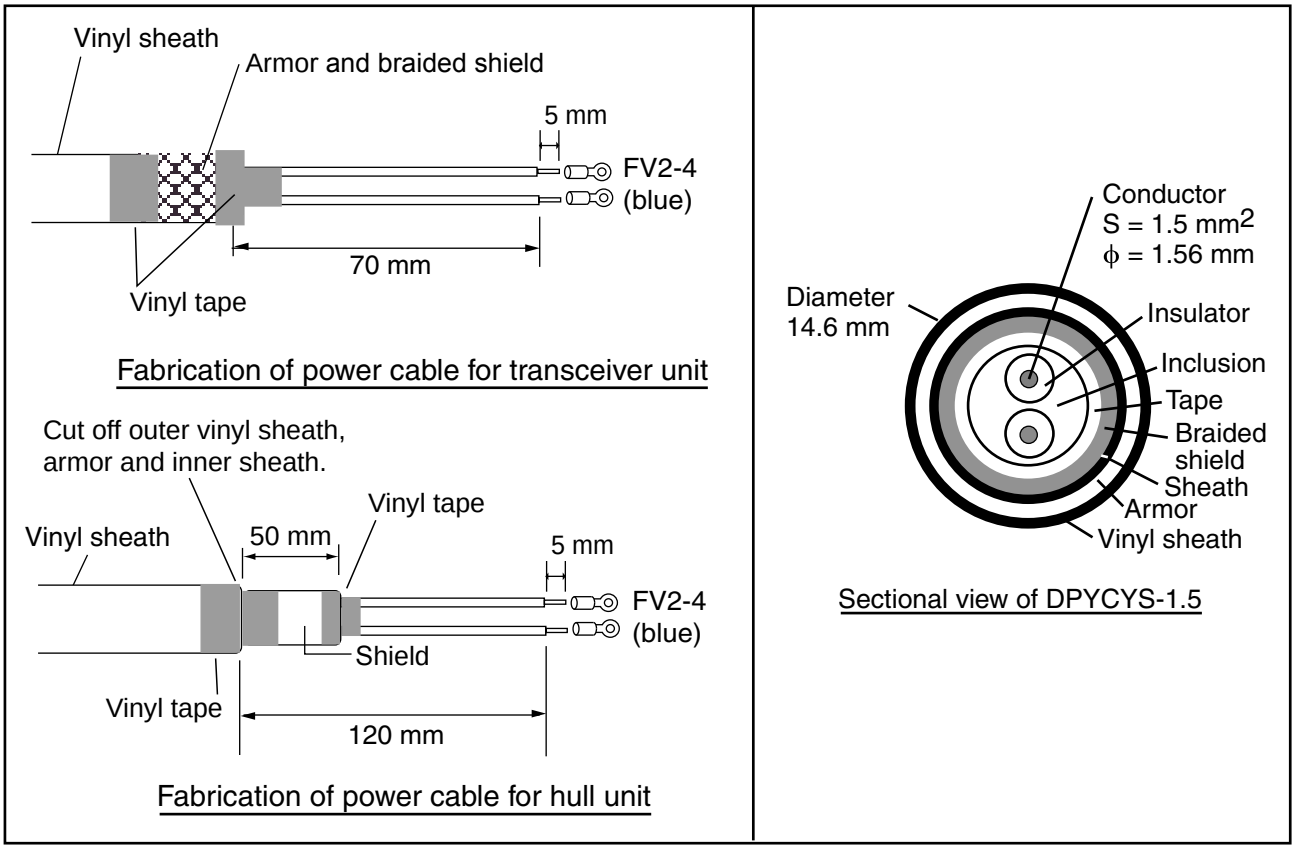
2.1 Wiring Among Units

Wire units referring to the drawing on the next several pages. Cables which connect between units have connectors at both ends. Refer to the interconnection diagram at the back of this manual for wiring information.

- The type of raise/lower drive motor and breaker used depends on ship's mains.
- If the D-sub connector used with the display unit, transceiver unit and interface unit is too large to pass through a hole, remove the connector cover. Wrap wires and rubber cover with vinyl tape to ease passing the cable through the hole. Reattach the cover after passing the cable through the hole. The cable can be passed through a hole of up to 30 mm in diameter.
- The power cable should be arranged locally, fabricating it as shown below. Use power cable type DPYCYS-1.5 (Japan Industrial Standard cable) or equivalent. See the illustration below for cable specifications.

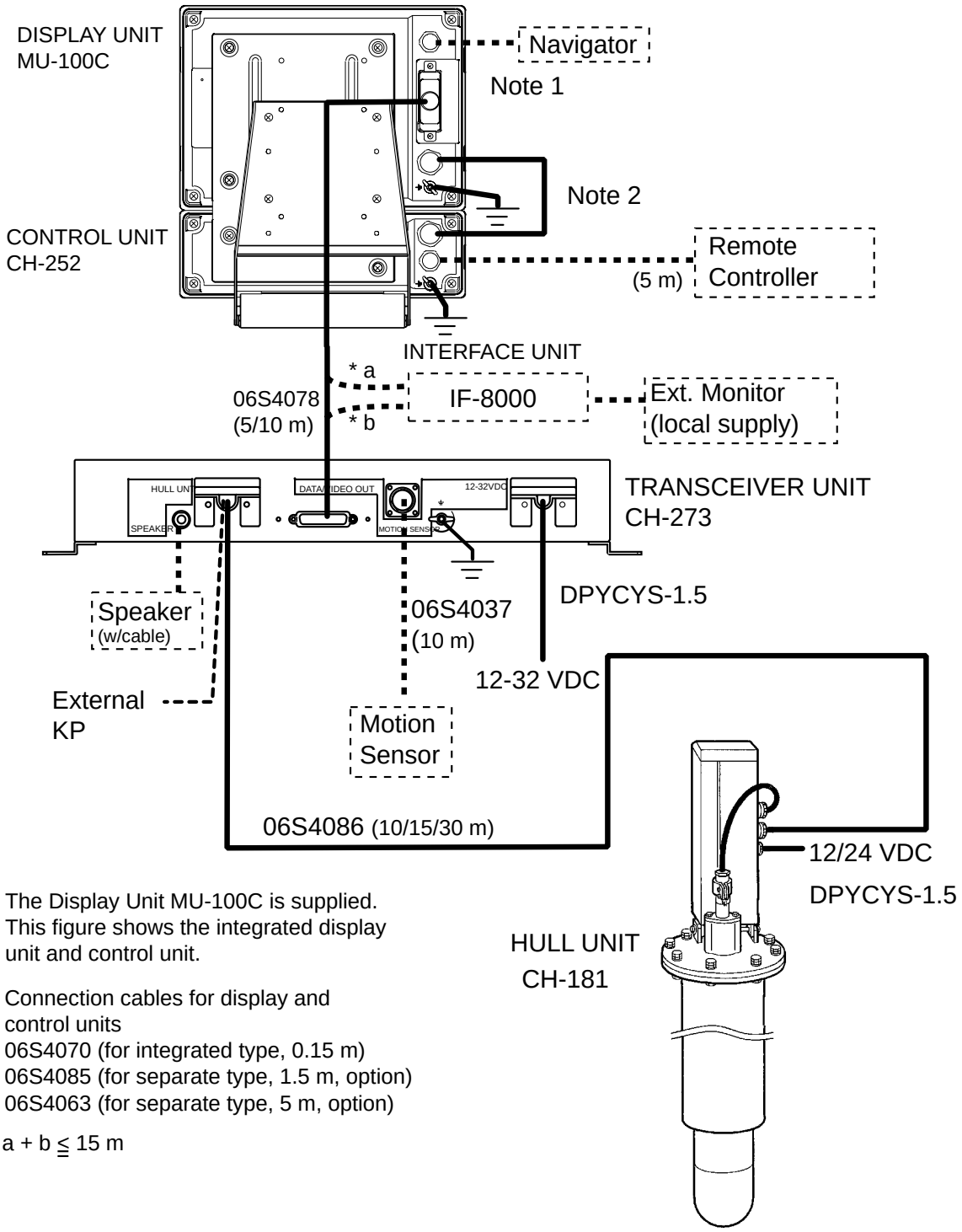
Fabrication of power cable for transceiver unit and hull unit

Transceiver unit: Fabricate as shown below. Fold back the braided shield and tape it with vinyl tape.
Hull unit: Fabricate as shown below.



Fabricating power cable DPYCYS-1.5

Hull Unit CH-181, FURUNO-supplied display unit

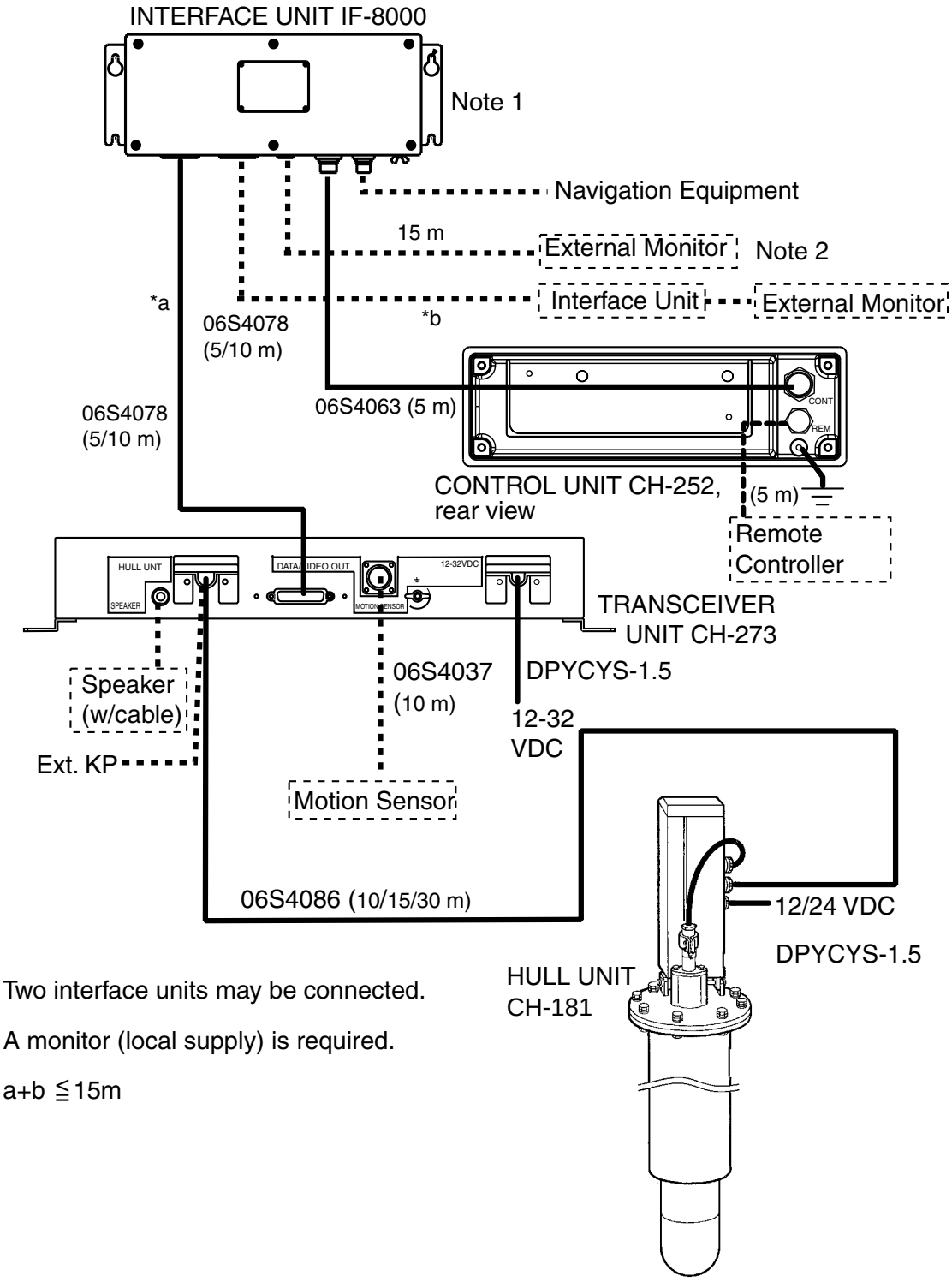


Note 1: The Display Unit MU-100C is supplied. This figure shows the integrated display unit and control unit.

Note 2: Connection cables for display and control units
06S4070 (for integrated type, 0.15 m)
06S4085 (for separate type, 1.5 m, option)
06S4063 (for separate type, 5 m, option)

Note 3: a + b ≦ 15 m

Hull Unit CH-181, locally supplied monitor

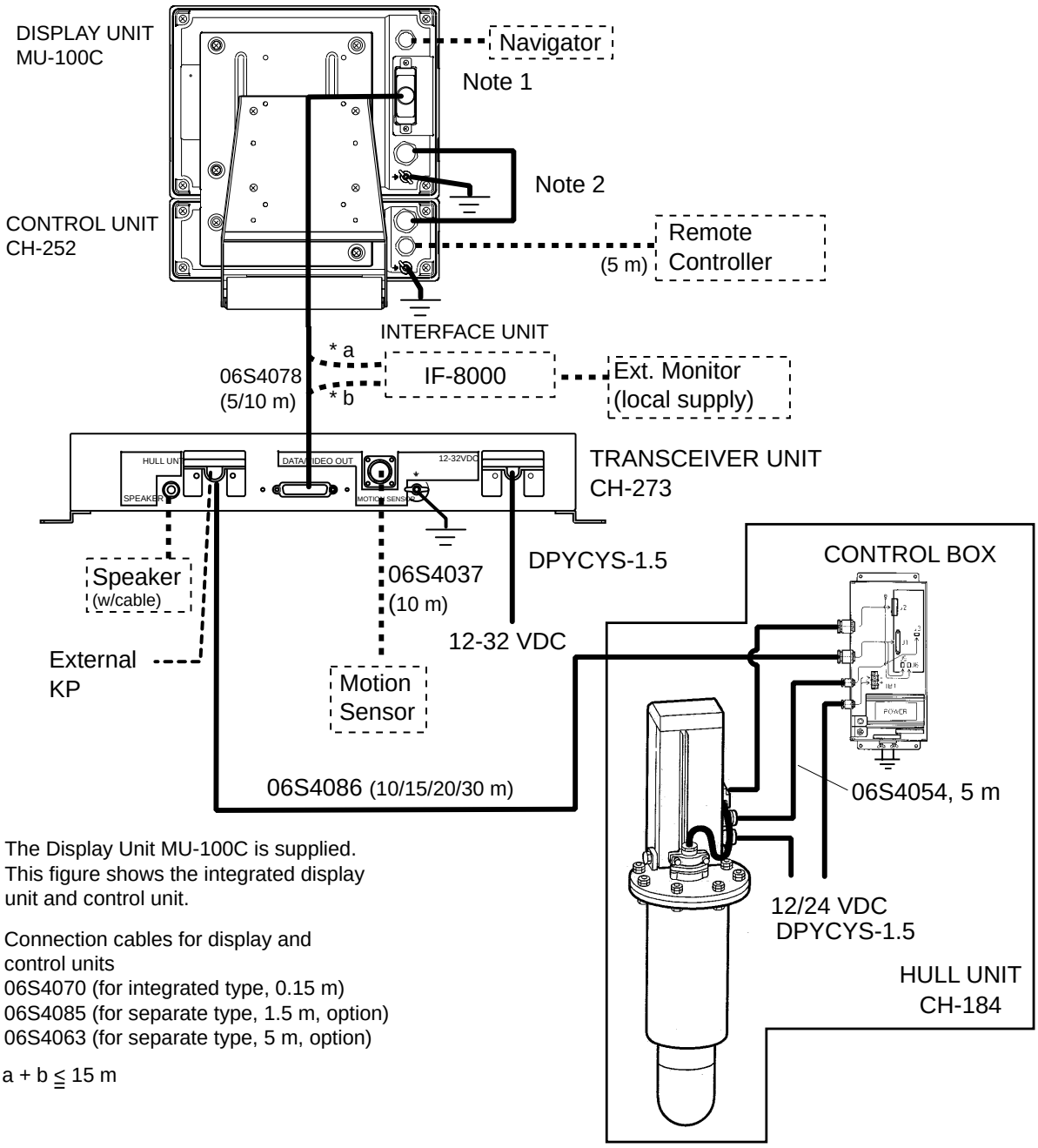


Note1: Two interface units may be connected.

Note 2: A monitor (local supply) is required.

Note 3: a+b ≦15m

Hull Unit CH-184, FURUNO-supplied display unit

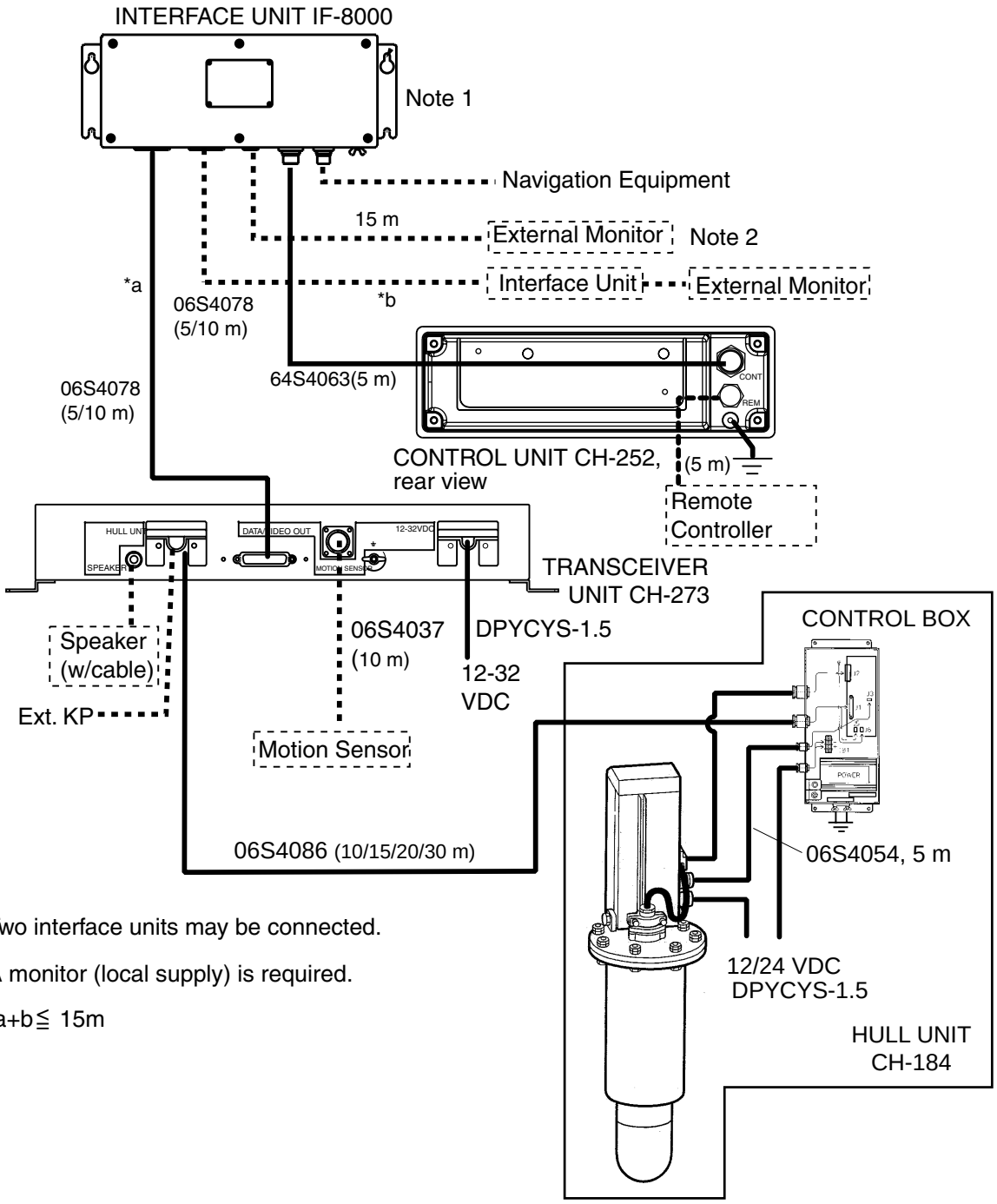


Note 1: The Display Unit MU-100C is supplied. This figure shows the integrated display unit and control unit.

Note 2: Connection cables for display and control units
06S4070 (for integrated type, 0.15 m)
06S4085 (for separate type, 1.5 m, option)
06S4063 (for separate type, 5 m, option)

Note 3: a + b ≦ 15 m

Hull Unit CH-184, locally supplied monitor



Note 1: Two interface units may be connected.

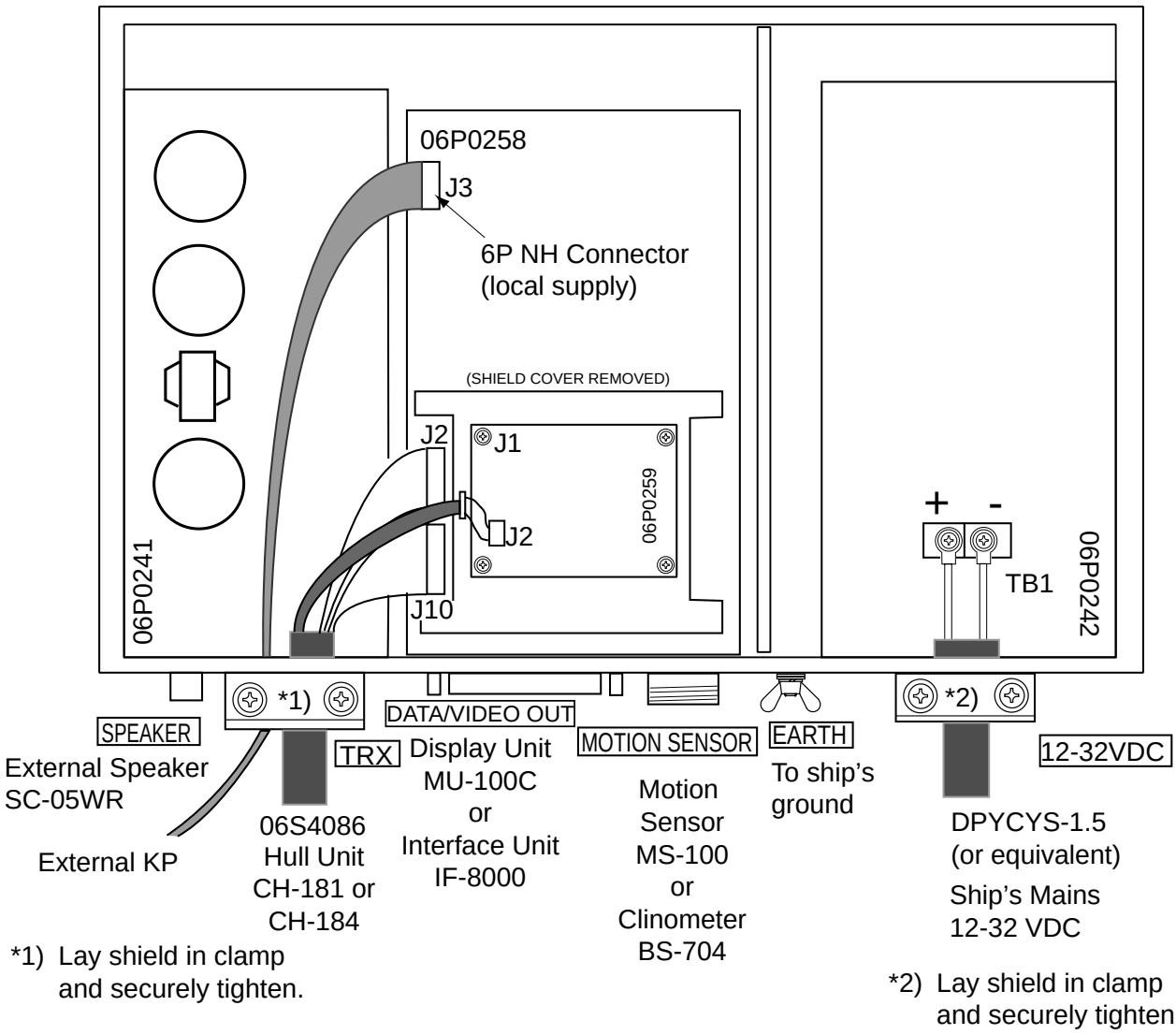
Note 2: A monitor (local supply) is required.

Note 3: a+b≦ 15m

2.2 Transceiver Unit

2.2.1 Wiring inside the transceiver unit

Detach the cover of the transceiver unit and connect cables as shown in the figure below. Remove the cover of the power terminal board to access connectors on that board.

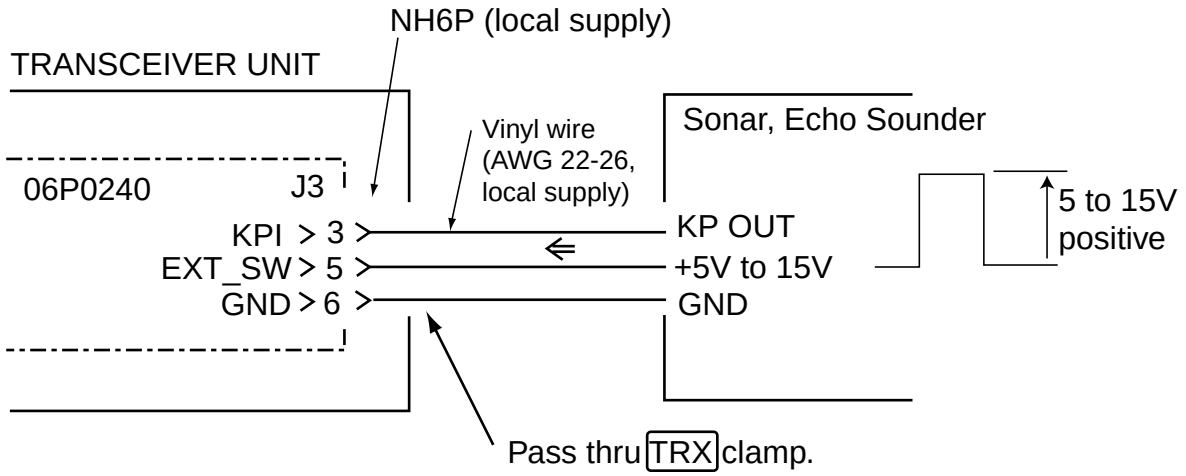


*1) Lay shield in clamp and securely tighten.

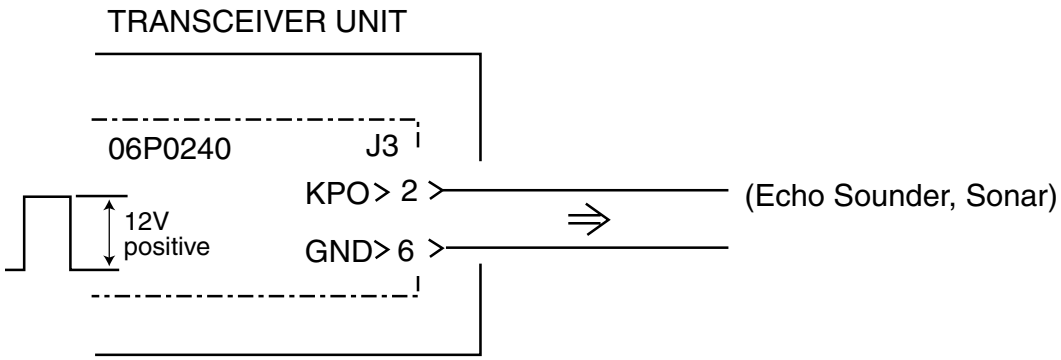
*2) Lay shield in clamp and securely tighten.

2.2.2 Synchronizing transmission with echo sounder or other sonar

To synchronize transmission of the CH-270 with an echo sounder or other sonar, wire the CH-270 as shown below. Also, see page 40 for how to set up to use external keying pulse.



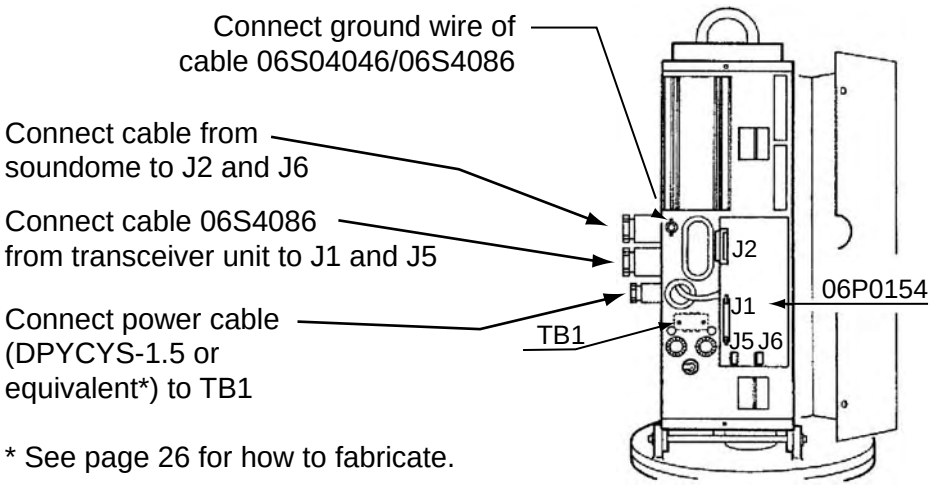
Note: To synchronize transmission of external echo sounder or other sonar with the CH-270, wire the CH-270 as shown below.



2.3 Hull Unit

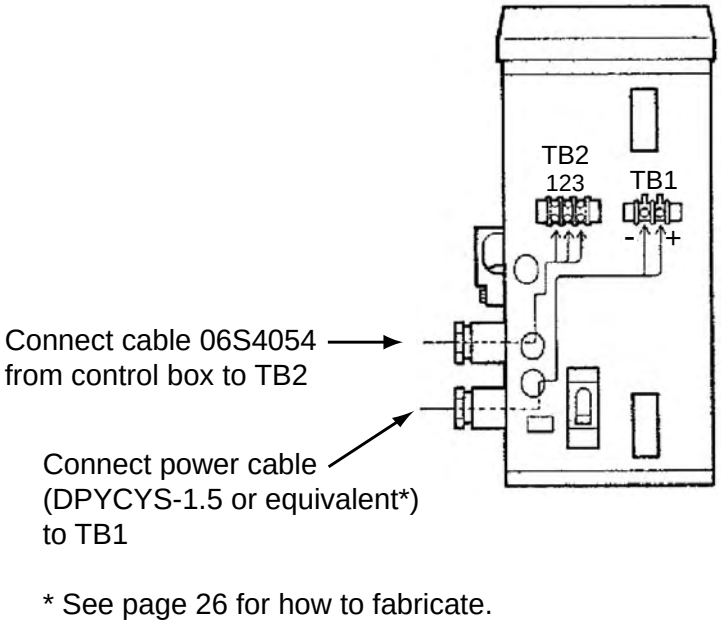
Hull unit CH-181

Open the cover of the control box on the hull unit and wire it as shown below.



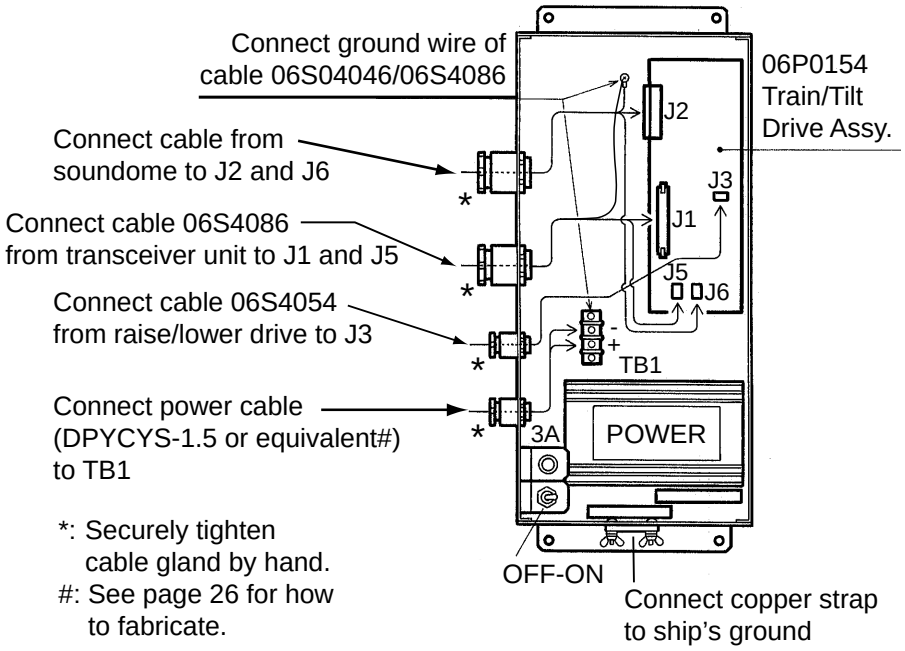
Hull unit CH-184

Open the cover of the hull unit CH-184 and wire it as shown below.

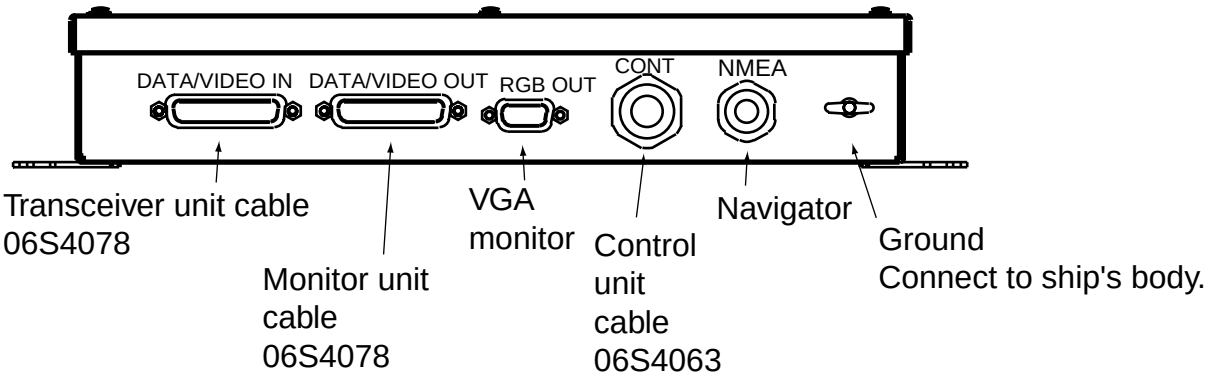


2.4 Control Box (for Hull Unit CH-184)

Open the cover of the Control Box and wire it as shown below.



2.5 Interface Unit



The blackbox-type system (monitor supplied locally) requires a standard VGA monitor, connected to the interface unit IF-8000. Supply monitor and interconnection cable locally. The recommended cable is type EVNPS05-50ft, male-female, max. 15 m, manufacturer Blackbox Japan, or equivalent. Attach a D-sub 15P connector to the cable.

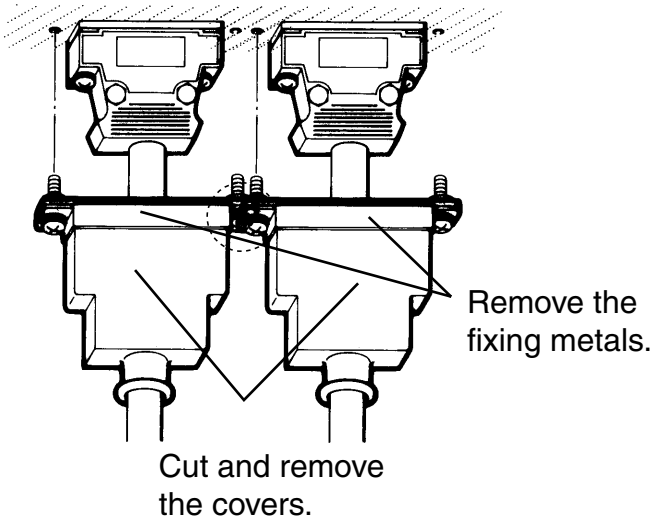
The monitor used should satisfy the specifications shown below.

- VGA type
- ANALOG RGB 0.7 Vpp, positive polarity
- TLL level H, V, negative polarity

Note 1: The D-sub connector has three rows of pins. Use 15 pins (two rows of pins are not used.)

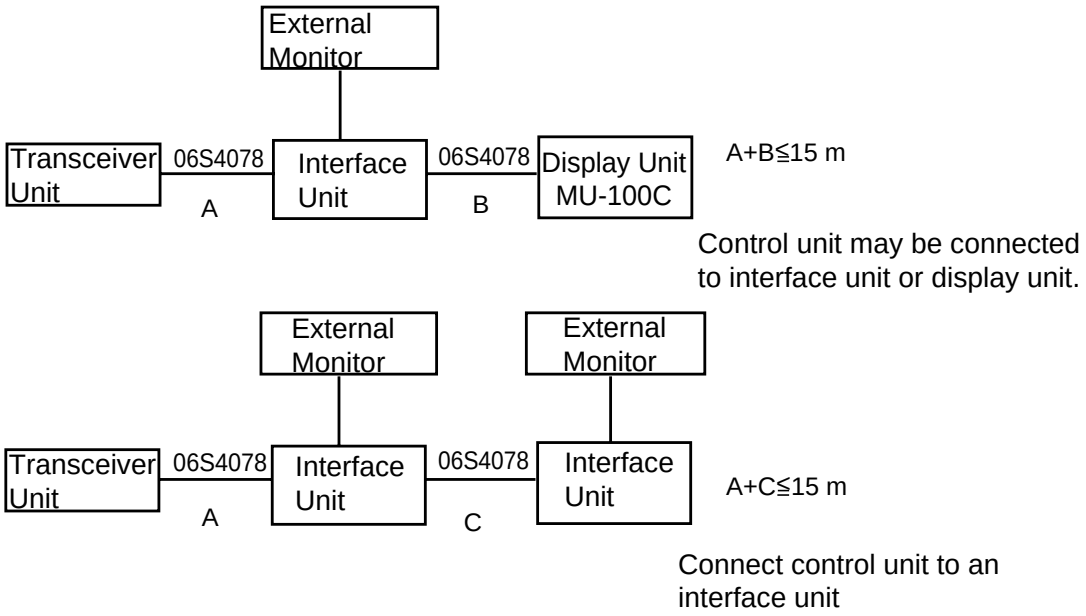
Note 2: Two interface units may be connected, in series.

Note 3: Cut and remove the rubber covers as below to attach connectors to the interface unit.



Note 4: The control unit or a navigator may be connected to either the display unit or the interface unit.

Note 5: When connecting the Display Unit MU-100C to the Interface Unit, or two interface units in parallel to the transceiver unit, the length of cables should be as shown below. Note that the length of two cables type 06S4078 cannot exceed 10 m each.



2.6 I/O Sentences

Talkers may be chosen from among GP, LC, LA, DR and DE and other (II). Refer to “NAV DATA” in System Setting 1 menu.

Available I/O sentences

Sentence	I/O	Remarks
GLL	I	Geographic position, latitude/longitude
GGA	I	Global positioning system fix data
RMA	I	Recommended minimum specific LORAN-C data
RMC	I	Recommended minimum specific GPS/TRANSIT data
VTG	I	Course over ground and ground speed
VHW	I	Water speed and heading, any talker
HDG	I	Heading, magnetic, any talker
HDM	I	Heading, magnetic, any talker
HDT	I	Heading, true, any talker
VDR	I	Set and drift, any talker
DBS	I	Depth below surface, any talker
DBT	I	Depth below transducer, any talker, NMEA Version 1.5
DPT	I	Depth, any talker, NMEA Version 2.0
MTW	I	Water temperature, any talker
MDA	I	Water temperature, any talker
TLL	O	Target latitude and longitude

3. ADJUSTMENTS

Turn on the power for the hull unit at the ship's mains switchboard. Press the [POWER] switch on the control unit. The language selection screen, shown below, appears the first time the power is turned on after completing the installation. English is selected; press the [MENU] key to escape.

Please set language.
([▲/▼]: Select, [MENU]: Enter)

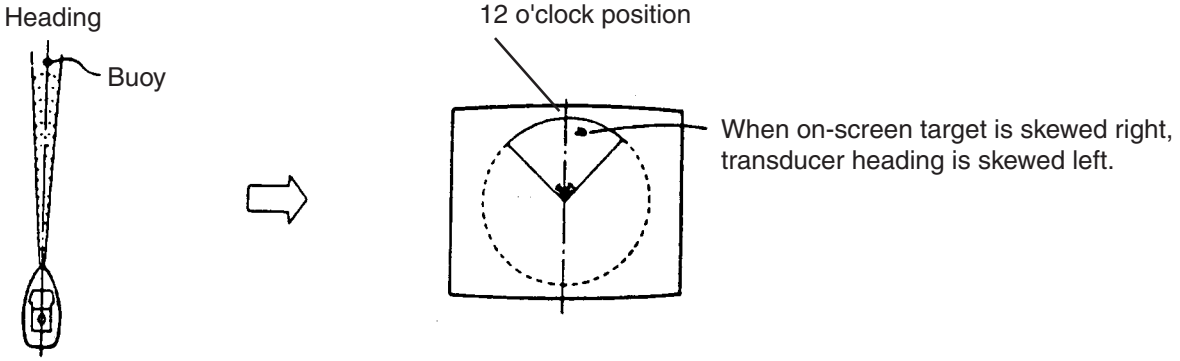
XXXX ... For Japanese Customer
XXXX

(Japanese)
English
Francais
Espanol
Italiano
Portugues
Dansk
Norsk
Svensk
Thai
Chinese
Vietnam

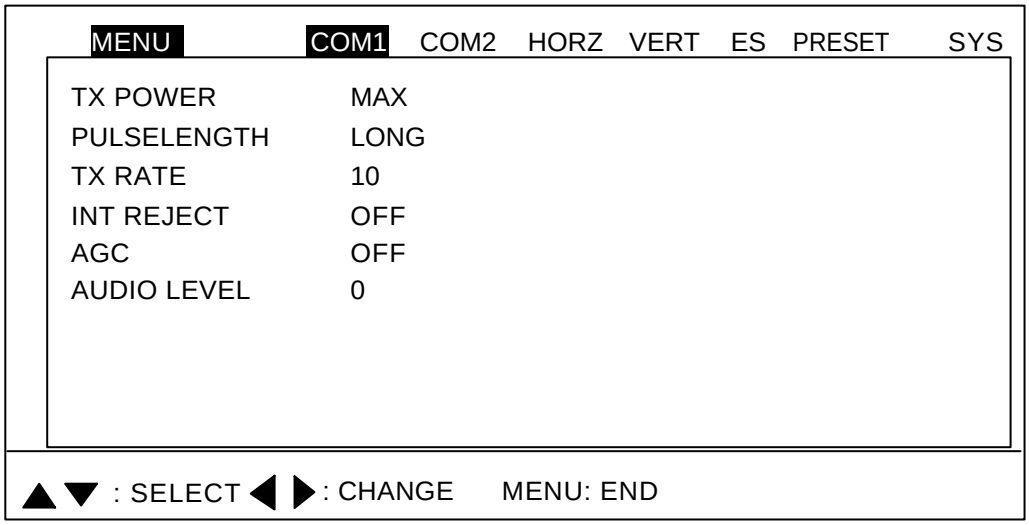
3.1 Heading Alignment and Draft Adjustments

The soundome assy., main body flange assy. and main shaft have been oriented toward the ship's bow. However, some fine alignment may be required. You can align the heading from the System menu, in the range of -180 to +180°. (Although the adjustment range is -180° to +180° be sure to align the tank guide with ship's fore and aft line.)

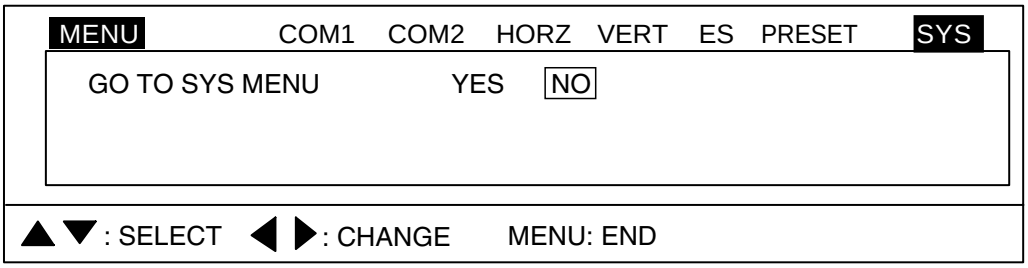
1. Locate a target (buoy, etc.) in the bow direction and display it on the screen at close range. Read the deviation. The heading alignment is correct when the target is displayed at 12 o'clock on the screen.



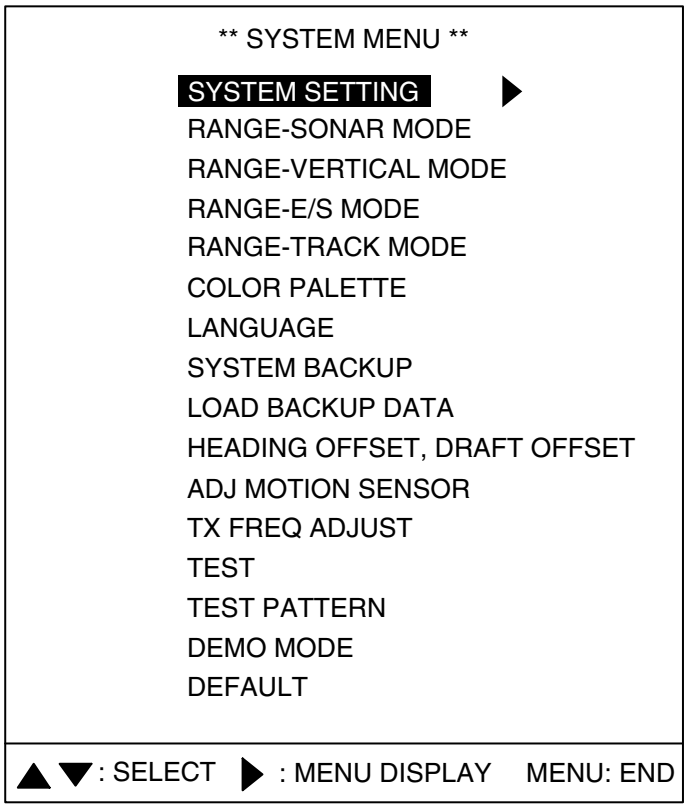
2. Press the [MENU] key to open the menu.



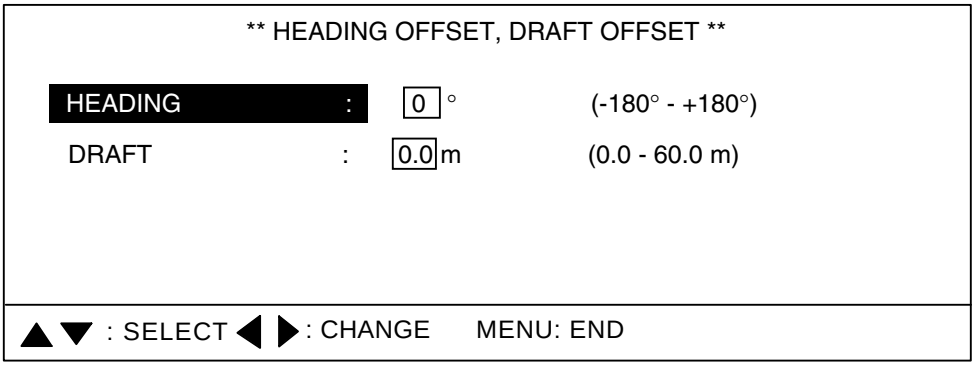
3. Operate the Omnipad to select “SYS” at the far right-hand side of the menu.



4. Press ▼ to choose GO TO SYS MENU.
5. Press ◄ to select YES to display the System menu.



6. Press ▼ to choose HEADING OFFSET, DRAFT OFFSET and then press ►.

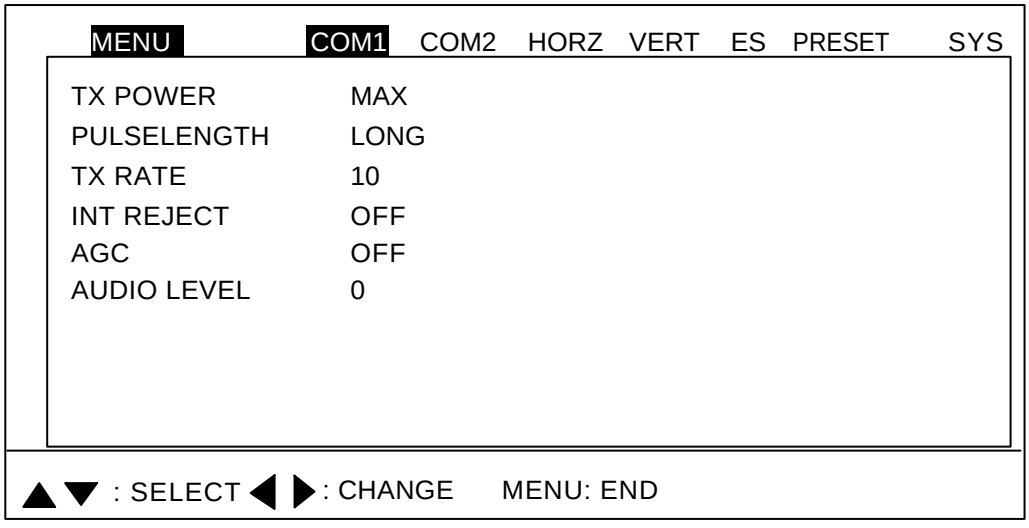


7. HEADING is selected; press ◄ or ► so that the target selected at step 1 appears at the twelve o'clock position.
8. Press ▼ to choose DRAFT.
9. Press ◄ or ► to set ship's draft.
10. Press the [MENU] key several times to close the menu.
11. Confirm that the target in the heading direction appears at the twelve o'clock position on the display.

3.2 Using External KP (Keying Pulse)

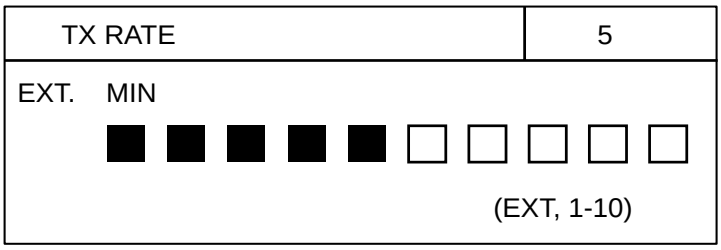
To synchronize transmission of the CH-270 with an echo sounder or other sonar, follow the procedure below. Also, see page 33 for wiring.

1. Press the [MENU] key to open the menu.
2. Operate the Omnipad to choose COM1 at the top of the screen.



3. Press ▼ to choose TX RATE.

4. Press ◄ to show the TX RATE dialog box.

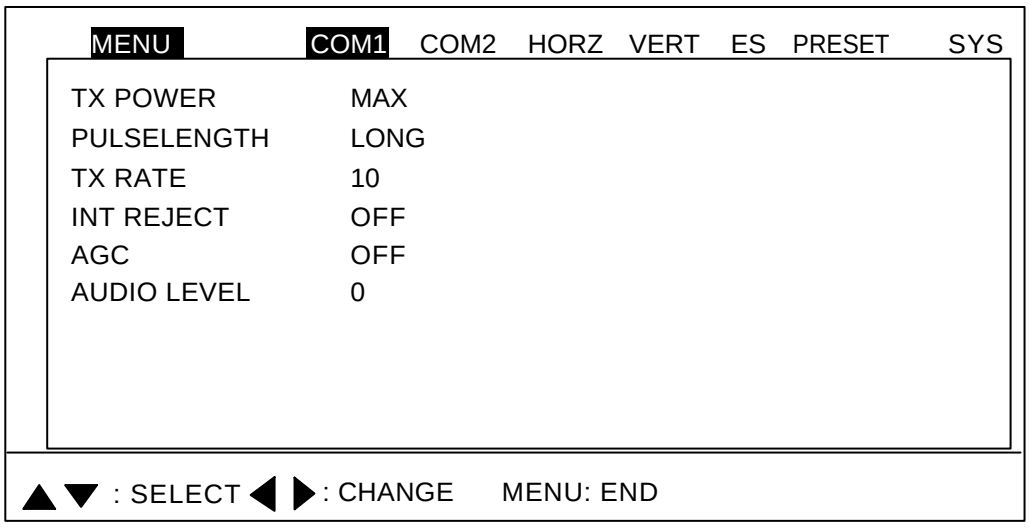


5. Press ◄ to display “EXT” in the sub window at top right-hand corner of the TX RATE dialog box.
6. Press the [MENU] key to close the menu.

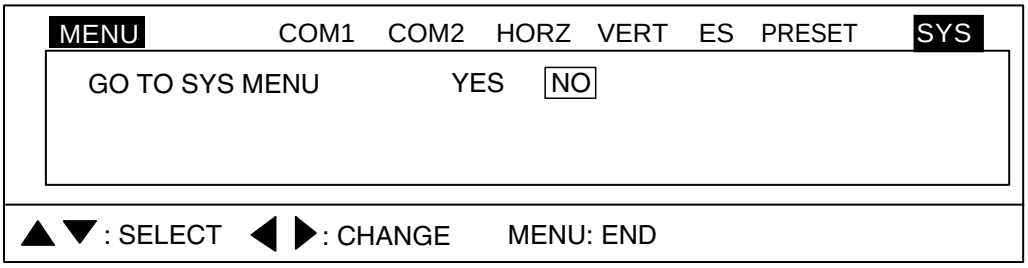
3.3 Adjusting the Motion Sensor, Clinometer

When the ship has a semi-permanent inclination, offset it as below to enable detection of motion by the motion sensor or clinometer. Turn on the CH-270 and wait one minute before setting.

1. Press the [MENU] key to open the menu.

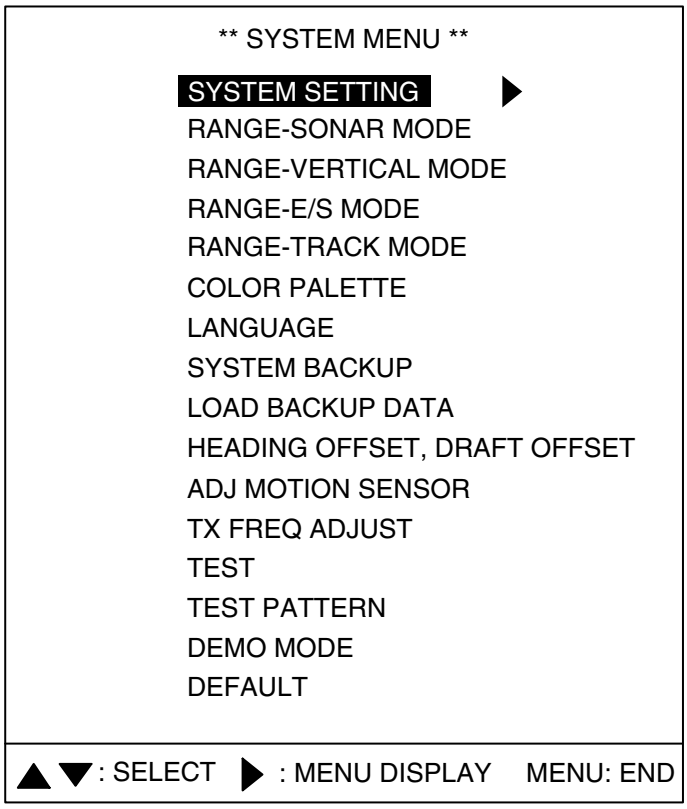


2. Operate the Omnipad to select “SYS” at the far right-hand side of the menu.

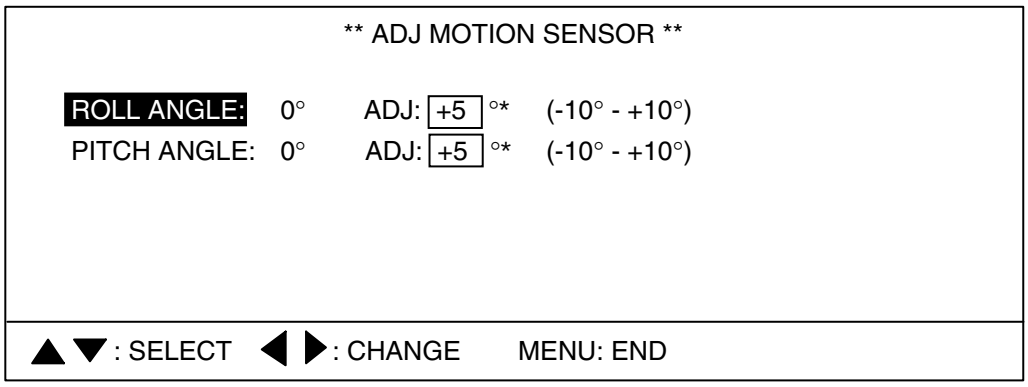


3. Press ▼ to choose GO TO SYS MENU.

4. Press ◄ to select YES to display the System menu.



5. Press ▼to choose ADJ MOTION SENSOR, and then press ► to display the ADJ MOTION SENSOR menu.

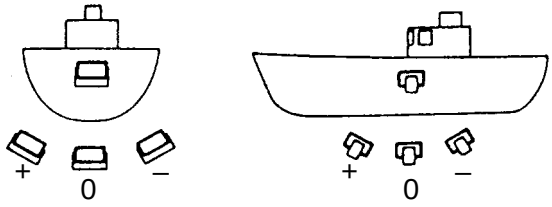


*: For Clinometer BS-704, tilt angle is displayed. For Motion Sensor MS-100, the readout is "0" (zero) when the ship is stopped, regardless of actual roll or pitch.

6. Press ▲ or ▼ to select ROLL ANGLE or PITCH ANGLE.
7. Press ◄ or ► to adjust (Adjustment range: -10° to +10°).

For Motion Sensor MS-100

Using a clinometer or similar device, measure ship's semi-permanent inclination angle. Polarity of the values represents ship's inclination. Take the polarity of the angle as follows: for example, if the stern is 3° down, set -3(°).



	+	–
ROLL ANGLE	Starboard up	Starboard down
PITCH ANGLE	Stern up	Stern down

For Clinometer BS-704

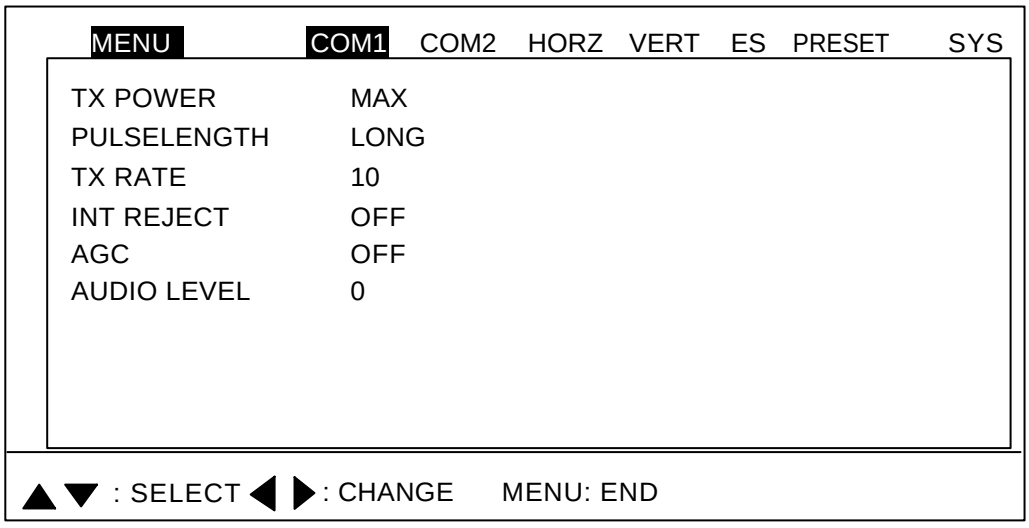
Adjust so that displayed roll and pitch angles become zero (0).

8. Press the [MENU] key several times to close the menu.

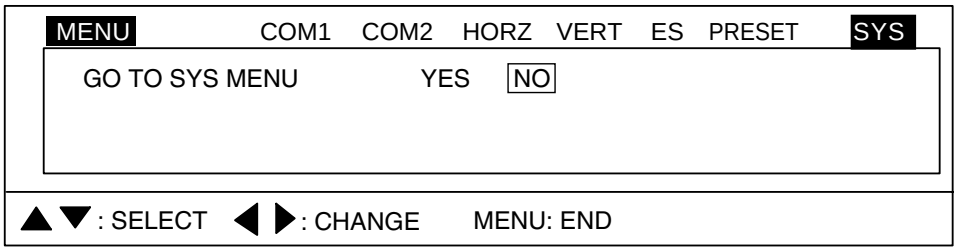
3.4 System Backup

After the equipment has been set up, follow the procedure below to back up system settings. Backup data can be loaded in the event of equipment trouble, to restore previous system settings.

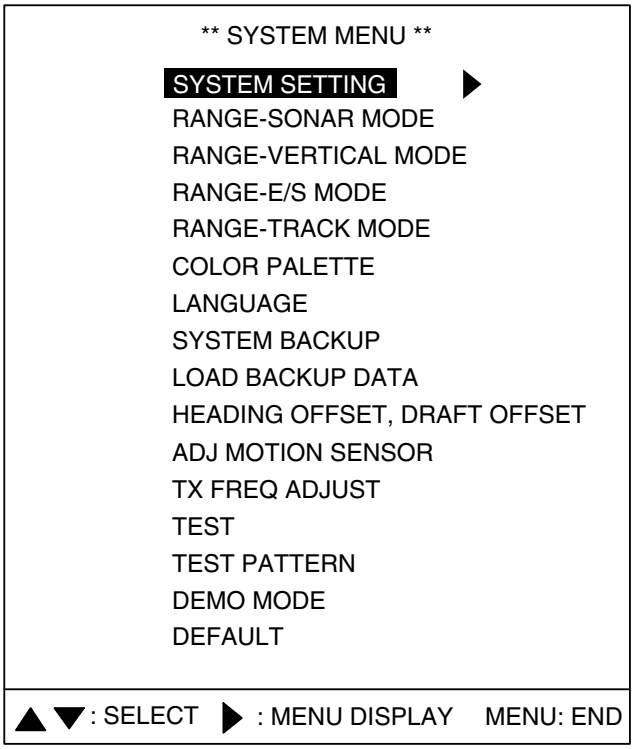
1. Press the [MENU] key to open the menu.



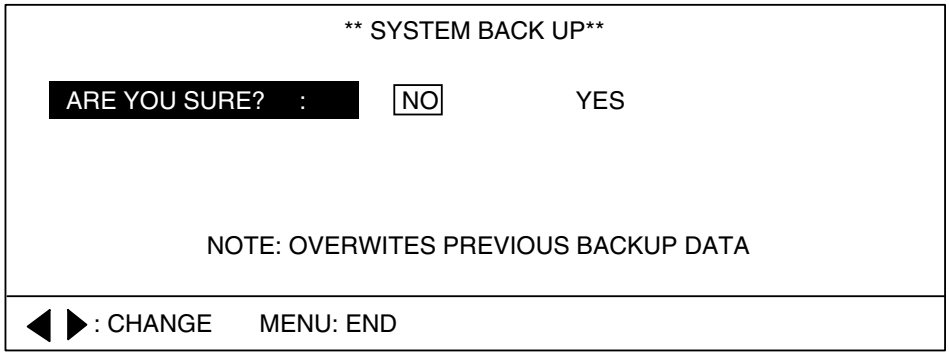
2. Operate the Omnipad to select “SYS” at the far right-hand side of the menu.



3. Press ▼ to choose GO TO SYS MENU.
4. Press ◄ to select YES to display the System menu.



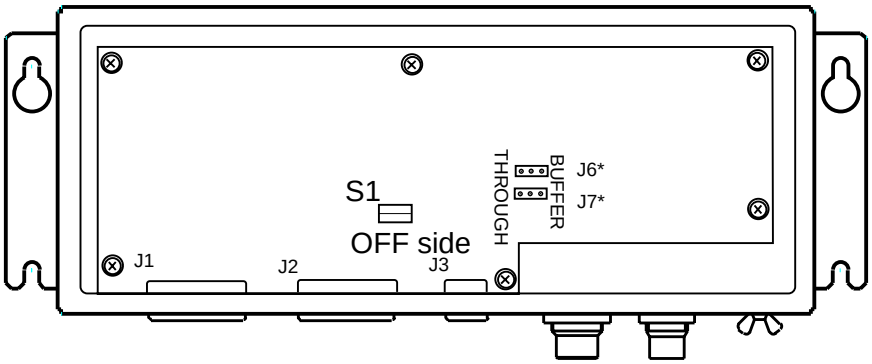
5. Press ▼ to select SYSTEM BACKUP.
6. Press ► to display the System Backup menu.



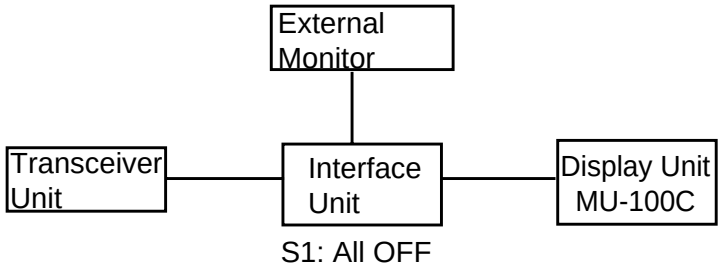
7. Press ► to choose YES.
8. Press the [MENU] key. The system loads backup data. After backup data has been loaded the System menu appears.
9. Press the [MENU] key to close the menu.

3.5 Setting of Interface Unit

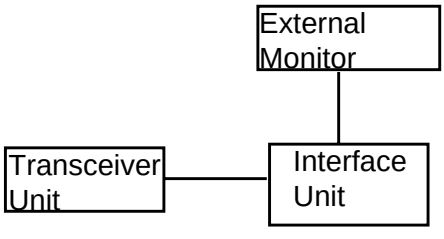
When the Display Unit MU-100C is connected to the DATA/VIDEO OUT port on the interface unit, turn OFF all switches on the DIP switch S1. If nothing is connected to the DATA/VIDEO OUT port, turn ON all switches on the DIP switch S1.



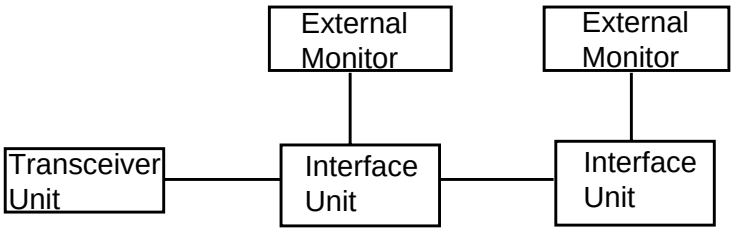
*: J6 and J7 should be set for "THROUGH" (default setting).



S1: All OFF



S1: All ON

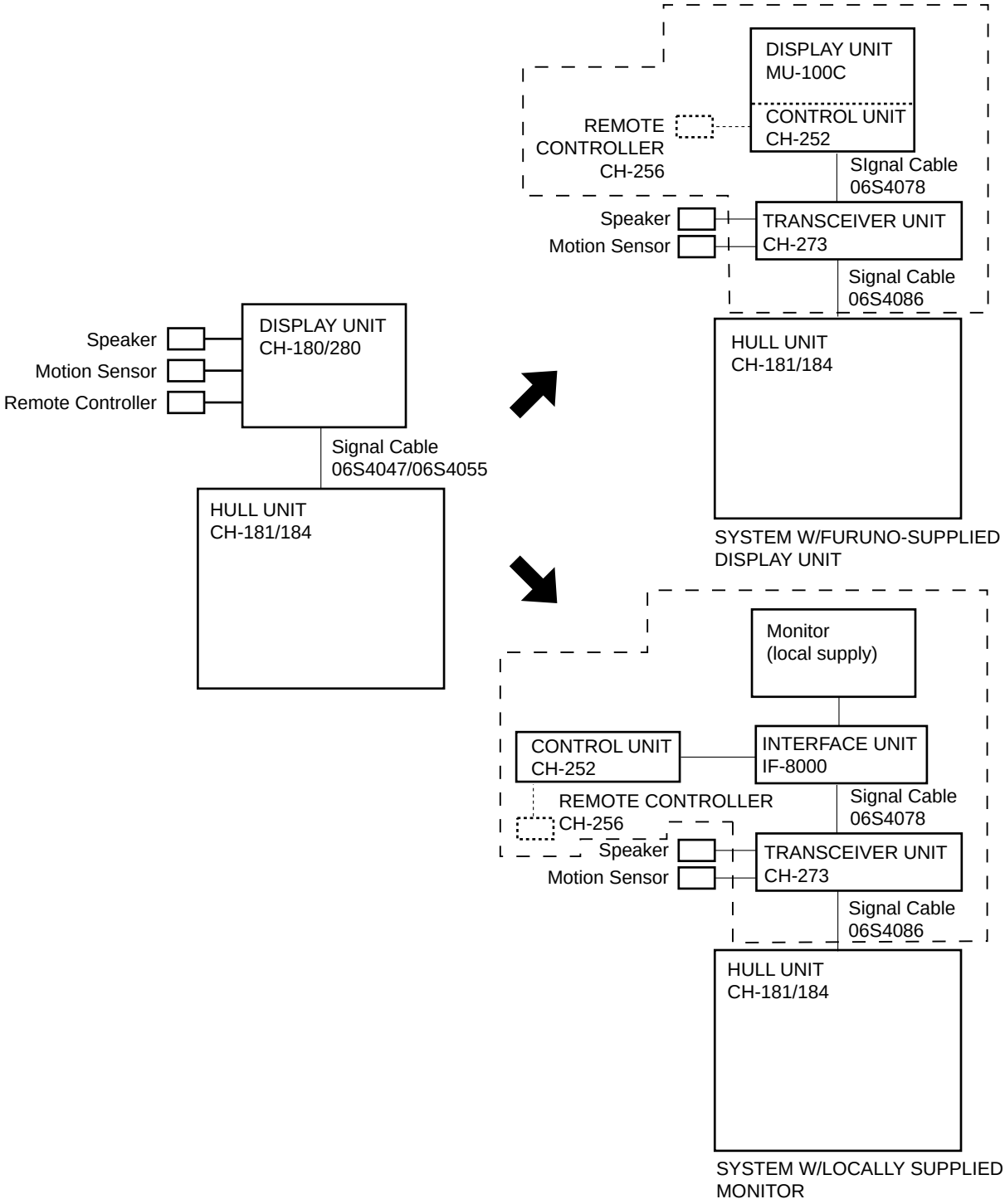


S1: All OFF S1: All ON

APPENDIX
Retrofitting CH-18/CH-28

This retrofit uses the existing hull unit. A display unit (FURUNO supplied or locally supplied), control unit and transceiver unit are newly installed.

Note: The maximum allowable speed with the transducer descended is 15 knots. Please explain this to the owner of the equipment.



Retrofit for system with FURUNO-supplied display unit

Previous Configuration	New Configuration
Display Unit CH-180/CH-280	Display Unit/Control Unit/Transceiver Unit MU-100C/CH-252/CH-273
Hull Unit↔Display Unit Signal Cable 06S4047/06S4055	Hull Unit↔Transceiver Unit Signal Cable 06S4086

Retrofit for system with locally supplied monitor

Previous Configuration	New Configuration
Display Unit CH-180/CH-280	Interface Unit/Control Unit/Transceiver Unit IF-8000/CH-252/CH-273
Hull Unit↔Display Unit Signal Cable 06S4047/06S4055	Hull Unit↔Transceiver Unit Signal Cable 06S4086

Notes

- Supply VGA monitor locally.
- The E/S Interface cannot be used.
- The existing speaker and motion sensor may be used, however Remote Controller CH-143/185 cannot be used. Use the optional Remote Controller CH-256.

Necessary parts for retrofitting

Integrated display unit, control unit

Name	Type	Code No.	Qty	Remarks
Transceiver Unit	CH-273	—	1	With SP06-01102
Control Unit/Display Unit	CH-252/MU-100C	—	1	With CP02-06600, FP02-05100, SP06-01101
Installation Materials	FV2-4, Blue	000-538-118	8	For transceiver unit
	06S4078*10 m*	000-142-900	1	For display unit, 10 m
	06S4078*5 m*	000-142-902		For display unit, 5 m
	06S4086*10 m*	000-146-974	1	For transceiver unit, 10 m
	06S4086*15 m*	000-146-975		For transceiver unit, 15 m
	06S4086*20 m*	000-146-976		For transceiver unit, 20 m
	06S4086*30 m*	000-146-977		For transceiver unit, 30 m

Blackbox type

Name	Type	Code No.	Qty	Remarks
Transceiver Unit	CH-273	—	1	With SP06-01102
Interface Unit	IF-8000	—	1	With SP06-01111
Control Unit	CH-252-15	—	1	With CP02-06610 (1.5 m cable) and FP06-01120
	CH-252-50	—		With CP02-06620 (5 m cable) and FP06-01120
Installation Materials	FV2-4, Blue	000-538-118	8	For transceiver unit
	06S4078*10 m*	000-142-900	1	For monitor, 10 m
	06S4078*5 m*	000-142-902		For monitor, 5m
	06S4086*10m*	000-146-974	1	For transceiver unit, 10 m
	06S4086*15 m*	000-146-975		For transceiver unit, 15 m
	06S4086*20 m*	000-146-976		For transceiver unit, 20 m
	06S4086*30 m*	000-146-977		For transceiver unit, 30 m

Installation and wiring

Refer to chapters 1 and 2 to install and wire the display unit, control unit, interface unit and transceiver unit.

Installation check

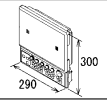
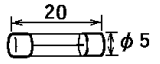
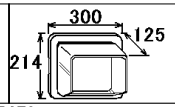
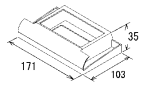
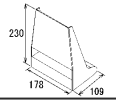
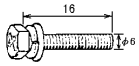
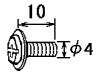
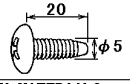
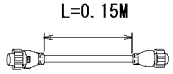
Run the diagnosis test to confirm proper operation, referring to the operator’s manual for the procedure.

PACKING LIST

06AS-X-9851 -5 1/1

CH-250/CH-270

A-1

NAME	OUTLINE	DESCRIPTION/CODE No.	Q'TY
ユニット UNIT			
操作／表示部 CONTROL/DISPLAY UNIT		CH252/MU100C 000-068-586-00 **	1
予備品 SPARE PARTS		**SP06-01101**	
ﾋｭｰｽﾞ FUSE GLASS TUBE TYPE		FGMB 125V 3A PBF 000-157-481-10	3
付属品 ACCESSORIES		**FP06-01102**	
ﾌｰﾄﾞｸﾐﾋﾝ HOOD ASSY.		FP06-01102 006-556-240-00	1
付属品 ACCESSORIES		**FP02-05101**	
ﾄﾘｯﾂｹﾀﾞｲ MOUNTING BASE		02-127-1301-1 ROHS 02-127-1301-1 100-285-141-10 100-285-141-00	1
ﾊﾝｶﾞｰ BRACKET		02-127-1302-1 ROHS 02-127-1302-1 100-285-151-10 100-285-151-00	1
+ｱﾌﾟｾｯﾄUIｾﾑｽB +HEX.BOLT		M6X16 SUS304 000-163-758-10	2
＋ﾊﾞｲﾝﾄﾞｾﾑｽF WASHER BINDING HEAD SCREW		M4X10 C2700W MBCR2 ﾋﾗ 000-163-543-10	4
+ﾄﾗｽﾀｯﾋﾟﾝﾈｼﾞ 1ｼｭ SELF-TAPPING SCREW		5X20 SUS304 000-162-608-10	4
工事材料 INSTALLATION MATERIALS		**CP02-06600**	
ｹｰﾌﾞﾙ組品MJ CABLE ASSY.		MJ-A10SPF0002-0015 000-142-879-00	1

注記）ｺｰﾄﾞ末尾に[**]の付いたﾕﾆｯﾄは代表の型式/ｺｰﾄﾞを表示しています。
DOUBLE ASTERISK DENOTES COMMONLY USED EQUIPMENT.

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.

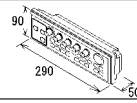
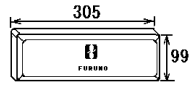
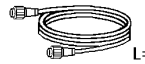
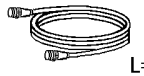
（略図の寸法は、参考値です。 DIMENSIONS IN DRAWING FOR REFERENCE ONLY.）

PACKING LIST

06AS-X-9853 -4 1/1

CH-250/CH-270(E)

A-2

NAME	OUTLINE	DESCRIPTION/CODE No.	Q'TY
ユニット UNIT			
操作部 CONTROL UNIT		CH-252 000-068-484-00 **	1
付属品 ACCESSORIES		**FP06-01410**	
ﾊｰﾄﾞｶﾊﾞｰ DISPLAY COVER		06-021-2121-1 ROHS 100-320-101-10	1
付属品 ACCESSORIES		FP06-01120 006-556-260-00	1
工事材料 INSTALLATION MATERIALS		**CP02-06610**	
ｹｰﾌﾞﾙ組品MJ CABLE ASSY.		MJ-A10SPF0002-015 000-142-878-00	1 (*)
工事材料 INSTALLATION MATERIALS		**CP02-06620**	
ｹｰﾌﾞﾙ組品MJ CABLE ASSY.		MJ-A10SPF0002-050 000-131-411-00	1 (*)

1.(*)印のｹｰﾌﾞﾙ組品は仕様により決定されます。
(*) MARKED CABLES ARE SELECTABLE.
2.ｺｰﾄﾞ番号末尾の[**]は、選択品の代表型式/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.

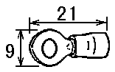
（略図の寸法は、参考値です。 DIMENSIONS IN DRAWING FOR REFERENCE ONLY.）

FURUNO

CODE NO.	006-559-570-00	06AT-X-9401 -1
TYPE	CP06-01301	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	圧着端子 CRIMP-ON LUG		FV2-4 CODE NO. 000-157-247-10	8	

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.）

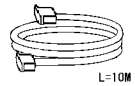
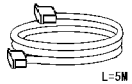
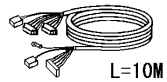
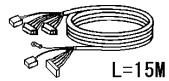
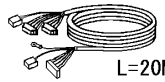
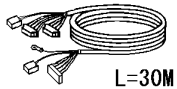
FURUNO

CODE NO.		06AT-X-9402 -0
TYPE		1/1

工事材料表

INSTALLATION MATERIALS

CH-270

番号 NO.	名称 NAME	略図 OUTLINE	型名／規格 DESCRIPTIONS	数量 Q'TY	用途／備考 REMARKS
1	ｹｰﾌﾞﾙ組品 CABLE ASSY.		06S4078 *10M* CODE NO. 000-142-900	1	選択　TO BE SELECTED
2	ｹｰﾌﾞﾙ組品 CABLE ASSY.		06S4078 *5M* CODE NO. 000-142-902	1	選択　TO BE SELECTED
3	ｹｰﾌﾞﾙ組品 CABLE ASSY.		06S4086 *10M* CODE NO. 000-146-974	1	選択　TO BE SELECTED
4	ｹｰﾌﾞﾙ組品 CABLE ASSY.		06S4086 *15M* CODE NO. 000-146-975	1	選択　TO BE SELECTED
5	ｹｰﾌﾞﾙ組品 CABLE ASSY.		06S4086 *20M* CODE NO. 000-146-976	1	選択　TO BE SELECTED
6	ｹｰﾌﾞﾙ組品 CABLE ASSY.		06S4086 *30M* CODE NO. 000-146-977	1	選択　TO BE SELECTED

06AT-X-9402

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

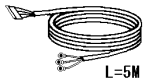
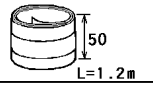
FURUNO

CODE NO.	006-573-730-00	06AL-X-9407 -1
TYPE	CP06-00403	1/1

工事材料表

INSTALLATION MATERIALS

CH-184

番号 NO.	名称 NAME	略図 OUTLINE	型名／規格 DESCRIPTIONS	数量 Q'TY	用途／備考 REMARKS
1	ｹｰﾌﾞﾙ組品 CABLE ASSY.		06S4054-1 *5M* CODE NO. 000-122-879-00	1	
2	ｱｰｽ板 COPPER STRAP		WEA-1004-0 ROHS CODE NO. 500-310-040-10	1	

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

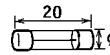
TWO TYPES AND CODES MAY BE LISTED FOR AN ITEM. THE LOWER PRODUCT MAY BE SHIPPED IN PLACE OF THE UPPER PRODUCT.
QUALITY IS THE SAME.

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

FURUNO

CODE NO.	006-556-210	06AS-X-9302 -2 1/1
TYPE	SP06-01102	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 FUSE		FGMB 125V 10A PBF			3	000-157-470

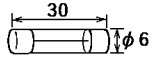
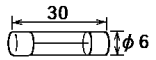
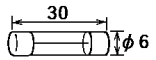
MFR'S NAME	FURUNO ELECTRIC CO.,LTD.	DWG NO.	06AS-X-9302	1/1

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

FURUNO

CODE NO.	006-559-590-00	06AT-X-9301 -2 1/1
TYPE	SP06-01201	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	ﾎﾞｰﾙﾚﾝﾁ BALL WRENCH		TWB-25			1	000-162-555-10
2	ﾋｭｰｽﾞ FUSE		FGBO-A 125V 3A PBF			3	000-155-850-10
3	ﾋｭｰｽﾞ FUSE		FGBO 125V 7A PBF			3	000-155-831-10
4	ﾋｭｰｽﾞ FUSE		FGBO-A 125V 4A PBF			3	000-155-851-10

MFR'S NAME	FURUNO ELECTRIC CO.,LTD.	DWG NO.	06AT-X-9301	1/1

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

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

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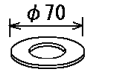
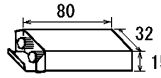
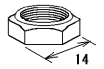
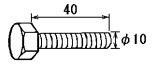
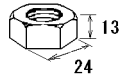
FURUNO

CODE NO.	006-546-420-00	06AL-X-9408 -8
TYPE	CH-1815-11	1/3

現地組部品
LOCAL ASSEMBLING PARTS

番号 NO.	名称 NAME	略図 OUTLINE	型名／規格 DESCRIPTIONS	数量 Q'TY	用途／備考 REMARKS
1	止めﾅｯﾄ LOCK NUT		06-013-2401-0 ROHS CODE NO. 100-098-730-10	1	
2	廻り止め用座金 STOPPER WASHER		06-013-2402-0 ROHS CODE NO. 100-098-740-10	1	
3	ﾄﾞｰﾑ抜き用当て板 ATTACHMENT PLATE		06-013-2701-1 CODE NO. 100-099-170-00	2	
4	ｾﾒﾀﾞｲﾝﾊｲｽｰﾊﾟｰ CEMEDINE HIGH SUPER		6Gｾｯﾄ CODE NO. 000-856-520-00	1	
5	Uﾅｯﾄ U-NUT		M10 SUS CODE NO. 000-167-533-10	2	
6	ﾊﾞﾈ座金 SPRING WASHER		M10 SUS304 CODE NO. 000-167-233-10	2	
7	六角ﾎﾞﾙﾄ HEX.BOLT		M10X40 SUS304 CODE NO. 000-162-787-10	2	
8	ﾊﾞﾈ座金 SPRING WASHER		M16 SUS304 CODE NO. 000-167-400-10	8	
9	ﾐｶﾞｷﾏﾙ平座金 FLAT WASHER		M16 SUS304 CODE NO. 000-167-448-10	16	
10	六角ﾅｯﾄ 1ｼｭ HEX. NUT		M16 SUS304 CODE NO. 000-167-474-10	16	

*1印は組み立て済みです。
*1. ASSEMBLED AT. FACTORY.

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

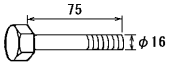
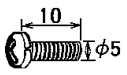
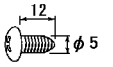
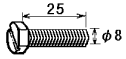
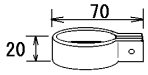
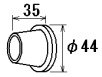
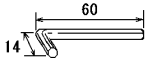
型式/ｺｰﾄﾞ番号が２段の場合、下段より上段に代わる過渡期品でどちらかが入っています。 なお、品質は変わりません。

TOW TYPES AND CODES MAY BE LISTED. THE BOTTOM PRODCT MAY BE SHIPPED IN PLACE OF THE TOP PRODUCT. QUALITY THE SAME.

FURUNO

CODE NO.	006-546-420-00	06AL-X-9408 -8
TYPE	CH-1815-11	2/3

現地組部品
LOCAL ASSEMBLING PARTS

番号 NO.	名称 NAME	略図 OUTLINE	型名／規格 DESCRIPTIONS	数量 Q'TY	用途／備考 REMARKS
11	六角ﾎﾞﾙﾄ HEX.BOLT		M16X75 SUS304 CODE NO. 000-162-823-10	8	
12	六角穴付止めﾈｼﾞ SOCKET SET SCREW		M4X5 SUS CODE NO. 000-162-702-10	1	
13	+ｰﾅﾍﾞｾﾑｽA WASHER HEAD SCREW A		M5X10 C2700W MBN12 CODE NO. 000-163-178-10	1	
14	+ﾄﾗｽｺﾈｼﾞ*M* +PAN HEAD SCREW		M5X12 SUS304 CODE NO. 000-163-788-10	10	
15	バネ座金 SPRING WASHER		M8 SUS304 CODE NO. 000-167-410-10	1	
16	六角ﾅｯﾄ 1ｼｭ HEX.NUT		M8 SUS304 CODE NO. 000-167-479-10	1	
17	六角ｽﾘﾜﾘ ﾎﾞﾙﾄ HEX.BOLT		M8X25 SUS304 CODE NO. 000-162-921-10	1	
18	抜止め金具 STOPPER		SHN-0003-2 ROHS CODE NO. 661-400-032-10	1	
19	ﾊﾟｲﾌﾟｷｬｯﾌﾟ PIPE CAP		SHN-0011-1 ROHS CODE NO. 661-400-111-10	1	
20	六角ﾚﾝﾁ HEX.WRENCH		ﾀｲﾍﾝ 2MM CODE NO. 000-830-108-00	1	

*1印は組み立て済みです。
*1. ASSEMBLED AT. FACTORY.

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

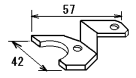
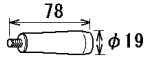
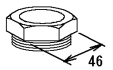
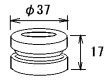
型式/ｺｰﾄﾞ番号が２段の場合、下段より上段に代わる過渡期品でどちらかが入っています。 なお、品質は変わりません。

TOW TYPES AND CODES MAY BE LISTED. THE BOTTOM PRODCT MAY BE SHIPPED IN PLACE OF THE TOP PRODUCT. QUALITY THE SAME.

FURUNO

CODE NO.	006-546-420-00	06AL-X-9408 -8
TYPE	CH-1815-11	3/3

現地組部品
LOCAL ASSEMBLING PARTS

番号 NO.	名称 NAME	略図 OUTLINE	型名／規格 DESCRIPTIONS	数量 Q'TY	用途／備考 REMARKS
21	手動ﾊﾝﾄﾞﾙ HAND CRANK		06-013-2601-0 ROHS CODE NO. 100-098-770-10	1	*1
22	回転ｸﾞﾘｯﾌﾟ GRIP		GTR-19XM6 CODE NO. 000-808-457-00	1	*1
23	ﾊﾞﾈ座金 SPRING WASHER		M6 SUS304 CODE NO. 000-158-855-10	1	*1
24	六角ﾅｯﾄ 1ｼｭ HEX.NUT		M6 SUS304 CODE NO. 000-158-856-10	1	*1
25	締付ｸﾞﾗﾝﾄﾞ GLAND		06-008-1031-0 CODE NO. 100-028-520-00	1	締付ｸﾞﾗﾝﾄﾞ用 FOR CABLE GLAND
26	座金 WASHER		06-011-2111-0 ROHS 06-011-2111-0 CODE NO. 100-057-940-10 100-057-940-00	2	締付ｸﾞﾗﾝﾄﾞ用 FOR CABLE GLAND
27	ﾊﾟｯｷﾝ PACKING		06-011-2209-1 ROHS 06-011-2209-1 CODE NO. 100-306-171-10 100-306-171-00	1	締付ｸﾞﾗﾝﾄﾞ用 FOR CABLE GLAND

*1印は組み立て済みです。
*1. ASSEMBLED AT. FACTORY.

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

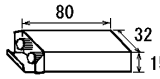
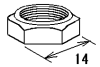
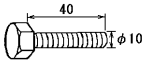
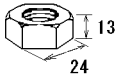
型式/ｺｰﾄﾞ番号が２段の場合、下段より上段に代わる過渡期品でどちらかが入っています。 なお、品質は変わりません。

TOW TYPES AND CODES MAY BE LISTED. THE BOTTOM PRODCT MAY BE SHIPPED IN PLACE OF THE TOP PRODUCT. QUALITY THE SAME.

FURUNO

CODE NO.	006-546-380-00	06AL-X-9410 -5
TYPE	CH-1845-11	1/3

現地組部品
LOCAL ASSEMBLING PARTS

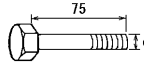
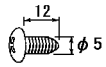
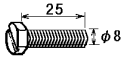
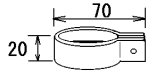
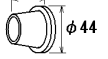
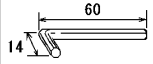
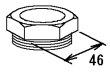
番号 NO.	名称 NAME	略図 OUTLINE	型名／規格 DESCRIPTIONS	数量 Q'TY	用途／備考 REMARKS
1	止めﾅｯﾄ LOCK NUT		06-013-2401-0 ROHS CODE NO. 100-098-730-10	1	
2	廻り止め用座金 STOPPER WASHER		06-013-2402-0 ROHS CODE NO. 100-098-740-10	1	
3	ﾄﾞｰﾑ抜き用当て板 ATTACHMENT PLATE		06-013-2701-1 CODE NO. 100-099-170-00	2	
4	ｾﾒﾀﾞｲﾝﾊｲｽｰﾊﾟｰ CEMEDINE HIGH SUPER		6Gｾｯﾄ CODE NO. 000-856-520-00	1	
5	Uﾅｯﾄ U-NUT		M10 SUS CODE NO. 000-167-533-10	2	
6	ﾊﾞﾈ座金 SPRING WASHER		M10 SUS304 M10 SUS304 CODE NO. 000-167-233-10 000-864-261-00	2	
7	六角ﾎﾞﾙﾄ HEX.BOLT		M10X40 SUS304 CODE NO. 000-162-787-10	2	
8	ﾊﾞﾈ座金 SPRING WASHER		M16 SUS304 CODE NO. 000-167-400-10	8	
9	ﾐｶﾞｷ平座金 FLAT WASHER		M16 SUS304 CODE NO. 000-167-448-10	16	
10	六角ﾅｯﾄ 1ｼｭ HEX. NUT		M16 SUS304 CODE NO. 000-167-474-10	16	

（略図の寸法は、参考値です。 DIMENSIONS IN DRAWING FOR REFERENCE ONLY.）
型式/ｺｰﾄﾞ番号が２段の場合、下段より上段に代わる過渡期品でどちらかが入っています。 なお、品質は変わりません。
TOW TYPES AND CODES MAY BE LISTED. THE BOTTOM PRODCT MAY BE SHIPPED IN PLACE OF THE TOP PRODUCT. QUALITY THE SAME.

FURUNO

CODE NO.	006-546-380-00	06AL-X-9410 -5
TYPE	CH-1845-11	2/3

現地組部品
LOCAL ASSEMBLING PARTS

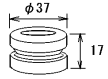
番号 NO.	名称 NAME	略図 OUTLINE	型名／規格 DESCRIPTIONS	数量 Q'TY	用途／備考 REMARKS
11	六角ﾎﾞﾙﾄ HEX.BOLT		M16X75 SUS304 CODE NO. 000-162-823-10	8	
12	六角穴付止めﾈｼﾞ SOCKET SET SCREW		M4X5 SUS CODE NO. 000-162-702-10	1	
13	+ﾄﾗｽｺﾈｼﾞ *ﾐﾘ* +PAN HEAD SCREW		M5X12 SUS304 CODE NO. 000-163-788-10	10	
14	ﾊﾞﾈ座金 SPRING WASHER		M8 SUS304 CODE NO. 000-167-410-10	1	
15	六角ﾅｯﾄ 1ｼｭ HEX.NUT		M8 SUS304 CODE NO. 000-167-479-10	1	
16	六角ｽﾘﾜﾘ ﾎﾞﾙﾄ HEX.BOLT		M8X25 SUS304 CODE NO. 000-162-921-10	1	
17	抜止め金具 STOPPER		SHN-0003-2 ROHS SHN-0003-2 CODE NO. 661-400-032-10 661-400-032-00	1	
18	ﾊﾟｲﾌﾟｷｬｯﾌﾟ PIPE CAP		SHN-0011-1 ROHS CODE NO. 661-400-111-10	1	
19	六角ﾚﾝﾁ HEX.WRENCH		ﾀｲﾍﾝ 2MM CODE NO. 000-830-108-00	1	
20	締付ｸﾞﾗﾝﾄﾞ GLAND		06-008-1031-0 CODE NO. 100-028-520-00	1	締付ｸﾞﾗﾝﾄﾞ用 FOR CABLE GLAND

（略図の寸法は、参考値です。 DIMENSIONS IN DRAWING FOR REFERENCE ONLY.）
型式/ｺｰﾄﾞ番号が２段の場合、下段より上段に代わる過渡期品でどちらかが入っています。 なお、品質は変わりません。
TOW TYPES AND CODES MAY BE LISTED. THE BOTTOM PRODCT MAY BE SHIPPED IN PLACE OF THE TOP PRODUCT. QUALITY THE SAME.

FURUNO

CODE NO.	006-546-380-00	06AL-X-9410 -5
TYPE	CH-1845-11	3/3

現地組部品
LOCAL ASSEMBLING PARTS

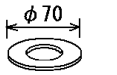
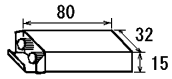
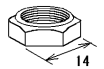
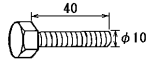
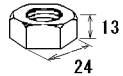
番号 NO.	名称 NAME	略図 OUTLINE	型名／規格 DESCRIPTIONS		数量 Q'TY	用途／備考 REMARKS
21	座金 WASHER		06-011-2111-0 ROHS		2	締付ｸﾞﾗﾝﾄﾞ用 FOR CABLE GLAND
			06-011-2111-0			
			CODE NO.	100-057-940-10		
				100-057-940-00		
22	ﾊﾟｯｷﾝ PACKING		06-011-2209-1 ROHS		1	締付ｸﾞﾗﾝﾄﾞ用 FOR CABLE GLAND
			06-011-2209-1			
			CODE NO.	100-306-171-10		
				100-306-171-00		

（略図の寸法は、参考値です。 DIMENSIONS IN DRAWING FOR REFERENCE ONLY.）
型式/ｺｰﾄﾞ番号が２段の場合、下段より上段に代わる過渡期品でどちらかが入っています。 なお、品質は変わりません。
TOW TYPES AND CODES MAY BE LISTED. THE BOTTOM PRODCT MAY BE SHIPPED IN PLACE OF THE TOP PRODUCT. QUALITY THE SAME.

FURUNO

CODE NO.	006-546-410-00	06AL-X-9411 -5
TYPE	CH-1845-22	1/2

現地組部品
LOCAL ASSEMBLING PARTS

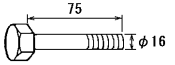
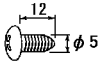
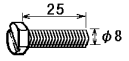
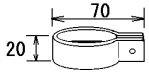
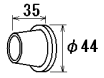
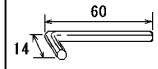
番号 NO.	名称 NAME	略図 OUTLINE	型名／規格 DESCRIPTIONS		数量 Q'TY	用途／備考 REMARKS
1	止めﾅｯﾄ LOCK NUT		06-013-2401-0 ROHS		1	
			CODE NO.	100-098-730-10		
2	廻り止め用座金 STOPPER WASHER		06-013-2402-0 ROHS		1	
			CODE NO.	100-098-740-10		
3	ﾄﾞｰﾑ抜き用当て板 ATTACHMENT PLATE		06-013-2701-1		2	
			CODE NO.	100-099-170-00		
4	ｾﾒﾀﾞｲﾝﾊｲｽｰﾊﾟｰ CEMEDINE HIGH SUPER		6Gｾｯﾄ		1	
			CODE NO.	000-856-520-00		
5	Uﾅｯﾄ U-NUT		M10 SUS		2	
			CODE NO.	000-167-533-10		
6	ﾊﾞﾈ座金 SPRING WASHER		M10 SUS304		2	
			M10 SUS304			
			CODE NO.	000-167-233-10		
				000-864-261-00		
7	六角ﾎﾞﾙﾄ HEX.BOLT		M10X40 SUS304		2	
			CODE NO.	000-162-787-10		
8	ﾊﾞﾈ座金 SPRING WASHER		M16 SUS304		8	
			CODE NO.	000-167-400-10		
9	ﾐｶﾞｷ平座金 FLAT WASHER		M16 SUS304		16	
			CODE NO.	000-167-448-10		
10	六角ﾅｯﾄ 1ｼｭ HEX. NUT		M16 SUS304		16	
			CODE NO.	000-167-474-10		

（略図の寸法は、参考値です。 DIMENSIONS IN DRAWING FOR REFERENCE ONLY.）
型式/ｺｰﾄﾞ番号が２段の場合、下段より上段に代わる過渡期品でどちらかが入っています。 なお、品質は変わりません。
TOW TYPES AND CODES MAY BE LISTED. THE BOTTOM PRODCT MAY BE SHIPPED IN PLACE OF THE TOP PRODUCT. QUALITY THE SAME.

FURUNO

CODE NO.	006-546-410-00	06AL-X-9411 -5
TYPE	CH-1845-22	2/2

現地組部品
LOCAL ASSEMBLING PARTS

番号 NO.	名称 NAME	略図 OUTLINE	型名／規格 DESCRIPTIONS	数量 Q'TY	用途／備考 REMARKS
11	六角ﾎﾞﾙﾄ HEX.BOLT		M16X75 SUS304 CODE NO. 000-162-823-10	8	
12	六角穴付止めﾈｼﾞ SOCKET SET SCREW		M4X5 SUS CODE NO. 000-162-702-10	1	
13	+ﾄﾗｽｺﾈｼﾞ*M* +PAN HEAD SCREW		M5X12 SUS304 CODE NO. 000-163-788-10	10	
14	バネ座金 SPRING WASHER		M8 SUS304 CODE NO. 000-167-410-10	1	
15	六角ﾅｯﾄ 1ｼｭ HEX.NUT		M8 SUS304 CODE NO. 000-167-479-10	1	
16	六角ｽﾘﾜﾘ ﾎﾞﾙﾄ HEX.BOLT		M8X25 SUS304 CODE NO. 000-162-921-10	1	
17	抜止め金具 STOPPER		SHN-0003-2 ROHS SHN-0003-2 CODE NO. 661-400-032-10 661-400-032-00	1	
18	ﾊﾟｲﾌﾟｷｬｯﾌﾟ PIPE CAP		SHN-0011-1 ROHS CODE NO. 661-400-111-10	1	
19	六角ﾚﾝﾁ HEX.WRENCH		ﾀｲﾍﾝ 2MM CODE NO. 000-830-108-00	1	

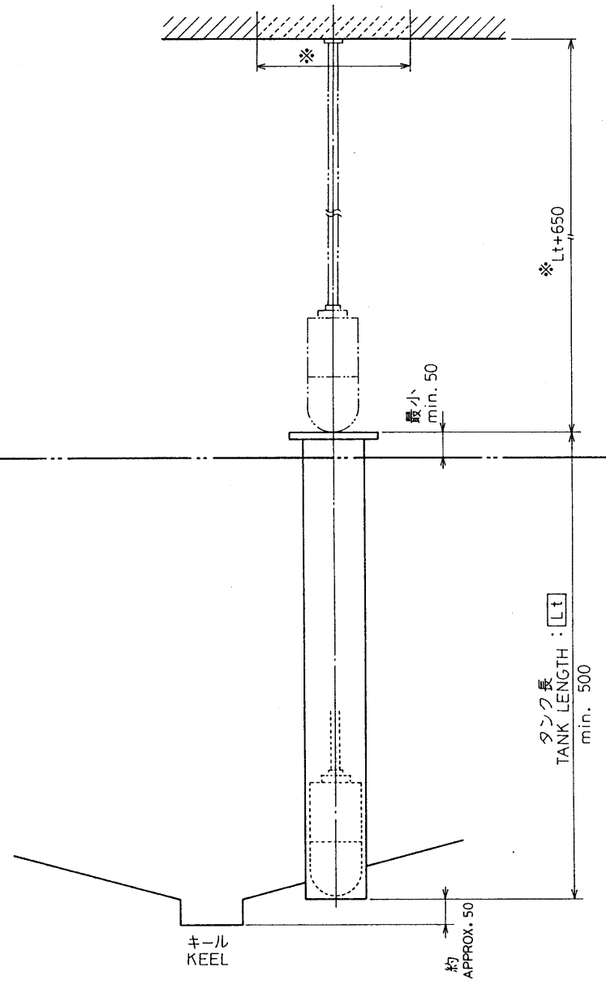
（略図の寸法は、参考値です。 DIMENSIONS IN DRAWING FOR REFERENCE ONLY.）
型式/ｺｰﾄﾞ番号が２段の場合、下段より上段に代わる過渡期品でどちらかが入っています。 なお、品質は変わりません。
TOW TYPES AND CODES MAY BE LISTED. THE BOTTOM PRODCT MAY BE SHIPPED IN PLACE OF THE TOP PRODUCT. QUALITY THE SAME.

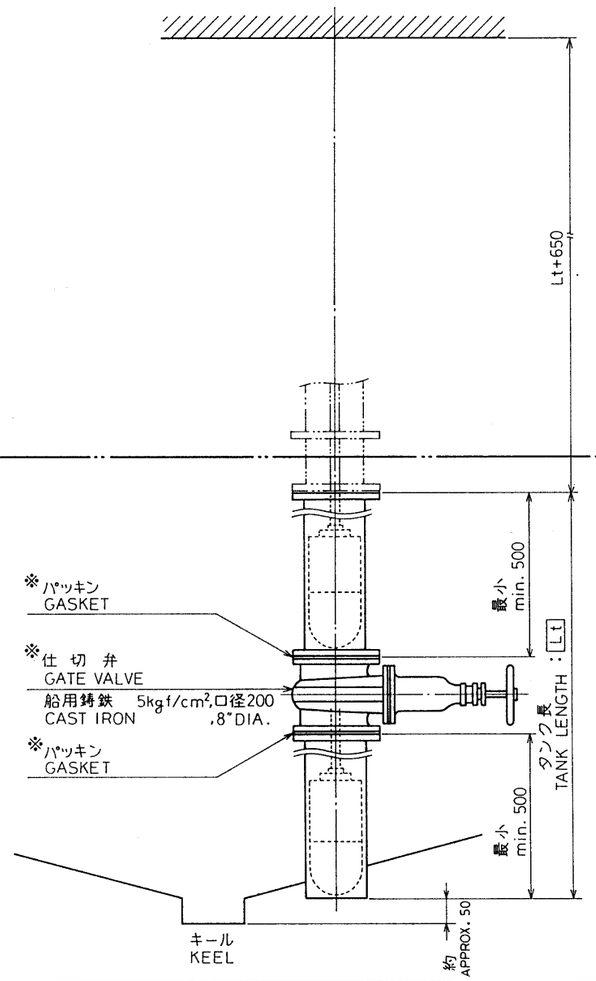
FURUNO

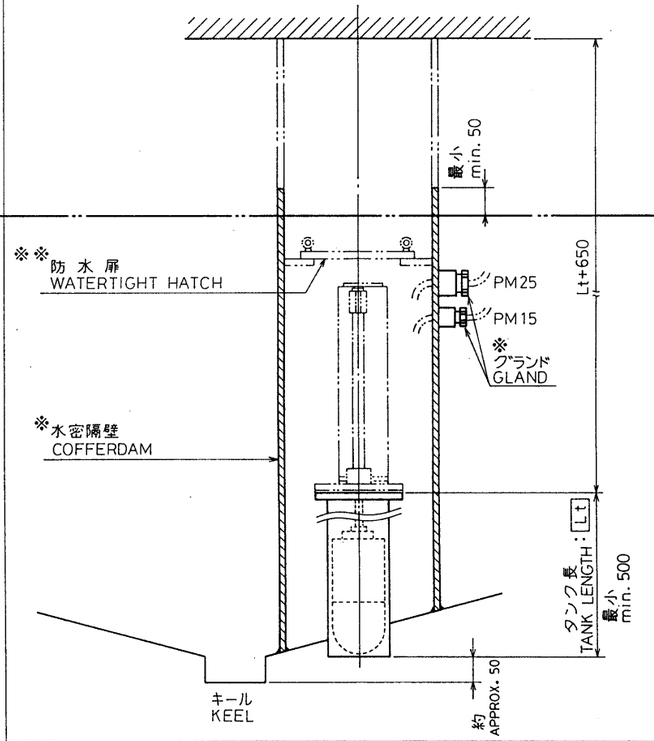
D-1

条件 CONDITION	B	A
タンク長を満載時の吃水線の上までとれる場合。 WHEN THE LONGER TANK IS USED SO THAT ITS FLANGE POSITIONS ABOVE WATER LINE.	1. オフシーズンに上下装置を取り外しておく場合。 THIS METHOD ALLOWS TO EASILY REMOVE THE SOUNDOME DURING A PERIOD OF NON-OPERATION OR SERVICING. 2. タンク長を吃水線の上まで取れない場合。 WHEN THE LONGER TANK IS NOT USED DUE TO LIMITED CLEARANCE.	タンク長を吃水線までとれない場合で、仕切り弁を使用しない時。 WHEN THE LONGER TANK OR A GATE VALVE CAN NOT BE USED.

装備法 METHOD







1. この装備法を標準として推奨する。
   THIS METHOD IS RECOMMENDED AS STANDARD INSTALLATION.
2. ※；上下装置の上部に“Lt+650”のサービス空間が取れない場合は、天井に“300×300”の穴を明けておくこと。
   ※；IF OVERHEAD CLEARANCE “Lt+650” IS NOT ALLOWED, MAKE A HOLE OF 300×300mm ON CEILING FOR FACILITATING INSTALLATION AND FUTURE SOUNDOME SERVICE.

条件（1）の目的でこの装備法を行う場合には、左図（A）と同様に、吃水線の上までタンク長をとる方が望ましい。
LIKE THE INSTALLATION METHOD [A], THE TANK FLANGE POSITION IS DESIRED TO BE ABOVE WATER LINE.

1. 水密隔壁は船級協会規則を参照し、造船所で製作下さい。その際サービススペースも考慮して下さい。
   FABRICATE THE COEFERDAM BY SHIPYARD IN ACCORDANCE WITH CONCERNED REGULATIONS. ALSO ALLOW ENOUGH MAINTENANCE SPACE.
2. ※※；水密隔壁の上限を吃水線の上までとれない場合には、上下装置取り外しの為の防水扉を設けること。
   ※※；PROVIDE A WATERTIGHT HATCH FOR FUTURE MAINTENANCE IF A COFFERDAM IS NOT HIGH ABOVE WATER LEVEL.

品番 ITEM	品名 NAME	材質 MATERIAL	数量 Q'TY	図番 DWG.NO.	摘要 REMARKS

注 1. 装備法の決定に際しては、安全性（強度、水密性等）を重視し、それに合わせて保守・点検の容易さも配慮のこと。
DECIDE AN INSTALLATION METHOD CONSIDERING SUFFICIENT REINFORCEMENT AND WATERTIGHTNESS OF THE SHIP'S HULL. ALSO PROVIDE ENOUGH MAINTENANCE SPACE.
2. ※※※；造船所手配
SHIPYARD SUPPLY.
3. 単位：mm
UNIT

CH-18/28

承認 APPROVED	AUG. 5. '88 T. NAKANO	三角法 THIRD ANGLE PROJECTION		名称 TITLE	格納タンクの装備例 RETRACTION TANK INSTALLATION METHOD
検図 CHECKED	AUG. 4. '88 T. KODA	尺度 SCALE	／		
製図 DRAWN	AUG. 3. '88 M. USUDA	重量 WEIGHT	kg	図番 DWG.NO.	C1271-002-C

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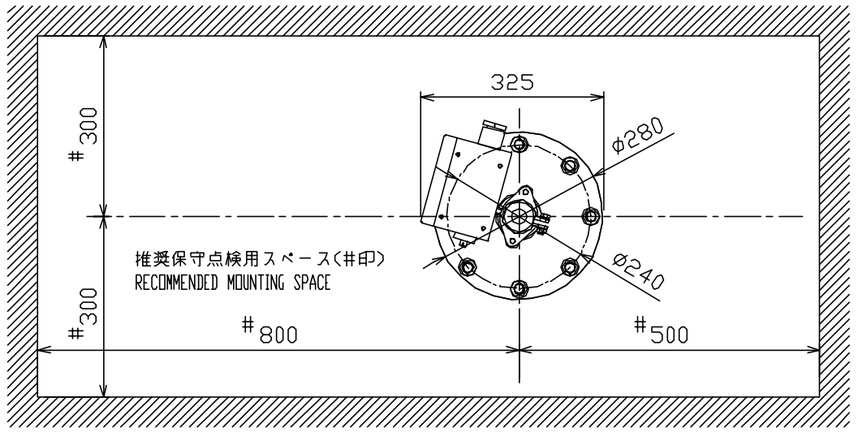
D-2

船首方向
FORWARD DIRECTION

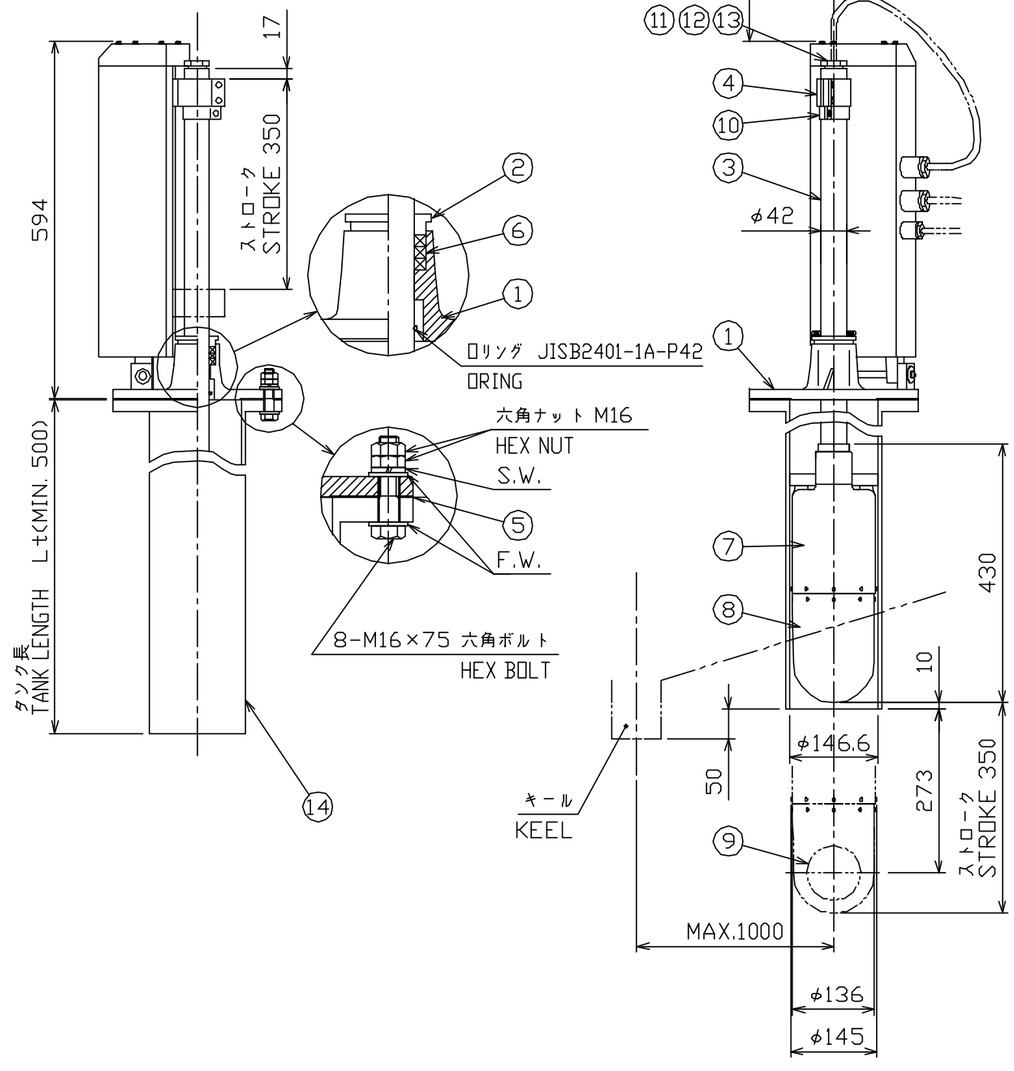


寸法区分（mm）	公差（mm）
L≦50	±1.5
50<L≦100	±2.5
100<L≦500	±3
500<L≦1000	±4

表 1

注 記
1) 指定外の寸法公差は表1による。
2) 装備位置は船首から1/3（小型船では1/2）程度でキールから1m以内とする。
3) 上下シャフトの長さ（Ls）は、格納タンクの長さ（Lt）に、170mmを加えた値で切断すること。
Ls=Lt+170(mm)
4) 上下装置及び格納タンクの船首方向は左図のごとく。
5) ドーム内部保守点検のため、上下装置上部には図示のスペースを設けるか障害となる天井等に300×300mm程度の角穴をあける。
6) 表記質量に上下シャフトの質量は、含まれていません。

NOTE
1) DIMENSIONAL TOLERANCE, IF NOT SPECIFIED, IS AS TABLE 1.
2) THE HULL UNIT IS GENERALLY PLACED ABOUT 1/3 (1/2 IN CASE OF SMALL BOAT) OF THE SHIP'S LENGTH FROM THE BOW ON THE FORE-AFT LINE AND BESIDE THE KEEL LINE (LESS THAN 1000mm FROM KEEL LINE).
3) THE MAIN SHAFT SHOULD BE CUT TO A LENGTH(Ls) GIVEN BY THE FOLLOWING FORMULA.
Ls=Lt+170(mm) Lt:TANK LENGTH
4) FORWARD DIRECTION ARROW SHOWS FORE OR AFT FOR HULL UNIT AND TANK
5) IF THE OVERHEAD CLEARANCE SHOWN IN THE DRAWING IS NOT OBTAINED MAKE A HOLE OF 300x300mm ON THE CEILING FOR FACILITATING INSTALLATION AND FUTURE SOUNDOME SERVICE.
6) THE FOLLOWING MASS SHOW HULL UNIT WITHOUT MAIN SHAFT



14	格納タンク RETRACTION TANK		(1)		オプション OPTION
13	ガスケット GASKET		1		
12	座　金 WASHER		2		
11	締付グランド GLAND		1		
10	板止め金具 STOPPER		1		
9	送受波器 TRANSDUCER		1		
8	ドーム（D） SOUNDOME(D)		1		
7	ドーム（U） TOP HOUSING(U)		1		
6	グリスコットン GREASE COTTONN		3		
5	フランジパッキン GASKET		1		
4	パイプ取付金具 SHAFT RETAINER		1		
3	上下シャフト(1) MAIN SHAFT(1)		1		
2	グリスコットン押え台 GREASE COTTON RETAINER		1		
1	架台載台 MAIN BODY FLANGE		1		

DRAWN	2003. May H. MAKI		TITLE CH-181
CHECKED	Takahashi T.		名称 上下装置
APPROVED	Takahashi T.	CH-18/CH-270	外寸図
SCALE	1/10 MASS 37 ±10% kg		NAME HULL UNIT OUTLINE DRAWING
DWG No.	C1271-008-C	06-013-200G	

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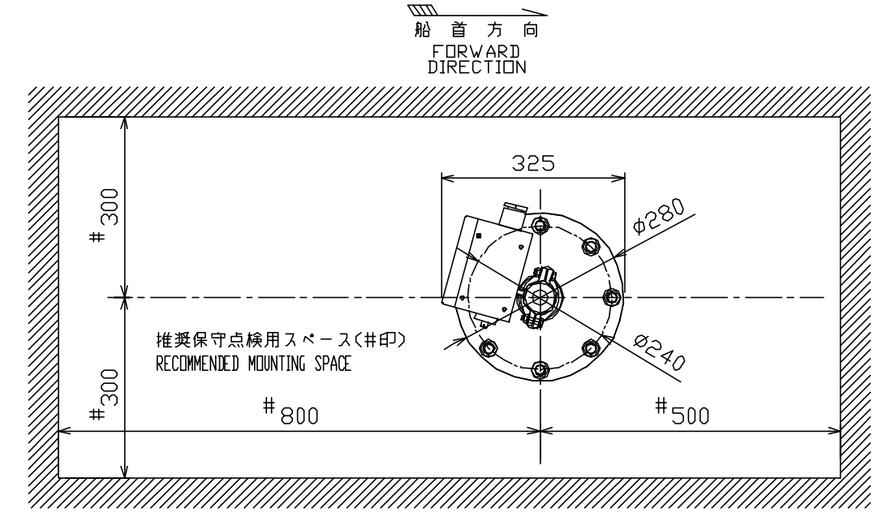
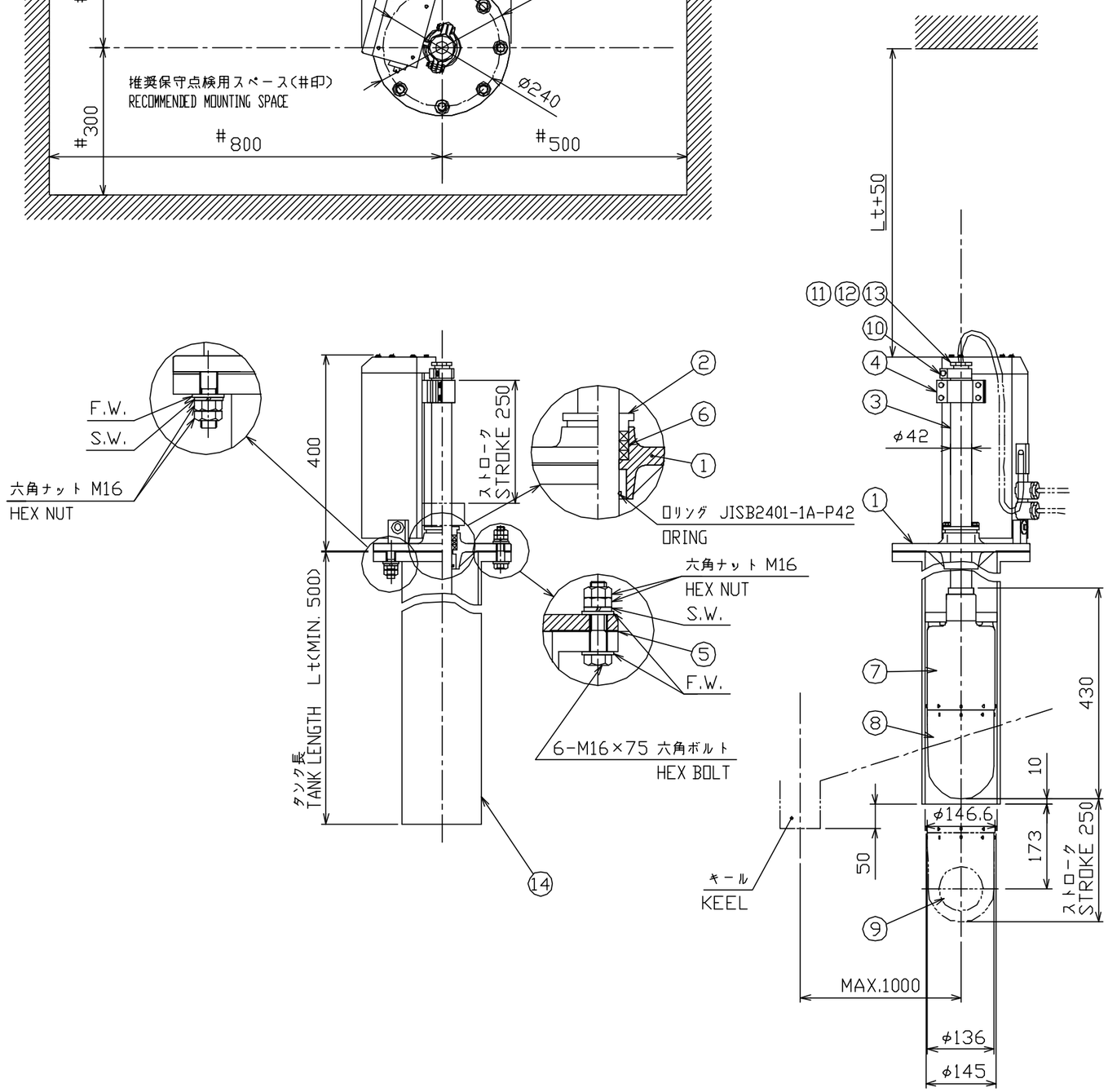


寸法区分（ｍｍ）	公差（ｍｍ）
Ｌ≦５０	±１．５
５０<Ｌ≦１００	±２．５
１００<Ｌ≦５００	±３
５００<Ｌ≦１０００	±４

表 1

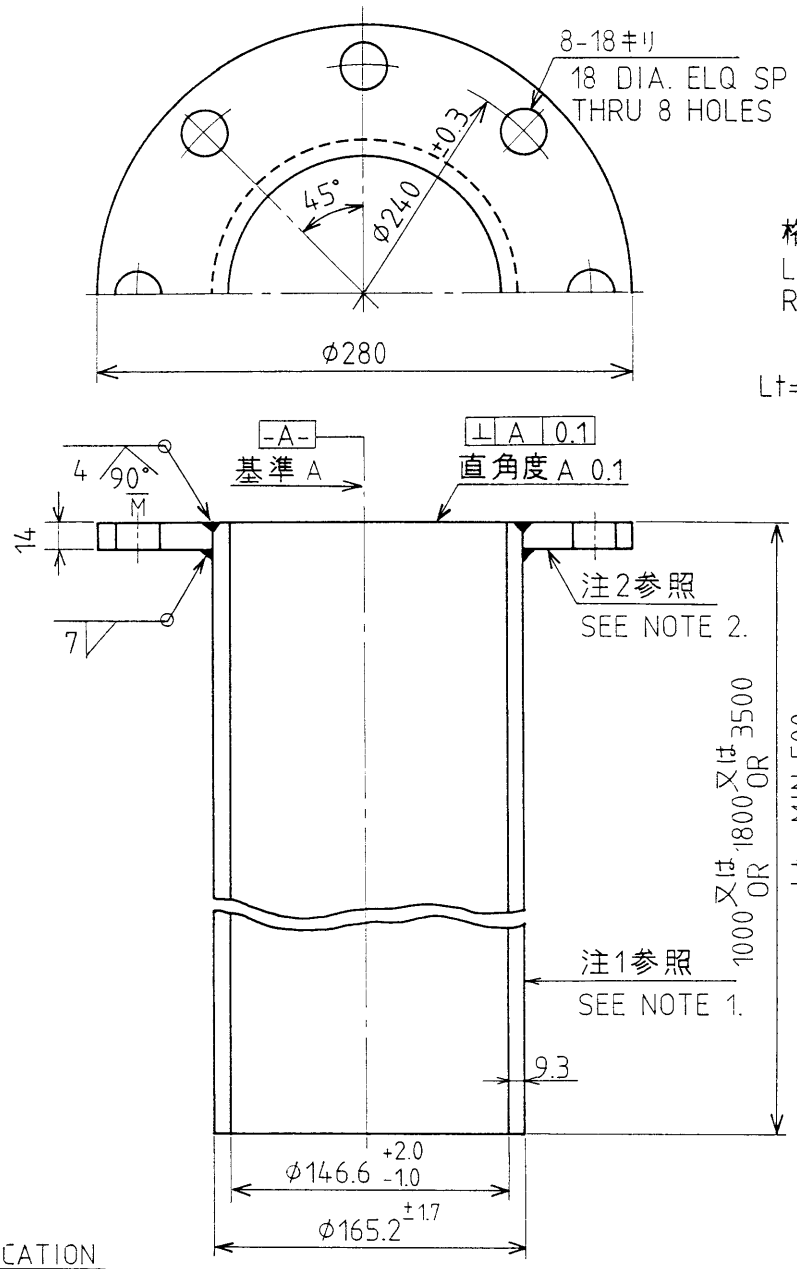
注　記　１）　指定外の寸法公差は表１による。
２）　装備位置は船首から1/3（小型船では1/2）程度でキールから1m以内とする。
３）　上下シャフトの長さ（Ｌｓ)は、格納タンクの長さ（Ｌｔ)に、17mmを引いた値で切断すること。
Ｌｓ=Ｌｔ−17(mm)
４）　上下装置及び格納タンクの船首方向は左図のごとく。
５）　ドーム内部保守点検のため、上下装置上部には図示のスペースを設けるか障害となる天井等に300×300mm程度の角穴をあける。
６）　表記質量に上下シャフトの質量は、含まれていません。

NOTE　1）　DIMENSIONAL TOLERANCE, IF NOT SPECIFIED, IS AS TABLE 1.
2）　THE HULL UNIT IS GENERALLY PLACED ABOUT 1/3 (1/2 IN CASE OF SMALL BOAT) OF THE SHIP'S LENGTH FROM THE BOW ON THE FORE-AFT LINE AND BESIDE THE KEEL LINE (LESS THAN 1000mm FROM KEEL LINE).
3）　THE MAIN SHAFT SHOULD BE CUT TO A LENGTH(Ls) GIVEN BY THE FOLLOWING FORMULA.
Ls=Lt-17(mm) Lt:TANK LENGTH
4）　FORWARD DIRECTION ARROW SHOWS FORE OR AFT FOR HULL UNIT AND TANK
5）　IF THE OVERHEAD CLEARANCE SHOWN IN THE DRAWING IS NOT OBTAINED MAKE A HOLE OF 300x300mm ON THE CEILING FOR FACILITATING INSTALLATION AND FUTURE SOUNDOME SERVICE.
6）　THE FOLLOWING MASS SHOW HULL UNIT WITHOUT MAIN SHAFT



14	格納タンク RETRACTION TANK		(1)		オプション OPTION
13	ガスケット GASKET		1		
12	座　金 WASHER		2		
11	締付グランド GLAND		1		
10	板止め金具 STOPPER		1		
9	送受波器 TRANSDUCER		1		
8	ドーム（D） SOUNDOME(D)		1		
7	ドーム（U） TOP HOUSING(U)		1		
6	グリスコットン GREASE COTTONN		3		
5	フランジパッキン GASKET		1		
4	パイプ取付金具 SHAFT RETAINER		1		
3	上下シャフト(1) MAIN SHAFT(1)		1		
2	グリスコットン押え台 GREASE COTTON RETAINER		1		
1	架台載台 MAIN BODY FLANGE		1		

DRAWN	2003. May H. MAKI		TITLE CH-184
CHECKED	Takahashi T.		名称 上下装置
APPROVED	Takahashi T.	CH-18/CH-270	外寸図
SCALE	1/10 MASS 35 ±10% kg		NAME HULL UNIT OUTLINE DRAWING
DWG No.	C1280-G05-B	06-013-3006	



製作時の注意
NOTE FOR FABRICATION

1. 材料はSTPG38-E-C(圧力配管用炭素鋼鋼管冷間仕上電気抵抗溶接鋼管)の150A×Sch60 (外径φ165.2,厚さ9.3)で内径がφ146.6 $^{+2.0}_{-1.0}$ のものを使用のこと。
2. 材料はSS41Pを使用のこと。
3. タンク側面は大日本ペイント速乾プライマー(ブラウン)を1回塗布のこと。
4. タンク内面はビニールAF(中国塗料)を2回塗布のこと。
5. タンク上面は塗装しないこと。

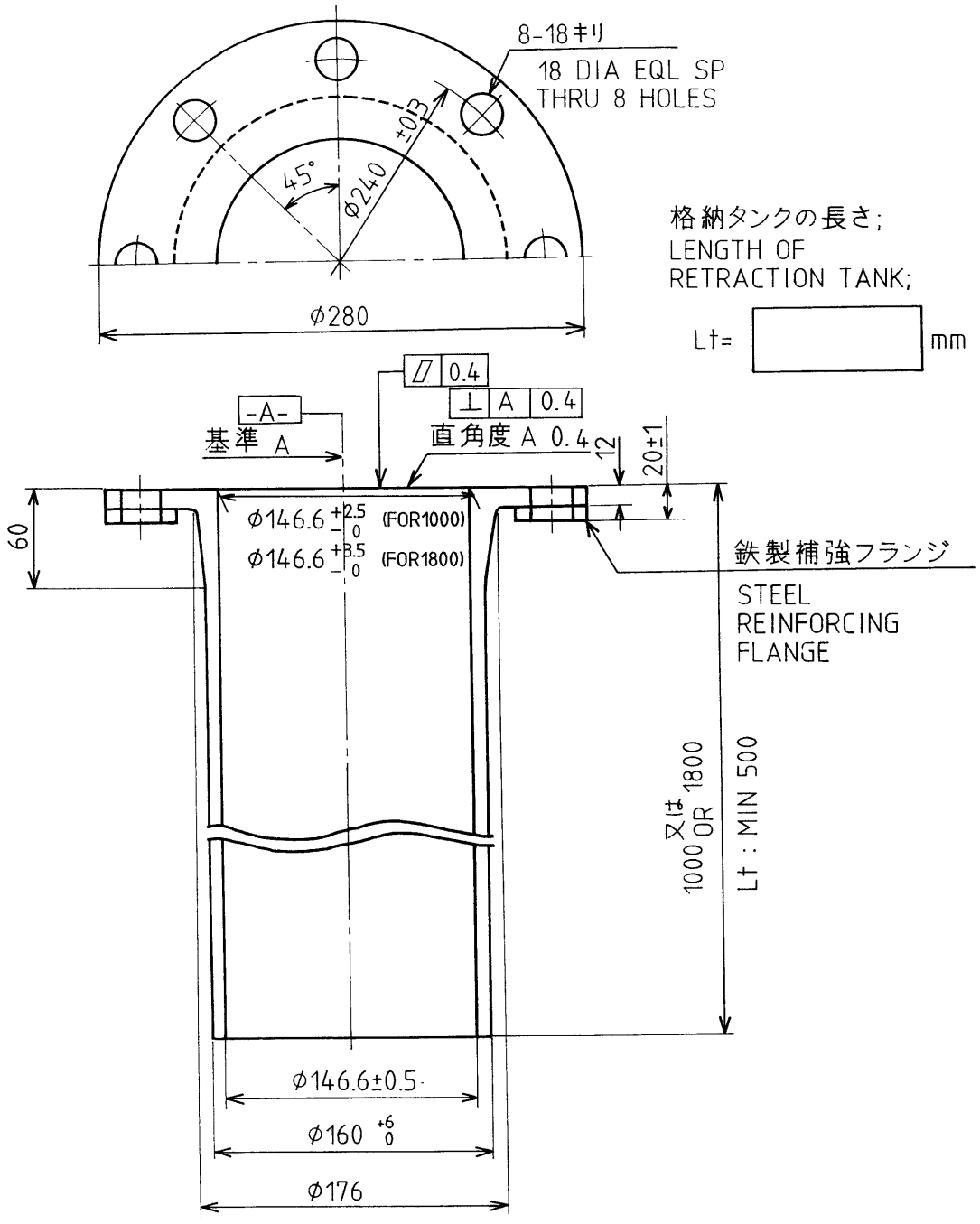
1. USE STPG-38-E-C (CARBON STEEL PIPE FOR PRESSURE SERVICE) WITH OUTER DIAMETER φ165.2, INNER DIAMETER φ146.6 $^{+2.0}_{-1.0}$ AND THICKNESS 9.3.
2. USE SS41P (JIS G3101, ROLLED STEEL FOR GENERAL STRUCTURE).
3. GIVE ONE COAT OF FAST-DRYING RED LEAD PAINT ON OUTSIDE OF TANK.
4. GIVE TWO COATS OF VINYL PAINT 'AF' OR ANTI-FOULING PAINT ON INSIDE OF TANK.
5. DO NOT PAINT SURFACE OF FLANGE.

単位 UNIT : mm	品番 ITEM	品名 NAME	材質 MATERIAL	数量 Q'TY	図番 DWG.NO.	摘要 REMARKS

承認 APPROVED		三角法 THIRD ANGLE PROJECTION	名称 TITLE 鉄製格納タンク外観図 STEEL RETRACTION TANK OUTLINE DRAWING
検図 CHECKED		尺度 SCALE 1/4	
製図 DRAWN	AUG. 30. '88 M. USUDA	重量 WEIGHT 1000mm : 46 1800mm : 69 kg 3500mm : 130	図番 DWG.NO. C1271-003-A

FURUNO

D-5



品番 ITEM	品名 NAME	材質 MATERIAL	数量 Q'TY	図番 DWG.NO.	摘要 REMARKS

承認 APPROVED	SEP・6・'88 T.NAKANO	三角法 THIRD ANGLE PROJECTION		名称 TITLE	FRP製格納タンク外観図 FRP RETRACTION TANK OUTLINE DRAWING
検図 CHECKED	Sep・6・'88 T. [illegible]	尺度 SCALE	1/4		
製図 DRAWN	AUG・30・'88 M. USUDA	重量 WEIGHT	1000mm: 10 1800mm: 16 kg	図番 DWG.NO.	C1271-004-A

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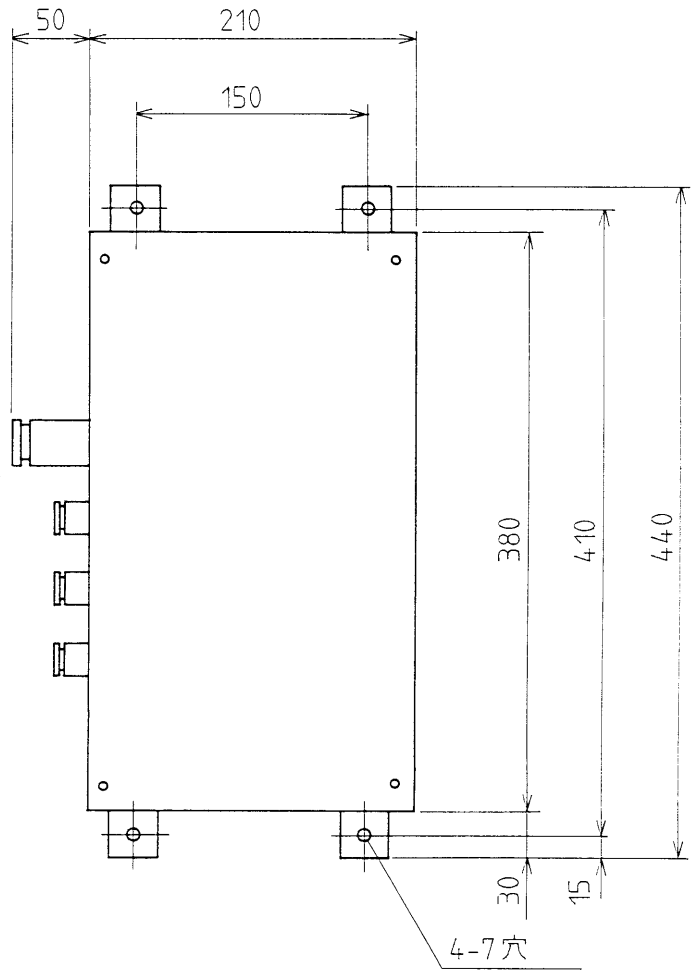
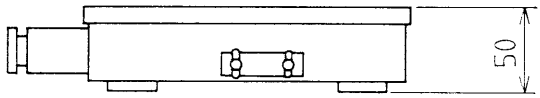


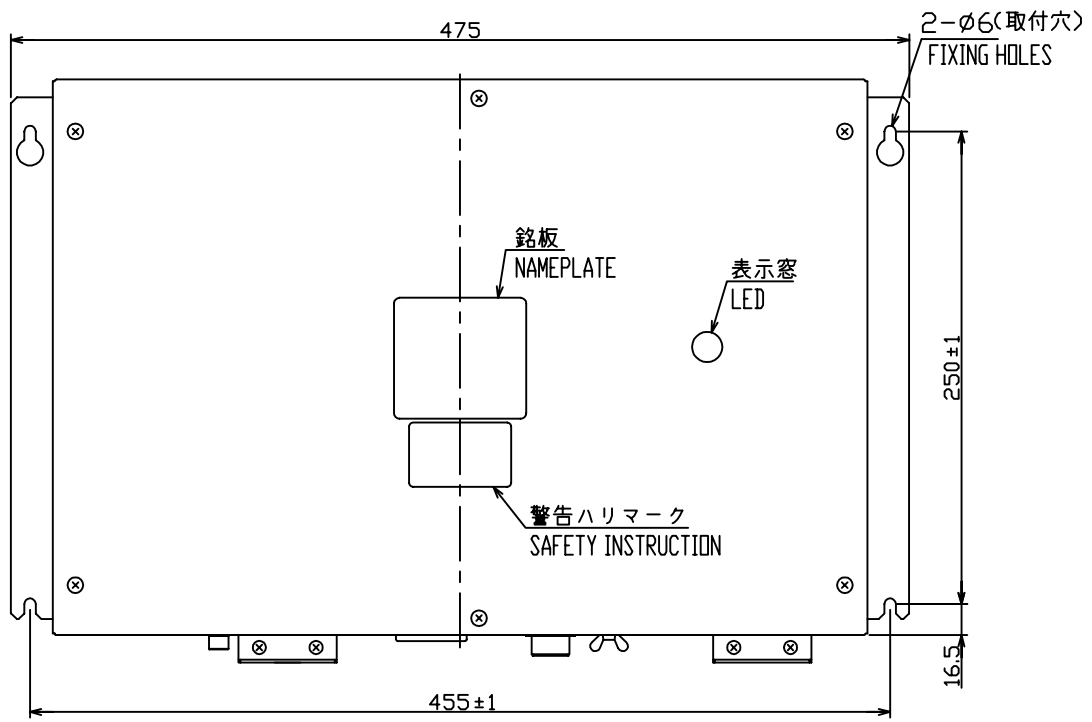


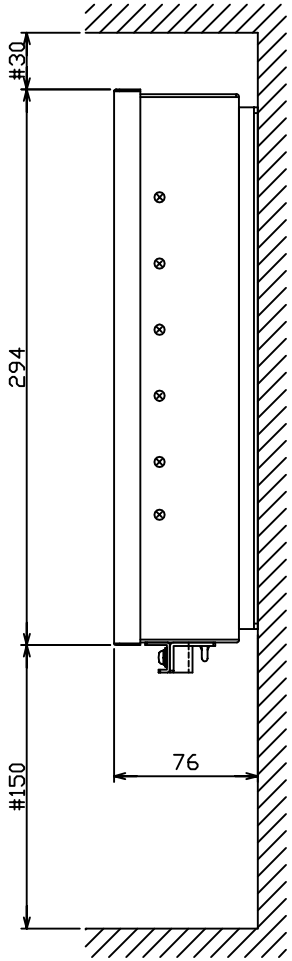
CH-18/28

品番 ITEM	品名 NAME	材質 MATERIAL	数量 Q'TY	図番 DWG.NO.	摘要 REMARKS

承認 APPROVED		三角法 THIRD ANGLE PROJECTION	名称 TITLE: CH-1841 制御箱 CONTROL BOX
検図 CHECKED		尺度 SCALE: 1/5	
製図 DRAWN		重量 WEIGHT: 2.2 kg	図番 DWG.NO.: C1280-G01-A

FURUNO





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

表１ TABLE１

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

NOTE　1.　#: RECOMMENDED SERVICE CLEARANCE.
　　2.　TABLE 1 INDICATES TOLERANCE OF DIMENSIONS.

DRAWN Mar. 31 '03 T.YAMASAKI			TITLE CH-273
CHECKED Mar. 31 '03 T.MATSUGUCHI			名称 送受信装置
APPROVED Mar.31.'03 s.yoshimura	CH-270		外寸図
SCALE 1/4	MASS 3.5 ±10% kg		NAME TRANSCEIVER UNIT
DWG.No. C1322-G01- A	06-022-300G-0		OUTLINE DRAWING

FURUNO ELECTRIC CO., LTD.

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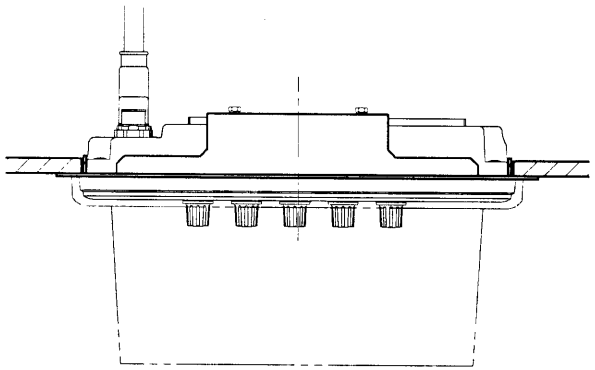
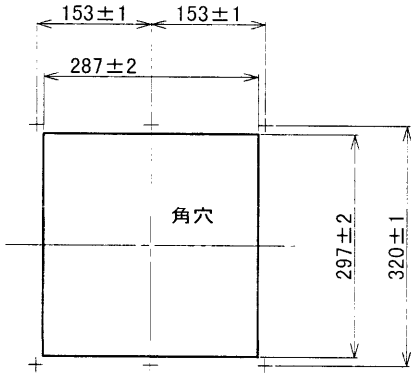
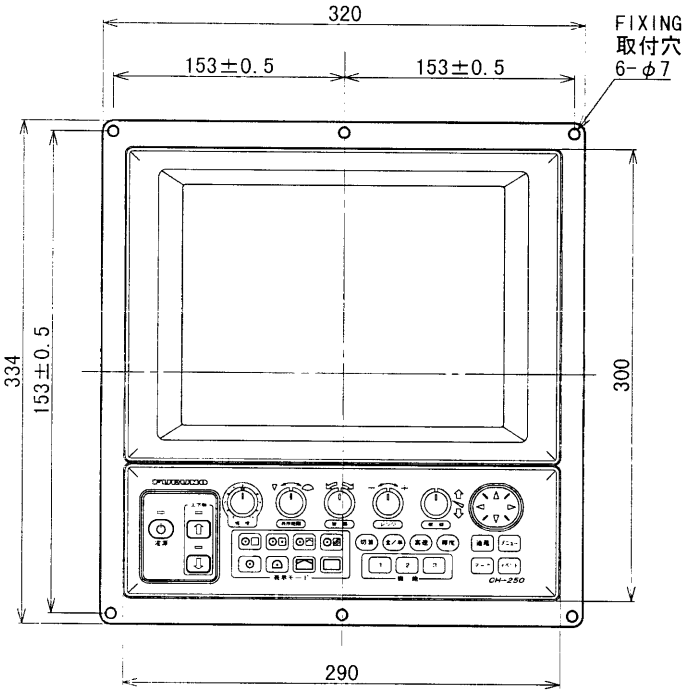


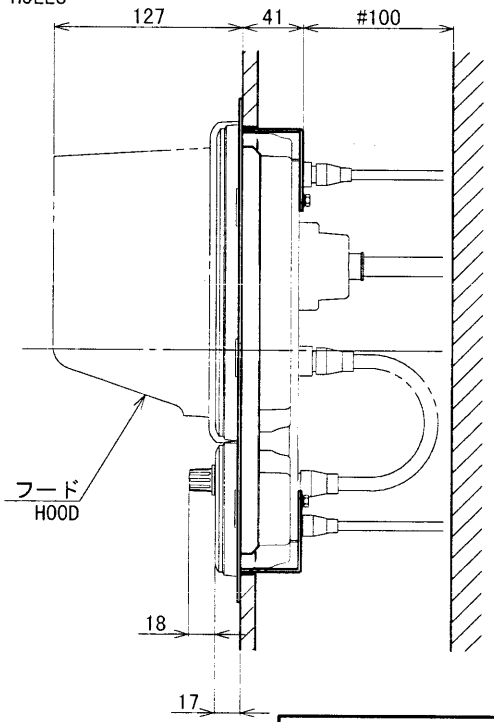


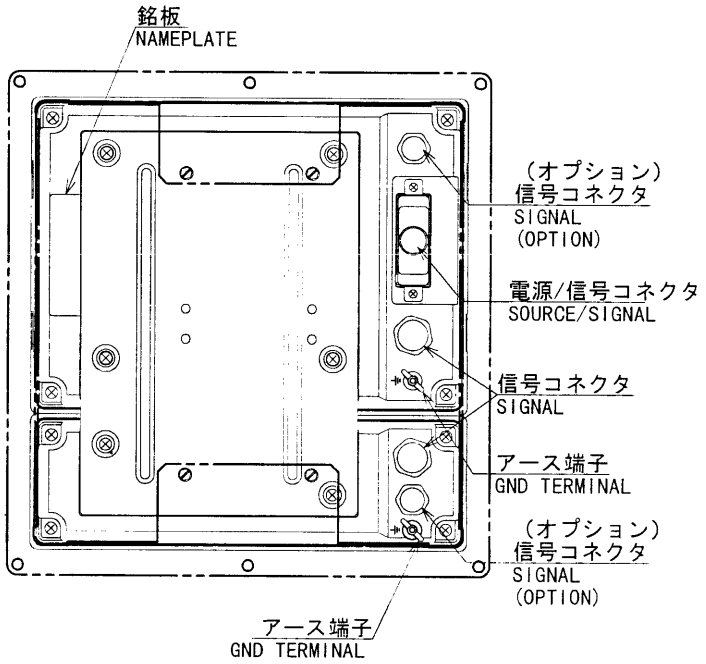
寸法区分 (mm) DIMENSION	公差 (mm) TOLERANCE
0 < L ≦ 50	±1．5
50 < L ≦ 100	±2．5
100 < L ≦ 500	±3

表 1
TABLE 1

取付穴寸法図　尺度 1/10
CUTOUT DIMENSIONS (SCALE 1/10)







DRAWN Mar22'00 T.YAMASAKI		TITLE	MU-100C
CHECKED Mar22'00 Y.Kimura		名称	表示部（埋込装備）
APPROVED Mar23'00 S.Yoshimura	CH-250		外寸図
SCALE 1/5	MASS ±10% 4.2 kg	NAME	DISPLAY UNIT (FLASHMOUNT)
DWG. No. C1316-G09- A	06-021-1920-G0		OUTLINE DRAWING

FURUNO ELECTRIC CO., LTD.

FURUNO

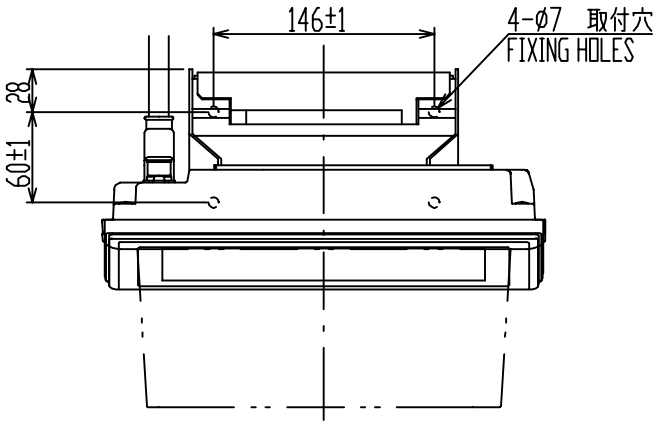
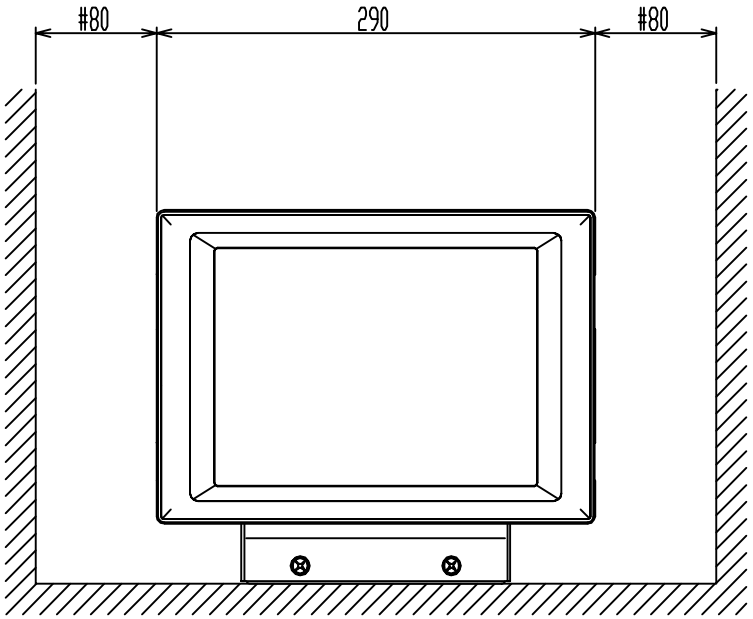
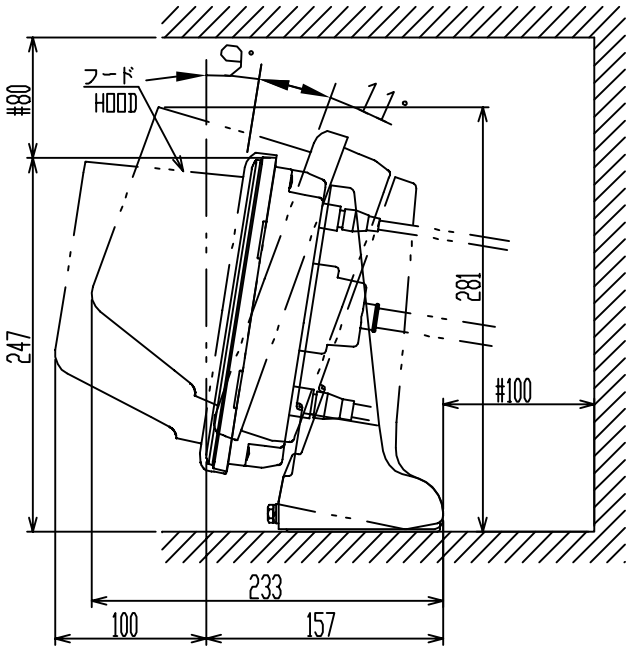
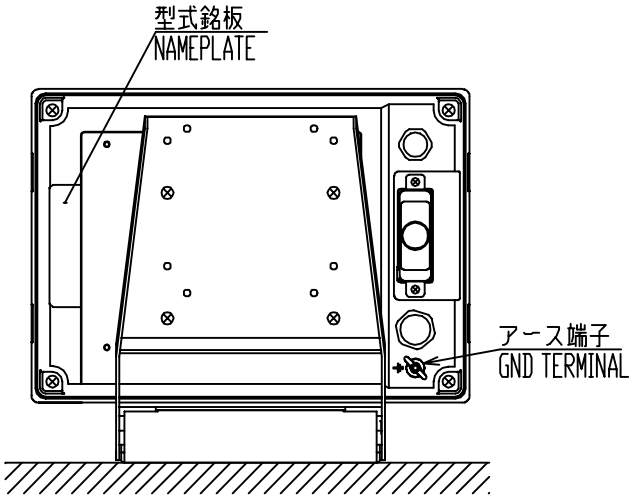


表 1 TABLE 1

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







注 記 1）#印寸法は最小サービス空間寸法とする。
2）指定外の寸法公差は表1による。
3）取付用ネジは+トラスタッピンネジ呼び径5x20を使用のこと。
4）装備ケーブルはサービス時、本体を前方に十分引出せるよう余裕を持たせること。

NOTE 1. #: MINIMUM SERVICE CLEARANCE.
2. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS WHICH IS NOT SPECIFIED.
3. USE SELF-TAPPING SCREWS 5x20 FOR FIXING THE UNIT.
4. LEAVE ENOUGH SLACK IN CABLING SO UNIT CAN BE DRAWN FORWARD WITHOUT DISCONNECTING CABLING.

DRAWN Dec. 15, '04 E.MIYOSHI		TITLE	MU-100C
CHECKED TAKAHASHI. T	CH-300	名称	表示部（分離型、卓上装備）
APPROVED Y. Hatai	CH-250/S		外寸図
SCALE 1/5 MASS 4.2 ±10% kg		NAME	MONITOR UNIT (SEPARATE, TABLETOP MOUNT)
DWG.No. C1316-G08- D	06-021-191G- 2		OUTLINE DRAWING

FURUNO ELECTRIC CO., LTD.

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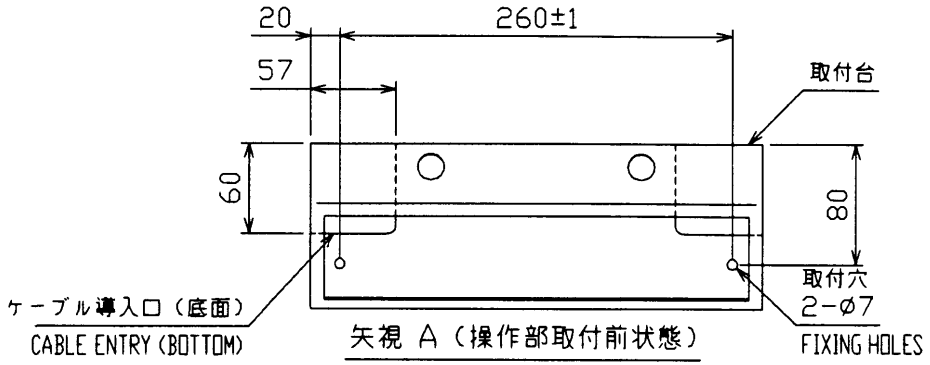
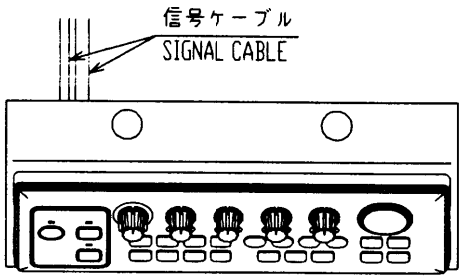
寸法区分（ｍｍ） DIMENSION	公差（ｍｍ） TOLERANCE
L≦50	±1．5
50<L≦100	±2．5
100<L≦500	±3

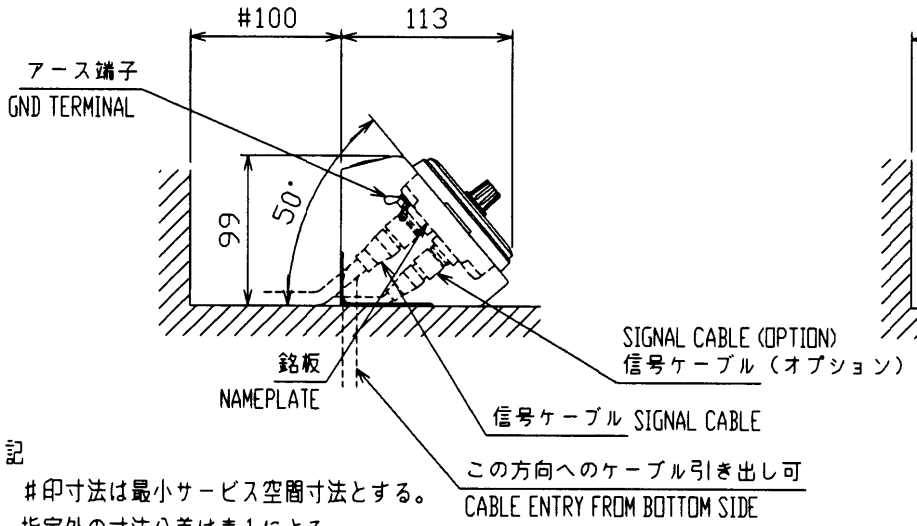
表１ TABLE 1

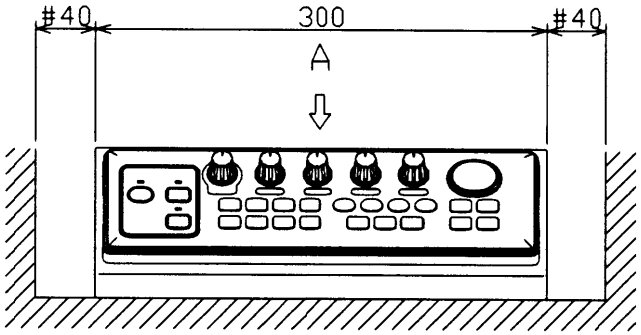


矢視 A（操作部取付前状態）

VIEW A (BEFORE INSTALLATION)







注　記

1）　#印寸法は最小サービス空間寸法とする。
2）　指定外の寸法公差は表１による。
3）　取付用ネジは＋トラスタッピングネジ呼び径５ｘ２０を使用のこと
4）　装備ケーブルはサービス時、本体を前方に十分引き出せるよう余裕を持たせること。

NOTE

1. #: RECOMMENDED SERVICE CLEARANCE.
2. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS.
3. USE TAPPING SCREWS 5x20 FOR FIXING UNIT.
4. KEEP SUFFICIENT CABLE LENGTH BEHIND UNIT.

DRAWN Aug. 16 '02 T.YAMASAKI		TITLE CH-252
CHECKED Aug. 16 '02 Y.K		名称 操作部（分離型・卓上装備）
APPROVED Aug. 16 '02 Y.K	CH-250/S	外寸図
SCALE 1/5 MASS 1.6 kg ±10%		NAME CONTROL UNIT (DESKTOP MOUNT)
DWG.No. C1316-G02-B	06-021-2000-G1	OUTLINE DRAWING

FURUNO ELECTRIC CO., LTD.

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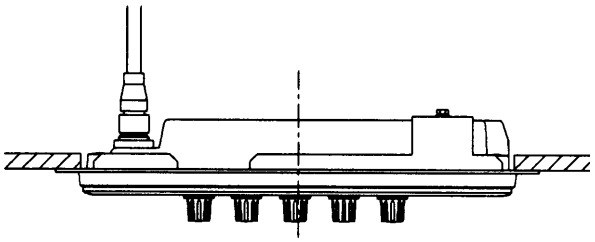
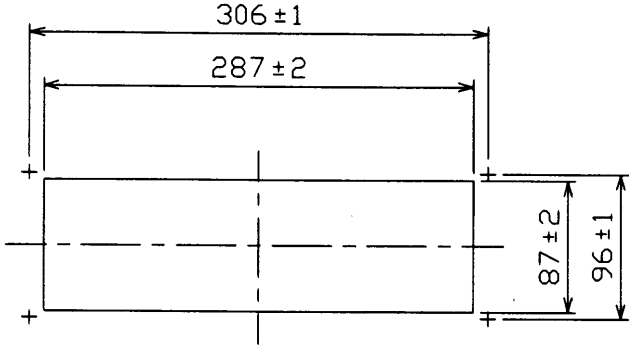
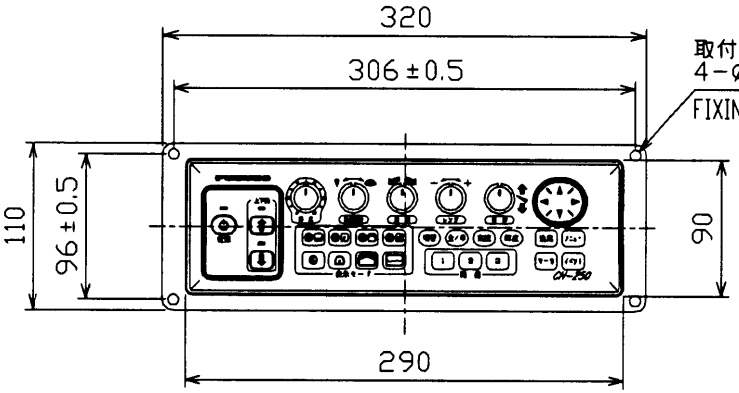
寸法区分（ｍｍ） DIMENSION	公差（ｍｍ） TOLERANCE
L≦50	±1.5
50<L≦100	±2.5
100<L≦500	±3

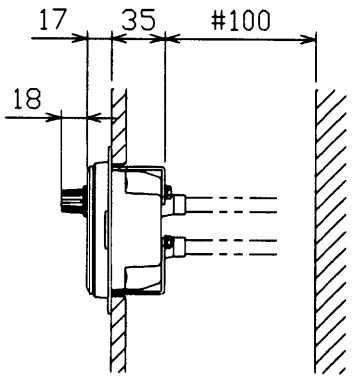
表 1 TABLE 1

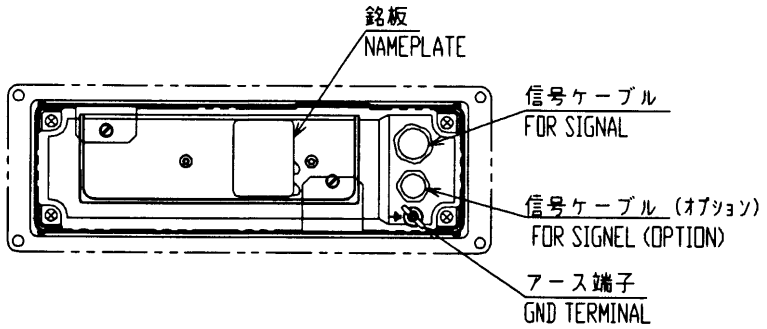




取付穴寸法図
CUTOUT DIMENSIONS







注 記 1） #印寸法は最小サービス空間寸法とする。
2） 指定外の寸法公差は表1による。
3） 取付用ネジは＋トラスタッピングネジ呼び径5×20を使用のこと
4） 装備ケーブルはサービス時、本体を前方に十分引き出せるよう余裕を持たせること。

NOTE 1. #: RECOMMENDED SERVICE CLEARANCE.
2. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS.
3. USE TAPPING SCREWS 5x20 FOR FIXING UNIT.
4. KEEP SUFFICIENT CABLE LENGTH BEHIND UNIT.

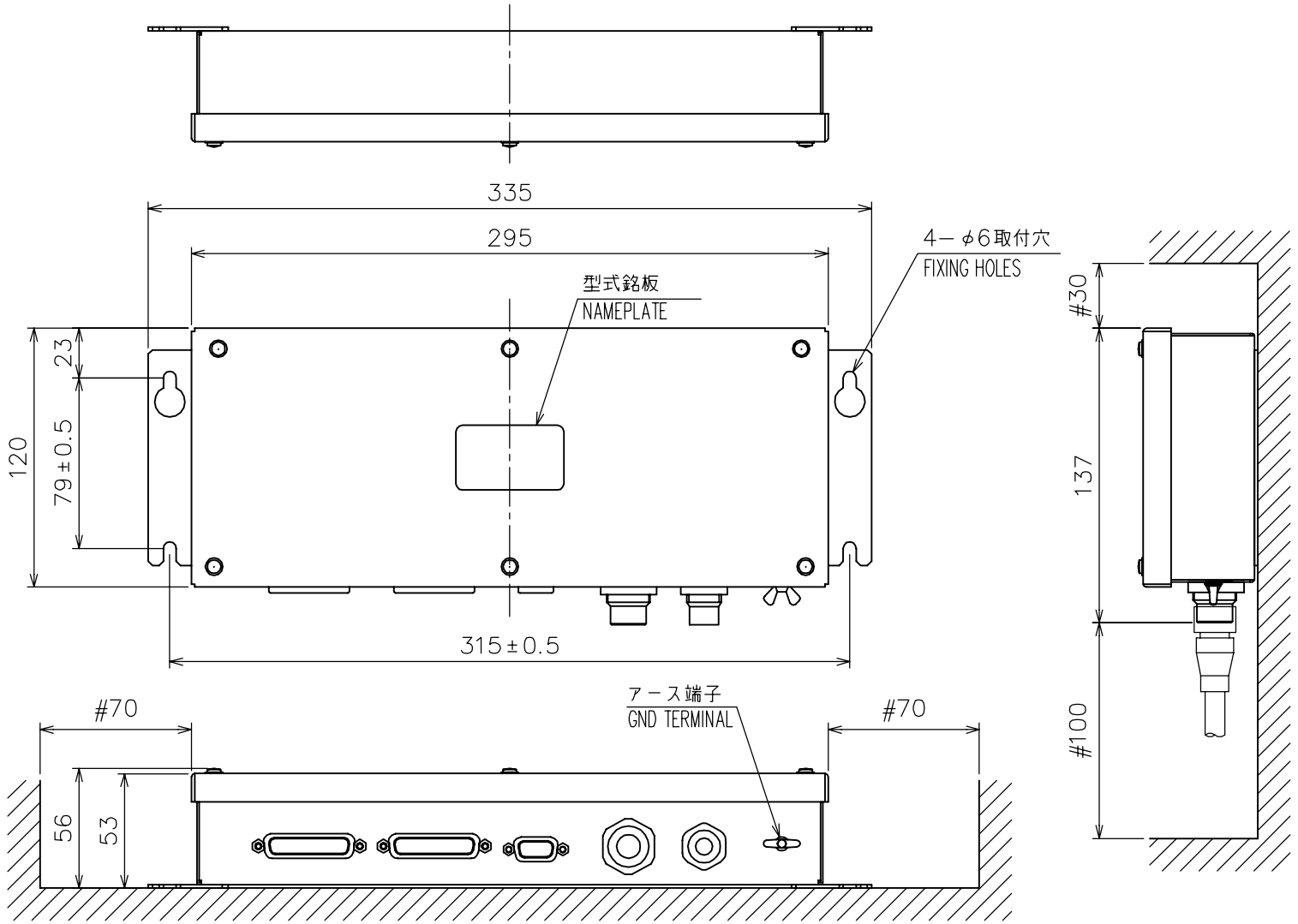
DRAWN Aug.16'02 J.YAMASAKI		TITLE CH-252
CHECKED Aug.16'02 Y.K		名称 操作部（分離型・埋込装備）
APPROVED Aug.16'02 Y.K	CH-250/S	外寸図
SCALE 1/5 MASS 1.1 ±10% kg		NAME CONTROL UNIT (FLUSH MOUNT)
DWG.No. C1316-G11-B	06-021-2900-G0	OUTLINE DRAWING

FURUNO ELECTRIC CO., LTD.

FURUNO

表 1 TABLE1

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



注　記　1）＃印寸法は最小サービス空間寸法とする。
　　2）指定外の寸法公差は表１による。
　　3）取付用ネジは＋トラスタッピンネジ呼び径4x16を使用のこと。

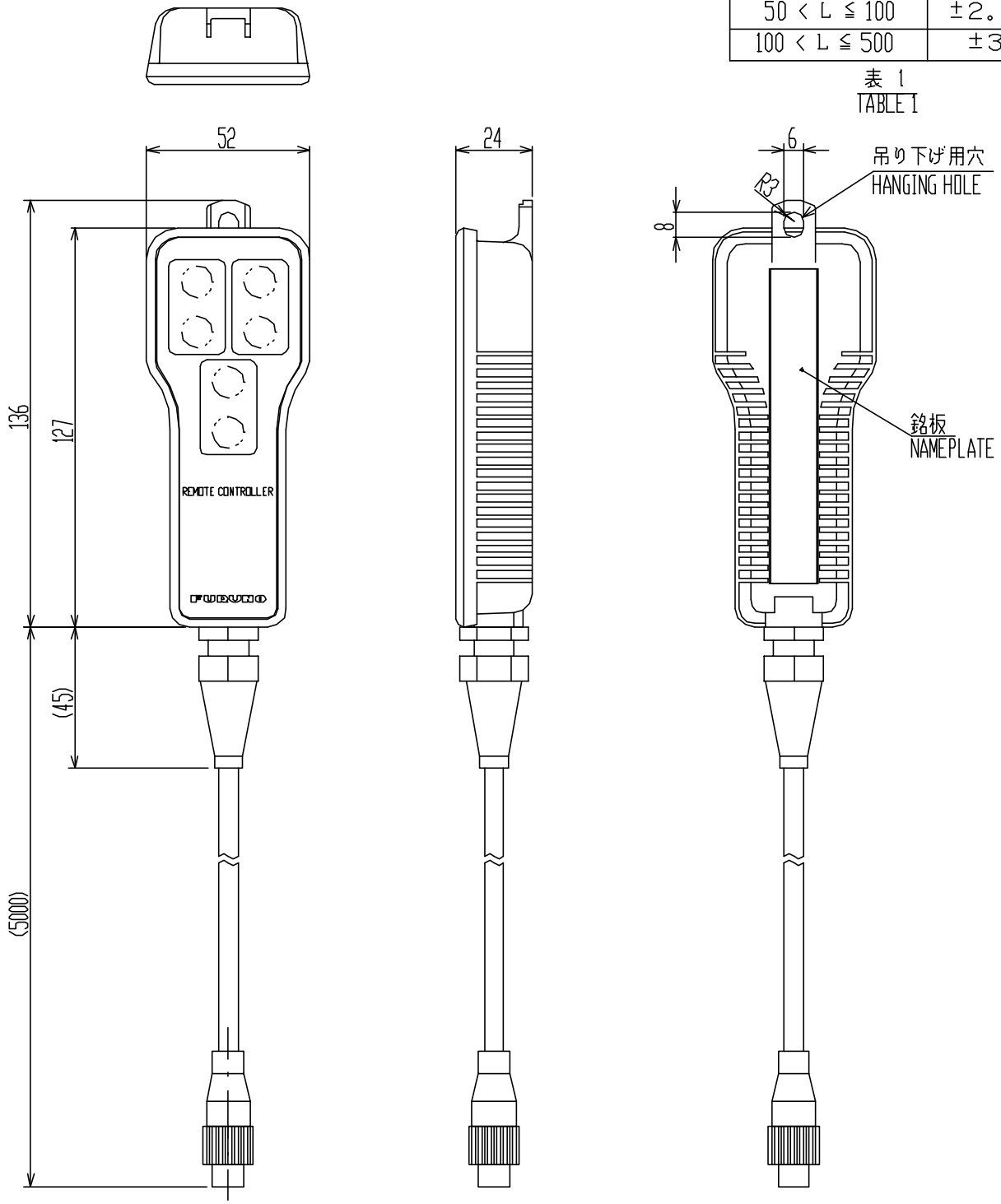
NOTE　1. #: MINIMUM SERVICE CLEARANCE.
　　2. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS WHICH IS NOT SPECIFIED.
　　3. USE SELF-TAPPING SCREWS 4x16 FOR FIXING THE UNIT.

DRAWN Mar. 23, '06 E. MIYOSHI		TITLE	IF-8000
CHECKED TAKAHASHI. T		名称	インターフェイスユニット
APPROVED Y. Hatai	CH-250		外寸図
SCALE 1/3	MASS 1.1 ±10% kg	NAME	INTERFACE UNIT
DWG.No. C1316-G07- C	REF.No. 06-021-500G-3		OUTLINE DRAWING

FURUNO ELECTRIC CO., LTD.

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

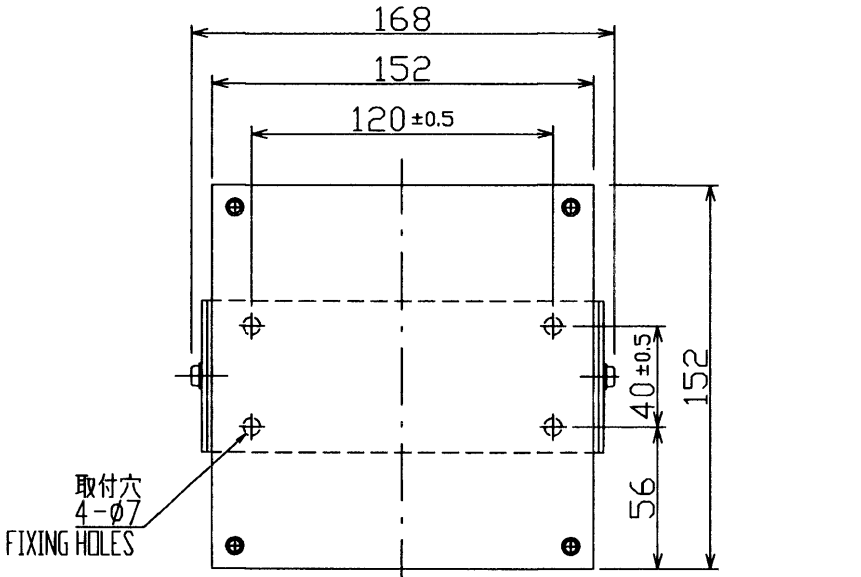
表 1
TABLE 1



注記　1）　指定なき寸法公差は表1による。
NOTE　1. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS.

DRAWN 2003. June H. MAKI		TITLE	CH-256
CHECKED Takahashi T.		名称	リモートコントローラ
APPROVED Takahashi T.	CH-250/CH-270		外寸図
SCALE 1/2 MASS 0.3 ±10% kg	質量はケーブル重さを含む MASS W/ CABLE	NAME	REMOTE CONTROLLER
DWG.No. C1316-G06- D	06-021-6000-G2		OUTLINE DRAWING

FURUNO



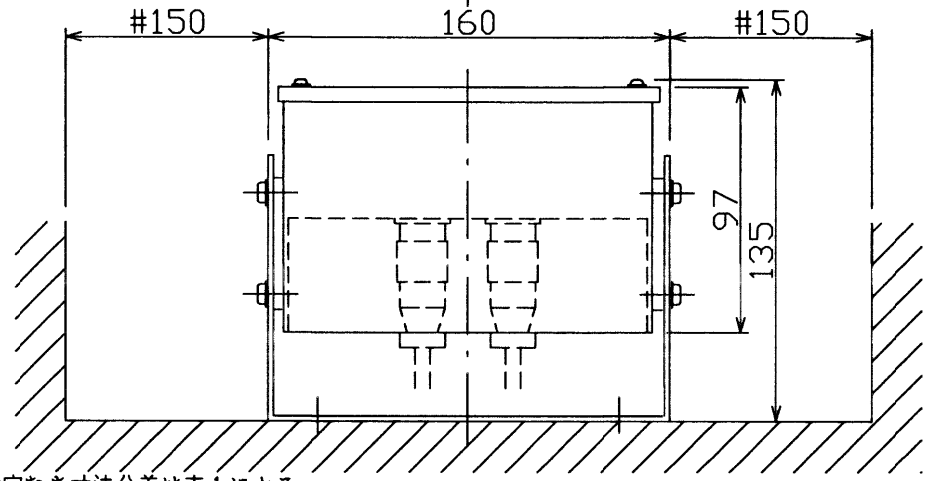
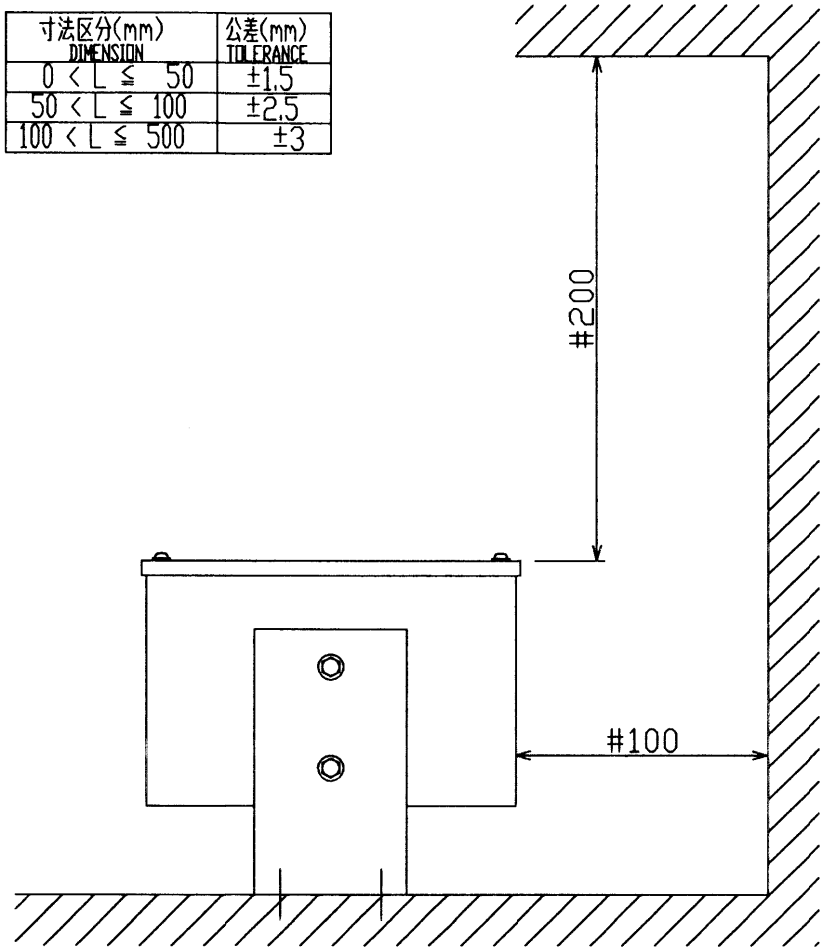


表1 TABLE 1

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



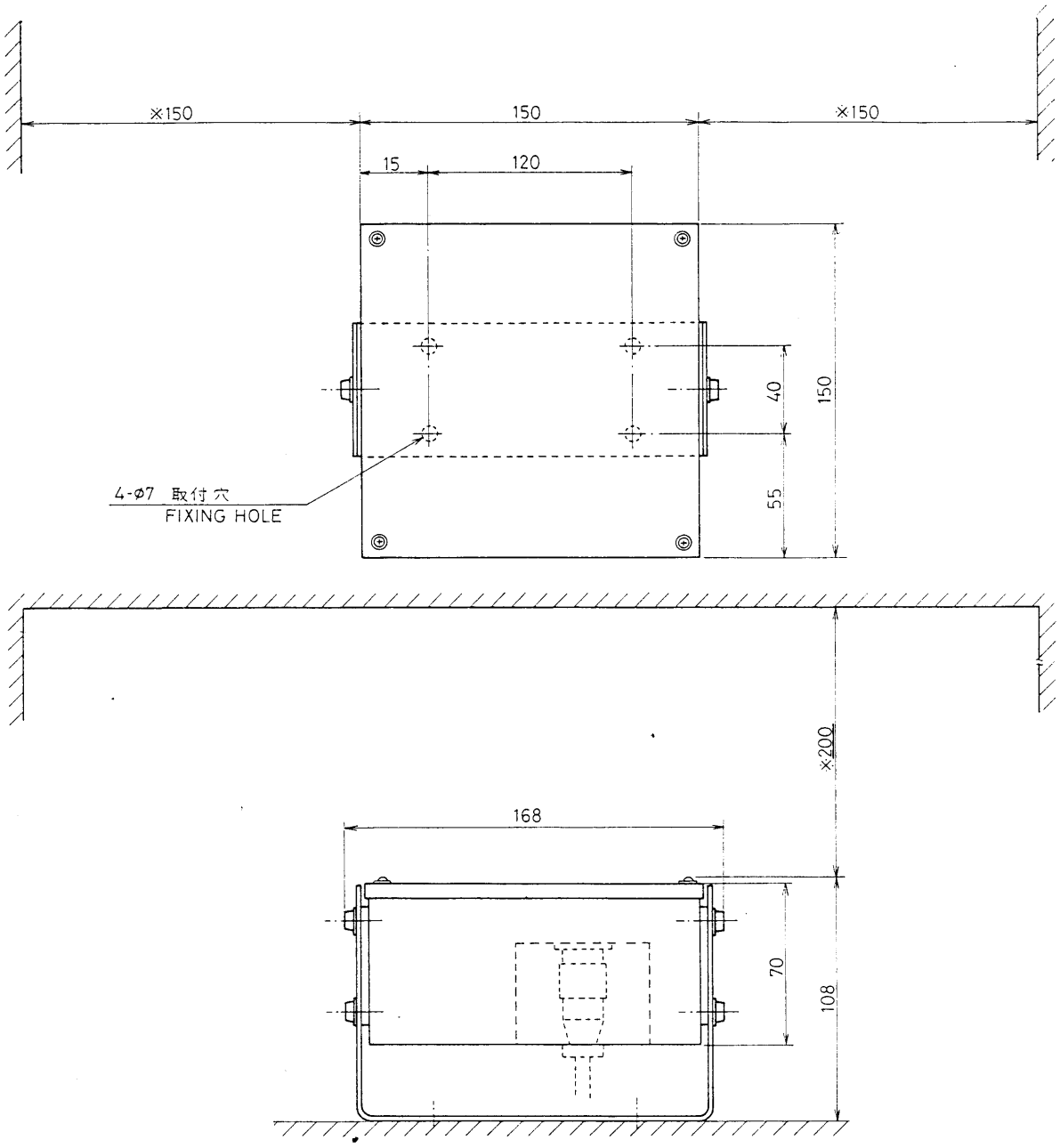
注記
1）指定なき寸法公差は表1による。
2）#：推奨する最小サービス空間寸法。
3）船首マーク(FORE)を船首方向に向けて、
きょう体を水平に取り付けること。

NOTE
1. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS.
2. #: RECOMMENDED SERVICE CLEARANCE.
3. ORIENT THE 'FORE' MARK ON THE UNIT TOWORD SHIP'S BOW AND MOUNT THE UNIT LEVEL IN PARALLEL WITH SURFACE.

DRAWN	Nov. 6 '01 I.YAMASAKI
CHECKED	Nov 6 '01 Y.K
APPROVED	Nov 6 '01 Y.K
SCALE	1/3
MASS	1.1 kg ±10%
DWG.No.	C1278-G01- B
TITLE	MS-100
名称	動揺検出器
	外寸図
NAME	MOTION SENSOR
	OUTLINE DRAWING

FURUNO ELECTRIC CO., LTD.

FURUNO

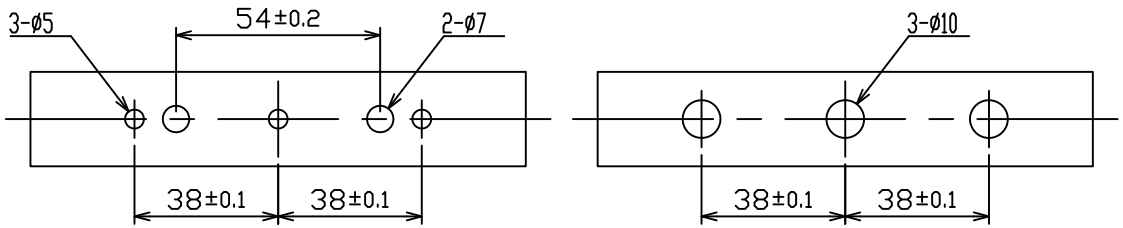


NOTE 1. 保守点検及び放熱用として ※印のスペースをとる事。
DIMENSIONS MARKED "※" SHOW RECOMMENDED MAINTENANCE AND VENTILATION SPACE.
2. 船体の回転の中心に水平に取り付ける事。
INSTALL THE UNIT HORIZONTALLY ON THE ROTATION AXES OF SHIP'S ROLLING AND PITCHING.

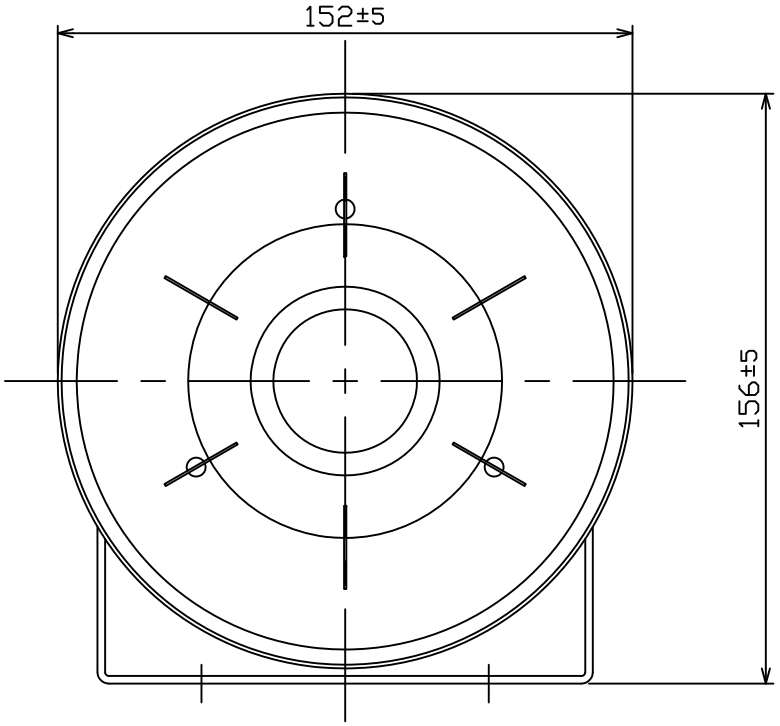
品番 ITEM	品名 NAME	材質 MATERIAL	数量 Q'TY	図番 DWG. NO.	摘要 REMARKS

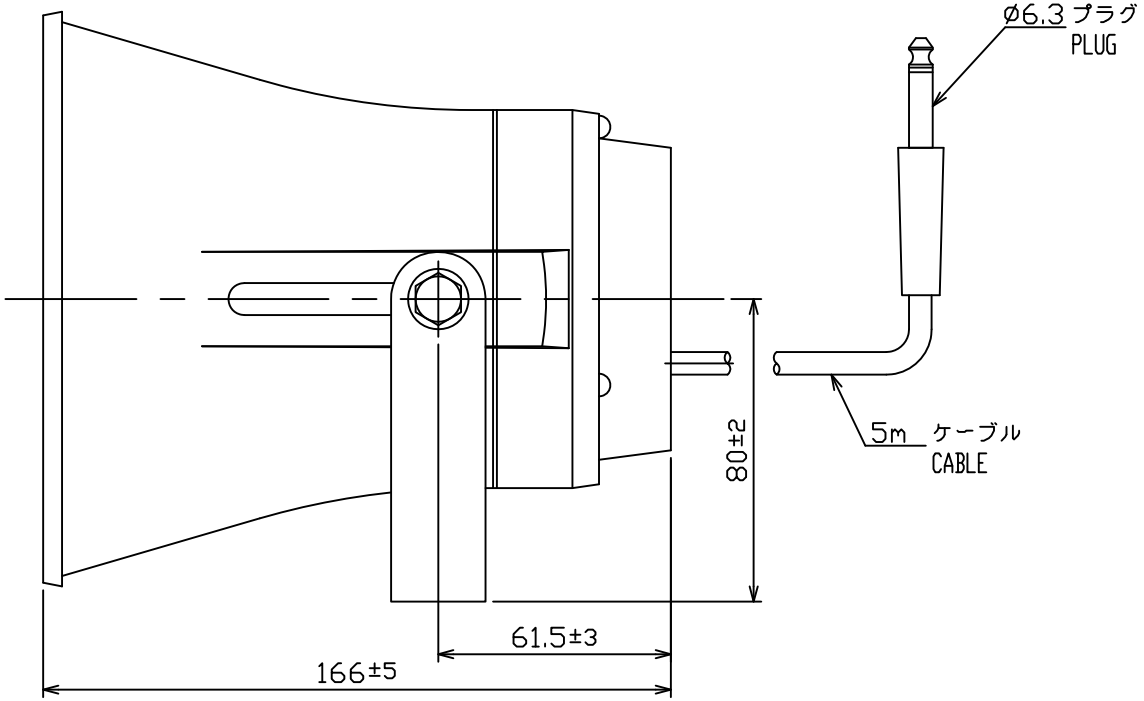
承認 APPROVED	JAN. 8 '86	三角法 THIRD ANGLE PROJECTION	名称 TITLE: 傾斜角検出器 CLINOMETER
検図 CHECKED		尺度 SCALE: 1/3	BS-704
製図 DRAWN		重量 WEIGHT: 2 kg	図番 DWG. NO.: C1259-009-C

FURUNO



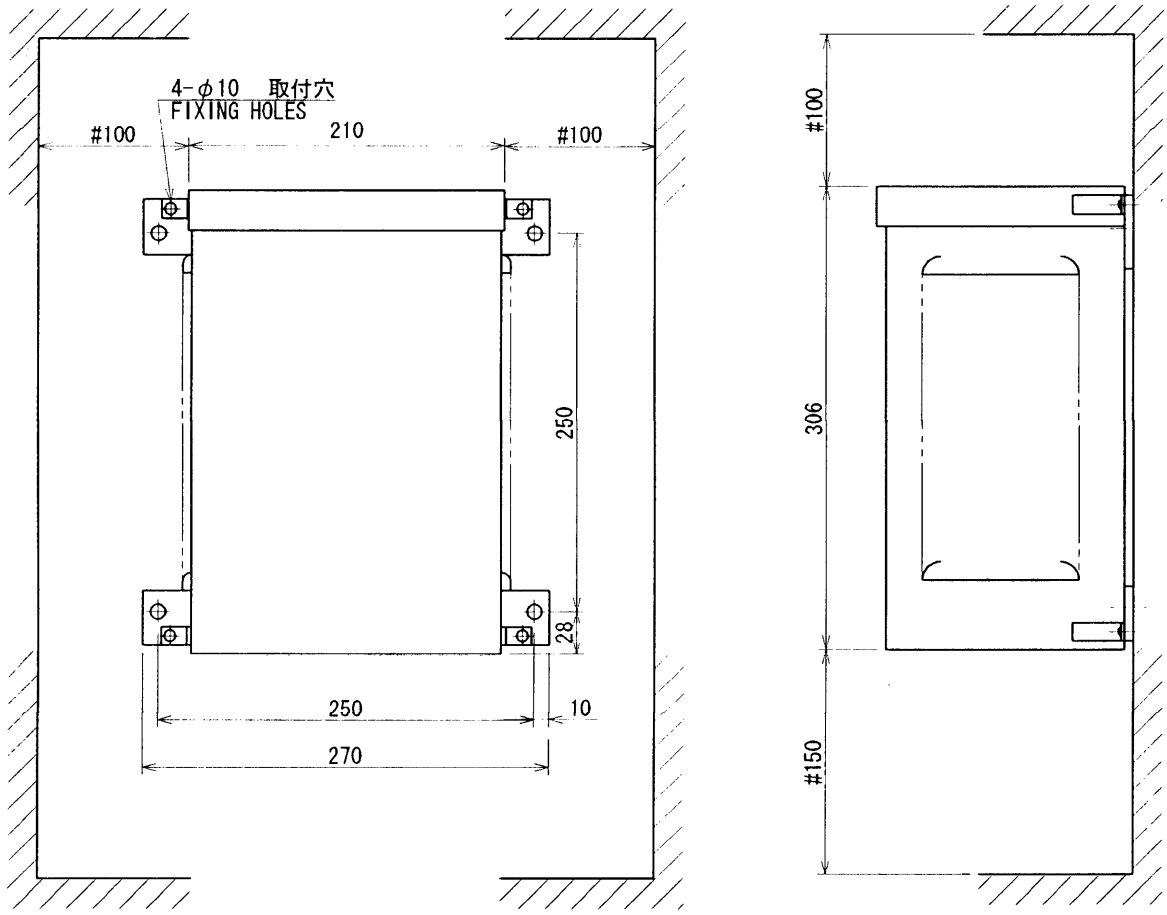
取付寸法
FIXING DIMENSIONS



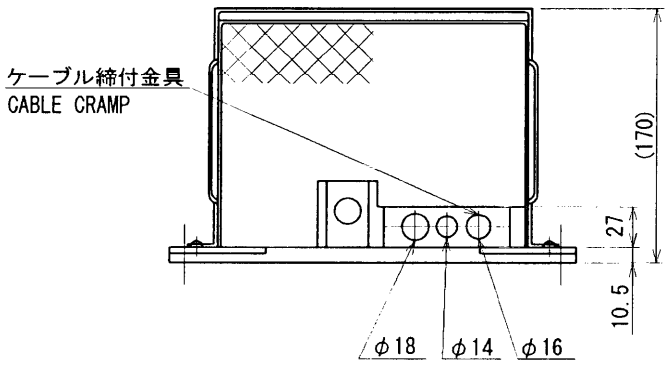


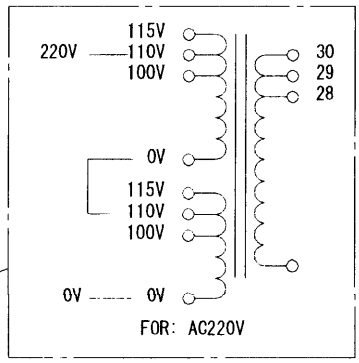
DRAWN 9/Oct/08 T.YAMASAKI		TITLE	SC-05WR, CA-150
CHECKED 9/Oct/08 T.TAKENO		名称	5Wトランペットスピーカ
APPROVED 23/Oct/08 R.Esumi			外寸図
SCALE 1/2 / MASS 1.2 ±10% kg	質量はケーブルを含まず。 MASS W/O CABLE.	NAME	TRUMPET SPEAKER
DWG.No. C5016-101- E	REF.No.		OUTLINE DRAWING

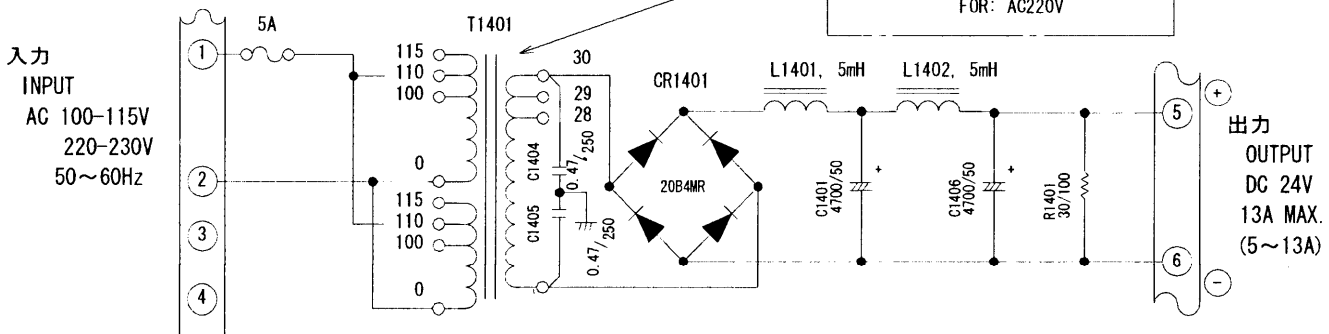
FURUNO ELECTRIC CO., LTD.



NOTE 1. ＃：推奨サービス空間
RECOMMENDED SERVICE CLEARANCE.





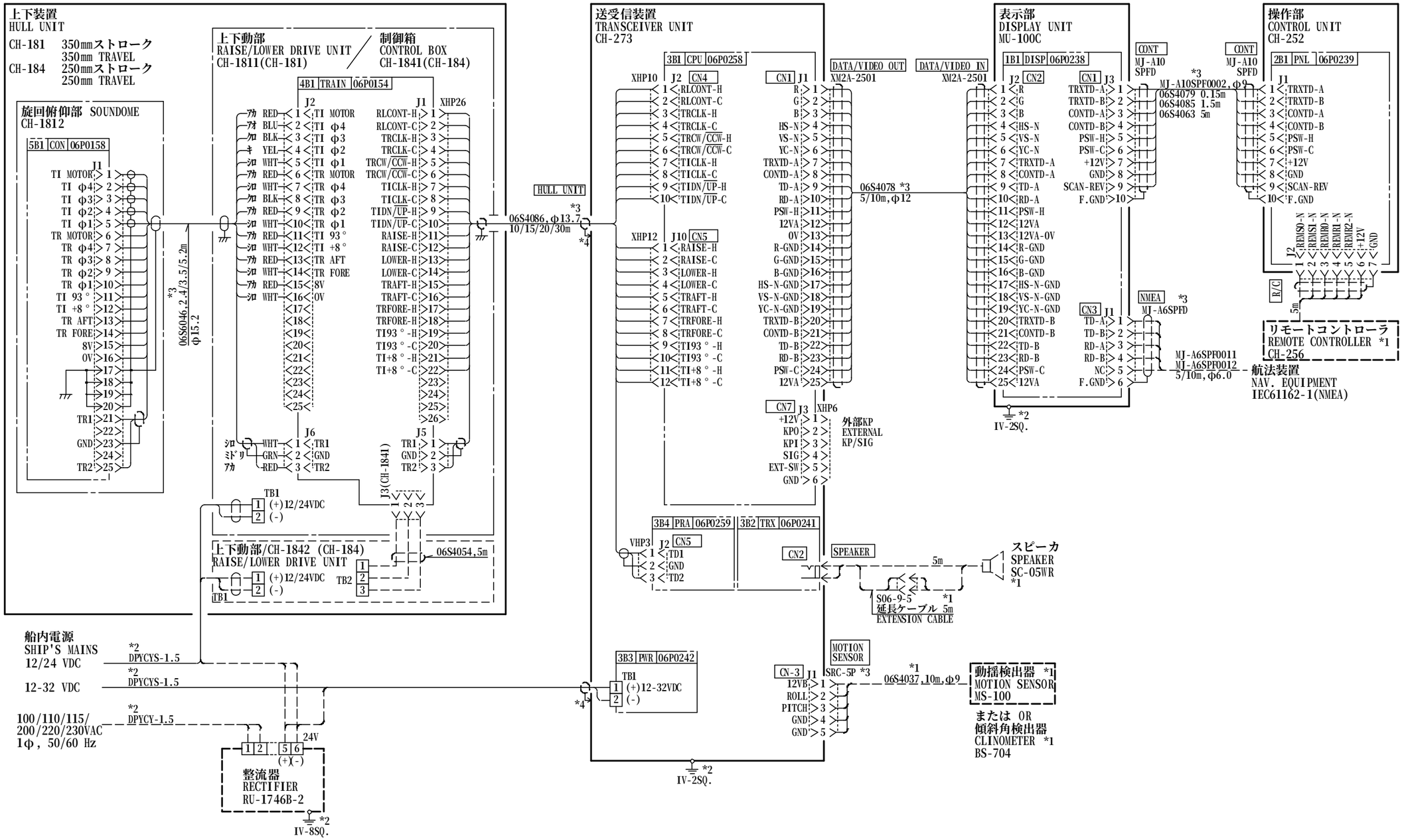


注記　AC220V入力に対しては T1401の一次巻線を直列に接続する。
NOTE　FOR 220V AC INPUT, CONNECT T1401 PRIMARY WINDINGS IN SERIES.

DRAWN Aug16'00 TYAMASAKI		TITLE RU-1746B-2
CHECKED Aug17'00 Y.K		名称 整流器
APPROVED Aug17'00 Y.K		外寸図
SCALE 1/5 MASS 17 kg ±10%		NAME RECTIFIER UNIT
DWG. No. C3002-002- N		OUTLINE DRAWING

FURUNO

S-1

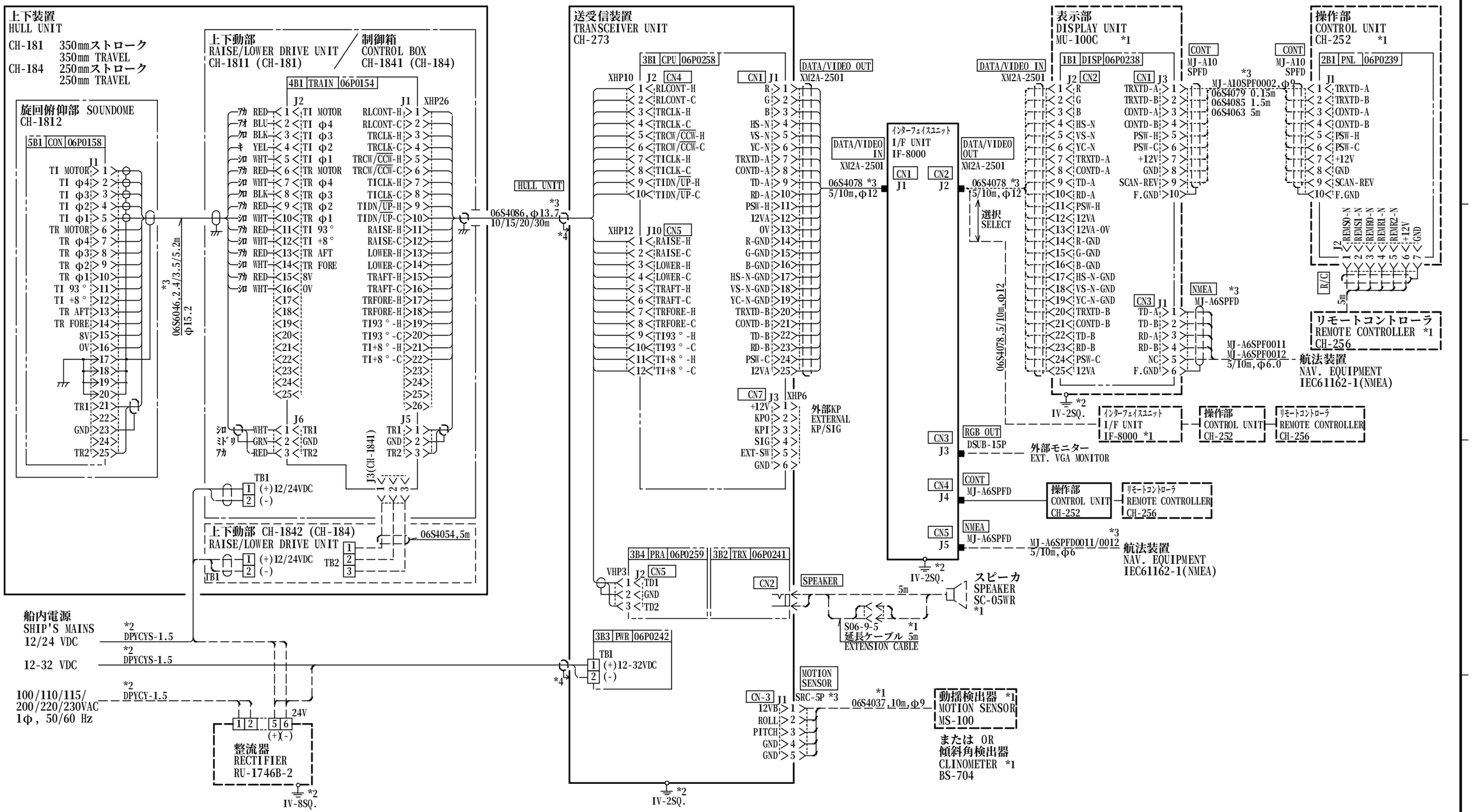


注記
＊1）オプション。
＊2）造船所手配。
＊3）コネクタは工場で取付済み。
＊4）ケーブルクランプでアースに落とす。

NOTE
*1. OPTION.
*2. SHIPYARD SUPPLY.
*3. CONNECTOR PLAG IS FITTED AT FACTORY.
*4. GROUND BRAIDED SHIELD THRU CABLE CLAMP.

DRAWN 2003. May H. MAKI		TITLE	CH-270
CHECKED Takahashi T.		名称	カラーLCDサーチライトソナー
APPROVED Takahashi T.			相互結線図
SCALE / MASS kg		NAME	COLOR LCD SEARCHLIGHT SONAR
DWG No. C1322-C01- C	06-022-0001-0		INTERCONNECTION DIAGRAM

FURUNO ELECTRIC CO., LTD.



注記
＊1）オプション。
＊2）造船所手配。
＊3）コネクタは工場で取付済み。
＊4）ケーブルクランプでアースに落とす。

NOTE
*1. OPTION.
*2. SHIPYARD SUPPLY.
*3. CONNECTOR PLAG IS FITTED AT FACTORY.
*4. GROUND BRAIDED SHIELD THRU CABLE CLAMP.

DRAWN 2003. May H. MAKI			TITLE CH-270
CHECKED Takahashi T.			名称 カラーLCDサーチライトソナー（I/Fユニット使用）
APPROVED Takahashi T.			相互結線図
SCALE	MASS kg		NAME COLOR LCD SEARCHLIGHT SONAR (W/IF UNIT)
DWG No. C1322-C02- B		06-022-0002-0	INTERCONNECTION DIAGRAM

FURUNO ELECTRIC CO., LTD.