FURUNO

Installation Manual
SEARCHLIGHT SONAR
DUAL-FREQUENCY SEARCHLIGHT SONAR
Model CH-500/CH-600

FURUNO ELECTRIC CO., LTD.

www.furuno.com

ECF
(Elemental Chlorine Free)
The paper used in this manual
is elemental chlorine free.

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・FURUNO Authorized Distributor/Dealer

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SAFETY INSTRUCTIONS

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

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

Warning, Caution Prohibitive Action Mandatory Action

WARNING

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

Only qualified personnel can work inside the equipment.

Do not install the equipment in a dusty environment, or one where the equipment may get wet from rain or water splash.

Dust or water in the equipment can result in fire, electrical shock, or damage to the equipment.

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

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

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.

WARNING

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

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

⚠ CAUTION

WORKING WITH THE SONAR OIL

Precautions

- Keep the oil away from eyes. Wear protective glasses 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.
- For further details, see the material safety data sheet (MSDS).

Emergency

- If the oil enters eyes, flush with clean water for 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.
- Keep the oil out of reach of children.
- For other information, see the material safety data sheet (MSDS).

Disposal of oil and its container

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

Storage

- Seal container to keep out foreign materials. Store in dark place.

Ground the equipment to prevent electrical shock and mutual interference.

Connect the ground terminal to the ship's ground.

If the ground terminal is connected to a terminal other than the ship's ground (ex. main engine), electrolytic corrosion may occur.

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

Unit	Standard compass	Steering compass
MU-121C	0.75 m	0.50 m
CH-502	0.55 m	0.35 m
CH-602	0.55 m	0.35 m
CH-503	1.30 m	0.85 m

⚠ CAUTION

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

Injury may result if caught in the shaft.

The hull unit is designed to withstand ship's speed of 20 kn (15 kn during raise/lower operation). For vessels with greater speed, reinforce the hull unit.

The transducer tank should be mounted 100 mm or more above the waterline. If this is impossible, use a waterproofing shaft and gland (supplied locally) and make safety provisions (ex. construction of watertight compartment).

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

The hull unit can not work if the ambient temperature is below 0 °C.

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

Electrolytic corrosion can damage the hull.

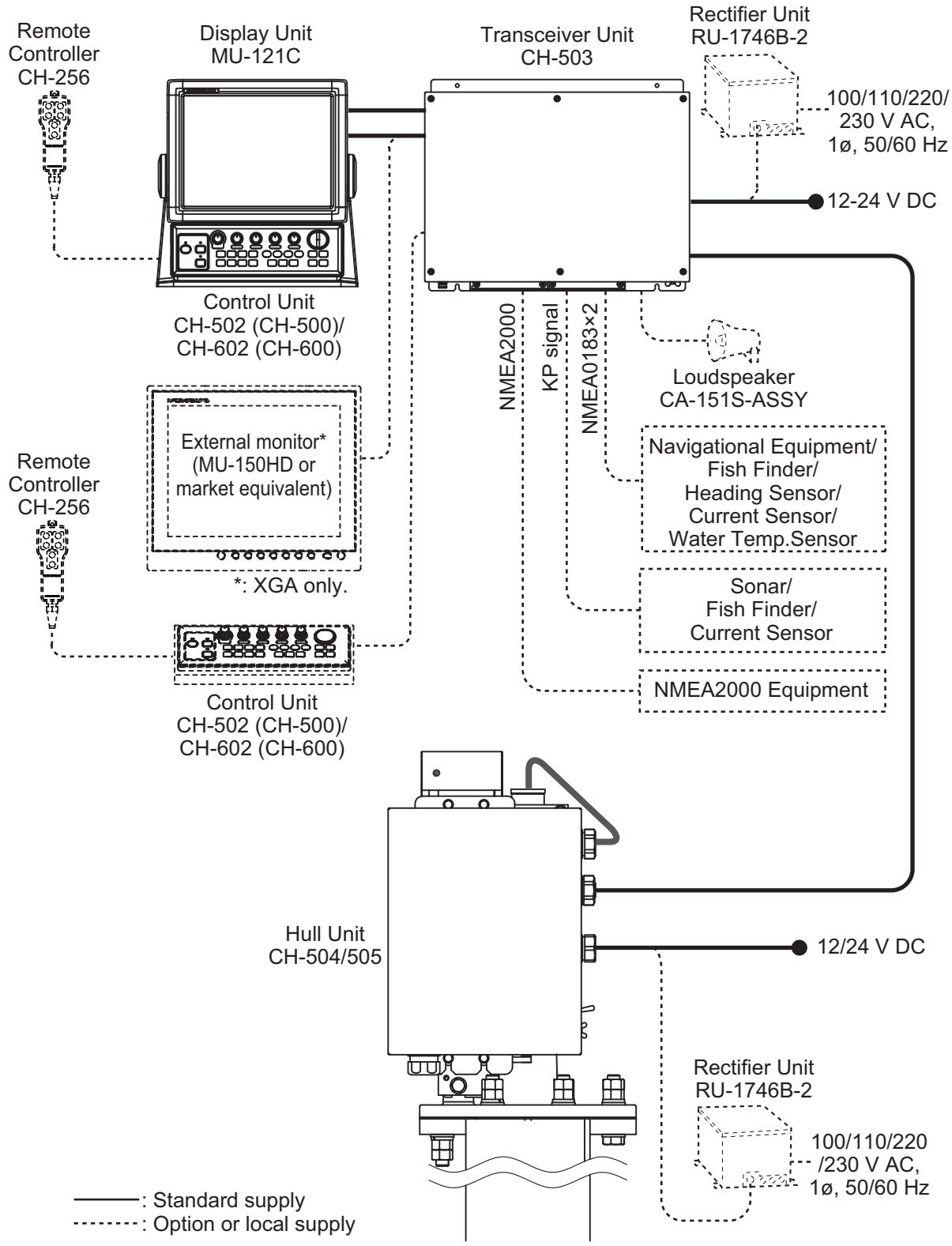
Do not apply substances which contain organic solvents (alcohol, thinner, etc.) to the soundome.

Chemical cracking may occur.

Do not connect/disconnect the connector while turning the power on.

The equipment may be damaged.

SYSTEM CONFIGURATION

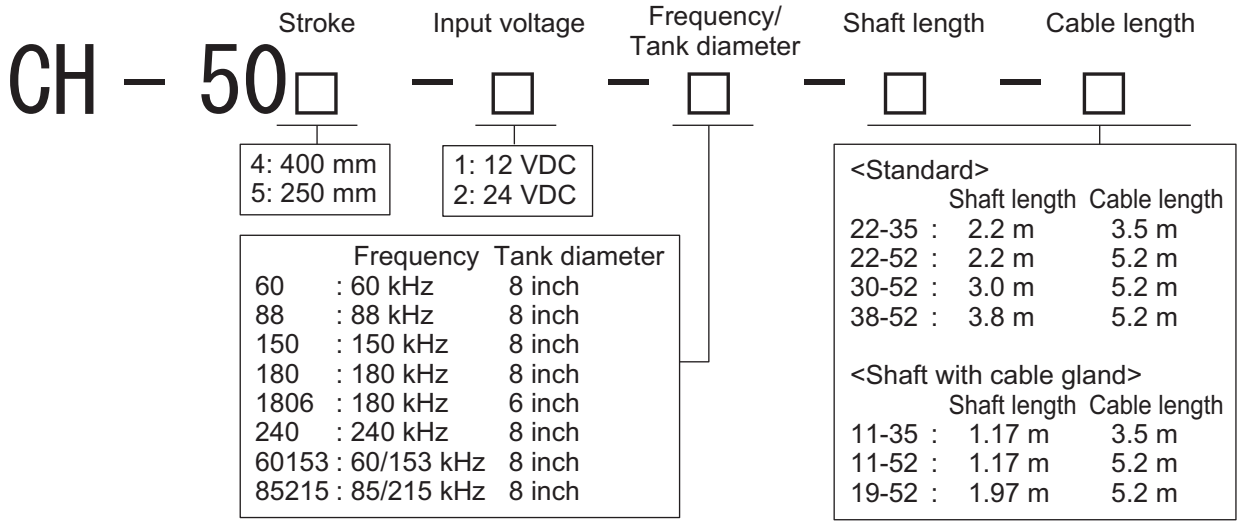


EQUIPMENT LISTS

Standard Supply

Name	Type	Code No.	Qty	Remarks
Control/Display Unit	CH-502/MU-121C	-	1	For CH-500, standalone type
	CH-602/MU-121C	-		For CH-600, standalone type
Control Unit	CH-502	-	1	For CH-500, black box type
	CH-602	-		For CH-600, black box type
Display Unit	MU-121C	-	1	Supplied for black box type.
Transceiver Unit	CH-503	-	1	
Hull Unit*	CH-504	-	1	400 mm stroke
	CH-505	-		250 mm stroke
Installation Materials	CP06-02100	001-453-960	1	Supplied for standalone type.
	CP06-02200	001-471-870	1	Cable between the control unit and transceiver unit, supplied for black box type only
	CP06-02301	001-456-130	1	For transceiver unit
	CP06-02410	000-032-347	1	See page v.
	CP06-02420	000-032-348		
	CP06-02430	000-032-349		
	CP06-02440	000-032-350		
	CP06-02450	000-032-351		
	CP06-02460	000-032-352		
	CP06-02501	001-468-920	1	For hull unit
Accessories	FP06-01900	000-033-449	1	Supplied for standalone type.
	FP06-01800	001-454-080	1	For display unit, supplied for black box type
	FP06-01600	000-032-340	1	For control unit, supplied for black box type
	FP06-01610	000-032-341	1	
Spare Parts	SP06-01601	001-456-120	1	For transceiver unit
	SP06-01701	001-456-490	1	For hull unit (24 V DC)
	SP06-01702	001-478-140		For hull unit (12 V DC)

*: Hull unit can be arranged as follows:



Hull Unit

Name	Type	Code No.	Qty	Remarks
Raise/Lower Drive Unit	CH-5041	-	1	400 mm stroke
	CH-5051	-		250 mm stroke
Complete Soundome Assembly	CH-5048	-	1	For 8 inch retraction tank
	CH-5046	-		For 6 inch retraction tank
Hull Unit Assembly Parts	CH-5081	000-030-337	1	For CH-5048, 1.17/1.97 m soundome shaft, included liquid gasket
		000-030-338		For CH-5048, 1.17/1.97 m soundome shaft, without liquid gasket
	CH-5082	000-030-339		For CH-5048, 2.2/3.0/3.8 m soundome shaft, included liquid gasket
		000-030-340		For CH-5048, 2.2/3.0/3.8 m soundome shaft, without liquid gasket
	CH-5061	000-030-341		For CH-5046, 1.17/1.97 m soundome shaft, included liquid gasket
		000-030-342		For CH-5046, 1.17/1.97 m soundome shaft, without liquid gasket
	CH-5062	000-030-343		For CH-5046, 2.2/3.0/3.8 m soundome shaft, included liquid gasket
		000-030-344		For CH-5046, 2.2/3.0/3.8 m soundome shaft, without liquid gasket
Soundome Shaft	06-008-1021	001-237-220	1	1.17 m
	06-008-1022	001-458-090		1.97 m
	SHJ-0006	001-237-230		2.2 m
	06-007-1591	001-261-030		3.0 m
	06-007-1572	001-237-210		3.8 m

Cables for Installation Materials

Type	Code No.	Cable between display unit and transceiver unit		Cable between transceiver unit and hull unit	
		Type	Length	Type	Length
CP06-02410	000-032-347	FRU-HDMI-5M-AS	5 m	FRU-WH-A-15M	15 m
		FRU-CCCAF18-05M-B			
CP06-02420	000-032-348	FRU-HDMI-5M-AS	5 m	FRU-WH-A-30M	30 m
		FRU-CCCAF18-05M-B			
CP06-02430	000-032-349	FRU-HDMI-5M-AS	5 m	FRU-WH-A-50M	50 m
		FRU-CCCAF18-05M-B			
CP06-02440	000-032-350	FRU-HDMI-10M-AS	10 m	FRU-WH-A-15M	15 m
		FRU-CCCAF18-10M-B			
CP06-02450	000-032-351	FRU-HDMI-10M-AS	10 m	FRU-WH-A-30M	30 m
		FRU-CCCAF18-10M-B			
CP06-02460	000-032-352	FRU-HDMI-10M-AS	10 m	FRU-WH-A-50M	50 m
		FRU-CCCAF18-10M-B			

Option

Name	Type	Code No,	Remarks	
Control Unit	CH-502	-	For CH-500	
	CH-602	-	For CH-600	
Display Unit	MU-121C	-		
Remote Controller	CH-256	-		
Loudspeaker	CA-151S-ASSY	-		
Rectifier	RU-1746B-2	-		
Bracket Assembly with Knobs	OP06-24	001-458-030	For desktop mount of display unit	
Flush Mount Kit (DISP)	OP06-25	001-458-040	For flush mount of display unit	
Flush Mount Kit (CTRL)	OP06-26	001-458-050	For flush mount of control unit	
Waterproof Attachment Kit	OP06-27	001-458-060	For soundome shaft	
Fixing Materials	OP10-9	006-990-040	For remote controller	
Cable Assembly	MJ-A10SPF0002-015+	001-122-610-10	Cable between display unit and control unit, 1.5 m	
	MJ-A10SPF0002-050+	001-122-630-10	Cable between display unit and control unit, 5 m	
	MJ-A6SPF0011-050C	000-159-690-10	For NMEA0183 connection	6 pin-4 pin, 5 m
	MJ-A6SPF0011-100C	000-159-691-10		6 pin-4 pin, 10 m
	MJ-A6SPF0011-200C	001-244-120		6 pin-4 pin, 20 m
	MJ-A6SPF0012-050C	000-154-053-10		6 pin-6 pin, 5 m
	MJ-A6SPF0012-100C	000-154-037-10		6 pin-6 pin, 10 m
	MJ-A6SPF0012-150C	000-161-513-10		6 pin-6 pin, 15 m
	MJ-A6SPF0012-200C	001-244-130		6 pin-6 pin, 20 m
	M12-05BM+05BF-010	001-105-750-10	For NMEA2000 connection	w/micro type connectors, 1 m
	M12-05BM+05BF-020	001-105-760-10		w/micro type connectors, 2 m
	M12-05BM+05BF-060	001-105-770-10		w/micro type connectors, 6 m
	M12-05BFFM-010	001-105-780-10		w/micro type connector, 1 m
	M12-05BFFM-020	001-105-790-10		w/micro type connector, 2 m
	M12-05BFFM-060	001-105-800-10		w/micro type connector, 6 m
	FRU-NMEA-PMM-01	001-471-560	For connecting NMEA2000 cable	
	FRU-CCCAF18-05M-B	001-471-470	Cable between display unit and transceiver unit, 5 m	
	FRU-CCCAF18-10M-B	001-471-480	Cable between display unit and transceiver unit, 10 m	
	FRU-HDMI-5M-AS	001-471-490	Cable between display unit and transceiver unit, 5 m	
	FRU-HDMI-10M-AS	001-471-500	Cable between display unit and transceiver unit, 10 m	

Name	Type	Code No,	Remarks
Cable for External Monitor	HDMI-TO-DVI-A-L=5.3M	001-471-450	For connecting external monitor, 5.3 m
	HDMI-TO-DVI-A-L=10.3M	001-471-440	For connecting external monitor, 10.3 m
Cable for External KP	FRU-WH-B-05M	001-471-570	For external KP connection, 5 m
	FRU-WH-B-10M	001-471-580	For external KP connection, 10 m
Cable between Transceiver and Control	MJ-A10SPF0022-050+	001-471-540	For sub control unit connection, 5 m
	MJ-A10SPF0022-100+	001-471-550	For sub control unit connection, 10 m
Speaker Extension Cable	S06-9-5	006-556-270	Extension cable for loudspeaker, 5 m
Tabletop Mount Kit (CTRL)	FP06-01601	001-458-100	For desktop mount of control unit
Faring	06-021-4502	001-159-790-10	For an FRP ship
Retraction Tank	06-007-1570-2	001-428-120	Steel, 1 m, tank diameter: 8 inch
	SHJ-0001-2*1.8M*ROHS	001-428-150	Steel, 1.8 m, tank diameter: 8 inch
	06-007-1571-2	001-241-270	Steel, 3.5 m, tank diameter: 8 inch
	06-021-4024-0	001-352-280	FRP, 1 m, tank diameter: 8 inch
	06-007-1573-0	001-428-260	FRP, 1.8 m, tank diameter: 8 inch
	OP10-5	000-019-283	Aluminum, 1 m, tank diameter: 8 inch
	06-013-2501	001-241-280	Steel, 1 m, tank diameter: 6 inch
	06-013-2502	001-428-130	Steel, 1.8 m, tank diameter: 6 inch
	06-013-2503	001-428-140	Steel, 3.5 m, tank diameter: 6 inch
	06-022-2201	100-306-180-10	FRP, 1 m, tank diameter: 6 inch
	06-022-2202	100-306-200-10	FRP, 1.8 m, tank diameter: 6 inch

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1. MOUNTING

NOTICE

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

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

1.1 Required Tools and Materials

Prepare the following tools in advance for this installation.

No.	Name	Qty	Specification/Remarks
1	Phillips-head Screwdriver	-	#1 for M3 and #2 for M4/M5
2	Wrench	-	For M4 (hex. size 7 mm), M8 (hex. size 13 mm), M10 (hex. size 17 mm), M16 (hex. size 24 mm, for CH-5046), M20 (hex. size 30 mm, for CH-5048)
3	Adjustable Wrench	-	Hex. size 35 mm and 41 mm
4	Pipe Wrench	-	Hex. size 55 mm
5	Ball Wrench*1	-	For M5 (hex. size 4 mm)
6	Ratchet Wrench	1	Hex. size 19 mm, for checking manual raise/lower of transducer
7	Hex Wrench	1	Hex. size 3 mm, only required for optional waterproofing attachment kit (OP06-27)
8	Terminal Opener*2	-	For wiring WAGO connector
9	Power Cable	1	DPYCYSLA-2.5 cable, for hull unit
		1	DPYCY-2.5 cable, for transceiver unit
10	Ground Wire	4	IV-2sq., for hull unit, transceiver unit, display unit, control unit
11	Crimp-on Lug	4	FV2-4, for ground wire
12	Vinyl Tape	-	For fabricating
13	Heat Shrinkable Tube	-	For drain wire of the DPYCYSLA-2.5 cable
14	Lithium Grease	-	Recommended: • Daphne Eponex Grease No.2 (IDEMITSU KOSAN CO.,LTD) • Shell Albania Grease S No.2 (SHOWA SHELL SEKIYU K. K.) • Mobilux EP No.2 (Exxon Mobil Corporation) • Multinox Grease No.2 (Nippon Oil Corporation)
15	Liquid Gasket*3	-	TB1121 or TB1184 (ThreeBond Holdings Co., Ltd.)
16	Retaining Compound	-	For optional waterproof attachment kit (OP06-27) Recommended: LOCTITE 601 (Henkel.,LTD)
17	Extension Cable	-	Used only when the raise/lower control unit is mounted separately (not recommended). Cable diameter: ϕ7±0.5 mm

*1: Supplied with installation materials for the CH-5048. Not required for CH-5046.

*2: Pre-attached inside the raise/lower control unit.

*3: Liquid gasket may not be supplied with the product because of export restrictions in each country. If not included, prepare specified liquid gasket locally.

1.2 Control/Display Unit (Standalone Type)

There are two configurations for control unit and display unit installation; standalone or black box type. Desktop mount is available for standalone type.

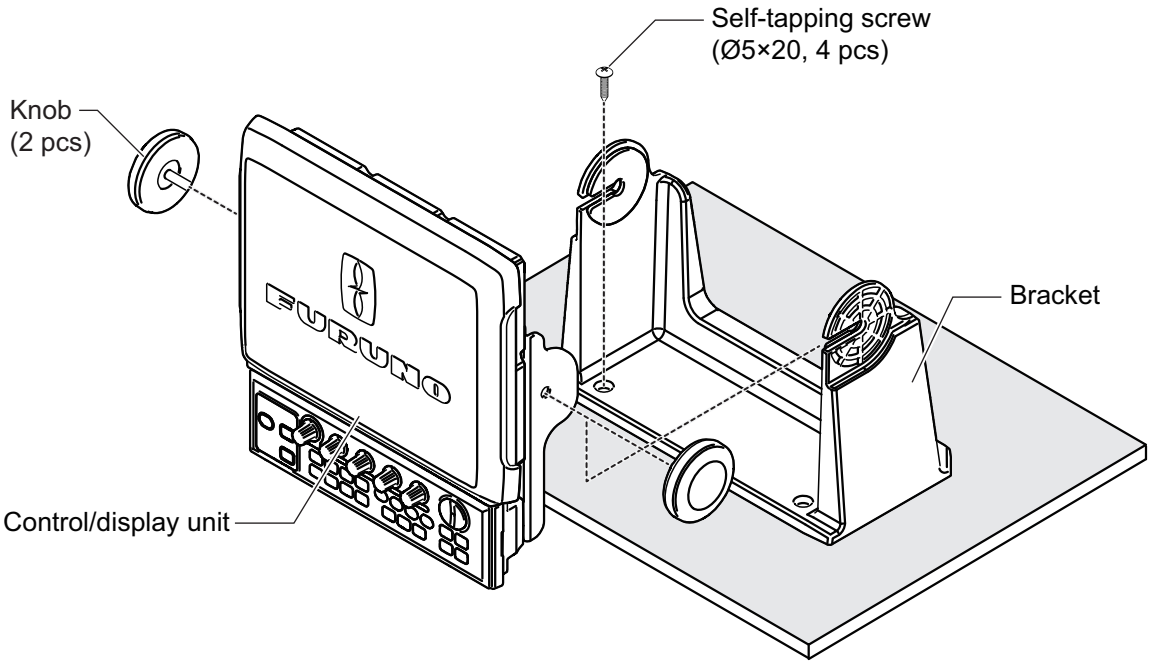
For how to install the control unit and display unit separately, see section 1.3 (display unit) and section 1.4 (control unit).

Mounting consideration

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

- Select a location where the unit can easily be operated.
- Keep the display unit out of direct sunlight.
  The LCD can blackout if the unit is exposed to the direct sunlight for a long time.
- Locate the unit away from places subject to water splash and rain.
- Locate the unit away from exhaust pipes and ventilators.
- The mounting location should be well ventilated.
- Select a location where shock and vibration are minimal.
- Referring to the outline drawings at the back of this manual, allow sufficient space for maintenance and service.
- Select a mounting location considering the length of the cables to be connected to the unit.
- A magnetic compass will be affected if the unit is placed too close to the magnetic compass. Observe the compass safe distances at the front of this manual to prevent interference to a magnetic compass.

Procedure



1. Secure the supplied bracket to the mounting location, using four supplied self-tapping screws (ϕ5×20).
2. Fasten two supplied knobs to the control/display unit loosely.

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

1.3 Display Unit (Black Box Type)

The display unit can be mounted on a desktop or flush mounted in a console. Following optional item is required for each mounting method.

- Desktop mounting: Bracket assembly with knobs (OP06-24)
- Flush mounting: Flush mount kit (OP06-25)

Mounting consideration

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

- Keep the display unit out of direct sunlight.
  The LCD can blackout if the unit is exposed to the direct sunlight for a long time.
- Locate the unit away from places subject to water splash and rain.
- Locate the unit away from exhaust pipes and ventilators.
- The mounting location should be well ventilated.
- Select a location where shock and vibration are minimal.
- Referring to the outline drawings at the back of this manual, allow sufficient space for maintenance and service.
- Select a mounting location considering the length of the cables to be connected to the unit.
- A magnetic compass will be affected if the unit is placed too close to the magnetic compass. Observe the compass safe distances at the front of this manual to prevent interference to a magnetic compass.

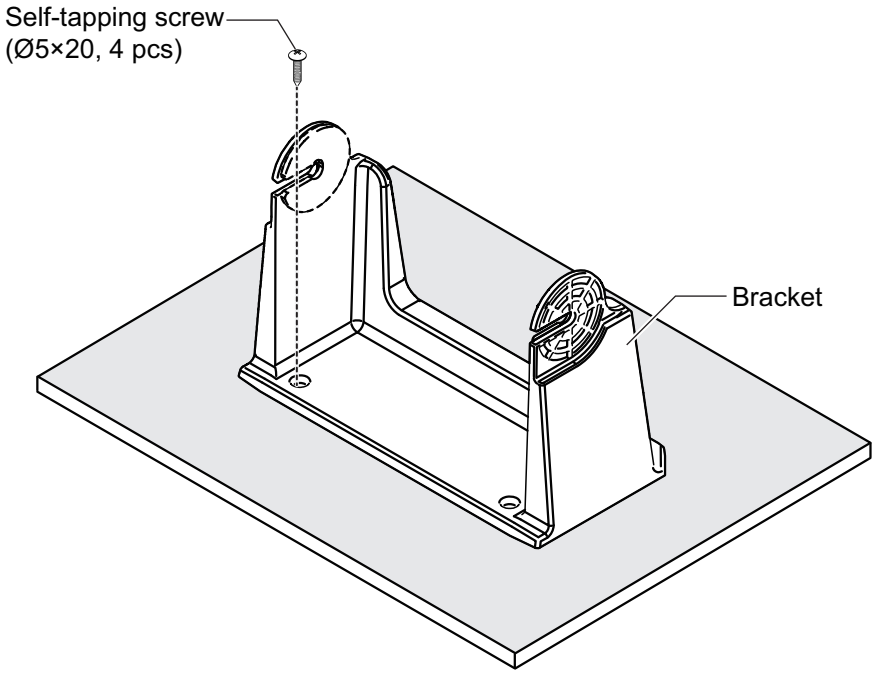
1.3.1 Desktop mounting

Prepare the optional bracket assembly with knobs (type: OP06-24, code no,: 001-458-030), to mount the display unit on a desktop. The items included in OP06-24 are listed in the following table.

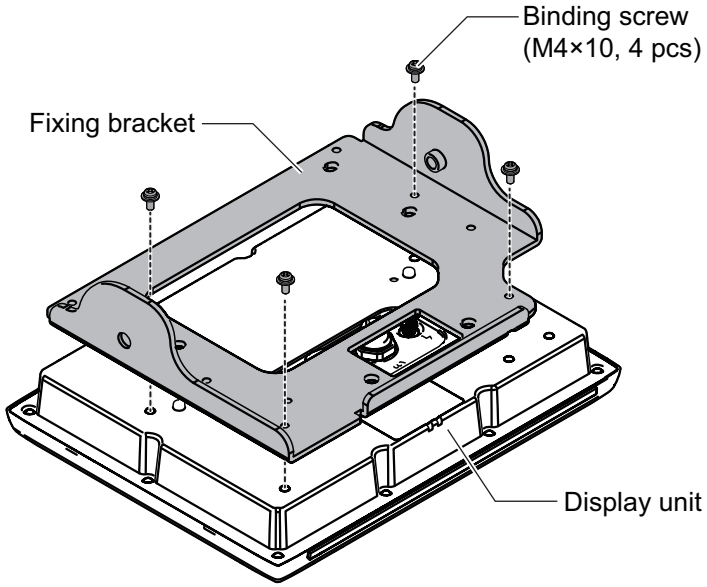
Name	Type	Code No.	Qty
Fixing Bracket	06-027-1508-1	100-409-371-10	1
Bracket	FP06-01901	001-478-130	1
Bracket Washer	05-029-0132-1	100-087-911-10	2
Knob	19-028-2073-1	100-340-481-10	2
Binding Screw	M4×10 C2700W MBCR2	000-163-543-10	4
Self-tapping Screw	5×20 SUS304	000-162-608-10	4

Procedure

1. Secure the bracket to the mounting location, using four self-tapping screws (ϕ5×20).

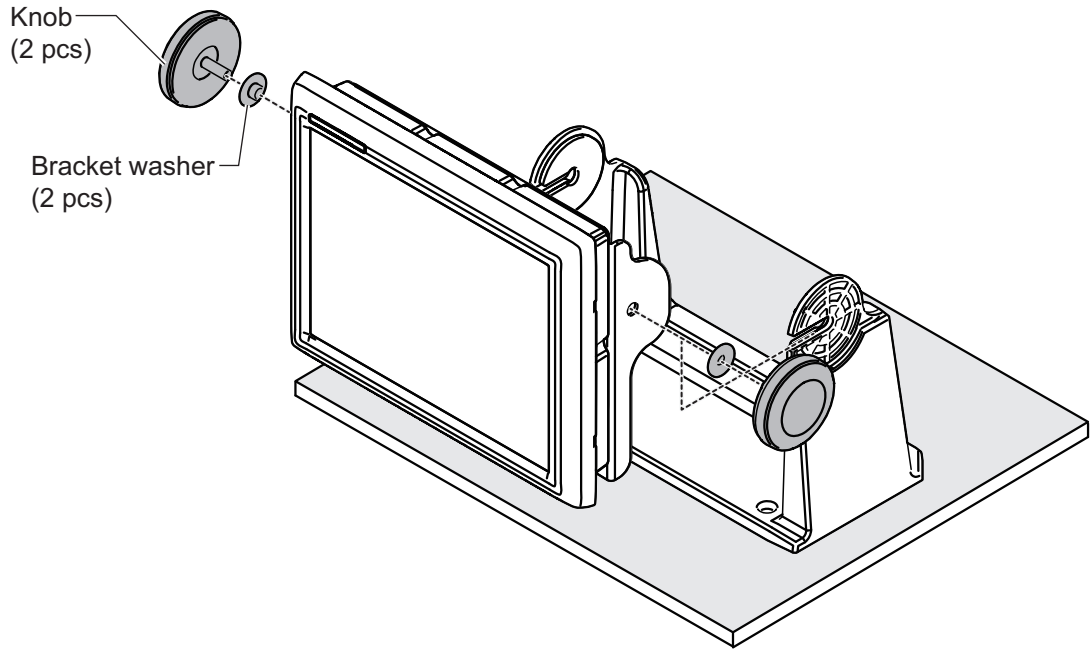


2. Secure the fixing bracket to the display unit, using four binding screws (M4×10).
   Note: Place the unit face-down on a soft, clean surface to prevent the damage to the LCD.



3. Fasten two knobs and bracket washers to the fixing bracket loosely.
4. Connect the cables to the unit, referring section 2.2.

5. Set the unit in the bracket, then fasten the knobs.

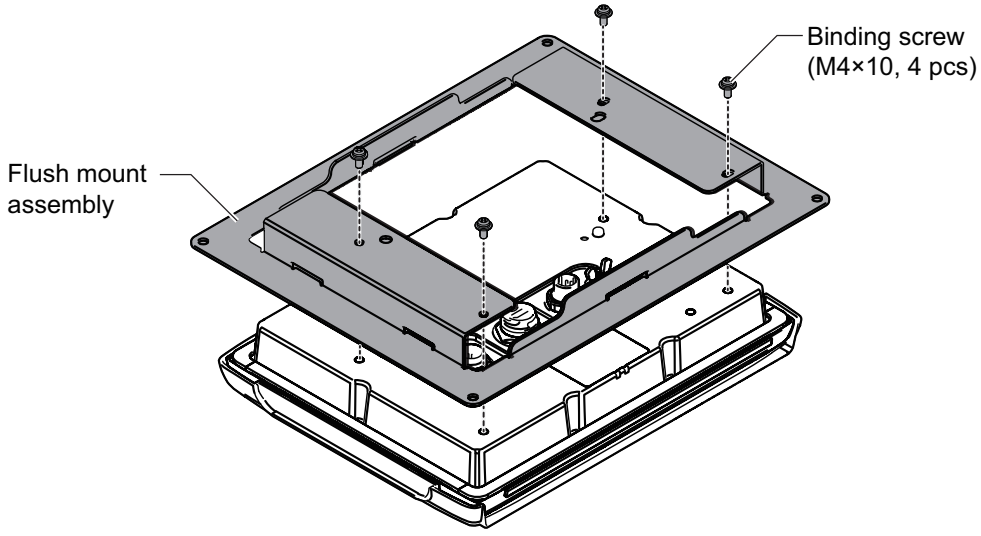


1.3.2 Flush mounting

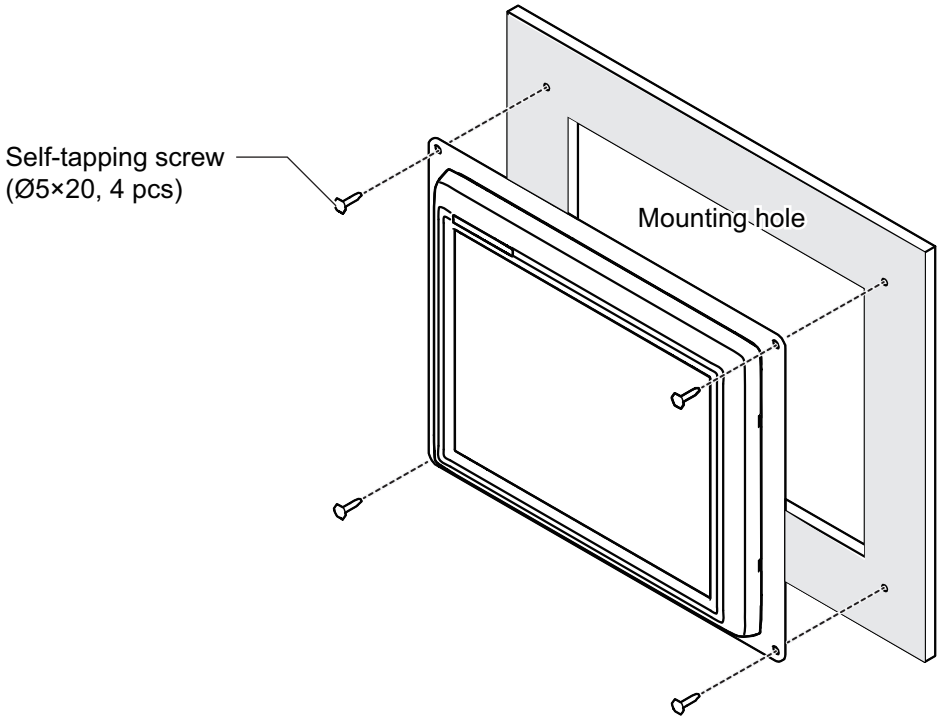
Prepare the optional flush mount kit (type: OP06-25, code no,: 001-458-040) for flush mounting the display unit. The included items in OP06-25 are listed in the following table.

Name	Type	Code No.	Qty
Flush Mount Assembly	OP06-25-1	001-454-100	1
Binding Screw	M4×10 C2700W MBCR2	000-163-543-10	4
Self-tapping Screw	5×20 SUS304	000-162-609-10	4

1. Make a mounting hole in the mounting location, referring to the outline drawing at the back of this manual.
2. Secure the flush mount assembly to the display unit, using four binding screws (M4×10).
   Note: Place the unit face-down on a soft, clean surface to prevent the damage to the LCD.



3. Connect the cables to the unit, referring section 2.2.
4. Set the unit to the mounting hole, then secure the unit with four self-tapping screws (ϕ5×20).



1.4 Control Unit (Black Box Type)

The control unit can be mounted on a desktop or flush mounted in a console. The following optional items are required for each mounting method.

- Desktop mounting: Tabletop mount kit* (FP06-01601)
  *: Supply depends on configuration purchased.
- Flush mounting: Flush mount kit (OP06-26)

Mounting consideration

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

- Select a location where the unit can easily be operated.
- Locate the unit away from places subject to water splash and rain.
- Locate the unit away from exhaust pipes and ventilators.
- The mounting location should be well ventilated.
- Select a location where shock and vibration are minimal.
- Referring to the outline drawings at the back of this manual, allow sufficient space for maintenance and service.
- Select a mounting location considering the length of the cables to be connected to the unit.
- A magnetic compass will be affected if the unit is placed too close to the magnetic compass. Observe the compass safe distances at the front of this manual to prevent interference to a magnetic compass.

1.4.1 Desktop mounting

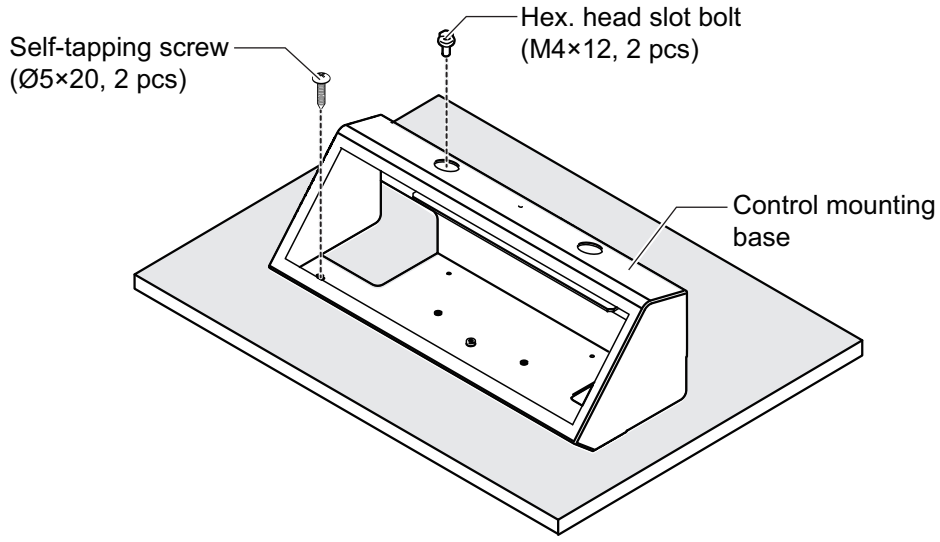
Prepare the optional tabletop mount kit* (type: FP06-01601, code no: 001-458-100) for flush mounting the display unit. The items included in FP06-01601 are listed in the following table.

*: Supply depends on configuration purchased.

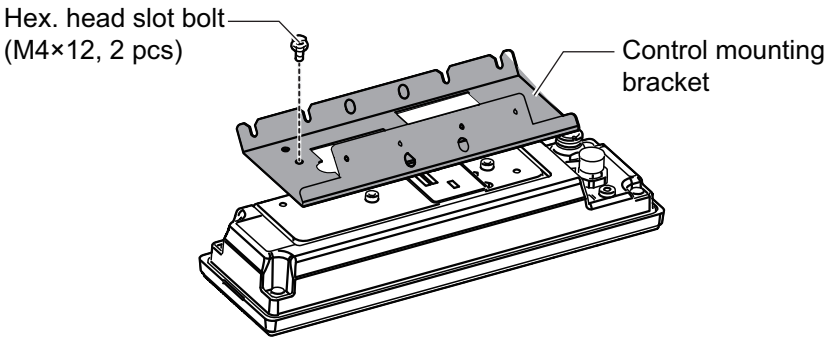
Name	Type	Code No.	Qty
Control Mounting Base	06-027-2541-0	100-409-510-10	1
Control Mounting Bracket	06-021-2112-0	100-281-880-10	1
Self-tapping Screw	5×20 SUS304	000-162-608-10	2
Cosmetic Plug	DP-687	000-165-997-10	2
Hex. Head Slot Bolt	M4×12 SUS304	000-162-939-10	4

Procedure

1. Secure the control mounting base to the mounting location, using two self-tapping screws (ϕ5×20).
2. Fasten two hex. head slot bolts (M4×12) loosely to the control mounting base, passing the bolt and screwdriver through the hole at the top of the mounting base.

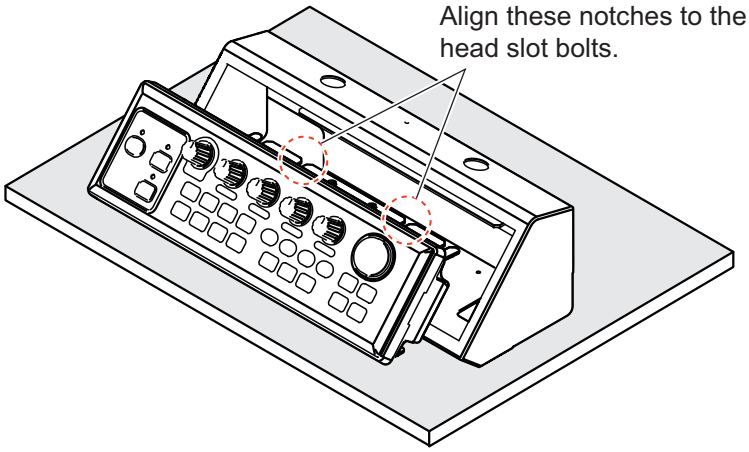


3. Secure the control mounting bracket to the control unit, using two hex. head slot bolts (M4×12).

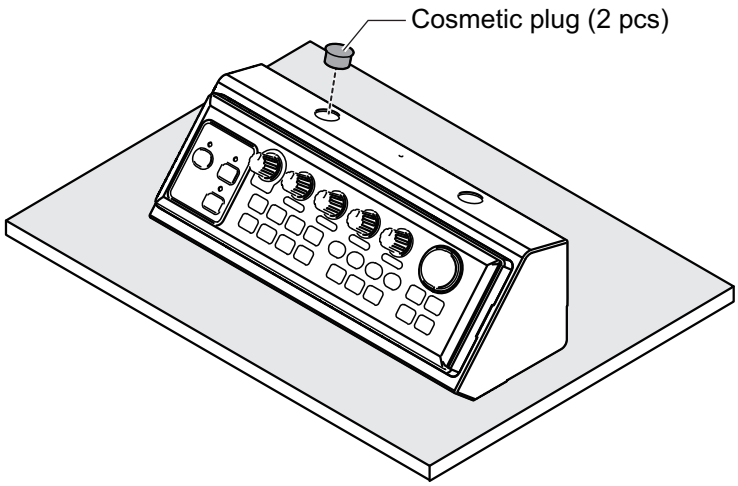


4. Connect the cables to the unit, referring section 2.3.

5. Set the control unit to the control mounting base, then tightly fasten the two bolts that were fastened loosely at step 2.
   When you set the control unit, align the two notches on the control unit to the bolts fastened at step 2.



6. Attach the two cosmetic plugs to the holes at the top of the control mounting base.



1.4.2 Flush Mounting

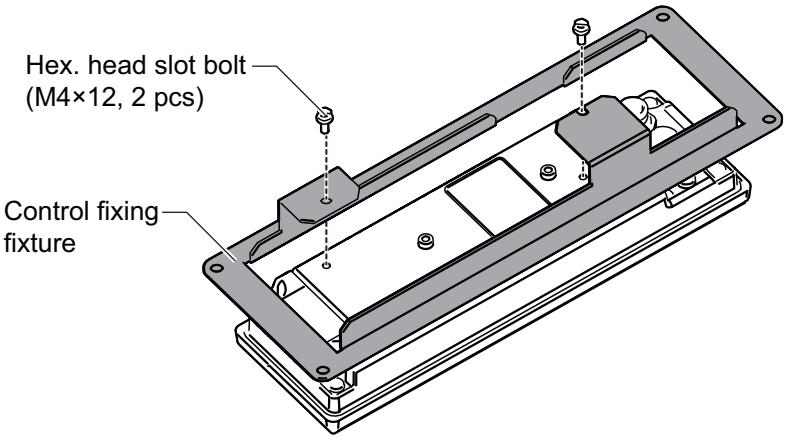
Prepare the optional flush mount kit (type: OP06-26, code no,: 001-458-050) for flush mounting the display unit. The included items in OP06-26 are listed in the following table.

Name	Type	Code No.	Qty
Control Fixing Fixture	06-027-2543-0	100-409-520-10	1
Self-tapping Screw	5×20 SUS304	000-162-609-10	4
Hex. Head Slot Bolt	M4×12 SUS304	000-162-939-10	2

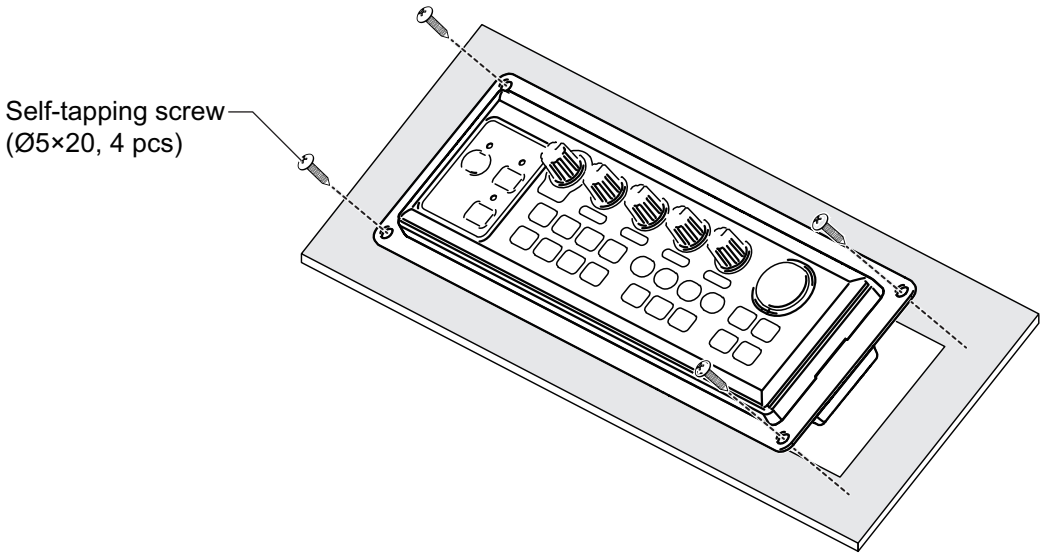
Procedure

1. Make a mounting hole in the mounting location, referring to the outline drawing at the back of this manual.

2. Secure the control fixing fixture to the control unit, using two hex. head slot bolts (M4×12).



3. Connect the cables to the unit, referring section 2.3.
4. Set the unit to the mounting hole, then secure the unit with four self-tapping screws (ϕ5×20).



1.5 Transceiver Unit

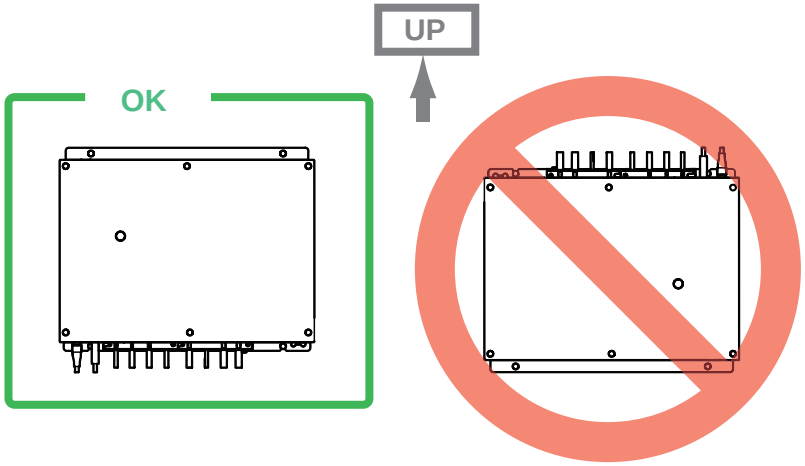
Mount the transceiver unit on a bulkhead.

Mounting consideration

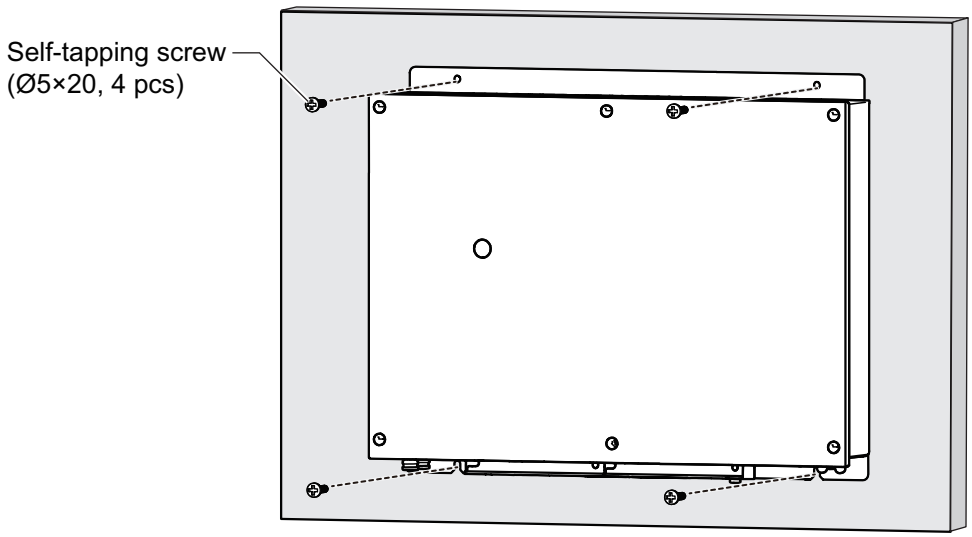
Select a mounting location, keeping in mind the following points:

- Keep the display unit out of direct sunlight.
- Locate the unit away from places subject to water splash and rain.
- Locate the unit away from exhaust pipes and ventilators.
- The mounting location should be well ventilated.
- Select a location where shock and vibration are minimal.
- Referring to the outline drawings at the back of this manual, allow sufficient space for maintenance and service.
- Select a mounting location considering the length of the cables to be connected to the unit.

- A magnetic compass will be affected if the unit is placed too close to the magnetic compass. Observe the compass safe distances at the front of this manual to prevent interference to a magnetic compass.
- Secure the unit so that the cable entrance faces downward.



Procedure



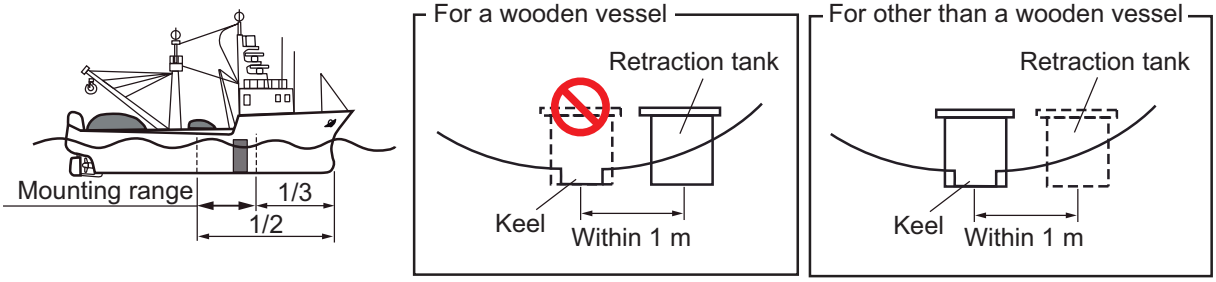
1. Drill four pilot holes in the bulkhead for self-tapping screws.
2. Screw two supplied self-tapping screws (ϕ5×20) into the lower pilot holes. Leave 5 mm of thread visible.
3. Set the notches of the unit onto the screws fastened at step 2.
4. Screw two supplied self-tapping screws (ϕ5×20) into the upper fixing holes.
5. Fasten all screws tightly to secure the unit in place.

1.6 Hull Unit

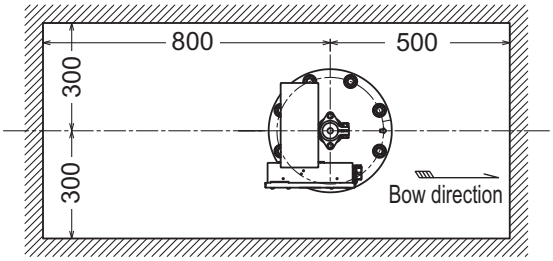
1.6.1 Installation position considerations

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:

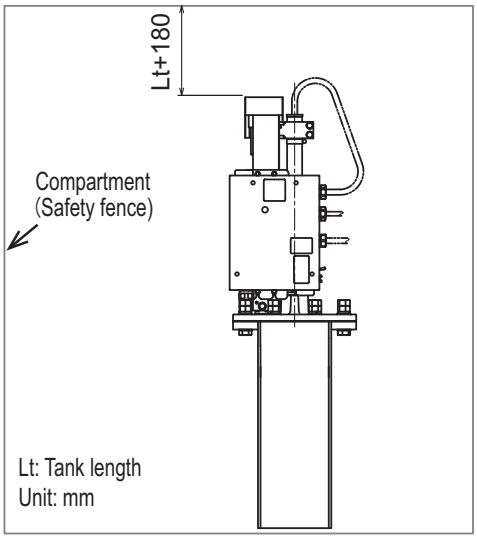
- Select an area where propeller noise, cruising noise, bubbles and interference from turbulence are minimal. Generally, the point at 1/3 to 1/2 of the ship's length from the bow or near the keel is the best. If the hull unit cannot be installed on the keel, the center of the retraction tank should be within 1 meter of the keel to prevent a rolling effect.
  For a wooden vessel: Install the hull unit off the keel.
  For other than a wooden vessel: On-the-keel installation is advantageous in comparison with off-the-keel.



- Select a place where interference from the transducers of other sounding equipment is minimal. The hull unit should be at least 2.5 meters 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.
- Referring to the outline drawings at the back of this manual, allow sufficient space for maintenance and service.
- If the ambient temperature will be below 0°C, provide the sonar compartment with a heater to keep the temperature above 0°C.
  The hull unit can not work if the ambient temperature is below 0°C.



- Prepare a secure and firm safety fence for the hull unit, to prevent accidental injury from the moving hull unit. The safety fence should be easily removable for maintenance and allow room for the connected cables to swing freely with pitch, roll and heave. The power switch on the raise/lower control unit should be operatable from outside the safety fence.



1.6.2 Retraction tank

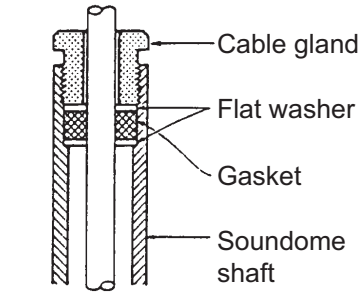
A typical mounting method is shown in the outline drawing at the back of this manual (DWG No.: C1316-T01). Consult with the ship's owner, dockyard and user to determine the appropriate mounting method. Pay attention to safety (strength, watertightness) first, followed by ease of maintenance and inspection.

Tank length (Lt)

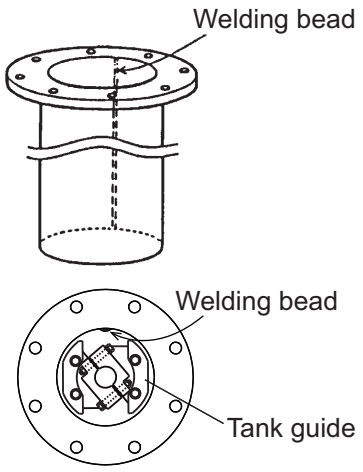
Shorten the retraction tank so the transducer is lowered into water as deep as possible. Pay particular attention to the tank length (Lt). Determine the length of the soundome shaft.

- For CH-5048 (complete soundome assembly for 8 inch retraction tank):
  400 mm stroke: Soundome shaft length = Lt + 200 mm
  250 mm stroke: Soundome shaft length = Lt + 50 mm
- For CH-5046 (complete soundome assembly for 6 inch retraction tank):
  400 mm stroke: Soundome shaft length = Lt + 190 mm
  250 mm stroke: Soundome shaft length = Lt + 40 mm

Note 1: Do not shorten the 1 meter and 1.8 meter retraction tanks. Shortening it may also necessitate shortening of the top part of the soundome shaft, thereby destroying the watertight construction of the soundome shaft. If the soundome shaft is shortened, attach the optional waterproof attachment kit (OP06-27) to the top of the soundome shaft, see section 1.6.5.



Note 2: When the retraction tank is constructed locally, finish it so that welding beads do not protrude on the inner surface of the tank. The tank guide will hit the bead, burning out the raise/lower motor. Also, do not position the welding bead in the ship's fore-aft line.

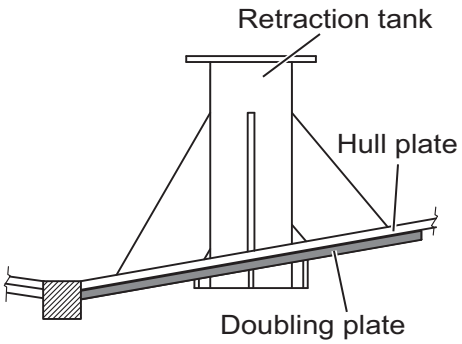


Guideline for the installation on a steel or aluminum hull

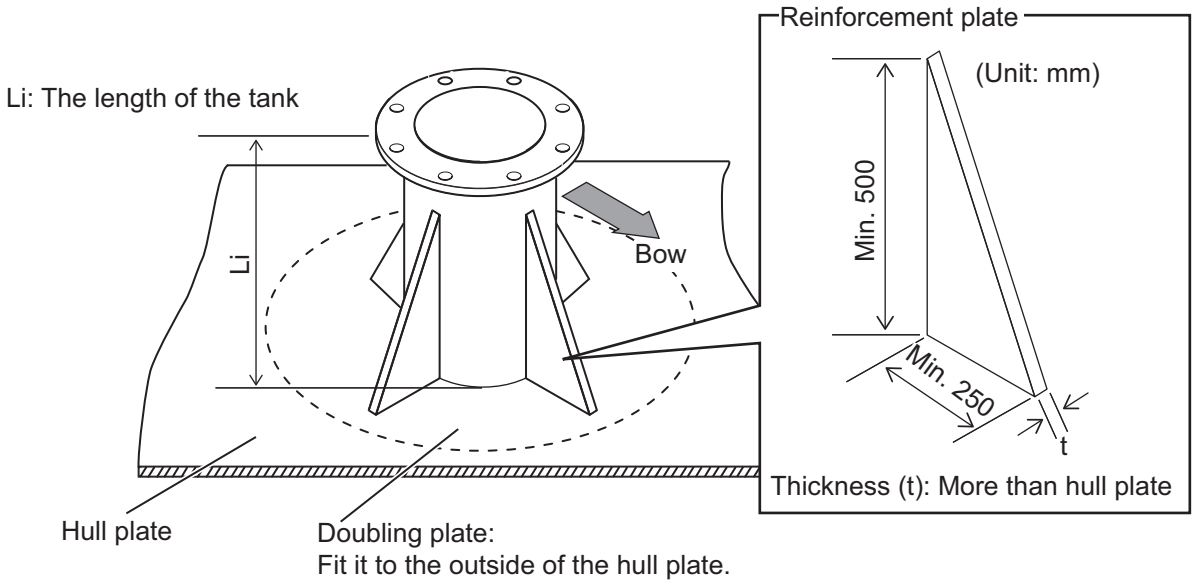
When the retraction tank is installed on a steel or aluminum hull, follow the guidelines shown below and see the outline drawing at the back of this manual.

- The flange of the retraction tank must be parallel with the waterline.

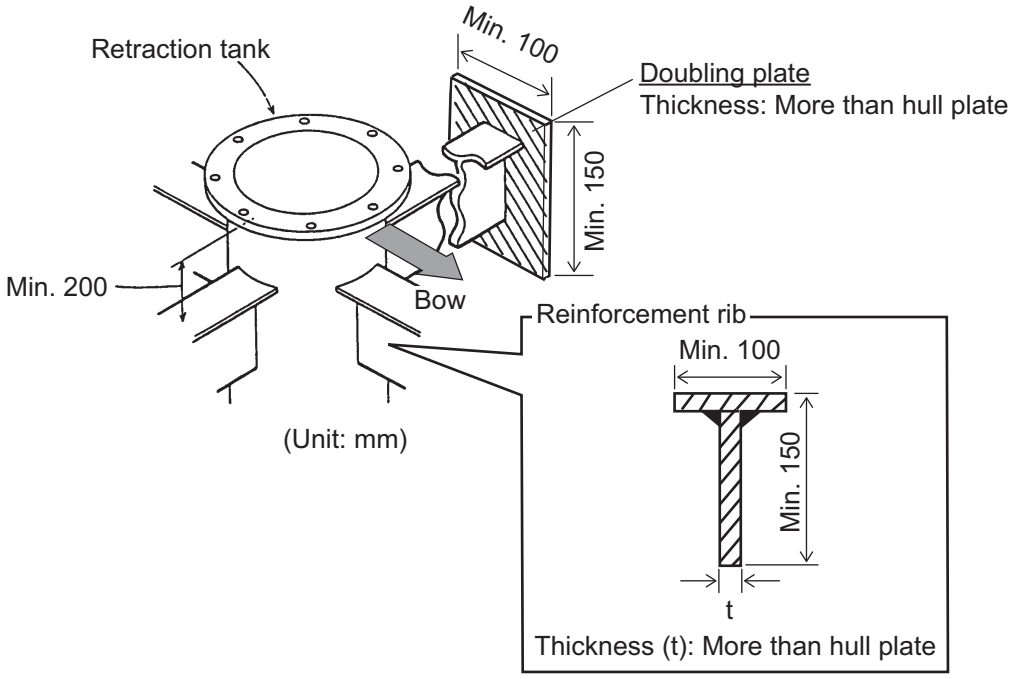
- Fit a doubling plate (a plate to reinforce the hull plate) of 600 mm or more diameter to the outside of the hull plate (see the figure to the right). For the doubling plate, use the same material and thickness as hull plate.



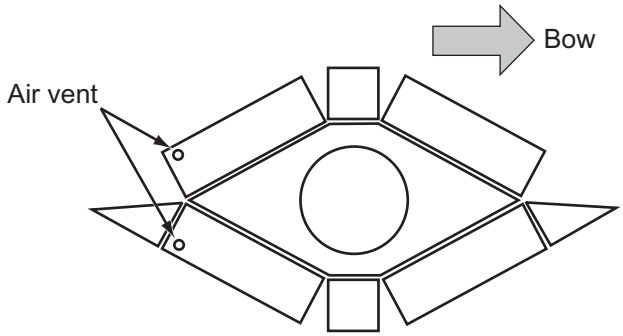
- Weld four reinforcement plates to the retraction tank.



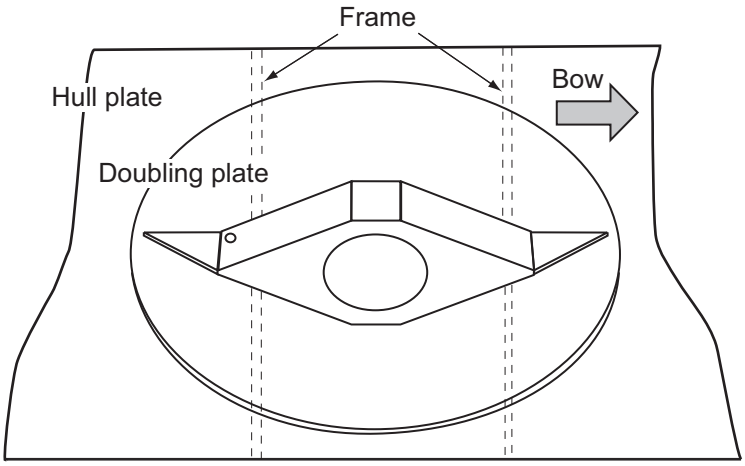
- If the length of the retraction tank (Li) is more than 1 m, install at least one reinforcement rib to prevent damage of the tank and vessel. One reinforcement rib should be installed toward the ship's bow (see the following figure). It is recommended that four reinforcement ribs are installed.
- For the reinforcement ribs, fit doubling plates to the location where the reinforcement ribs are welded to the bulkhead of the vessel (see the following figure).



- Install a fairing plate to the bottom hull where the transducer projects to protect the transducer from the water pressure. The fairing plate should contact the frame of the hull plate.
  For the fairing plate, use the same material and thickness as the hull plate. Wooden or plastic material can also be used.
  Note: When you install the fairing plate with bolts, fill the bolt holes with marine sealant to smooth the water flow.
  For using the same material and thickness as the hull plate
  Make a fairing plate to refer the following figure. The figure is an example taken from technical drawings.

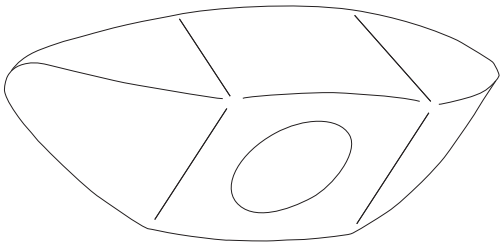


Example: Technical drawing of the fairing plate



After installing the fairing plate

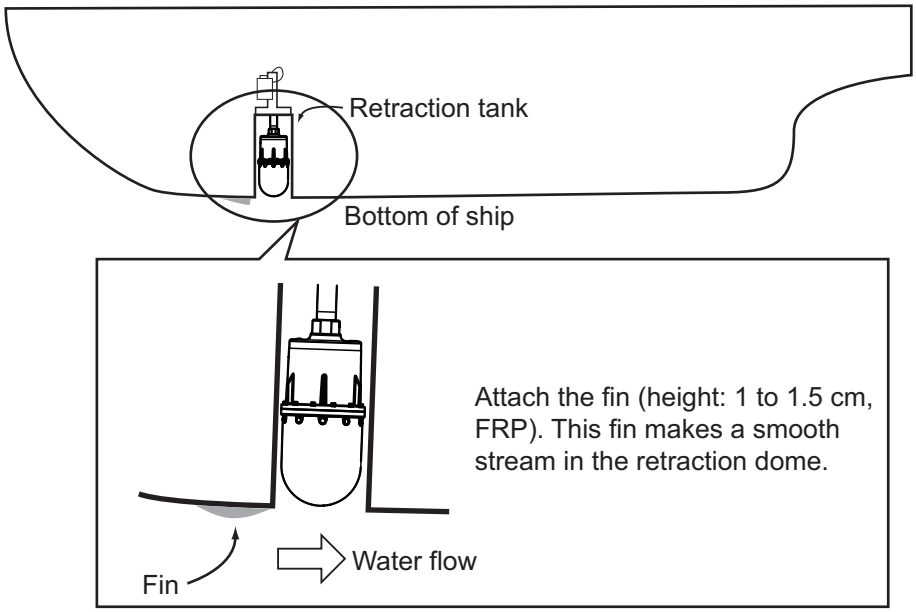
For using the wooden or plastic material
Make a fairing plate to refer the following figure.



For small FRP hulls

For small FRP hulls, the retraction tank should be 2 degrees against ship's draft. This creates high water pressure in the tank because of the resistance at the rear of the tank well. To solve this problem, attach a fin to the hull the location shown in the following figure.

Note: The optional fairing (06-021-4502) is available for making a smooth stream in the retraction tank. For how to install the fairing, see the installation instructions (C12-01104) supplied with the fairing.

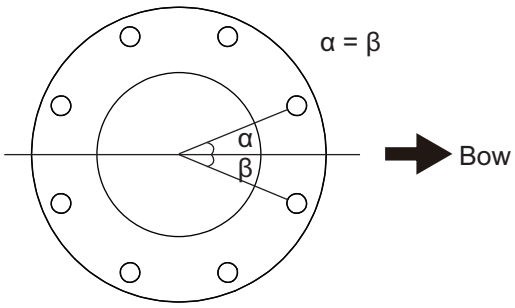


Mounting of retraction tank

Install the transducer tank referring to the hull unit outline drawings at the back of this manual.

Note 1: When making a retraction tank locally, the inside diameter of the retraction tank should not be more than ϕ190 ± 0.5, as shown on outline drawing at the back of this manual. If the inner diameter is larger, the hull unit may be damaged.

Note 2: Locate the retraction tank so that the center of any two bolt holes is facing the ship's bow.

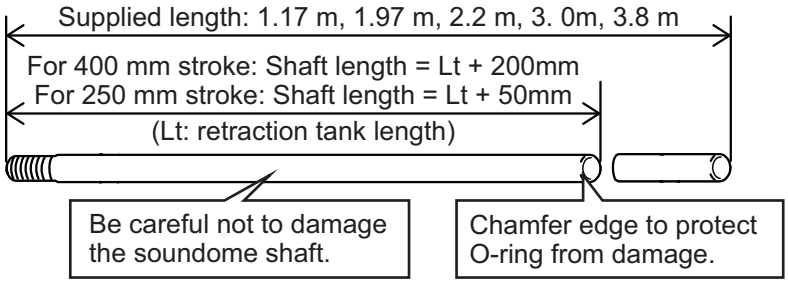


1.6.3 Assembling and mounting of hull unit for CH-5048

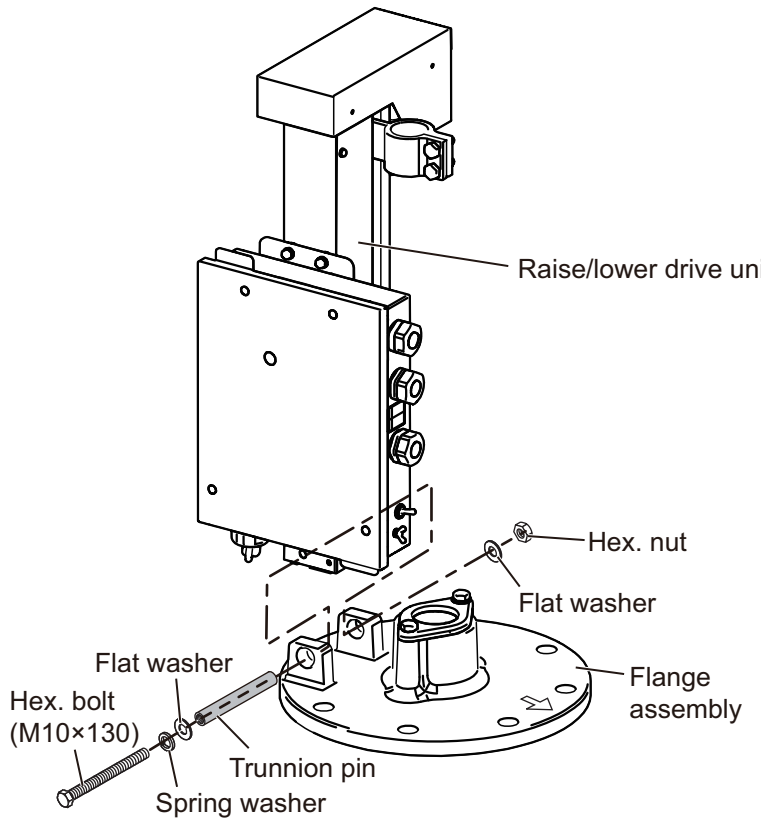
The hull unit is shipped disassembled as parts. Assemble the hull unit as shown in the following procedure.

The following procedure is for the CH-5048 (transducer for 8-inch diameter tank). For the procedure for the CH-5046 (transducer for 6-inch diameter tank), see section 1.6.4.

1. Calculate the required length of the soundome shaft from the retraction tank length (Lt) and cut off the spare portion.
   Note: When the retraction tank length is 1 meter, the soundome shaft whose length is 1.17 meter can be used without cutting off any portion. Also, when the retraction tank length is 1.8 meter, the soundome shaft whose length is 1.97 meter can be used without cutting off any portion. If the 1.17/1.97 m soundome shaft is shortened, attach the optional waterproof attachment kit (OP06-27) to the top of the soundome shaft, see section 1.6.5.

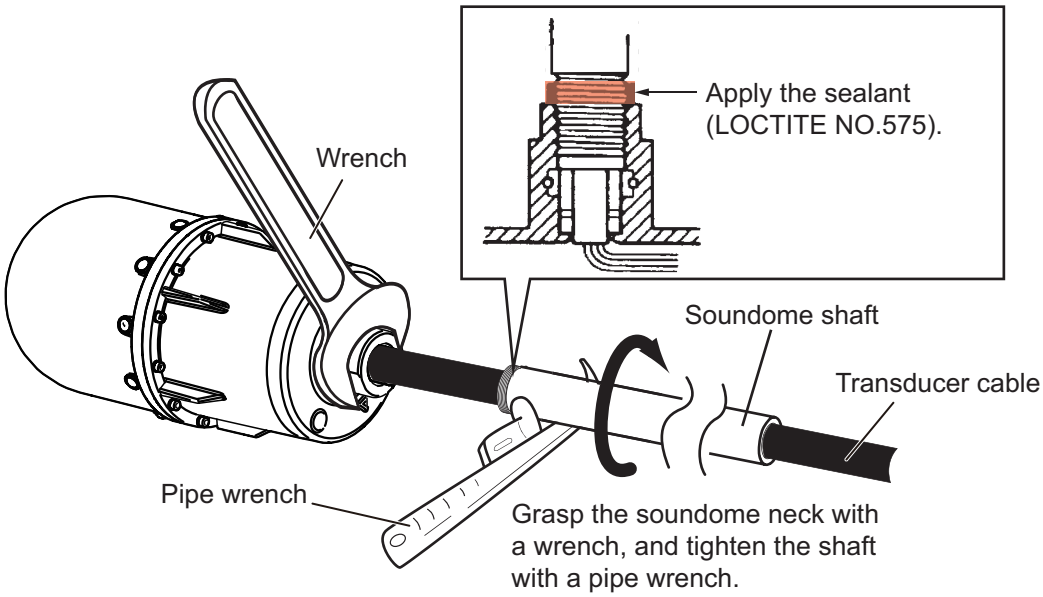


2. Remove the hex. bolt, hex. nut, spring washer, two flat washer, and trunnion pin from the flange assembly, then mount the raise/lower driver unit on the main body flange, using the removed materials.

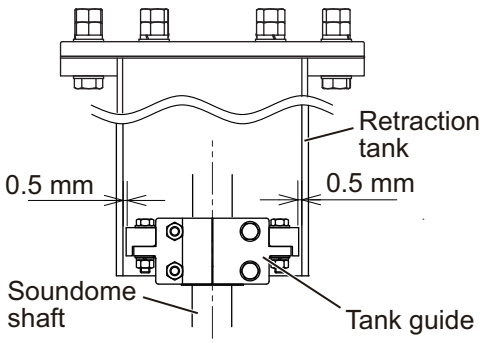


3. Pass the transducer cable through the soundome shaft.

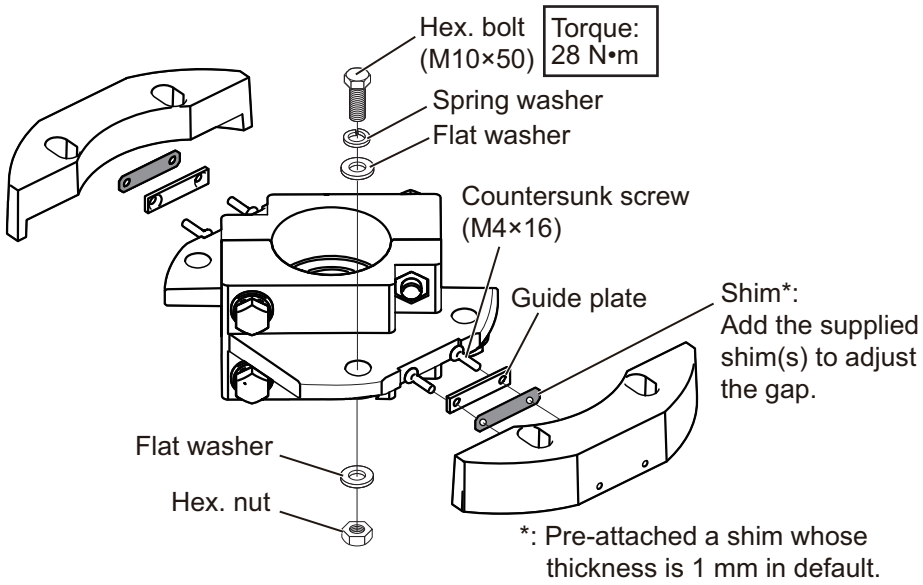
4. After fully screwing the main shaft into the soundome neck, unscrew it by four turns and apply the supplied sealant (LOCTITE NO.575) to the threads.



5. Fasten the soundome shaft completely.
6. Remove any excess sealant with a waste cloth. The sealant does not harden when exposed to air.
7. Attach the supplied tank guide to the soundome shaft temporarily, then confirm the narrowest gap between the tank guide and retraction tank is within 0.5 mm.
   Note: If the gap is more than 0.5 mm, attach the supplied shim(s) to make the gap within 0.5 mm.

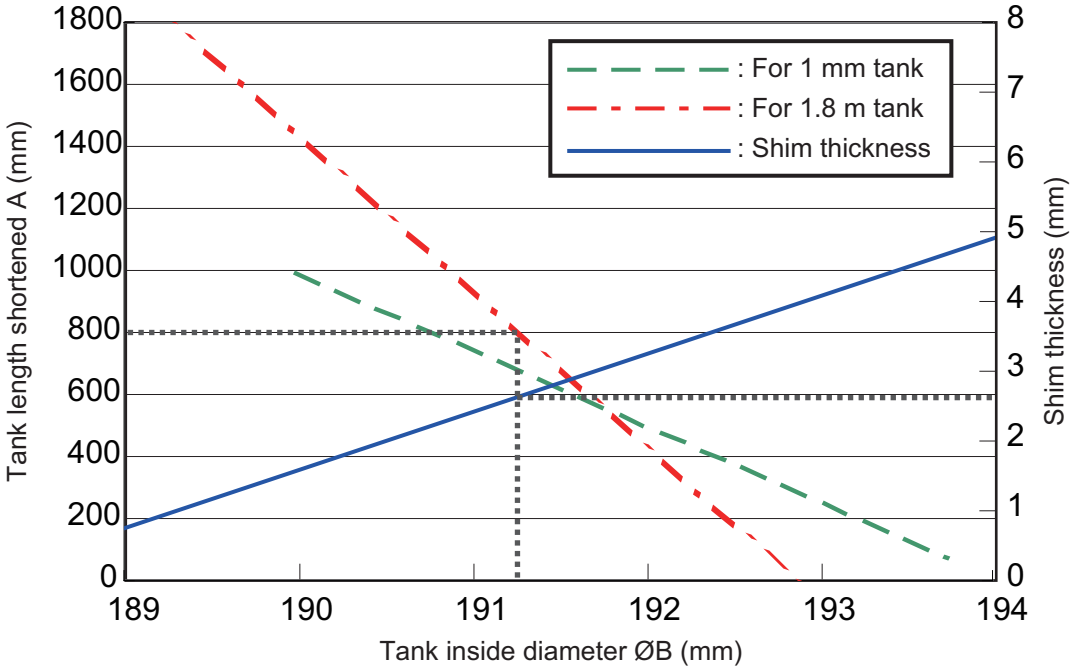


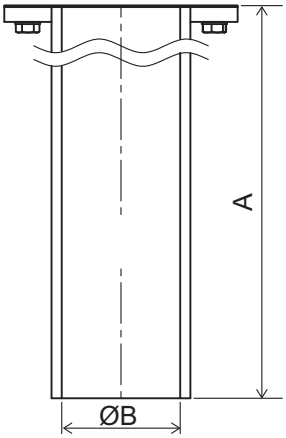
   1) Unfasten four hex. bolts (M10×50) from the tank guide.
   2) Unfasten two countersunk screws (M4×16).
   3) Attach the supplied shim(s) to make the gap within 0.5 mm.



Reference data for existing FPR retraction tank:

The following table is reference data for existing FRP retraction tank. It shows the relationship between the retraction tank length and necessary shim thickness. The shim thickness indicates the thickness for one side. For example, when cutting the 1,800 mm tank to 800 mm, the tank inside diameter is 191.25 mm, shim thickness is 2.5 mm as shown in the following table.

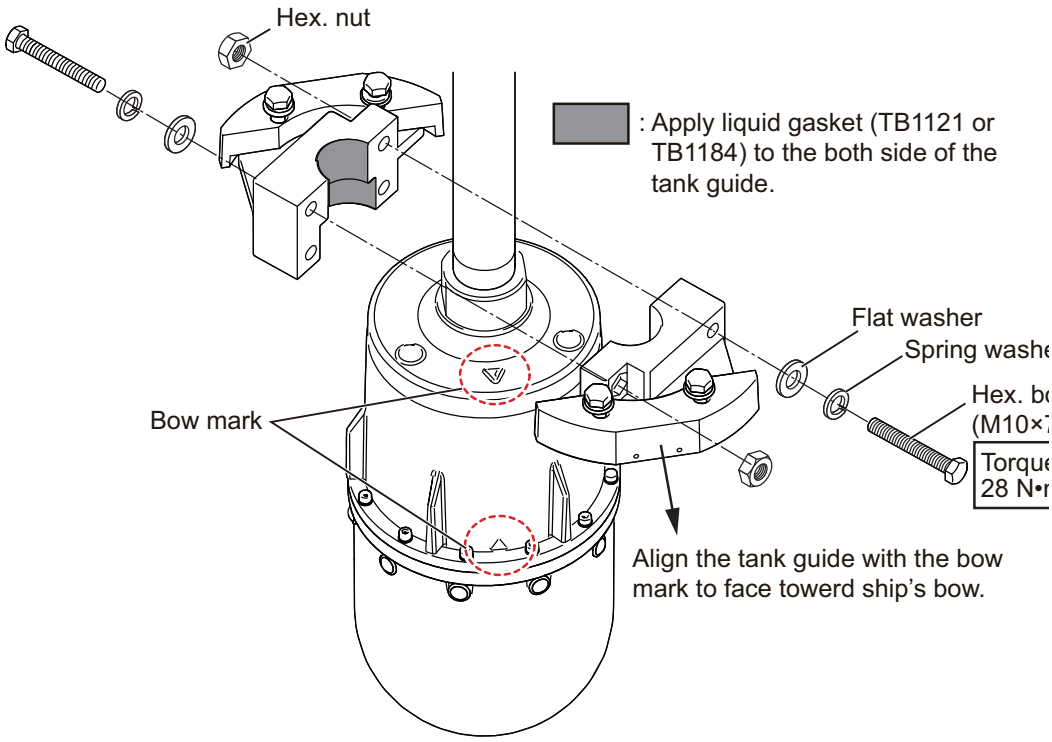




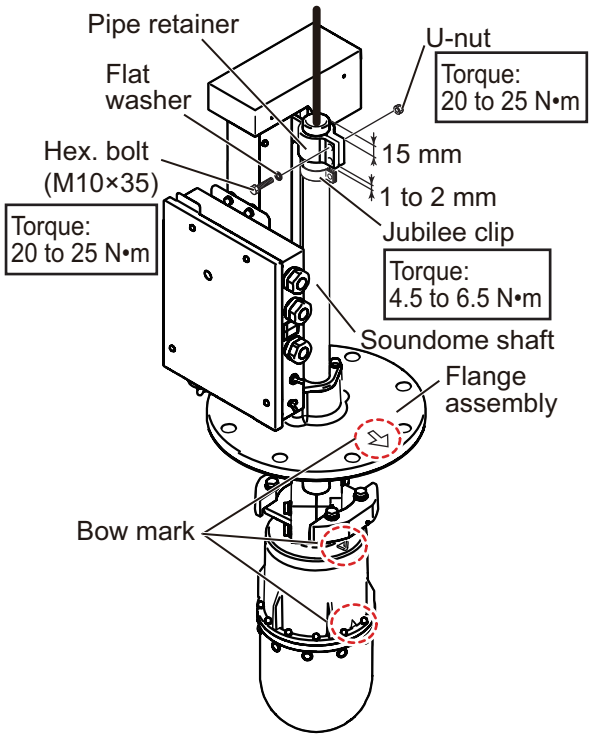
The following table shows number of shims required and shim thickness.

Shim thickness (mm)	0	0.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5
Number of shim (thickness: 2.0 mm)	0	0	0	0	1	1	1	1	2	2	2	2	2	2
Number of shim (thickness: 1.0 mm)	0	0	1	1	0	0	1	1	0	0	1	1	2	2
Number of shim (thickness: 0.5 mm)	0	1	0	1	0	1	0	1	0	1	0	1	0	1
Tank inner diameter ØB (mm)	188.1	188.7	189.3	189.9	190.5	191.1	191.7	192.3	192.9	193.5	194.1	194.7	195.3	195.9

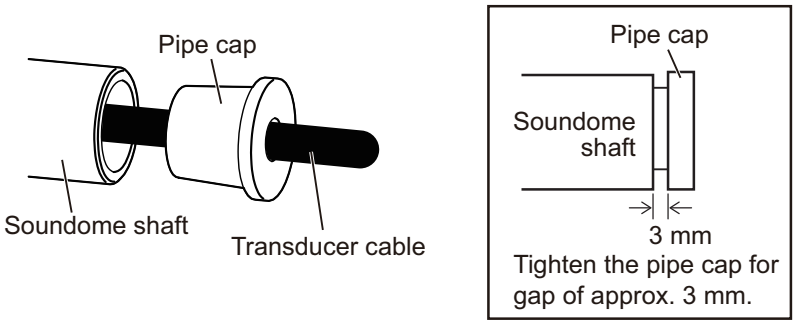
8. Apply liquid gasket (TB1121 or TB1184) to the inside of the tank guide, then fasten the tank guide at the neck of the soundome, referring the following figure.



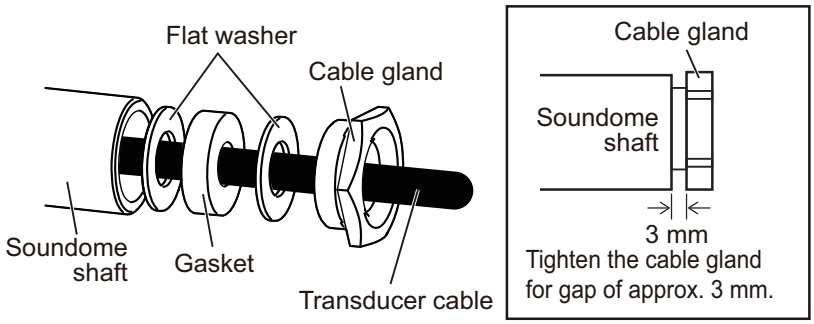
9. Pass the soundome shaft through the flange assembly and shaft retainer.
10. Fasten two supplied hex. bolts, flat washers, and U-nuts to the shaft retainer to secure the soundome shaft.
    Note 1: Face the bow mark on the soundome and flange assembly to the ship's bow.
    Note 2: Attach the shaft retainer so it is 15 mm below the top of the shaft. The soundome is then placed 10 mm above the bottom of the tank when retracted.
11. Attach the jubilee clip to the soundome shaft.
    Note: Attach the jubilee clip so that it is 1 to 2 mm below from the shaft retainer.



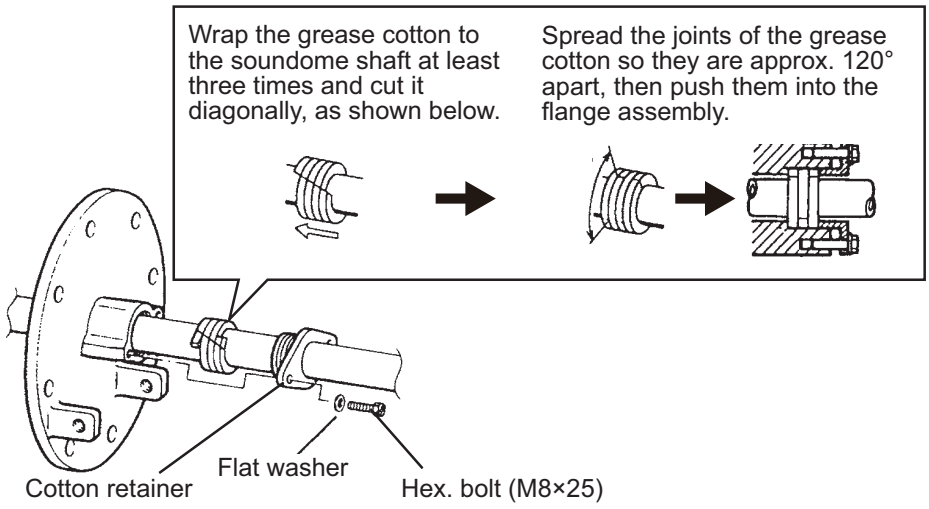
12. Inscribe the bow mark to the top of the soundome shaft, referring to the bow mark on the soundome.
13. Pass the following item(s) through the transducer cable, then fasten them to the top of the soundome shaft.
    - 2.2/3.0/3.8 m soundome shaft: Pass the pipe cap through the transducer cable, then fasten it to the shaft.
      Note: When you use the optional waterproof attachment kit (OP06-27), see section 1.6.5.



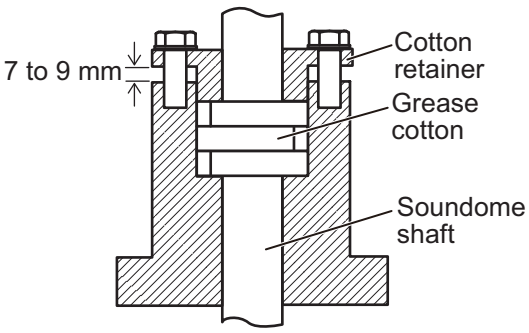
- 1.17/1.97 m soundome shaft: Pass two flat washer, gasket and cable gland through the transducer cable, then fasten the cable gland to the shaft.
  Note: If the 1.17/1.97 m soundome shaft is shortened, attach the optional waterproof attachment kit (OP06-27) to the top of the soundome shaft, see section 1.6.5.



14. Insert the supplied grease cotton (V8133L) to the flange assembly as follows: The grease cotton is supplied with the flange assembly.
    1) Remove two hex. bolts (M8×25) and flat washer from the flange assembly to remove the cotton retainer.
    2) Wrap the supplied grease cotton to the soundome shaft.
    3) Mark on the grease cotton as shown in the following below and unwrap the cotton, then cut the cotton along the mark.
       Note: Unwrap the grease cotton from the soundome shaft before cutting the cotton. If the grease cotton is cut with the cotton wrapped to the soundome shaft, the shaft can be damaged.
    4) Wrap the grease cotton to the soundome shaft again, then push the cotton into the flange assembly.
    5) Reattach the cotton retainer.



Note: After attaching the cotton retainer, confirm that the gap between the cotton retainer and flange assembly is 7 to 9 mm. If water leaks around the cotton retainer, the grease cotton may not be attached correctly. Reattach the grease cotton.



15. Loosen twelve socket head cap screws (M5×20), using the supplied ball wrench, to remove the soundome.
    Note: Do NOT unfasten the screws on the side of the soundome. Oil may leak inside.
16. Do the following works after removing the soundome, referring the figure on next page.
    - Rotate the transducer 4 or 5 turns by hand to make sure that turning mechanisms are functioning properly.
    - Remove the protective sponge from the soundome, then discard it.
    - Apply lithium grease (supplied locally) to the O-ring and groove of the O-ring. For recommended lithium grease, see page 1-1.

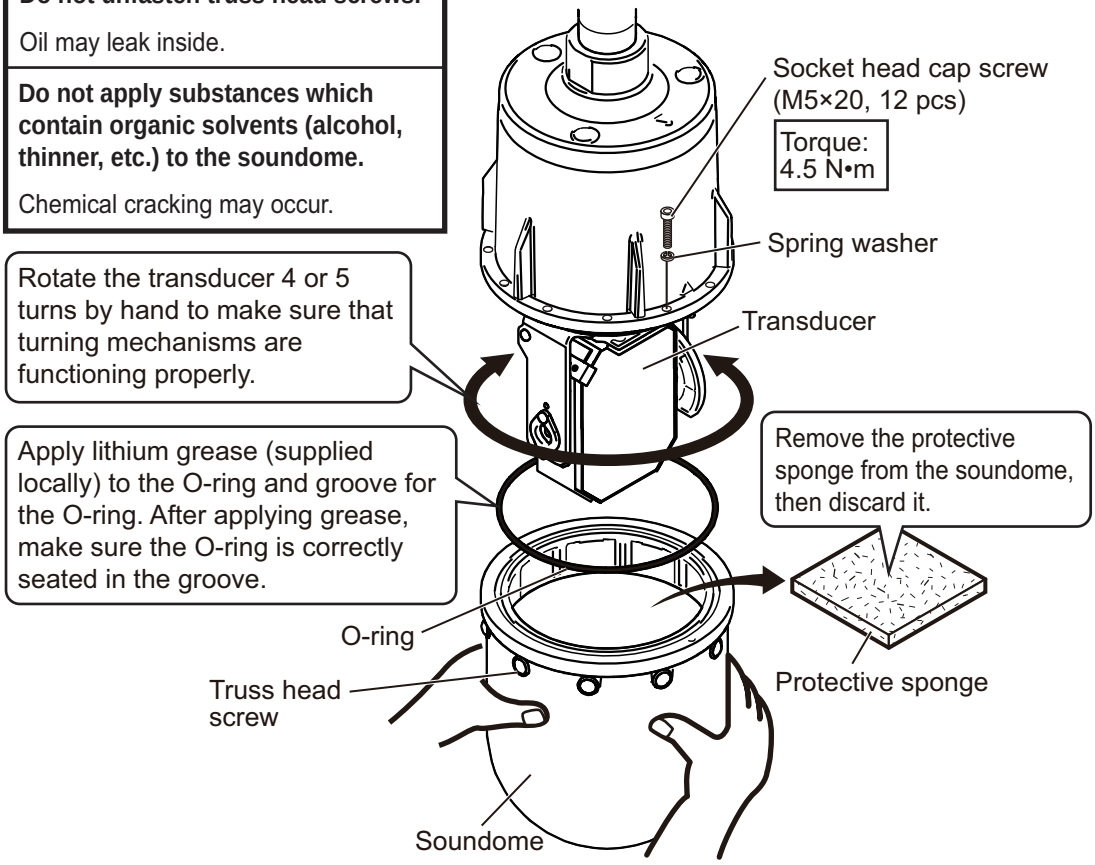
NOTICE

Do not unfasten truss head screws.

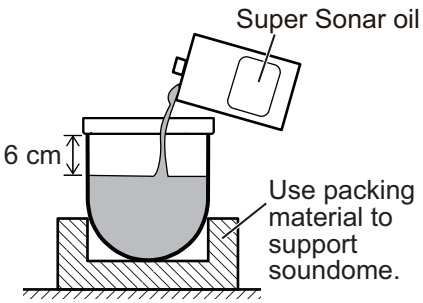
Oil may leak inside.

Do not apply substances which contain organic solvents (alcohol, thinner, etc.) to the soundome.

Chemical cracking may occur.



17. Fill the soundome with supplied super sonar oil until the scribe line (6 cm below the top of the dome).
    Note: Use only the specified sonar oil. Use of other sonar oils may affect the performance.



⚠ CAUTION

⚠ WORKING WITH THE SONAR OIL

Precautions

- Keep the oil away from eyes. Wear protective glasses 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.
- For further details, see the material safety data sheet (MSDS).

Emergency

- If the oil enters eyes, flush with clean water for 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.
- Keep the oil out of reach of children.
- For further details, see the material safety data sheet (MSDS).

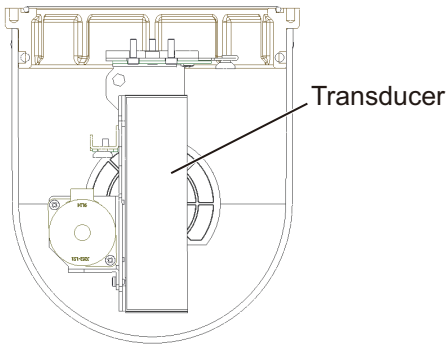
Disposal of oil and its container

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

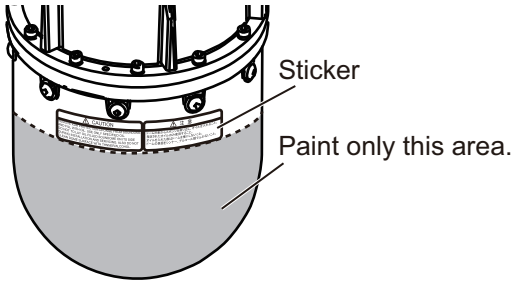
Storage

- Seal container to keep out foreign materials. Store in dark place.

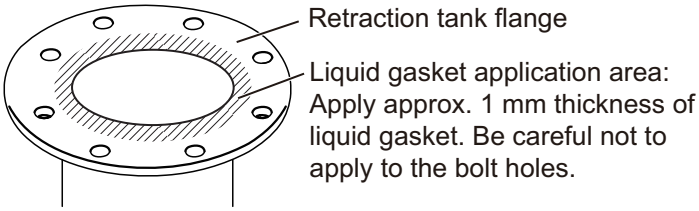
18. Confirm that the O-ring is correctly seated in the groove, then reattach the soundome. When you reattach the soundome, turn the transducer vertically to improve the workability.
    Note 1: Do not place the oil-filled soundome on its side for more than five minutes. Oil may leak.
    Note 2: When the soundome is painted to keep marine life off the transducer, observe the following precautions.



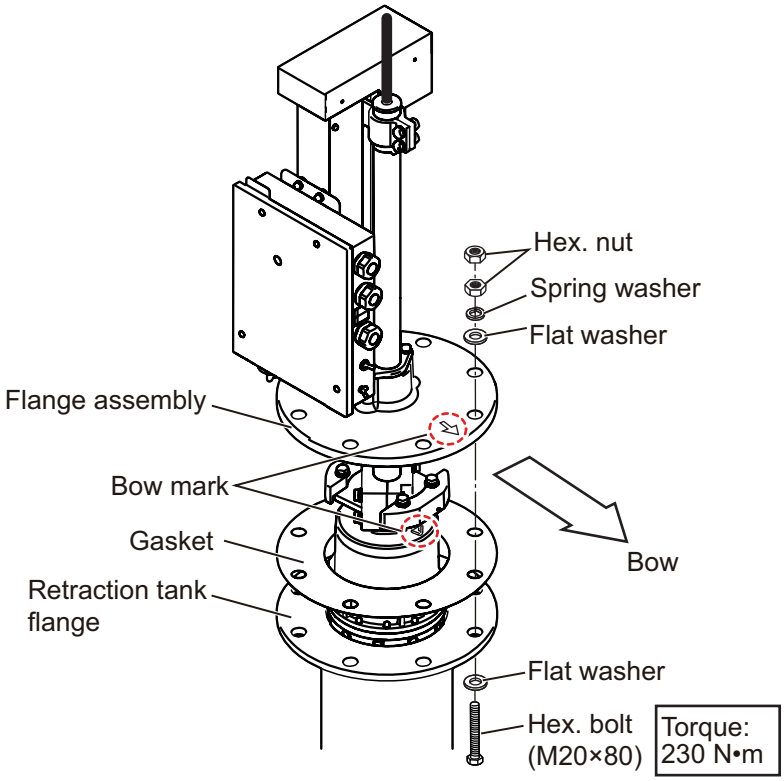
- Use only anti-foulant “SEATENDER 20”(Manufacture: Chugoku Marine Paint Co. Ltd., Japan).
- Paint the area below sticker on the soundome. Painting the metal parts causes corrosion.



19. Clean the supplied gasket, retraction tank flange, and flange assembly.
20. Apply approx. 1 mm thickness of liquid gasket (TB1121 or TB1184) to the retraction tank flange. For the application area, see the following figure.
    Note: Do not apply liquid gasket to the gasket. If applied, clean the gasket with a waste cloth.



21. Apply a slight coat of lithium grease (supplied locally) to the supplied hex. bolts (M20×80), spring washers, flat washers and hex. nuts.
    For recommended lithium grease, see page 1-1.
22. Set the hull unit into the retraction tank, taking care not to damage the soundome, then secure the hull unit to the retraction tank, using hex. bolts, nuts and washers.

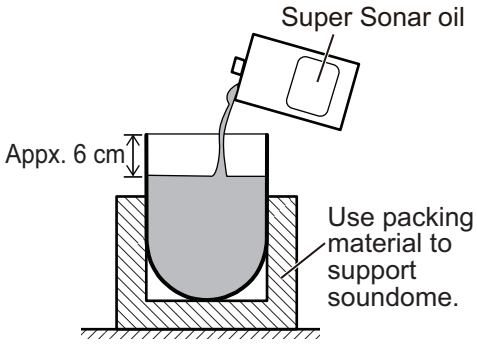


1.6.4 Assembling and mounting of hull unit for CH-5046

The hull unit is shipped disassembled as parts. Assemble the hull unit as shown in the following procedure.

The following procedure is for the CH-5046 (transducer for 6-inch diameter tank). For the procedure for the CH-5048 (transducer for 8-inch diameter tank), see section 1.6.3.

1. Fill the soundome with supplied super sonar oil until the scribe line (6 cm below the top of the dome).
   Note: Use only the specified sonar oil. Use of other sonar oils may affect the performance.



⚠ CAUTION

⚠ WORKING WITH THE SONAR OIL

Precautions

- Keep the oil away from eyes. Wear protective glasses 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.
- For further details, see the material safety data sheet (MSDS).

Emergency

- If the oil enters eyes, flush with clean water for 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.
- Keep the oil out of reach of children.
- For further details, see the material safety data sheet (MSDS).

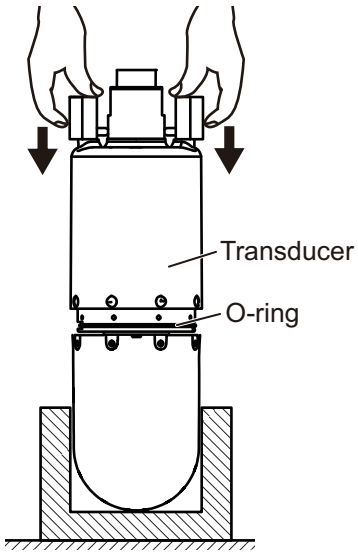
Disposal of oil and its container

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

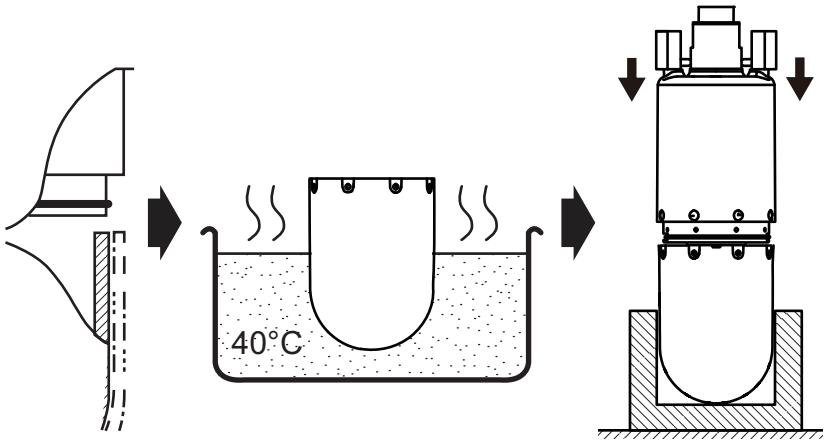
Storage

- Seal container to keep out foreign materials. Store in dark place.

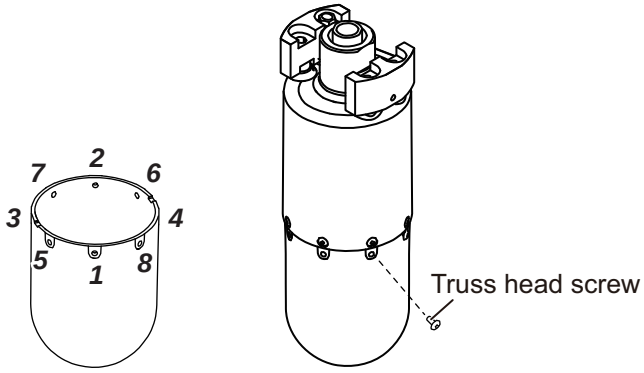
2. Confirm that the O-ring is properly seated in its groove.



3. Set the transducer to the soundome, aligning the screw holes.
   Note: When the soundome is installed in a low ambient temperature, the soundome may shrink and become difficult to fit to the transducer. To prevent this, warm the soundome in water of approx. 40°C (104°F) or leave it in room temperature above 20°C (68°F) for at least one hour.

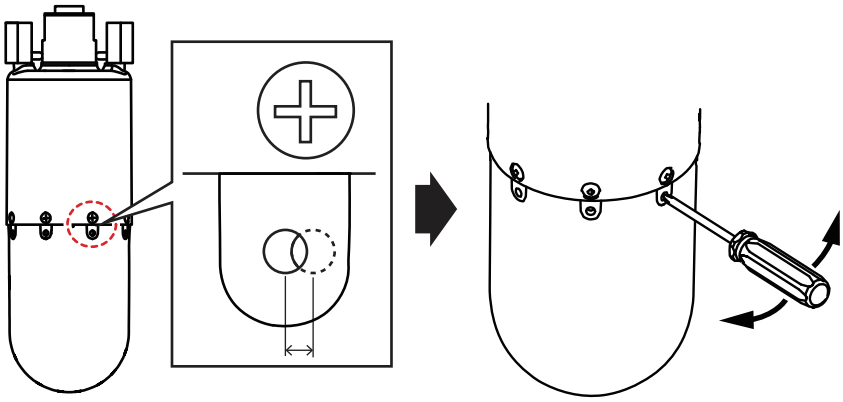


4. Secure the soundome, using the eight supplied truss head screws (M5×12). Fastening the screws in diagonal order. Note that the truss head screws do not require washers.



Note 1: When screw holes on the soundome are not aligned with the screw holes on the transducer, align the holes as follows:

- When the screw holes are not aligned slightly:
  Insert a screwdriver in holes to align them.



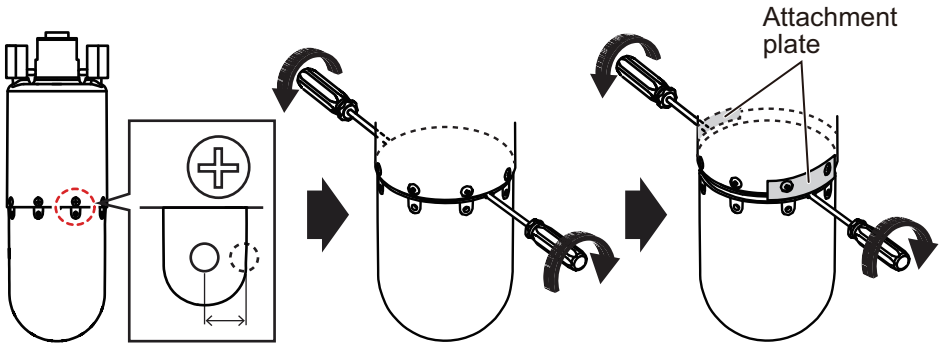
- When the screw holes are totally out of alignment:
  Detach the soundome as follows and then reattach it.

  1) Orient the soundome vertically.

2) Insert two screw drivers with a blade width of 7 to 10 mm in the slits on the soundome, then rotate them in the opposite directions of each other.
The transducer should pushed up by the width of the blade.

3) Attach the two supplied attachment plates to the transducer at the locations directly above the slits of the soundome.

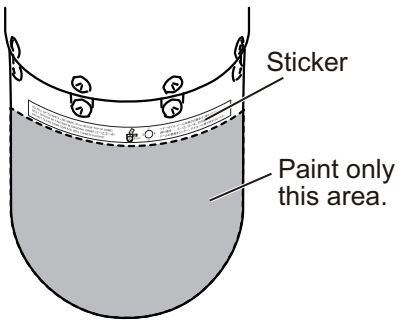
4) Insert the screwdrivers between the plates and slits of the soundome and rotate them.
The transducer is pushed up further and will become loose enough to be removed by hand.



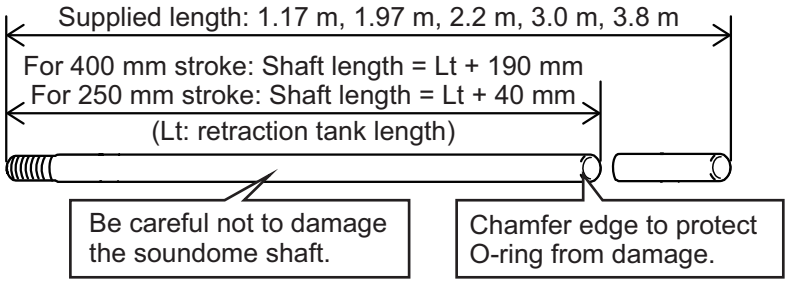
Note 2: Do not place the oil-filled soundome on its side for more than five minutes. Oil may leak.

Note 3: When the soundome is painted to keep marine life off the transducer, observe the following precautions.

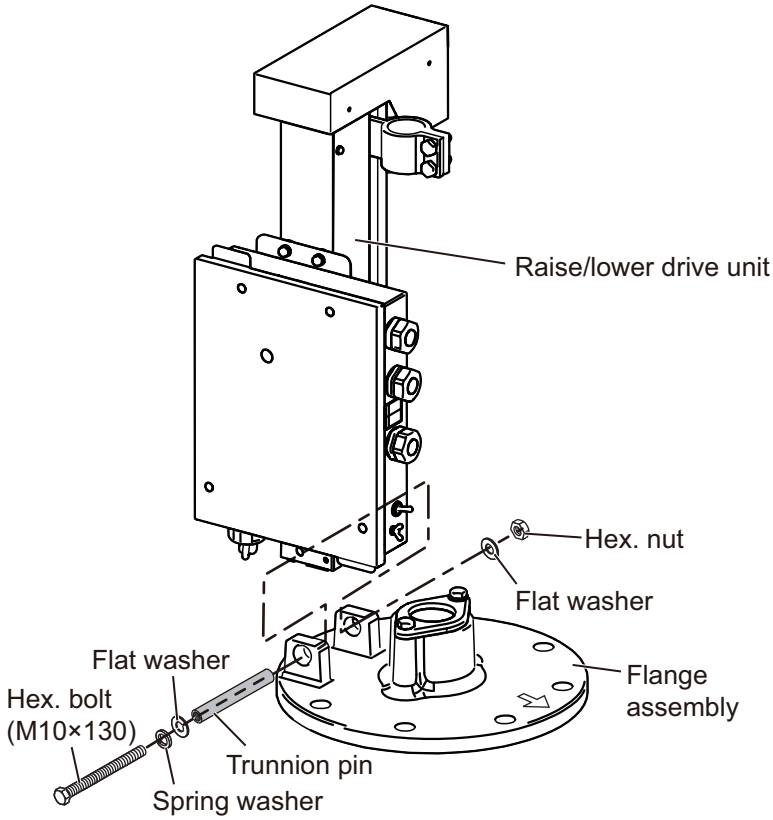
- Use only anti-foulant “SEATENDER 20”(Manufacture: Chugoku Marine Paint Co. Ltd., Japan).
- Paint the area below sticker on the soundome. Painting the metal parts causes corrosion.



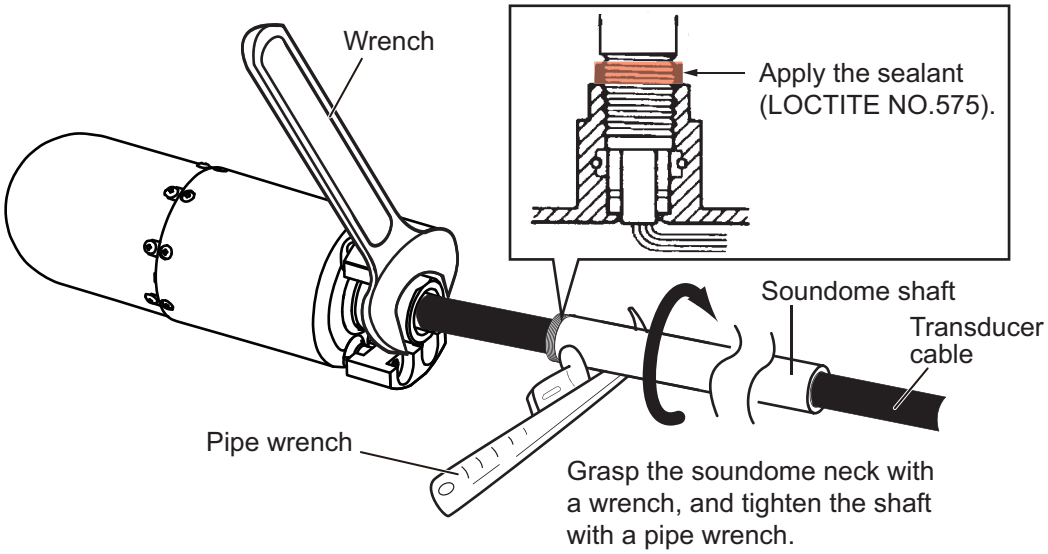
5. Calculate the required length of the soundome shaft from the retraction tank length (Lt) and cut off the spare portion.
Note: When the retraction tank length is 1 meter, the soundome shaft whose length is 1.17 meter can be used without cutting off any portion. Also, when the retraction tank length is 1.8 meter, the soundome shaft whose length is 1.97 meter can be used without cutting off any portion. If the 1.17/1.97 m soundome shaft is shortened, attach the optional waterproof attachment kit (OP06-27) to the top of the soundome shaft, see section 1.6.5.



6. Remove the hex. bolt, hex. nut, spring washer, two flat washer, and trunnion pin from the flange assembly, then mount the raise/lower driver unit on the main body flange, using the removed materials.

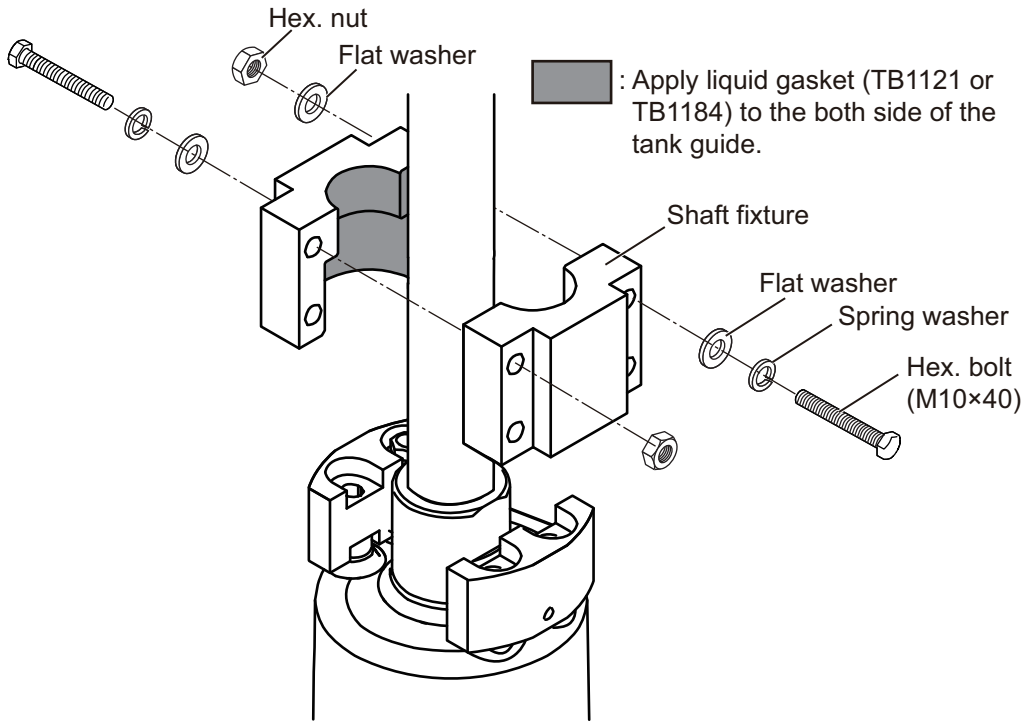


7. Pass the transducer cable through the soundome shaft.
8. After fully screwing the main shaft into the soundome neck, unscrew it by four turns and apply the supplied sealant (LOCTITE NO.575) to the threads.

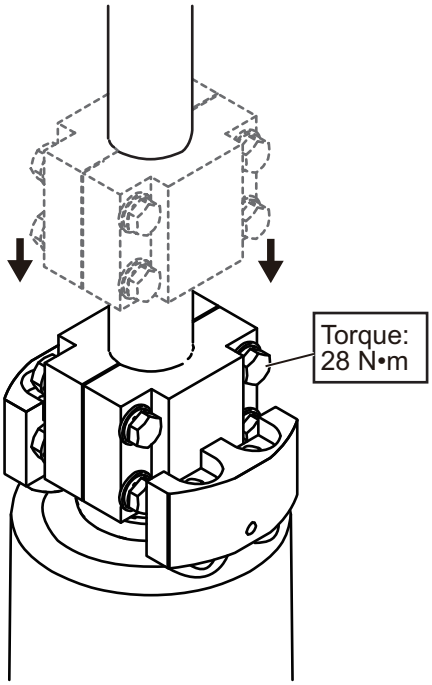


9. Fasten the soundome shaft completely.
10. Remove any excess sealant with a waste cloth. The sealant does not harden when exposed to air.

11. Apply liquid gasket (TB1121 or TB1184) to the inside of the shaft fixture, then fasten the shaft fixture to the soundome shaft temporarily.

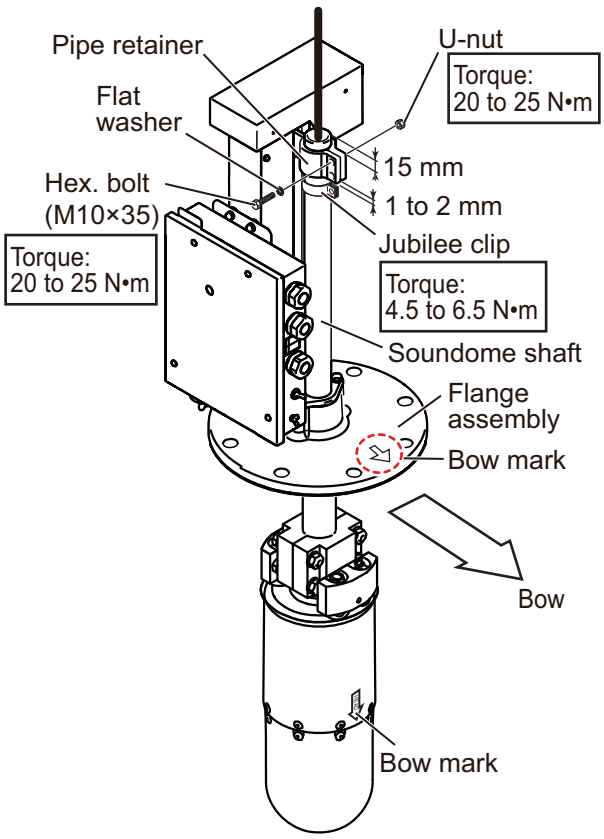


12. Move the shaft fixture to the neck of the soundome, then fasten the fixture tightly.

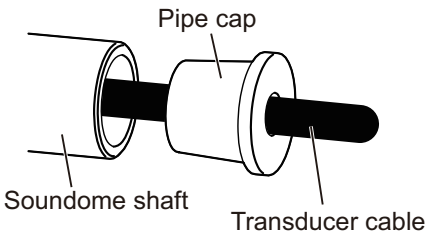


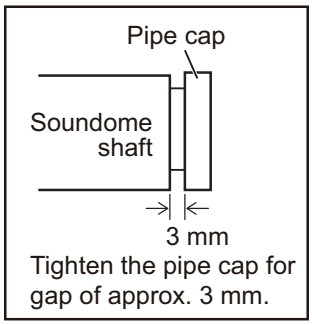
13. Fasten the supplied hex. socket set screw to the tank guide.

14. Pass the soundome shaft through the flange assembly and shaft retainer.
15. Fasten two supplied hex. bolts, flat washers, and U-nuts to the shaft retainer to secure the soundome shaft.
    Note 1: Face the bow mark on the soundome and flange assembly to the ship's bow.
    Note 2: Attach the shaft retainer so it is 15 mm below the top of the shaft. The soundome is then placed 10 mm above the bottom of the tank when retracted.
16. Attach the jubilee clip to the soundome shaft.
    Note: Attach the jubilee clip so that it is 1 to 2 mm below from the shaft retainer.

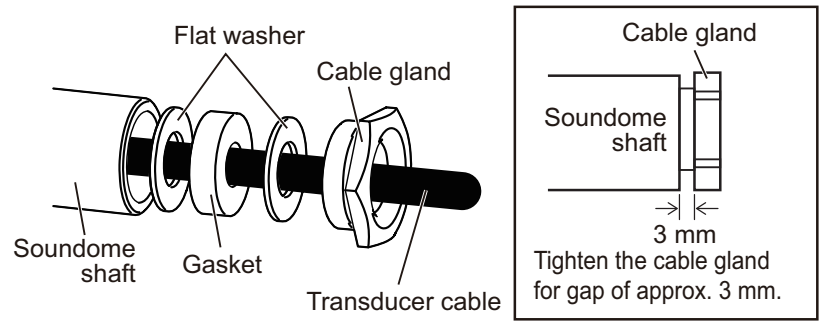


17. Inscribe the bow mark to the top of the soundome shaft, referring to the bow mark on the soundome.
18. Pass the following item(s) through the transducer cable, then fasten them to the top of the soundome shaft.
    - 2.2/3.0/3.8 m soundome shaft: Pass the pipe cap through the transducer cable, then fasten it to the shaft.
      Note: When you use the optional waterproof attachment kit (OP06-27), see section 1.6.5.

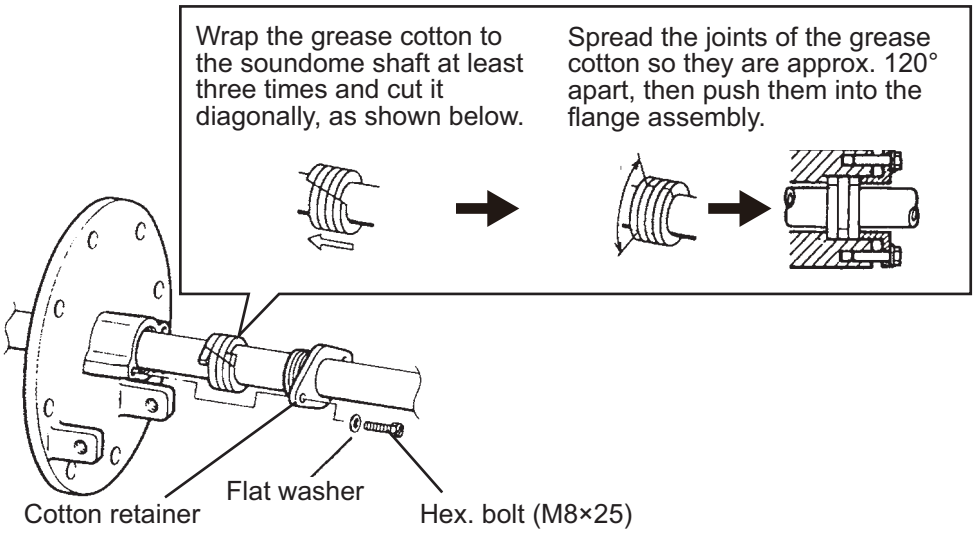




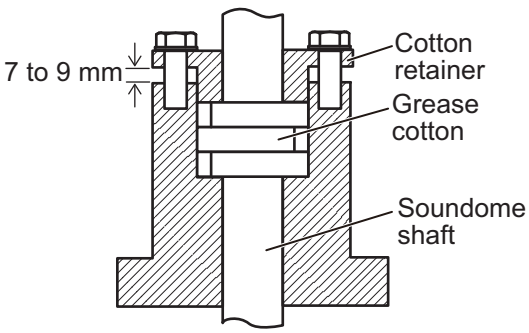
    - 1.17/1.97 m soundome shaft: Pass two flat washer, gasket and cable gland through the transducer cable, then fasten the cable gland to the shaft.
      Note: If the 1.17/1.97 m soundome shaft is shortened, attach the optional waterproof attachment kit (OP06-27) to the top of the soundome shaft, see section 1.6.5.



19. Insert the supplied grease cotton (V8133L) to the flange assembly as follows: The grease cotton is supplied with the flange assembly.
    1) Remove two hex. bolts (M8×25) and flat washer from the flange assembly to remove the cotton retainer.
    2) Wrap the supplied grease cotton to the soundome shaft.
    3) Mark on the grease cotton as shown in the figure below and unwrap the cotton, then cut the cotton along the mark.
       Note: Unwrap the grease cotton from the soundome shaft before cutting the cotton. If the grease cotton is cut with the cotton wrapped to the soundome shaft, the shaft can be damaged.
    4) Wrap the grease cotton to the soundome shaft again, then push the cotton into the flange assembly.
    5) Reattach the cotton retainer.

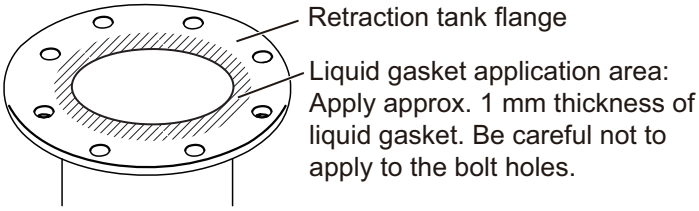


Note: After attaching the cotton retainer, confirm that the gap between the cotton retainer and flange assembly is 7 to 9 mm. If water leaks around the cotton retainer, the grease cotton may not be attached correctly. Reattach the grease cotton.

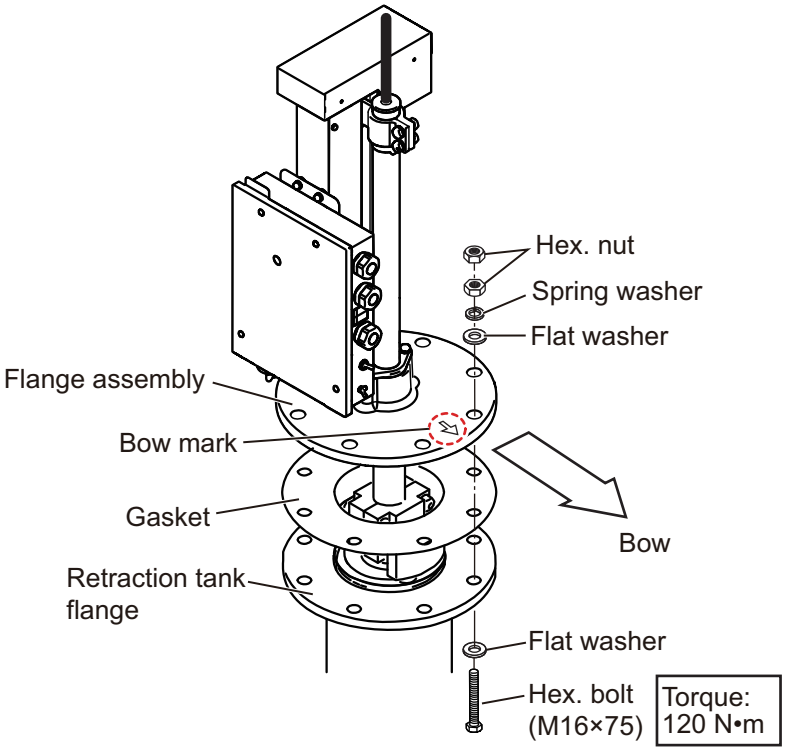


20. Clean the supplied gasket, retraction tank flange, and flange assembly.

21. Apply approx. 1 mm thickness of liquid gasket (TB1121 or TB1184) to the retraction tank flange. For the application area, see the following figure.
    Note: Do not apply liquid gasket to the gasket. If applied, clean the gasket with a waste cloth.



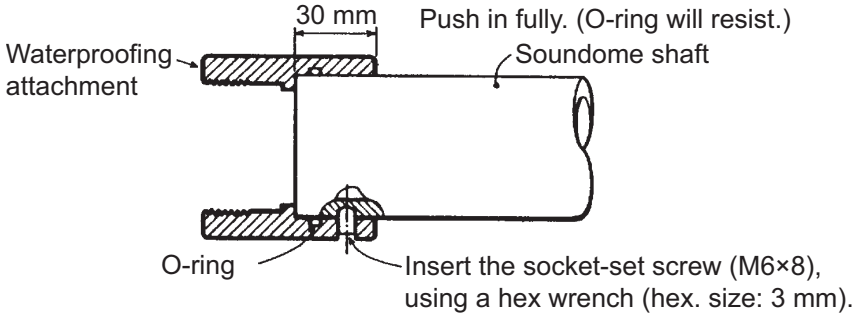
22. Apply a slight coat of lithium grease (supplied locally) to the supplied hex. bolts (M16×75), spring washers, flat washers and hex. nuts.
    For recommended lithium grease, see page 1-1.
23. Set the hull unit into the retraction tank, taking care not to damage the soundome, then secure the hull unit to the retraction tank, using hex. bolts, nuts and washers.



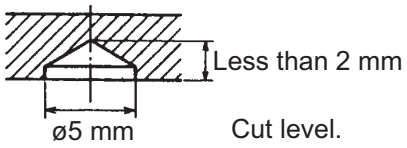
1.6.5 Waterproof attachment kit (option)

Attach the optional waterproof attachment kit (OP06-27) to the soundome shaft as follows:

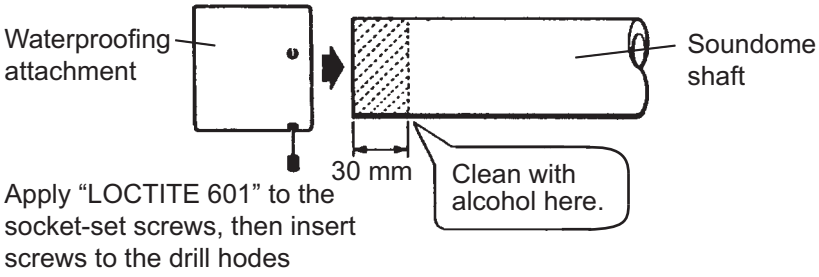
1. Temporarily install the waterproofing attachment on the top of the soundome shaft and drill holes for socket-set screws as follows:



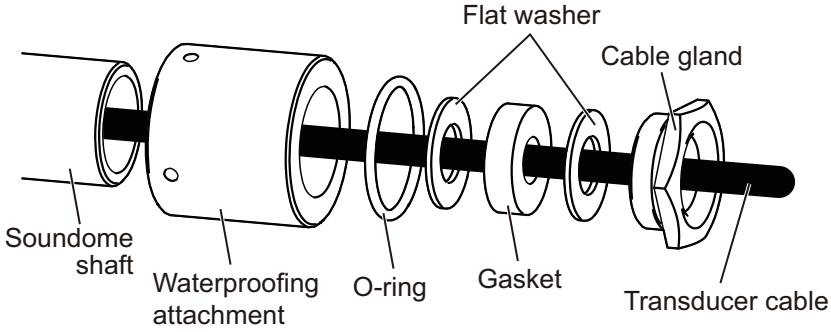
   1) Mark drilling point on the shaft surface by tightening two socket-set screws (M6×8).
   2) Remove the waterproofing attachment.
   3) Drill holes must be less than 2 mm in depth. The drill bit should be stainless steel, ϕ5, 120° tip. Do not drill holes through the shaft. Use a low rpm drill, and use a cutting oil.



2. Clean the top of the shaft with alcohol.
3. Apply “LOCTITE 601” (supplied locally) to the socket-set screws, then fasten the screws to the drill holes on the waterproofing attachment.



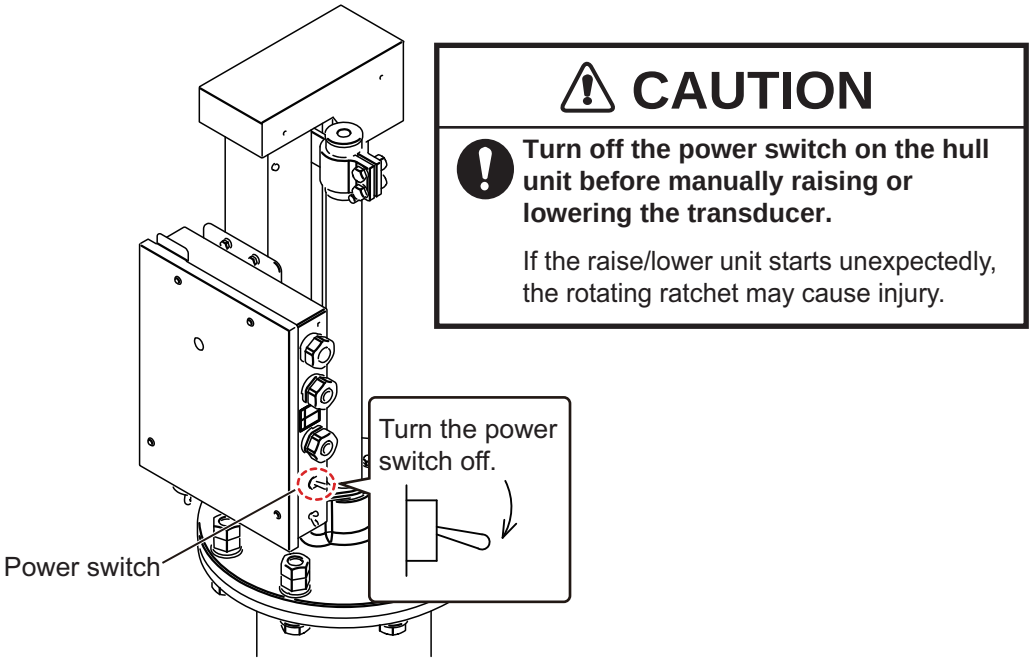
4. Attach the two flat washers, O-ring, waterproof attachment and cable gland to the soundome shaft, referring to the following figure.



1.6.6 Checking manual raise/lower of transducer

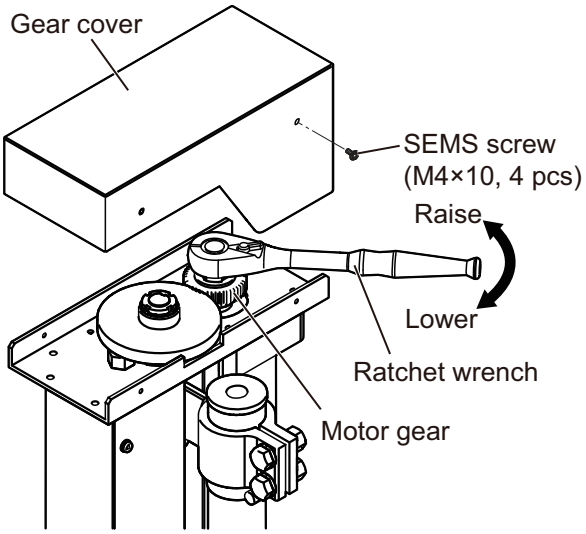
Raise/lower the transducer manually to check the raise/lower function after installing the hull unit.

1. Turn the hull unit (raise/lower control unit) off.



2. Unfasten four SEMS screws (M4×20) to remove the gear cover.
3. Set the ratchet wrench (hex. size: 19 mm) to the motor gear and rotate the wrench.
4. Confirm that the transducer raise/lower smoothly with even force in upper to lower limits. If not, adjust the hull mounting position if necessary, checking the following points:
   - The centers of the shaft sleeve and retraction tank are not aligned.
   - Painting inside the retraction tank is not smooth.
   - Inner diameter of the tank is not uniform.
   - Welding bead

   Note: If the transducer cannot be raised or lowered smoothly, do not use excessive force.

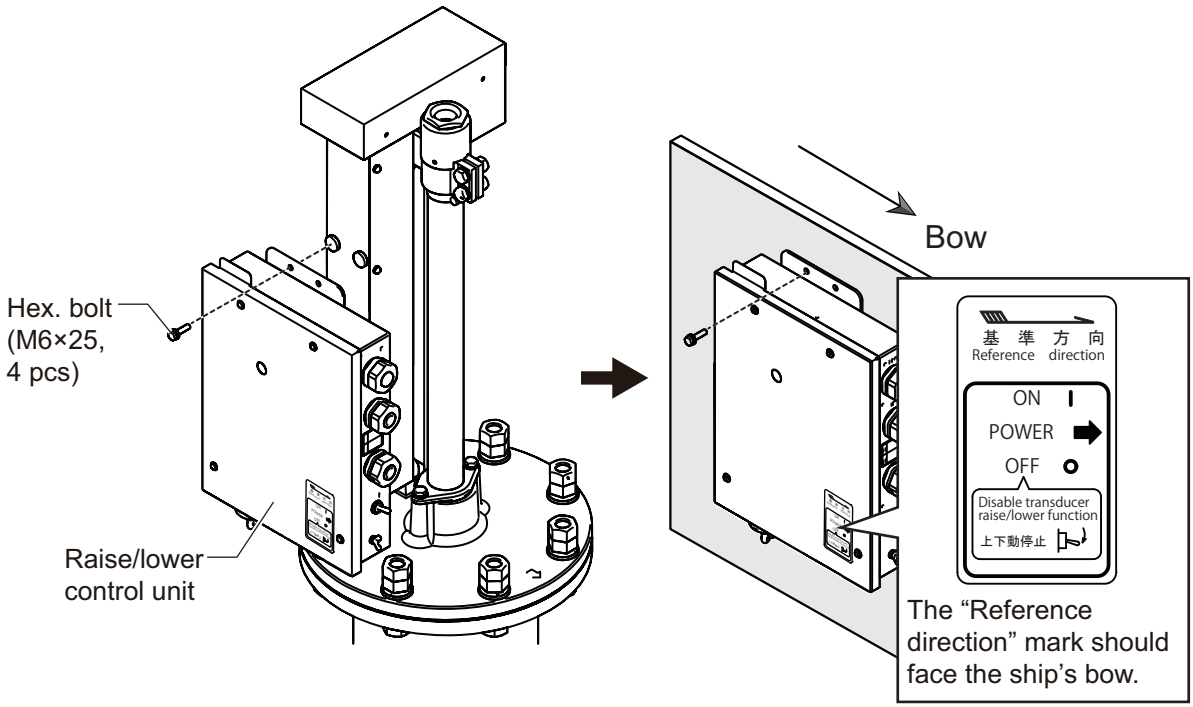


1.6.7 How to mount the raise/lower control unit separately (not recommended)

The raise/lower control unit is pre-attached to the hull unit. The motion sensor is built into the raise/lower control unit. Normally, install the hull unit without removing the raise/lower control unit, to keep the performance of the motion sensor. If you need to mount the raise/lower control unit separately from the hull unit, do as follows:

Note: When the raise/lower control unit is mounted separately, it is required to extend the motor, upper and lower limit switch lines. Use the extension cable (supplied locally) whose diameter is ϕ7±0.5 mm.

1. Unfasten the two upper hex. bolts (M6×25), which secure the raise/lower control unit.
2. Loosen the two lower hex. bolts (M6×25), then detach the raise/lower control unit.
3. Drill four pilot holes to the mounting location.
   Note: Select a mounting location so that the “Reference direction” mark faces the ship’s bow.
4. Screw two fixing bolts (M6×25, supplied locally) into the lower pilot holes. Leave 5 mm of thread visible.
5. Hang the notches of the raise/lower control unit onto the bolts fastened at step 4.
6. Screw two fixing bolts (M6×25, supplied locally) into the upper fixing holes.
7. Fasten all bolts tightly to secure the raise/lower control unit in place.
8. Adjust the offset value of the motion sensor, referring to section 3.6.
   Note: If the motion sensor offset is not compensated, the beam stabilization feature does not work properly.



1.7 External Monitor

The portrait type monitor MU-150HD or a commercial monitor can be used for the external monitor. The transceiver unit outputs the HDMI video signal only. When you use the monitor (ex. MU-150HD), whose input interface is DVI-D, prepare the optional HDMI-TO-DVI-A-L=5.3/10.3M cable, to convert the HDMI video signal to DVI-D.

For details about the external monitor, see the operator's manual of the monitor.

When a commercial monitor is used, it should meet the following specifications;

Input signal interface:	HDMI or DVI-D* *: Requires HDMI-TO-DVI-A-L=5.3/10.3M cable.
Resolution:	XGA (1024×768)
Refresh rate:	60Hz

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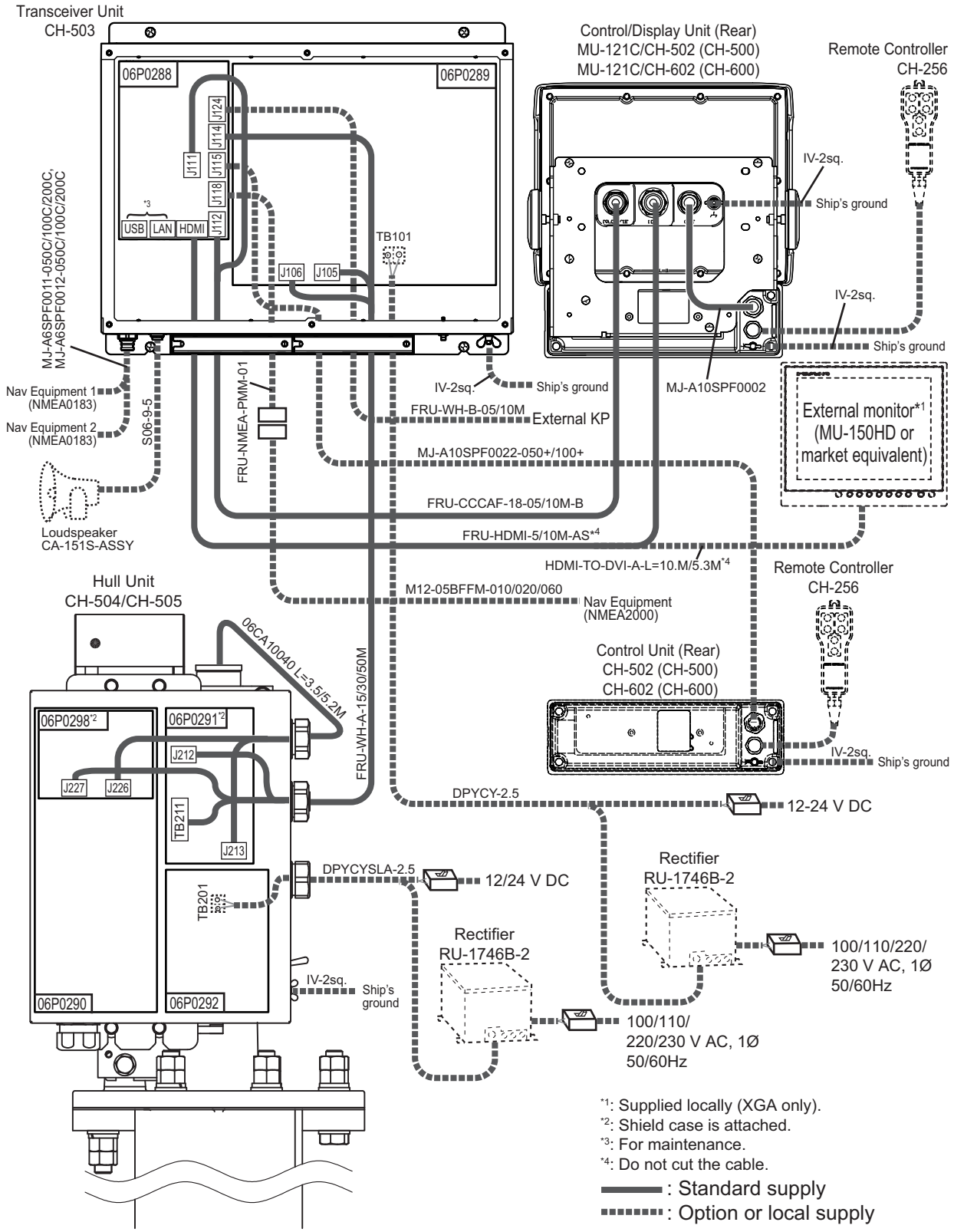
2. WIRING

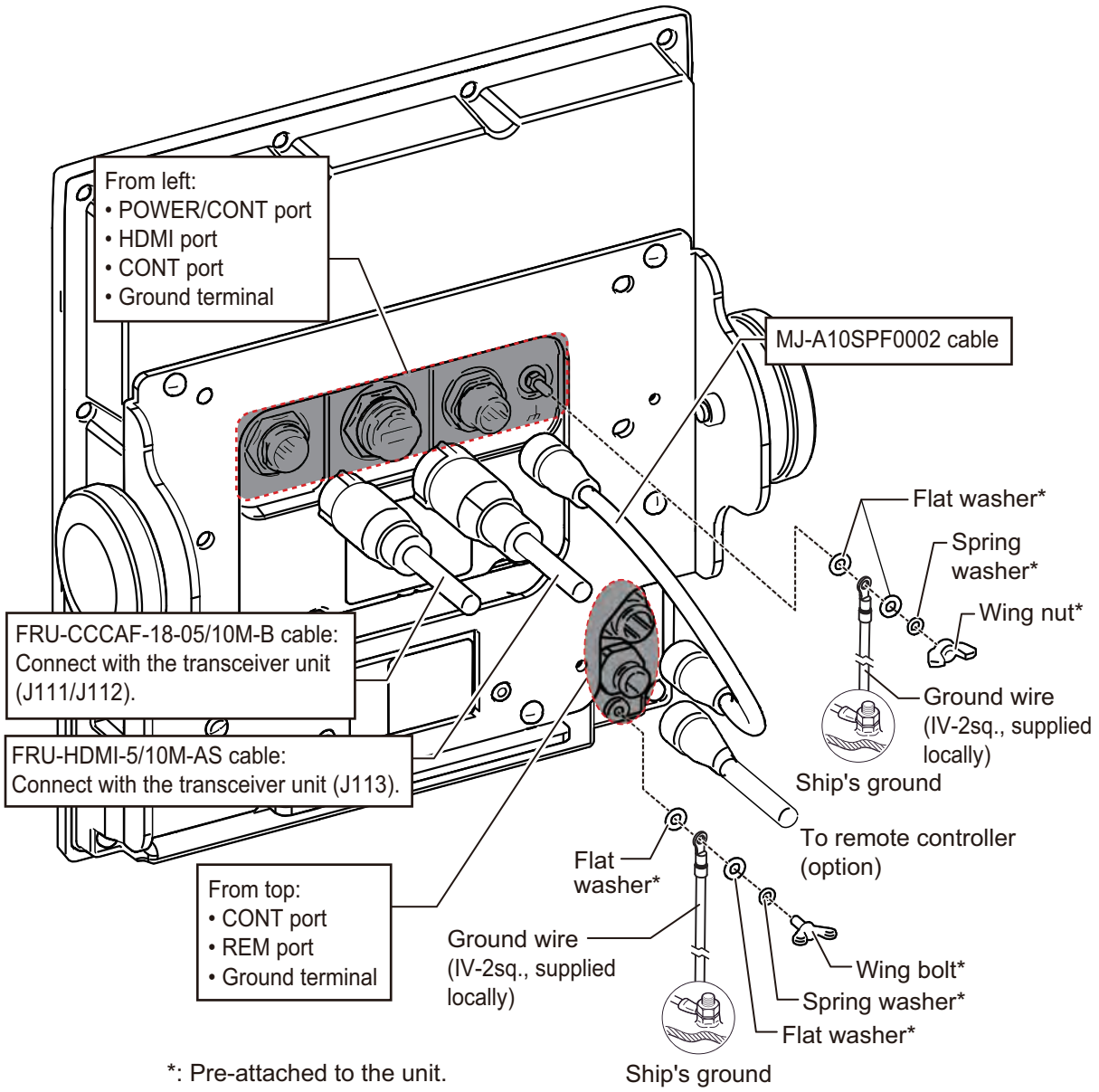
The following illustration shows the general connection of this system. For detailed information, see the interconnection diagram. Many of the cables mentioned are JIS (Japanese Industrial Standards) cables. If not available locally, use the equivalent. See the cable guide in the Appendix for how to select equivalent cables.



2.1 Control/Display Unit (Standalone Type)

Connect the cables to the connector on the rear side of the control/display unit, referring to the following figure.

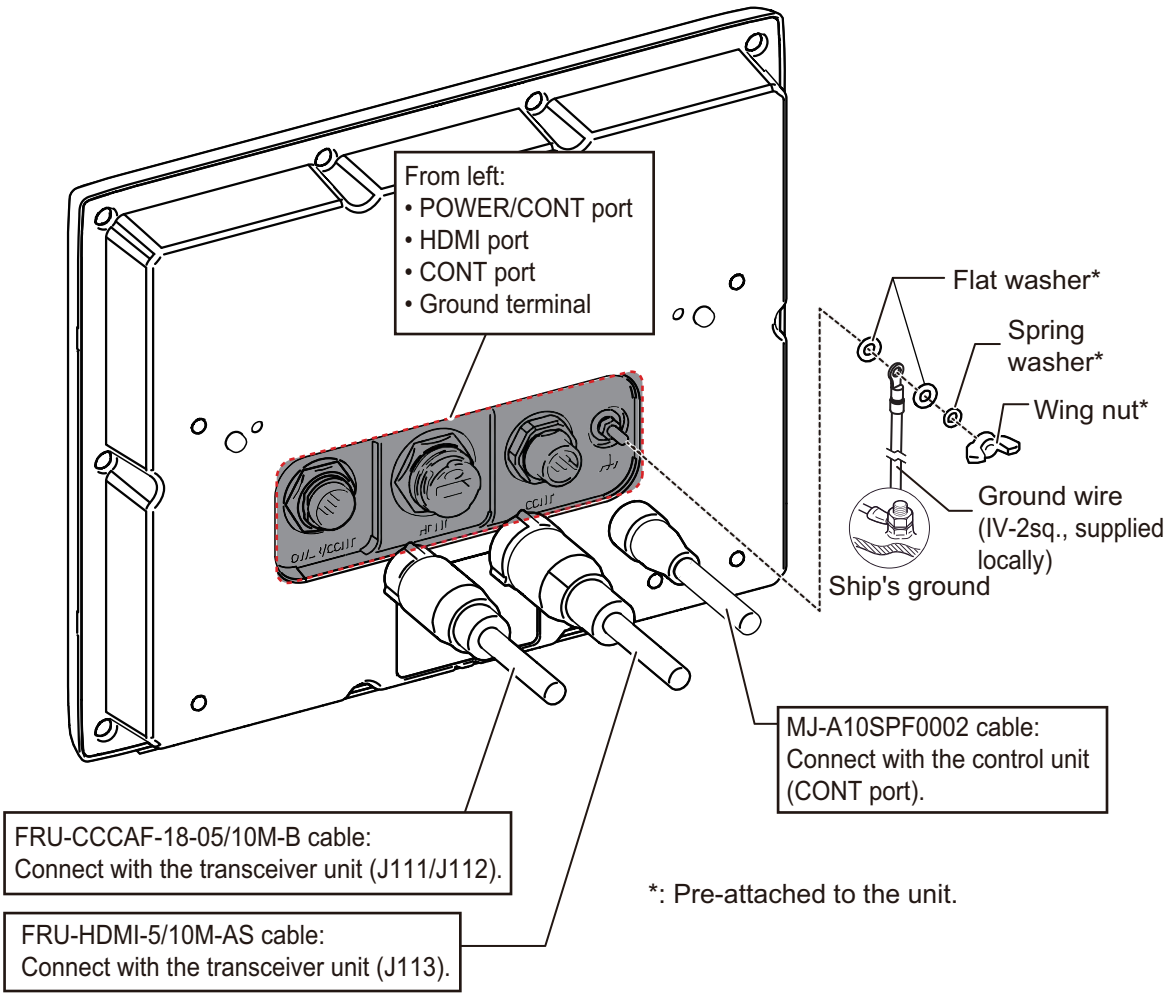
Note: When the optional remote controller is not connected, do not remove the connector cover on the REM port.



*: Pre-attached to the unit.

2.2 Display Unit (Black Box Type)

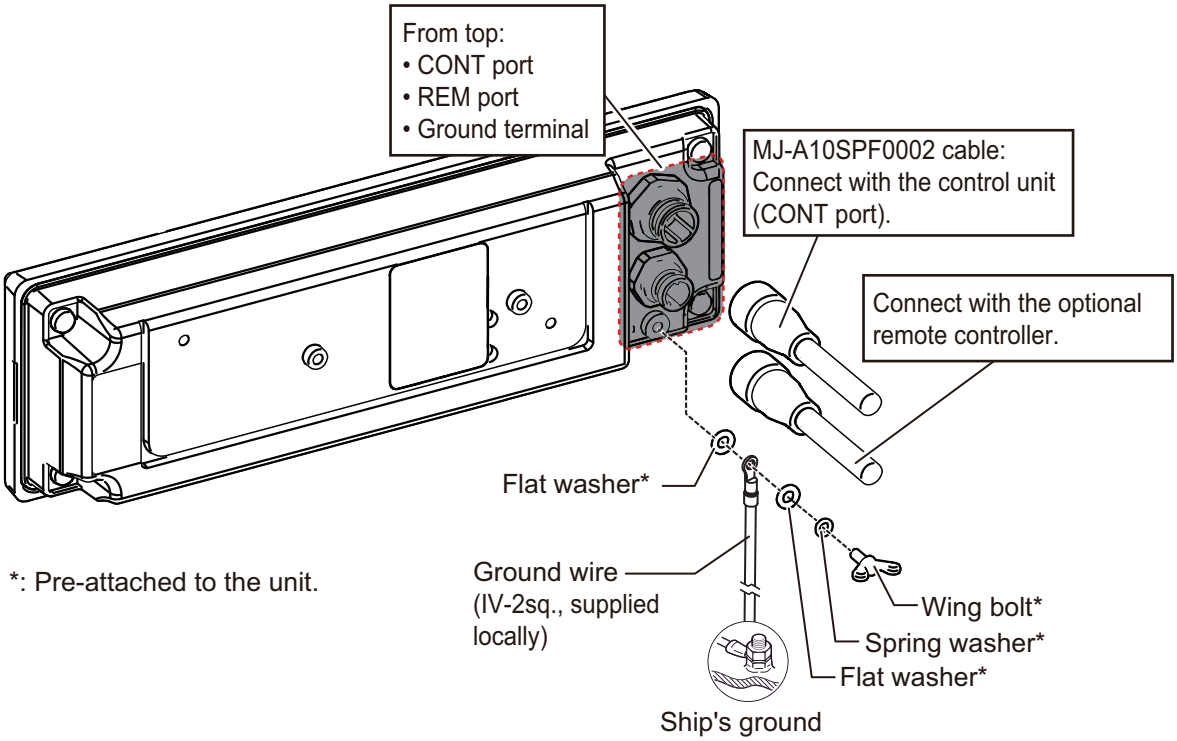
Connect the cables to the connector on the rear side of the display unit, referring to the following figure.



2.3 Control Unit (Black Box Type)

Connect the cables to the connector on the rear side of the control unit, referring to the following figure.

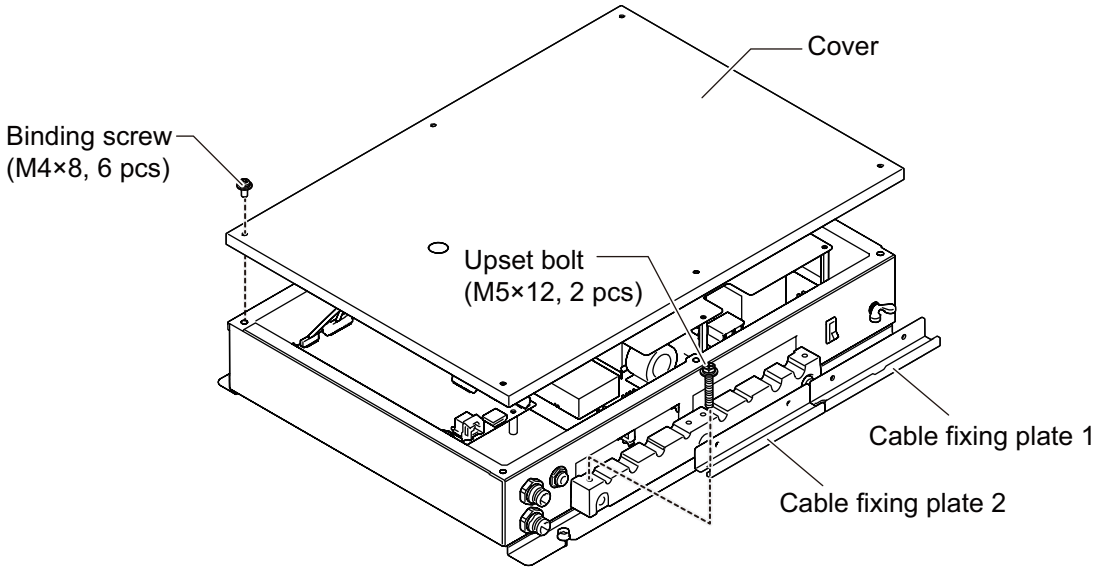
Note: When the optional remote controller is not connected, do not remove the connector cover on the REM port.



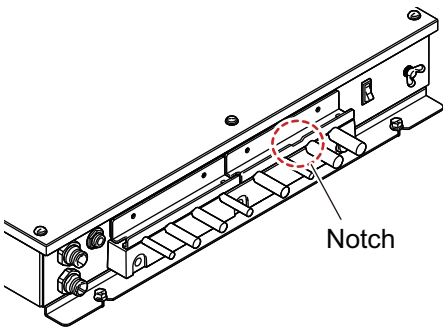
*: Pre-attached to the unit.

2.4 Transceiver Unit

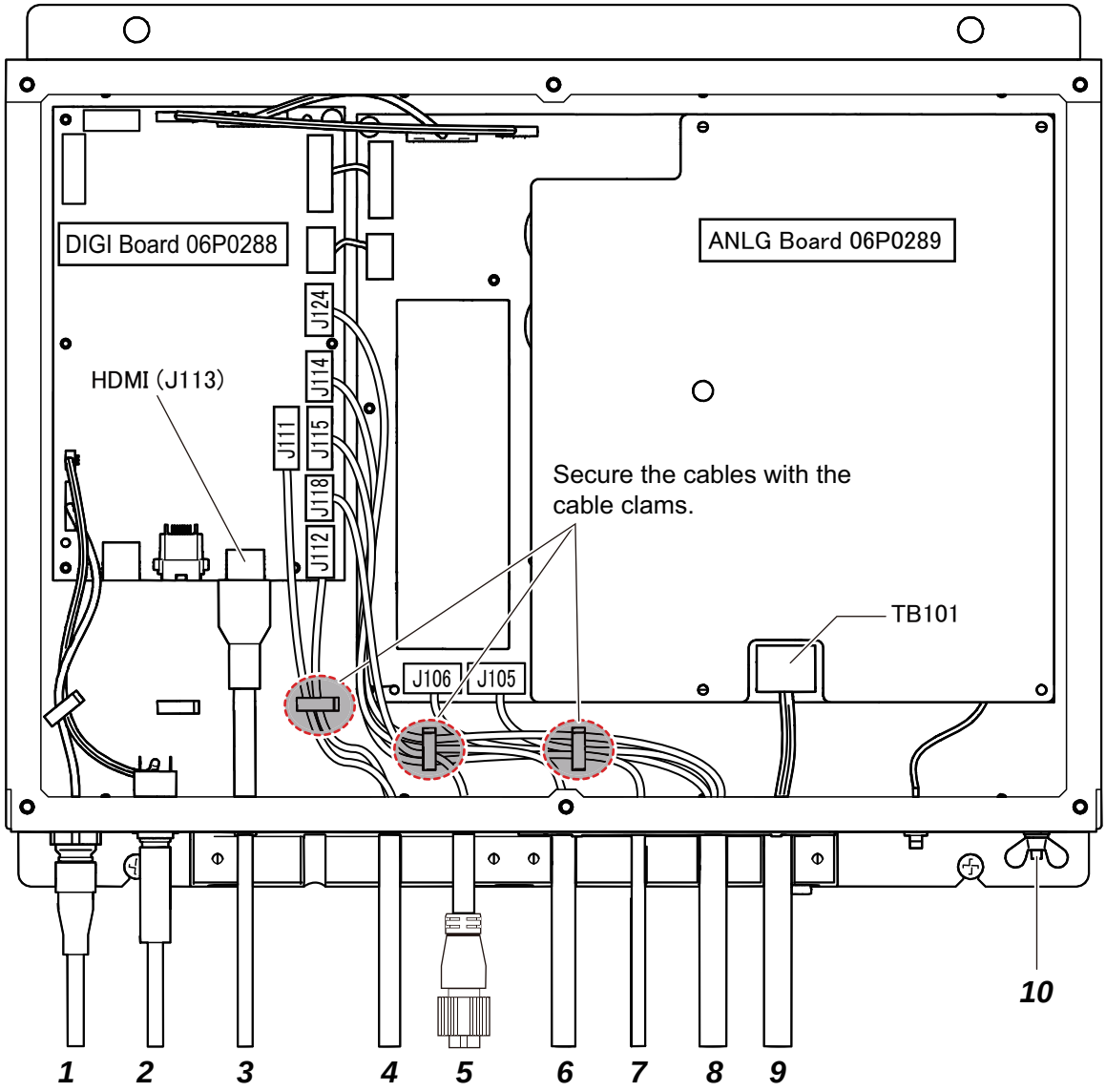
Remove the transceiver unit cover and two cable fixing plates, to connect the cables to the connector on the internal board. Loosen six binding screws (M4×8) to remove the cover. Loosen two upset bolts (M5×12) to remove the cable fixing plate.



Note: When you reattach the cable fixing plates, the plate which has the notch (cable fixing plate 1) should be attached to the right side.



Internal wiring of the transceiver unit

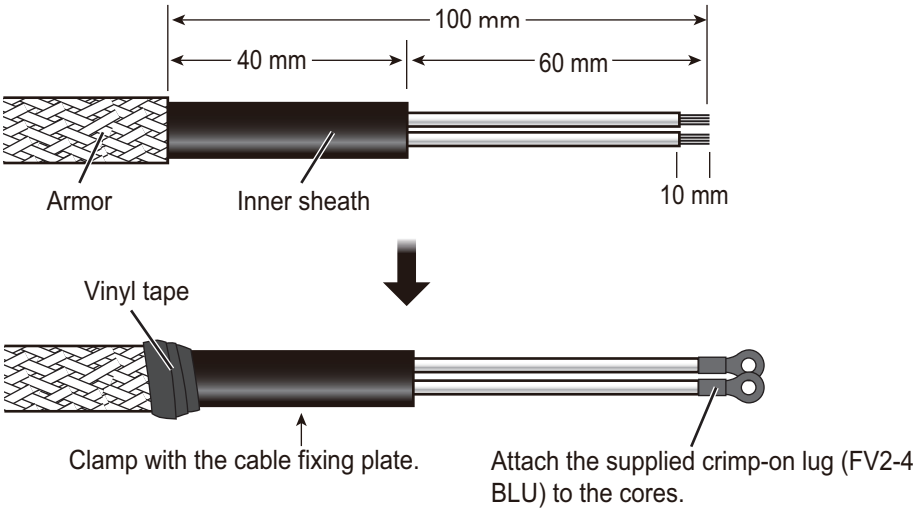


No.	Cable	Access point on the transceiver unit	Cable from
1	MJ-A6SPF0011-050C/100C/200C, MJ-A6SPF0012-050C/100C/200C	NMEA1/NMEA port	Navigation equipment (NMEA0183, max. 2)
2	Speaker cable, S06-9-5	SPEAKER jack	Loudspeaker
3	FRU-HDMI-5/10M-AS	DIGI board 06P0288: HDMI port (J113)	Display unit

No.	Cable	Access point on the transceiver unit	Cable from
4	FRU-CCCAF-18-05/10M-B	DIGI board 06P0288: POWER port (J112) and CONT port (J111)	Display unit
5	FRU-NMEA-PMM-01	DIGI board 06P0288: J118	Navigation equipment (NMEA2000)
6	MJ-A10SPF0022-050+/100+	DIGI board 06P0288: J115	No.2 control unit
7	FRU-WH-B-05/10M	DIGI board 06P0288: J124	External KP
8	FRU-WH-A-15/30/50M	DIGI board 06P0288: J114 ANLG board 06P0289: J105 and J106	Hull unit
9	DPYCY-2.5*	ANLG board 06P0289: TB101	Ship's main (12-24 V DC)
10	Ground Wire (IV-2sq.)	Ground terminal	Ship's ground

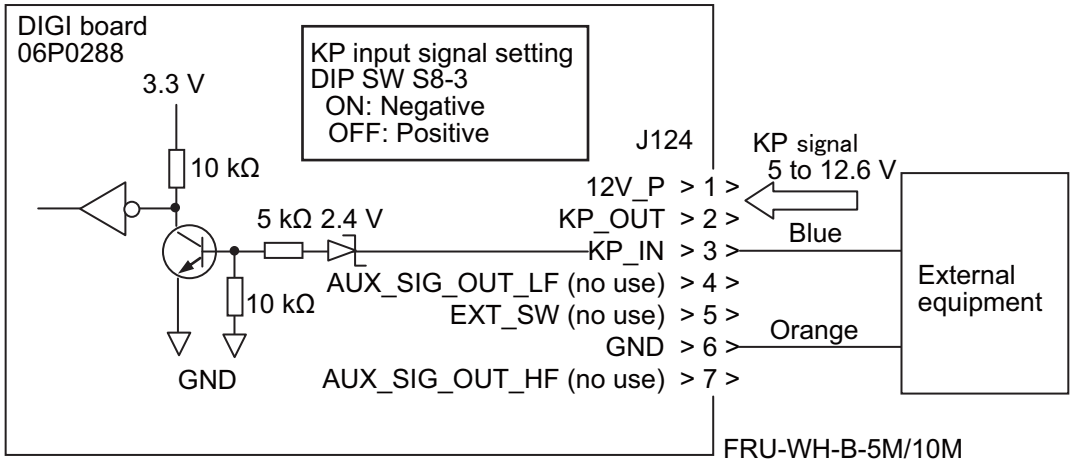
*: Fabricate the power cable (DPYCY-2.5, supplied locally), referring to the following figure.

Fabrication of DPYCY-2.5 cable

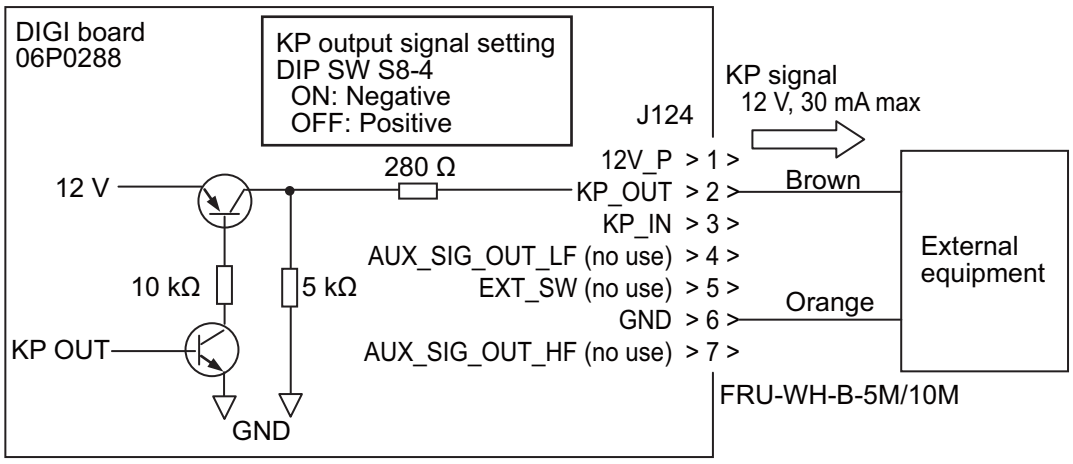


External KP connection

To synchronize the KP (Keying Pulse) signal from the external equipment, make the connection as follows. Also, change the DIP switch (S8-3) on the DIGI board 06P0288, according to the logic signal of the external equipment.

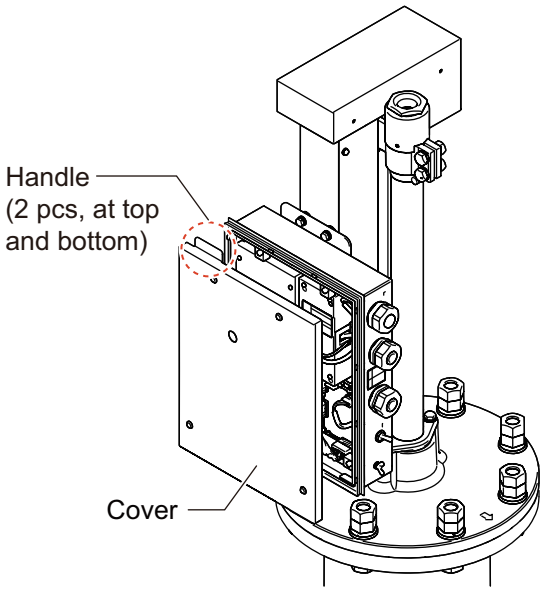


To output the KP signal from the transceiver unit to external equipment, make the connection as follows. Also, change the DIP switch (S8-4) on the DIGI board 06P0288, according to the logic signal of the external equipment. The transceiver unit outputs the KP signal while the power is turned on.



2.5 Hull Unit

Unfasten four binding screws (M4×10) to remove the cover from the raise/lower control unit, then connect the cables to the connector on the internal board. When you remove the cover, hold the handle and pull it.

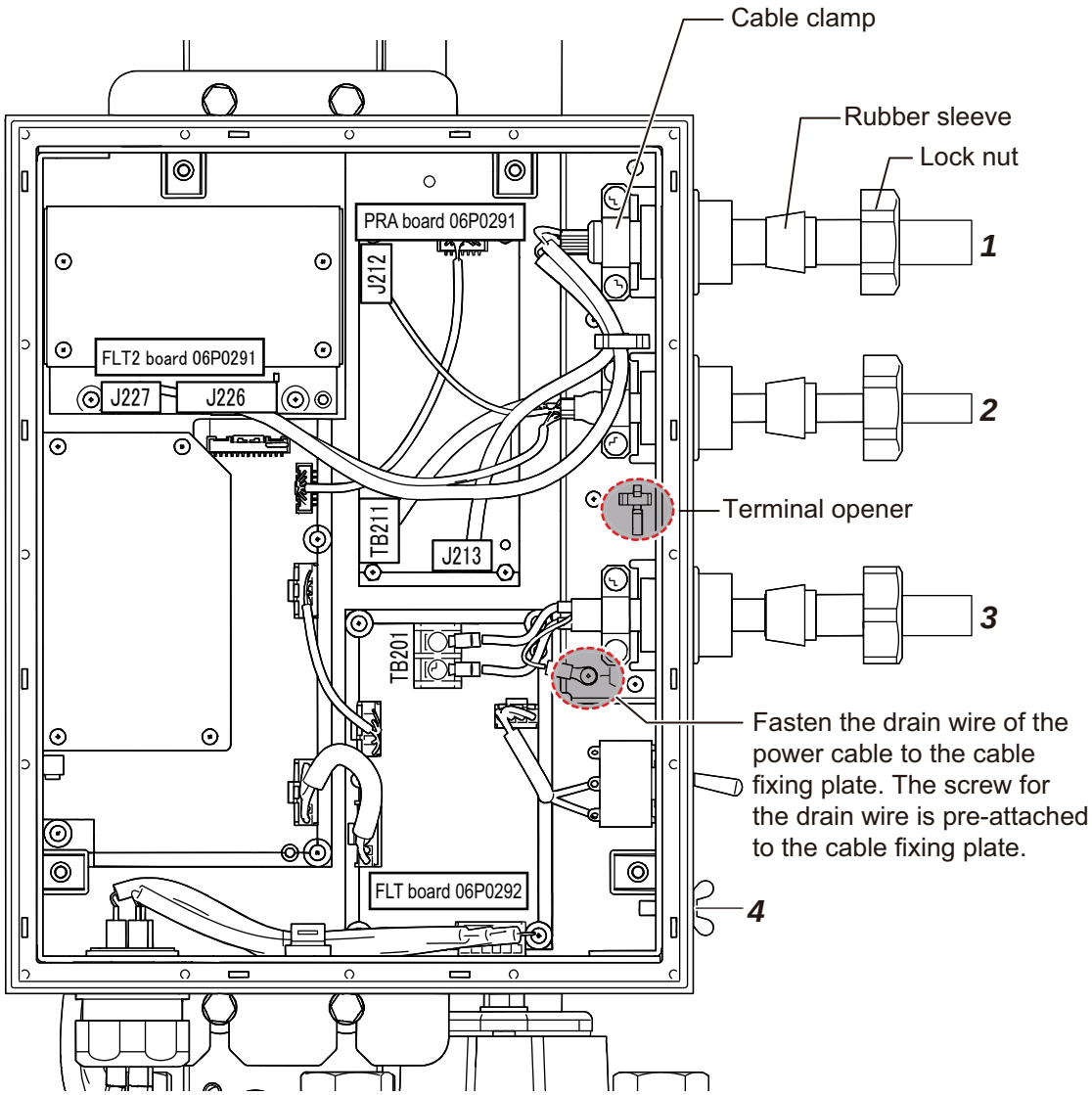


Internal wiring of the transceiver unit

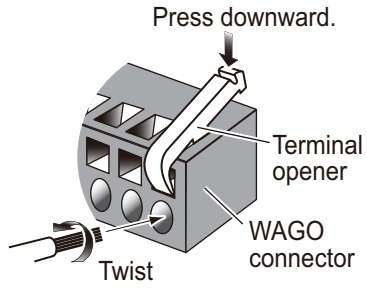
Remove the lock nut and rubber sleeve from the cable gland (3 pcs) on the raise/lower control unit, then insert the cables into the unit after passing the lock nut and rubber sleeve on to the cable.

The shield cover is attached on the PRA board 06P0291. When you connect the cables to the connector on the PRA board, loosen four binding screws to remove the shield cover.

Note: For the pin assignment of each connector, see the interconnection diagram at the back of this manual.



How to connect wires to WAGO connector



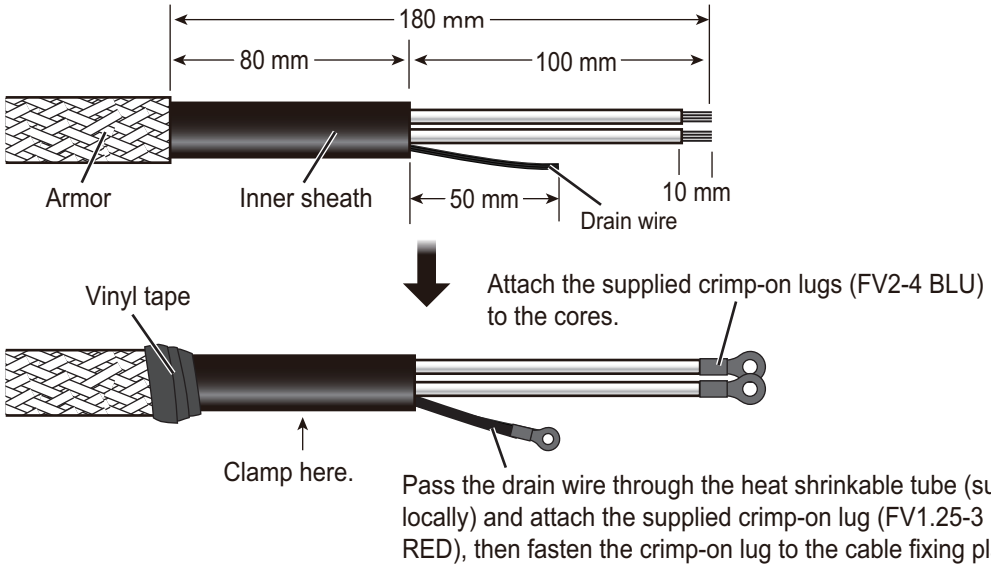
Procedure

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

No.	Cable	Access point on the raise/lower control unit	Cable from
1	Transducer cable (06CA10040)	PRA board 06P0291: J213 FLT2 board 06P0298: J226	Transducer
2	FRU-WH-A-15/30/50M	PRA board 06P0291: J212 and TB211 FLT2 board 06P0298: J227	Transceiver unit
3	DPYCYSLA-2.5*	FLT board 06P0292: TB201 **Note:** For the drain wire of the DPYCYSLA-2.5 cable, fasten to the cable fixing plate.	Ship's main (12/24 V DC)
4	Ground wire (IV-2sq.)	Ground terminal	Ship's ground

*: Fabricate the power cable (DPYCYSLA-2.5, supplied locally), referring to the following figure.

Fabrication of DPYCYSLA-2.5 cable



2.6 Auto Filter

The auto filter ensures that you get clear and crisp echoes even when traveling at speed. The auto filter also decreases interference from other fish finder equipped vessels.

The auto filter functions automatically by inputting the following data from a GPS.

- VTG sentence
- HDG, HDT, THS, VHW, Gpatt*, or HDM sentence
  *: FURUNO proprietary sentence

Notice for connecting a GPS

Connect a GPS to this equipment, keeping in mind the following points.If you do not observe the following points, this equipment may not detect fish echoes properly.

- Connect a GPS to the transceiver unit directly. When the interface unit (ex. IF-2300) is connected between the GPS and transceiver unit, the input signal may be delayed.
- Set the GPS smoothing as short as possible. For how to adjust the smoothing setting, see the operator's manual of the GPS.

2.7 Input/Output Sentences (NMEA0183)

This equipment can input/output following sentences:

Note: The NMEA0183 format data has higher priority than NMEA2000 format data.

Sentence	Data	NMEA0183 Version
Input sentences		
CUR	Water Current Layer	Ver. 1.5/2.0/3.0/4.0
DBS	Depth Below Surface	Ver. 1.5/2.0/3.0/4.0
DBT	Depth Below Transducer	Ver. 1.5/2.0/3.0/4.0
DPT	Depth	Ver. 1.5/2.0/3.0/4.0
GGA	Global Positioning System Fix Data	Ver. 1.5/2.0/3.0/4.0
GLL	Geographic Position	Ver. 1.5/2.0/3.0/4.0
GNS	GNSS FIX Data	Ver. 1.5/2.0/3.0/4.0
HDG	Heading, Deviation & Variation	Ver. 1.5/2.0/3.0/4.0
HDM	Heading, Magnetic	Ver. 1.5/2.0/3.0/4.0
HDT	Heading True	Ver. 1.5/2.0/3.0/4.0
MDA	Meteorological Composite	Ver. 1.5/2.0/3.0/4.0
MTW	Water Temperature	Ver. 1.5/2.0/3.0/4.0
RMC	Recommended Minimum Specific GNSS Data	Ver. 1.5/2.0/3.0/4.0
THS	True Heading and Status	Ver. 1.5/2.0/3.0/4.0
VDR	Set & Drift	Ver. 1.5/2.0/3.0/4.0
VHW	Water Speed and Heading	Ver. 1.5/2.0/3.0/4.0
VTG	Pitch and Roll	Ver. 1.5/2.0/3.0/4.0
ZDA	Time and date	Ver. 1.5/2.0/3.0/4.0
GPatt	FURUNO proprietary sentence	-
pireq	FURUNO proprietary sentence	-
Output sentences		
TLL	Target Latitude and Longitude	Ver. 3.0/4.0
pidat	FURUNO proprietary sentence	-

2.8 Input/Output PGNs (NMEA2000)

This equipment can input/output following PGNs:

Note: The NMEA0183 format data has higher priority than NMEA2000 format data.

Input PGNs

PGN	Data
059392	ISO Acknowledgement
059904	ISO Request
060160	ISO Transport Protocol, Data Transfer
060416	ISO Transport Protocol, Connection Management - BAM group
060928	ISO Address Claim
061184	FURUNO Proprietary PGN
065240	ISO Commanded Address
126208	NMEA - Request group function
	NMEA - Command group function
126720	FURUNO Proprietary PGN
126992	System Time

PGN	Data
126996	Product Information
127250	Vessel Heading
128259	Speed
128267	Water Depth
129025	Position, Rapid Update
129026	COG & SOG, Rapid Update
129029	GNSS Position Data
129033	Local Time Offset
129291	Set & Drift, Rapid Update
130310	Environmental Parameters
130311	Environmental Parameters
130312	Temperature
130316	Temperature, Extended Range
130577	Direction Data
130821	FURUNO Proprietary PGN

Output PGNs

PGN	Data	Sending Cycle
059392	ISO Acknowledgement	Non-periodic
059904	ISO Request	Non-periodic
060928*	ISO Address Claim	Non-periodic
061184	FURUNO Proprietary PGN	Non-periodic
126208	NMEA - Acknowledge group function	Non-periodic
126464	PGN List - Transmit PGN's group function	Non-periodic
	PGN List - Received PGN's group function	Non-periodic
126720	FURUNO Proprietary PGN	Non-periodic
126993	Heartbeat	60,000 ms
126996	Product Information	Non-periodic
126998	Configuration Information	Non-periodic
130822	FURUNO Proprietary PGN	Non-periodic
130823	FURUNO Proprietary PGN	Non-periodic
130828	FURUNO Proprietary PGN	Non-periodic

*: To change "Device Instance" or "System Instance" field of "060928 ISO Address Claim", use "126208 NMEA - Command group function".

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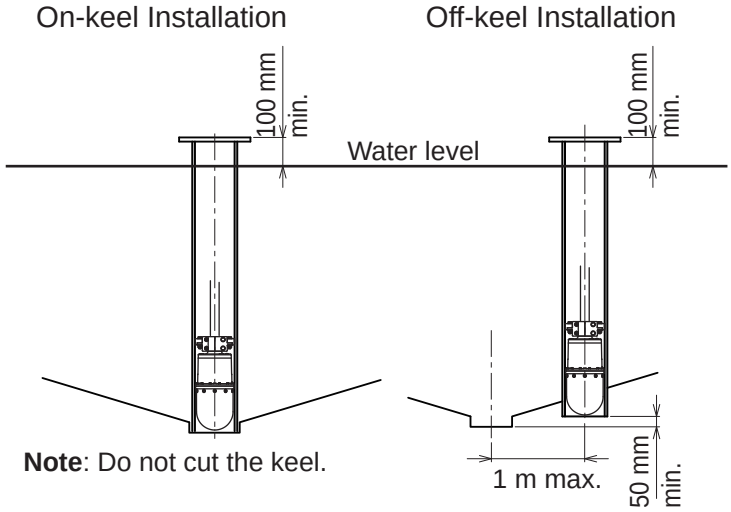
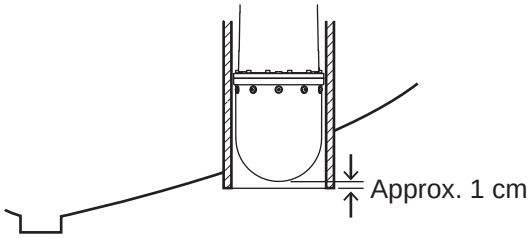
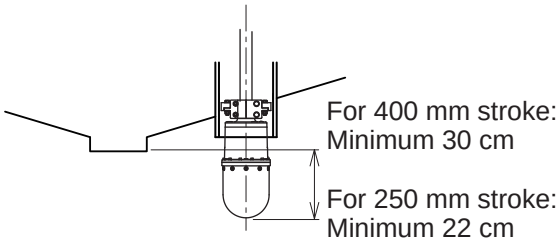
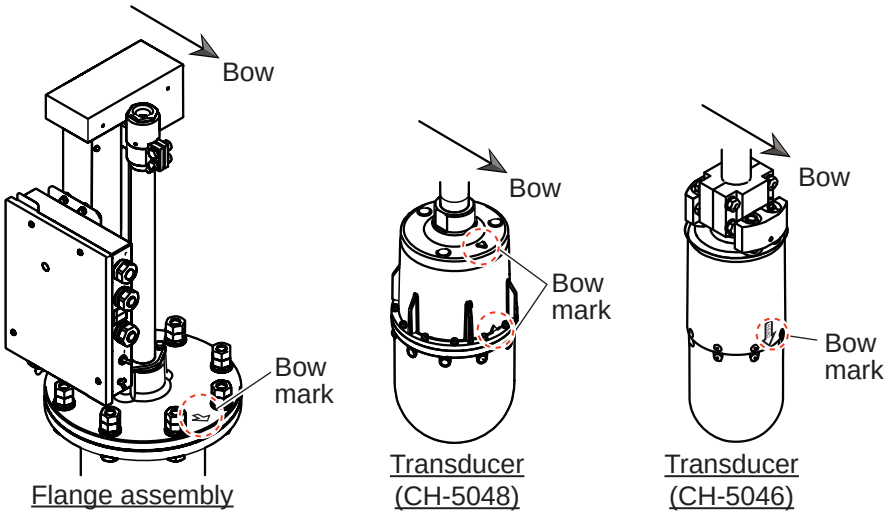
3. CHECKING AND INITIAL SETTINGS

3.1 Check Points After Installation

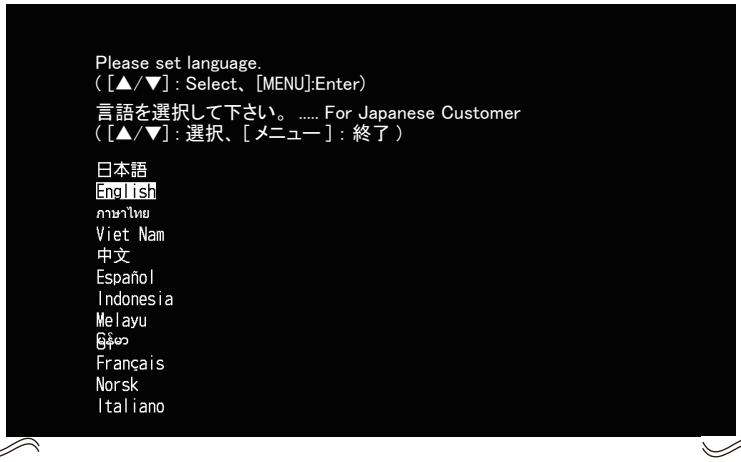
Check the following points in the dockyard after installation:

Item	Check point, Rating
Retraction tank level	• The retraction tank is installed on the keel, or is located within 1 meter of the keel. • The distance between the keel and bottom of the retraction tank is 500 mm or more. • The retraction tank flange is located 100 mm above the water level, or higher. 
Distance between transducer and bottom of the retraction tank when transducer is completely retracted.	• Distance between the transducer and bottom of the retraction tank when the transducer is retracted completely is approx. 1 cm. 
Transducer travel	• Distance between the transducer and bottom of the keel when the transducer is lowered completely is following value. 

Item	Check point, Rating
Direction of the bow mark	• The bow mark on the transducer and flange assembly should be faced to the ship's bow. If not faced to the bow, target echoes may not be displayed correctly. 
Wiring check	• All cables are correctly connected. • All screws (ex. cable clamp screw, ground terminal) are firmly fastened. • Cables are firmly secured. • Cable shields are properly grounded.
Rejecting source of noise and interference	• Noise generating machinery (motor, radiotelephone, TV set, etc.) are not placed nearby.
Ground	• Each unit is grounded correctly. **Note:** The ground terminal should be connected to ship's ground. If the ground terminal is connected to the terminal other than the ship's ground (ex. main engine), electrolytic corrosion may occur.
Ship's main voltage	• Ship's main voltage is stable 12 or 24 V DC.
Watertightness	• Water should not leak from the flange assembly or cotton retainer.
Heading alignment	• A target echo is displayed on the correct bearing. For how to adjust heading alignment, see section 3.3.

3.2 Language Setting

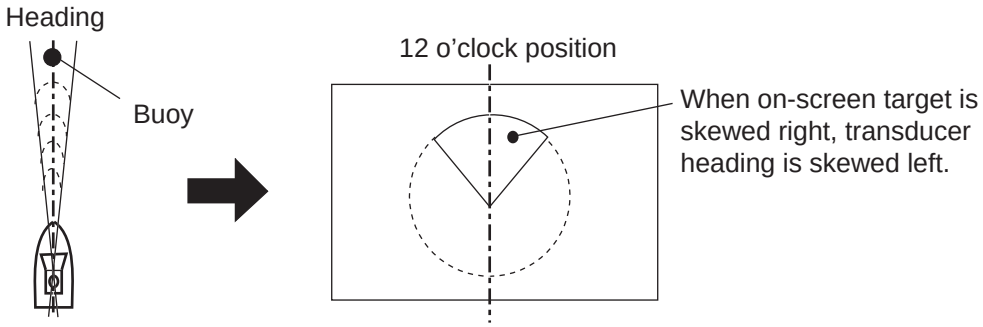
Turn the system on after completing the installation. The following language selection screen appears the first time the power is turned on. Press ▲ or ▼ on the cursorpad to select desired language, then press the **MENU** key.



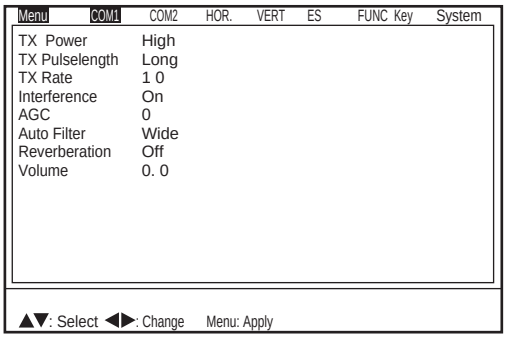
3.3 Heading Alignment, Draft and Stroke Adjustments

Do as follows to compensate the heading line and set own ship's draft and stroke length of the hull unit.

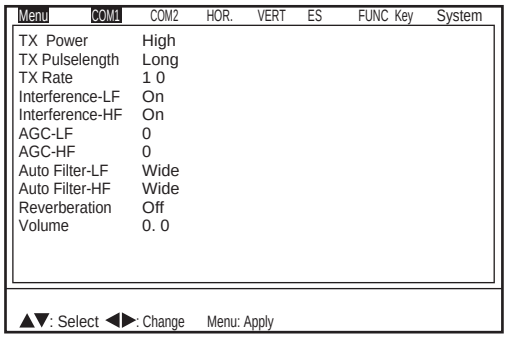
1. Locate a target (buoy, etc.) in the bow direction and display it on the screen at close range.
   The heading alignment is correct when the target is displayed at 12 o'clock on the screen.



2. Press the **MENU** key to open the menu.

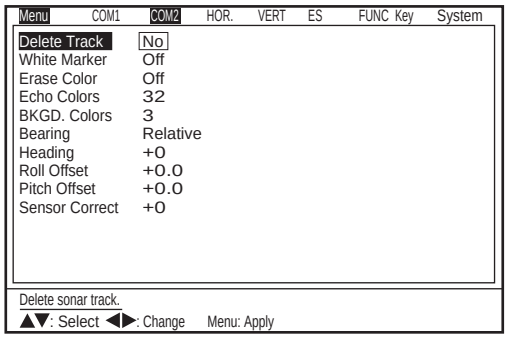


For CH-500

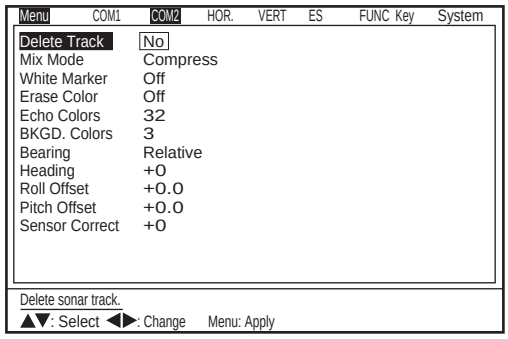


For CH-600

3. Press ▶ on the cursorpad to select [COM2] on the menu bar.
4. Press ▼ to move the cursor inside the menu.



For CH-500

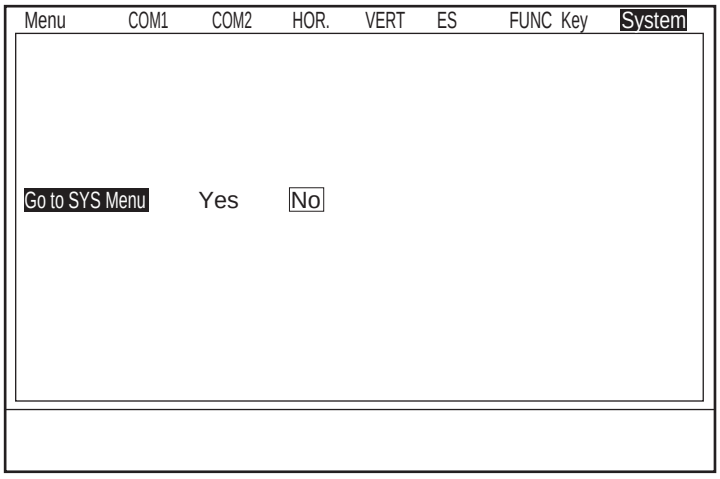


For CH-600

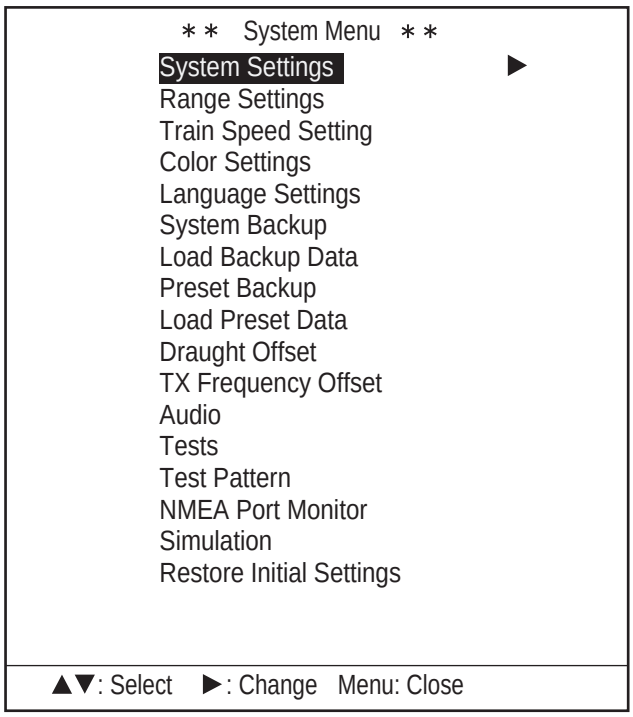
5. Press ▼ several times to select [Heading].
6. Press ▶ to open the setting window.
7. [Heading] is selected with the cursor; press ◀ or ▶ to adjust the setting value.
   Adjust the setting value so that the target echo selected at step 1 appears at the 12 o'clock position (+: clockwise direction, -: counterclockwise direction).

Heading	+0°
	(-180~+179°)

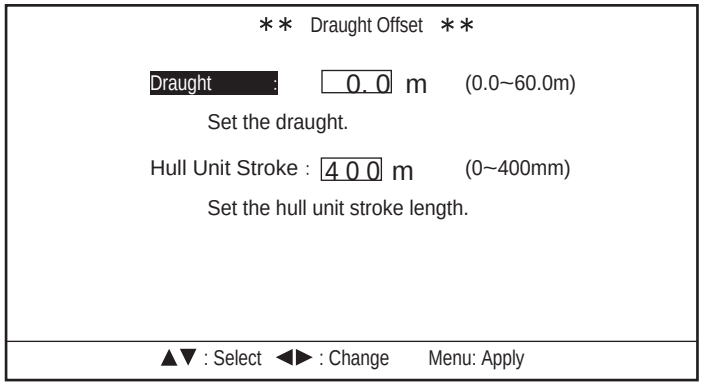
8. Press ▲ several times to move the cursor to the menu bar.
9. Press ▶ several times to select [System] on the menu bar.
10. Press ▼ to move the cursor inside the menu.



11. Press ◀ to select [Yes]. The [System Menu] appears.



12. Press ▼ several times to select [Draught Offset].
13. Press ▶ to open the [Draught Offset] window.



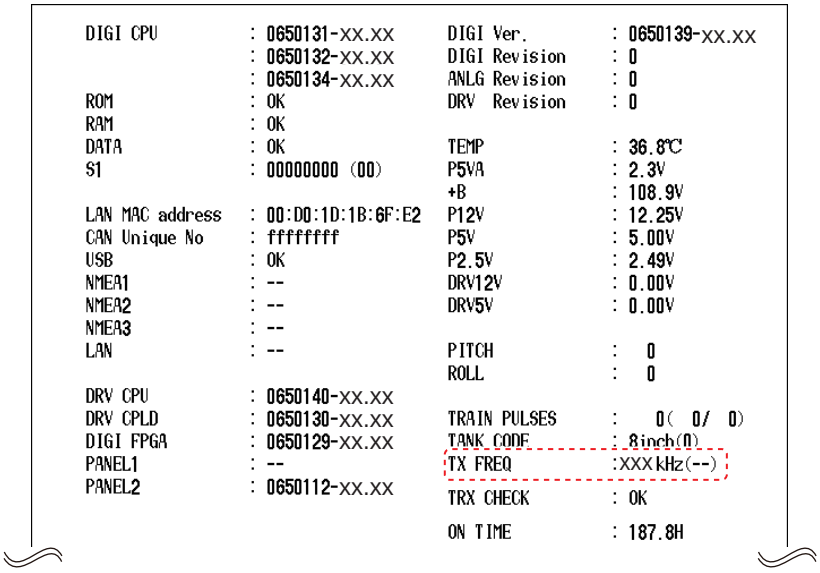
14. [Draught] is selected with the cursor; press ◀ or ▶ to set own ship's draft.

15. Press ▼ to select [Hull Unit Stroke].
16. Press ◀ or ▶ to set the stroke length of the hull unit.
17. Press the **MENU** key to apply the settings.
18. Press the **MENU** key to close [System Menu].

3.4 Checking TX Frequency

Check the TX frequency after completing the installation.

1. Press the **MENU** key to open the menu.
2. Press ▶ several times to select [System] on the menu bar.
3. Press ▼ to move the cursor inside the menu.
4. Press ◀ to select [Yes] to open [System Menu].
5. Press ▼ several times to select [Tests].
6. Press ▶ to start the self test.
   The test result displayed on the screen.

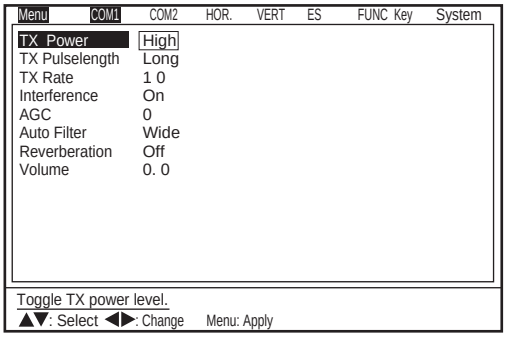


7. Check that the frequency at the [TX FREQ] line on the test result is same as the transducer's frequency. If not, contact your dealer.
8. Press the **MENU** key three times to close the test result.
9. Press the **MENU** key to close [System Menu].

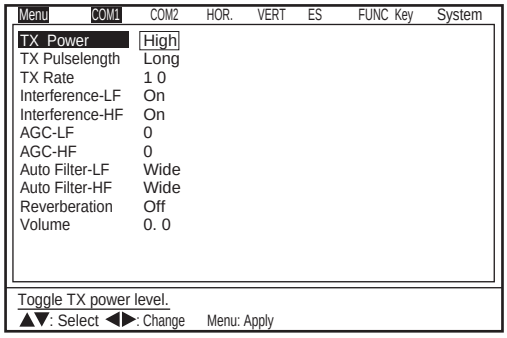
3.5 Setting for Synchronizing Transmission with other Equipment (External KP)

To synchronize transmission with other echo sounder, do as follows:

1. Press the **MENU** key to open the menu.
2. [COM1] is selected on the menu bar; press ▼ to move the cursor inside the menu.

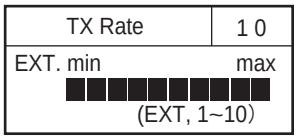


For CH-500



For CH-600

3. Press ▼ several times to select [TX Rate].
4. Press ▶ to open the setting window.
5. Press ◀ several times to select [EXT.].
6. Press the **MENU** key to apply the settings and close the menu.



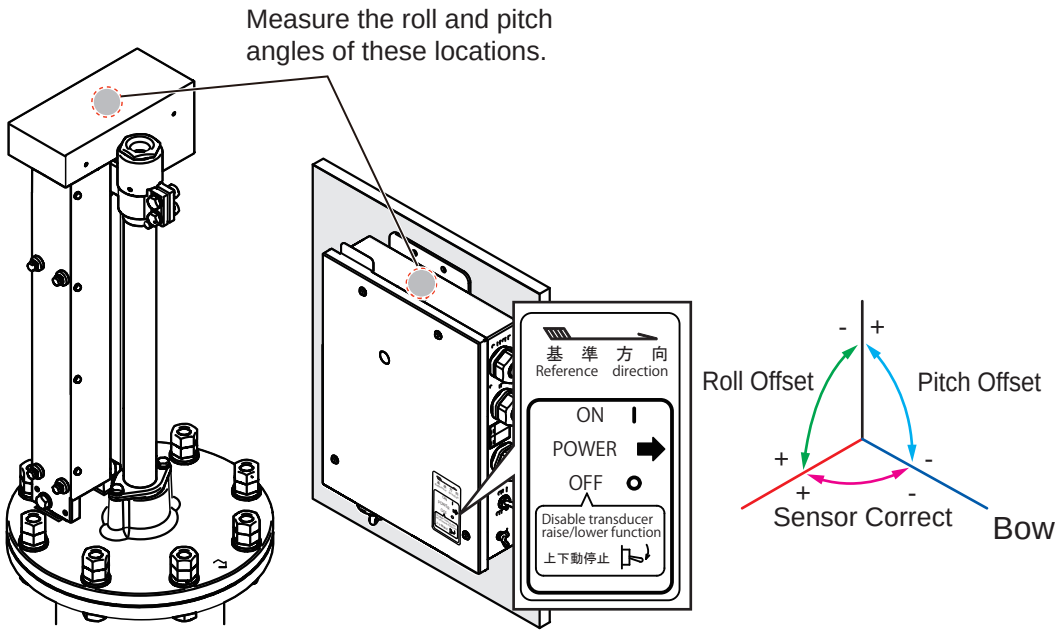
3.6 Motion Sensor Offset

The motion sensor is built in the raise/lower control unit. Stabilizer functions use the measurements of the motion sensor. To perform stabilization correctly, offset the motion sensor.

- **When the raise/lower control unit is not separated from the hull unit**:
  Adjust [Heading] and [Sensor Correct] in the [COM2] menu as required.
  [Roll Offset] and [Pitch Offset] do not require adjustment.
  If the Hull Unit and Raise/Lower Control Unit do not have a matching heading, adjust the value for [Heading]. See step 7 of the procedure in section 3.3.
  If the Hull Unit and Raise/Lower Control Unit do not have a matching azimuth, adjust the value for [Sensor Correct]. See step 13 of the procedure in this section.
- **When the raise/lower control unit is separated from the hull unit:**
  Adjust [Roll Offset], [Pitch Offset] and [Sensor Correct].

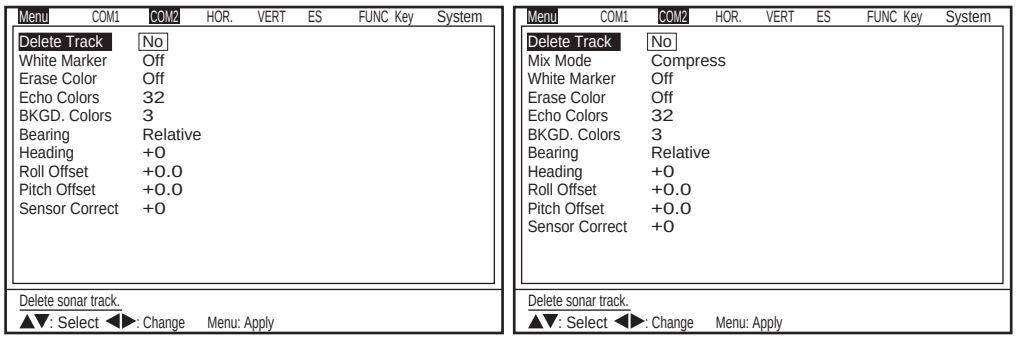
Note: When you adjust the motion sensor offset value, the vessel should be stable.

1. Measure the roll and pitch angles of the two locations shown in the following figure, using a angle meter. When the raise/lower control unit is not separated from the hull unit, go to next step.



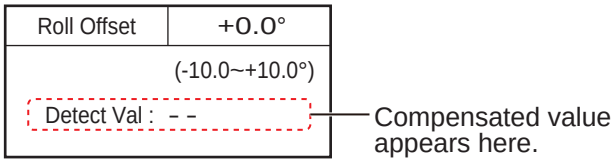
Hull unit　　Raise/lower control unit

2. Press the **MENU** key to open the menu.
3. Press ▶ on the cursorpad to select [COM2] on the menu bar.
4. Press ▼ to move the cursor inside the menu.



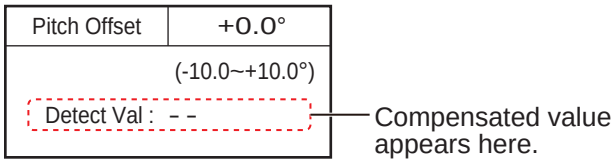
For CH-500　　For CH-600

5. Press ▼ several times to select [Roll Offset]. When the raise/lower control unit is not separated from the hull unit, go to step 11
6. Press ▶ to open the setting window.

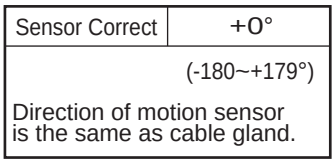


7. Press ◀ or ▶ to adjust the offset value.
   Calculate the offset value for [Roll Offset], using the values measured at step 1.
   - [Roll Offset] = "Hull unit's roll angle" minus "Raise/Lower control unit's roll angle"
8. Press ▼ to select [Pitch Offset].

9. Press ▶ to open the setting window.



10. Press ◀ or ▶ to adjust the offset value.
    Calculate the offset value for [Pitch Angle], using the values measured at step 1.
    - [Pitch Offset] = "Hull unit's pitch angle" minus "Raise/Lower control unit's pitch angle"
11. Press ▼ to select [Sensor Correct].
12. Press ▶ to open the setting window.
13. Press ◀ or ▶ to adjust the offset value.
    The [Reference direction] mark on the raise/lower control unit should face the ship's bow. When the mark is skewed 2° in the starboard direction, enter "+2°" to [Sensor Correct].

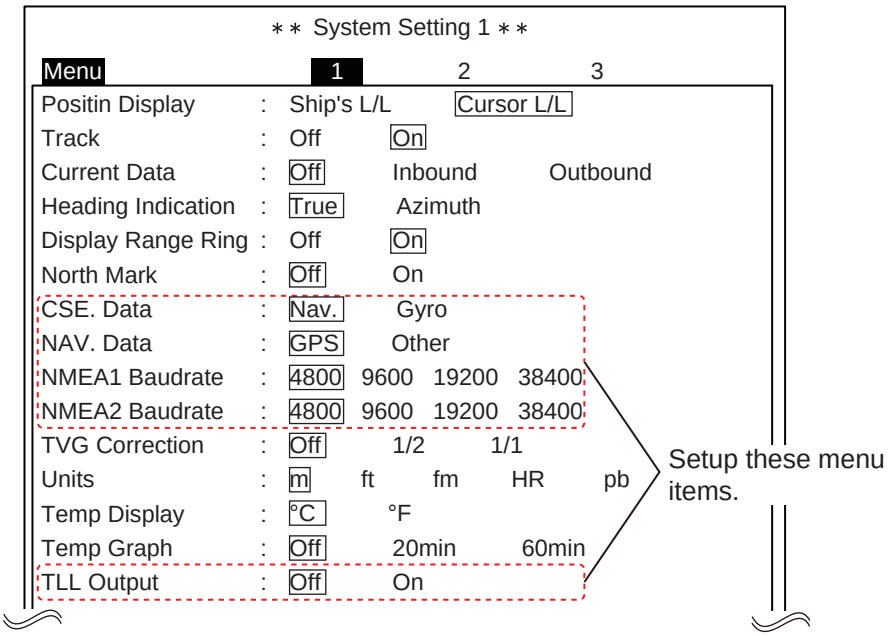


    Note: When the raise/lower control unit is not separated from the hull unit, enter the same value as the heading alignment value (see section 3.3).
14. Press the **MENU** key to apply the settings.
15. Press the **MENU** key to close [System Menu].

3.7 Navigation Equipment Setup

Do the following settings depending on the external equipment connected.

1. Press the **MENU** key to open the menu.
2. Press ▶ to select [System] on the menu bar.
3. Press ▼ to move the cursor inside the menu.
4. Press ◀ to select [Yes] to open [System Menu].
5. [System Settings] is selected with the cursor; press ▶.



6. Setup the following menu items, referring to the table below.

Menu item	Description
[CSE. Data]	Selects heading data source, navigator or gyrocompass, to draw ship's track. For heading sensor of gyrocompass connection select [Gyro].
[Nav. Data]	Selects source of navigational data ([GPS] or [Other]).
[NMEA1 Baudrate]/ [NMEA2 Baudrate]	Sets the baud rate for the NMEA1 and NMEA2 port. Select from [4800], [9600], [19200], [38400], as appropriate.
[TLL Output]	Select [On] to output the target position data specified by the **Event Mark** key to the plotter.

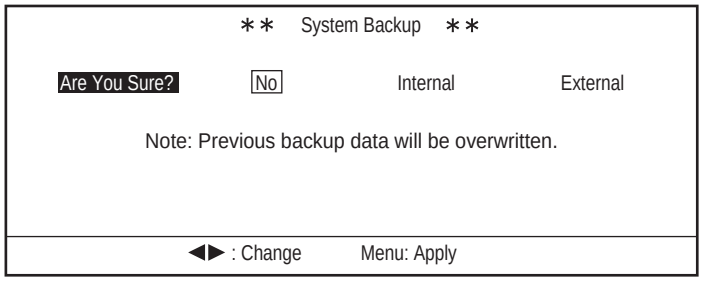
7. Press the **MENU** key two times to apply the settings.

3.8 System Backup

After setting up the equipment, do the following procedure to backup system settings. Backup data can be loaded in the event of equipment trouble, to restore previous system settings.

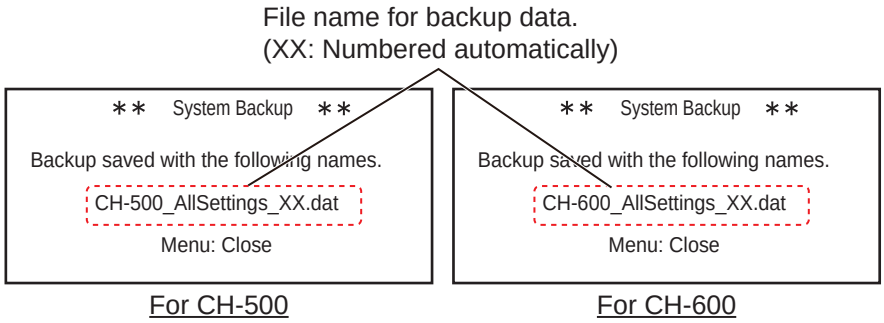
3.8.1 How to backup the system data

1. Press the **MENU** key to open the menu.
2. Press ▶ to select [System] on the menu bar.
3. Press ▼ to move the cursor inside the menu.
4. Press ◀ to select [Yes] to open [System Menu].
5. Press ▼ several times to select [System Backup].
6. Press ▶ to open the [System Backup] window.



7. Press ◀ or ▶ to select the item.
   - [No]: Chancel the backup of the system data.
   - [Internal]: Save the current system data to the transceiver unit.
     Note: When [Internal] is selected, the previous system data in the transceiver unit is overwritten with the current data.
   - [External]: Save the current system data to the USB flash memory. This setting item appears only when a USB device is connected to the transceiver unit.

8. Press the **MENU** key to apply the settings.
   When [External] is selected at step 7, the following pop-up message appears.
   Press the **MENU** key to close the message.

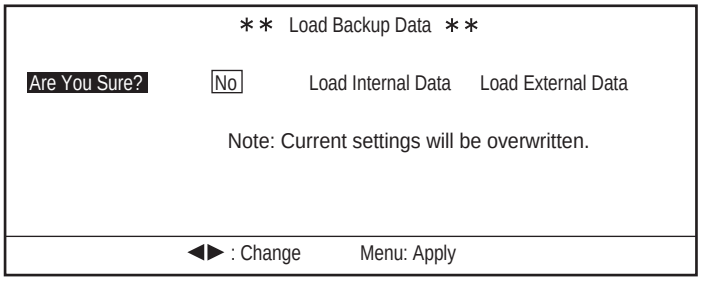


For CH-500 For CH-600

9. Press the **MENU** key to close [System Menu].

3.8.2 How to load the system data

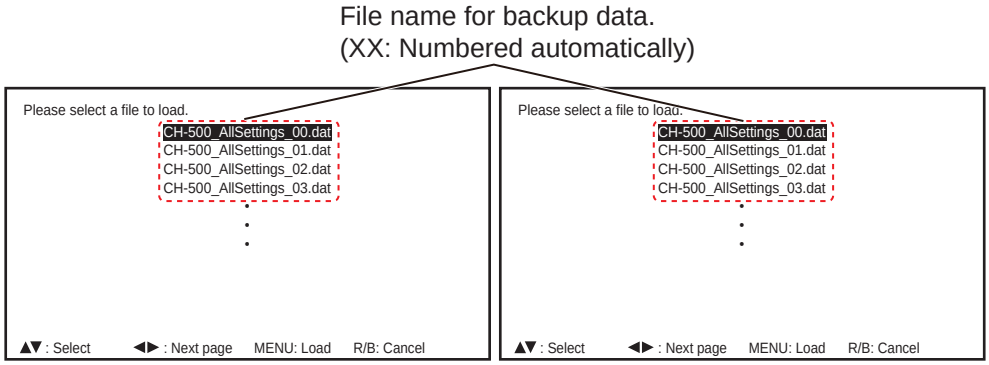
1. Press the **MENU** key to open the menu.
2. Press ▶ to select [System] on the menu bar.
3. Press ▼ to move the cursor inside the menu.
4. Press ◀ to select [Yes] to open [System Menu].
5. Press ▼ several times to select [Load Backup Data].
6. Press ▶ to open the [Load Backup Data] window.



7. Press ◀ or ▶ to select the item.
   - [No]: Chancel loading the backup data.
   - [Load Internal Data]: Load the backup data saved in the transceiver unit.
   - [Load External Data]: Load the backup data saved in the USB flash memory. This setting item appears only when a USB device is connected to the transceiver unit.

   Note: After loading the backup data, current system settings is overwritten with the backup data.

8. Press the **MENU** key to apply the settings.
   When [External] is selected at step 7, the file selection window appears. Press ▲ or ▼ to select the backup file, then press **MENU** key.



9. Press the **MENU** key to close [System Menu].

3.9 Color Settings

The color on the MU-101C for previous model and MU-121C for this equipment is different, even if the both color settings are same value. This is because MU-121C's liquid crystalline property is different from MU-101C. Therefore, default color settings is adjusted so that the colors on the MU-101C and MU-121C are same (the default color settings are different from the previous model).

- When the MU-101C is replaced with MU-121C:
  If you kept default color settings for the previous model, it is not required to adjust the color settings. If you customized the color settings for the previous model, adjust the color settings for this equipment on the menu.
- When you divert the display unit used for the previous model:
  Adjust the color settings so that the color settings is same value as the previous model. When you use the same display, the colors on the display are same, if the color setting value is same between previous model and this equipment.

For details about adjusting the color settings, see the operator's manual.

3.10 Automatic adjustment of the train direction

The soundome assembly has a function to adjust the train direction automatically in case it shifts due to vibration or external shocks. When the bow mark on the transducer and flange assembly are faced to the ship's bow, as per the "Direction of the bow mark" on section 3.1 "Check Points After Installation" the function is enabled.
When they are not faced to the ship's bow, change the DIP switch (S8-5) on the DIGI board 06P0288 to ON, referring to "External KP connection" on "2.4 Transceiver Unit". The function is enabled.

3.11 Decreasing cavitation

When operating with high water temperatures, cavitation can occur in the soundome assembly and the signal level can be subsequently decreased during high frequency transmission.
In this case, change the DIP switch (S8-6) on the DIGI board 06P0288 to ON, referring to "External KP connection" on "2.4 Transceiver Unit" to reduce the effects of cavitation by adjusting the transmission power of the transducer.

APPENDIX 1 JIS CABLE GUIDE

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

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

1. Core Type

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

2. Insulation Type

P: Ethylene Propylene Rubber

3. Sheath Type

Y: PVC (Vinyl)

4. Armor Type

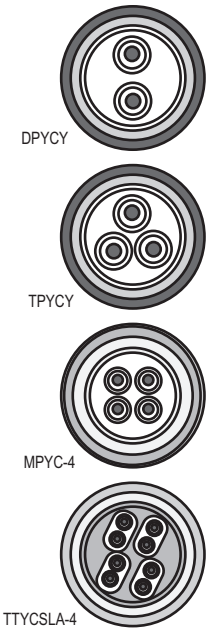
C: Steel

5. Sheath Type

Y: Anticorrosive vinyl sheath

6. Shielding Type

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



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

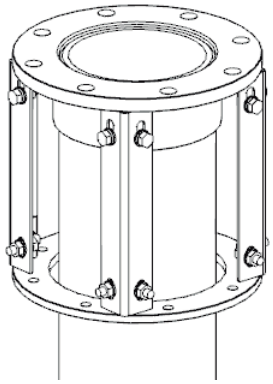
MPYC - 4
(1 2 3 4)
Designation type — # of cores

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

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

APPENDIX 2 HOW TO MAKE THE RETRACTION TANK FOR WOODEN VESSEL

These instructions show how to make the retraction tank for a wooden vessel.

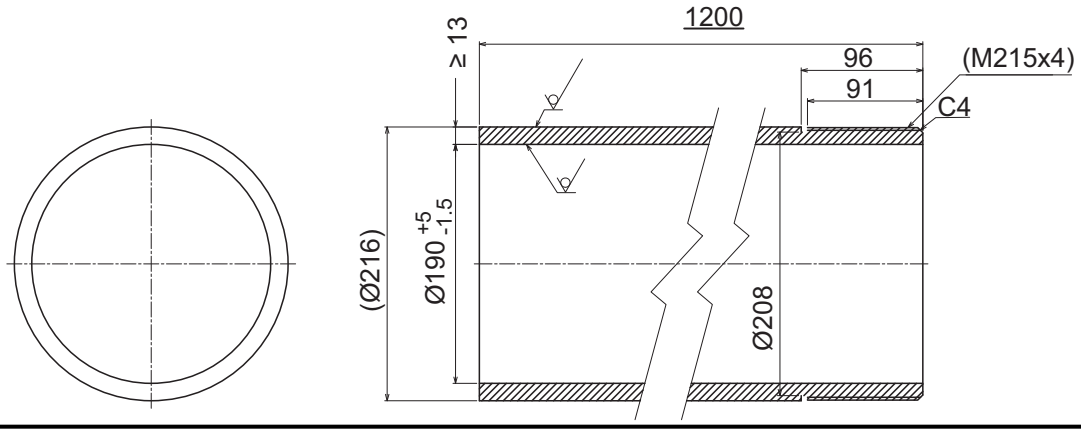


Retraction tank (conceptual drawing)

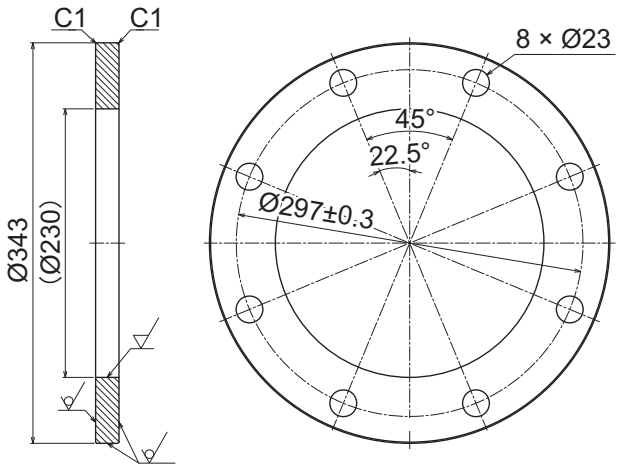
Necessary components for the retraction tank

Prepare the components shown in the table below for the retraction tank. The dimensions in the table are recommended values. Follow the recommended values as near as possible.

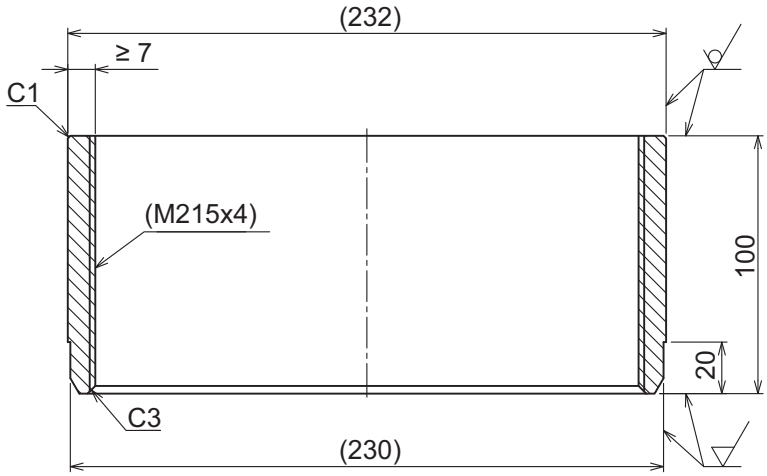
Name	Material	Thickness	Qty	Remarks
PVC pipe	PVC-U	More than 13 mm	1	8inch PN13.5 Inside diameter: 188.5 - 195 mmUse the VP type.Prepare a thread groove that is suitable for the outside diameter.



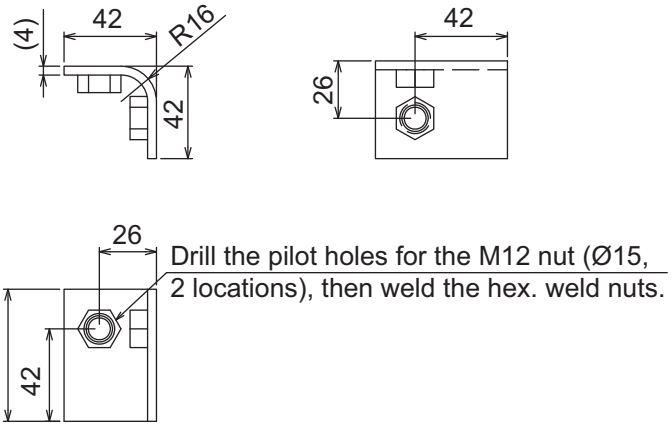
Name	Material	Thickness	Qty	Remarks
Flange-1	SS400	More than 20.0 mm	1	Inside diameter: Same as the outside diameter of the fixing pipe.Outside diameter: 343 mm



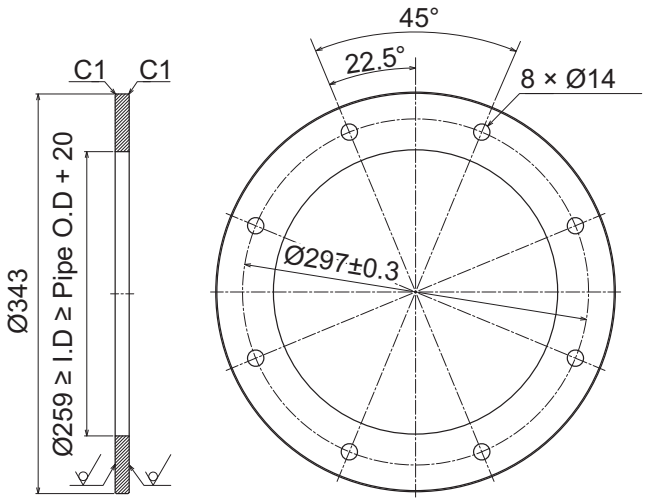
Fixing pipe	SS400	More than 7.0 mm	1	Inside diameter: 10 mm smaller than the outside diameter of the PVC pipe. Prepare a thread groove that is suitable for the thread groove of the PVC pipe.



Angle-1	SUS304-CP	4.0 mm	4	Welded to the flange-1.

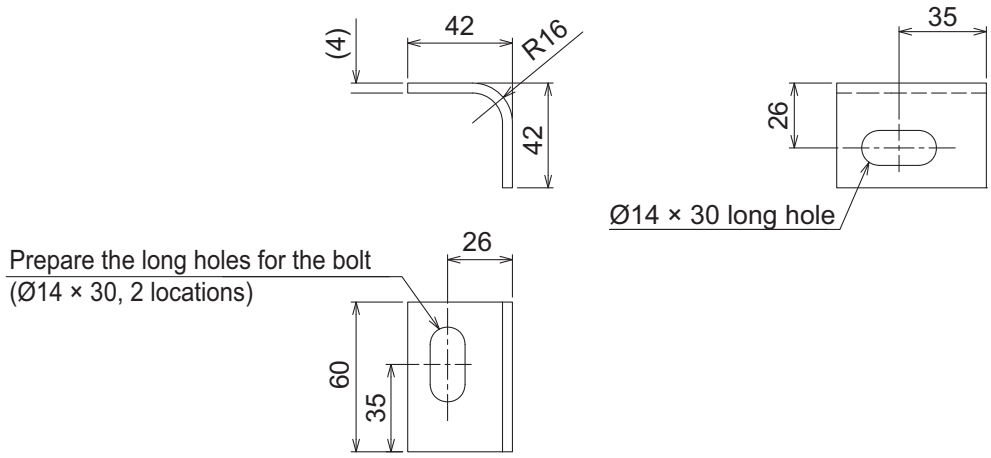


Name	Material	Thickness	Qty	Remarks
Flange-2	SS400	More than 12.0 mm	1	Inside diameter: Max. 259 mm, Min. Pipe O.D + 20 mm Outside diameter: 343 mm

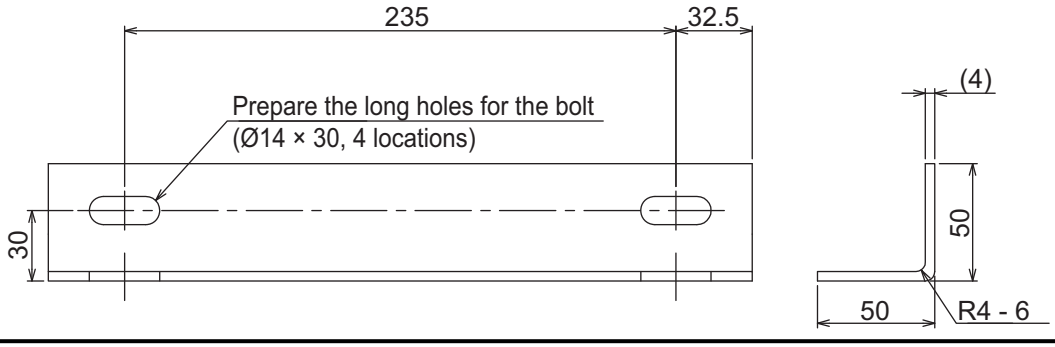


I.D: Inside diamater
Pipe O.D: Outside diameter of the PVC pipe

Angle-2	SUS304-CP	4.0 mm	4	Welded to the flange-2.



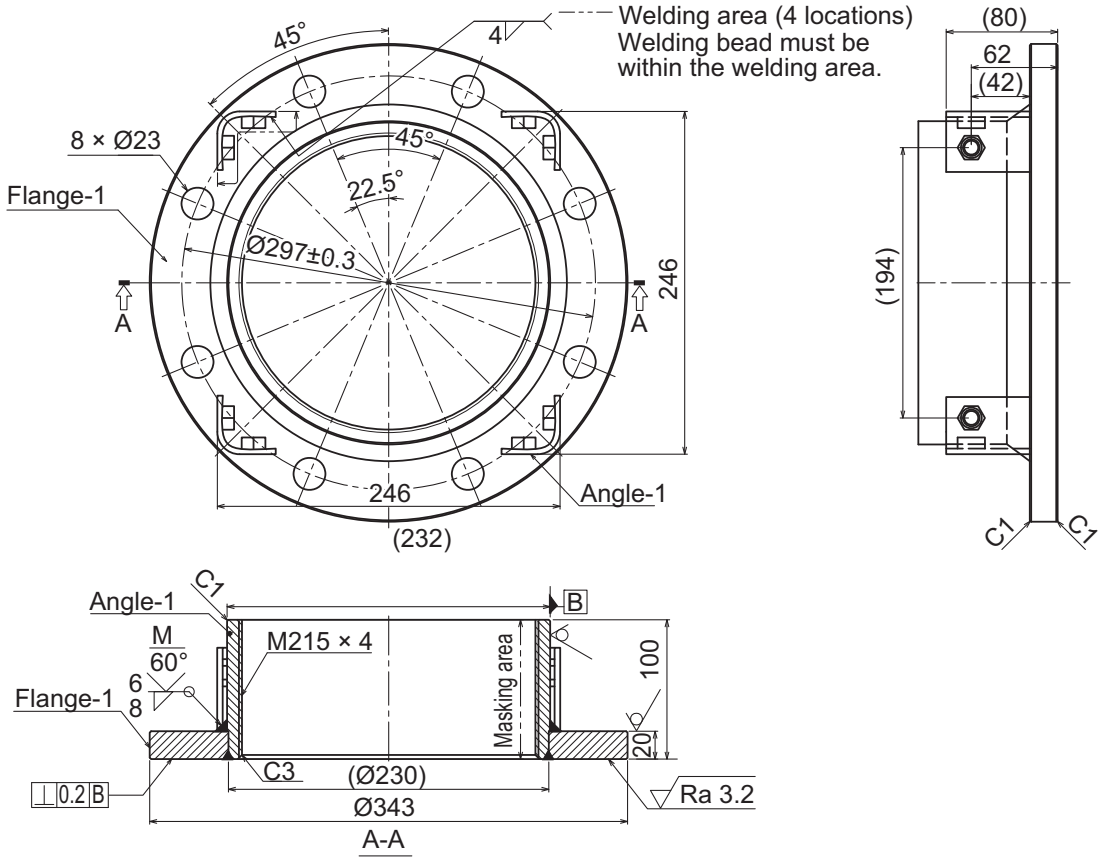
Fixing plate	SUS304-CP	4.0 mm	4	The equal angle iron (L50 × t4.0) is also available.



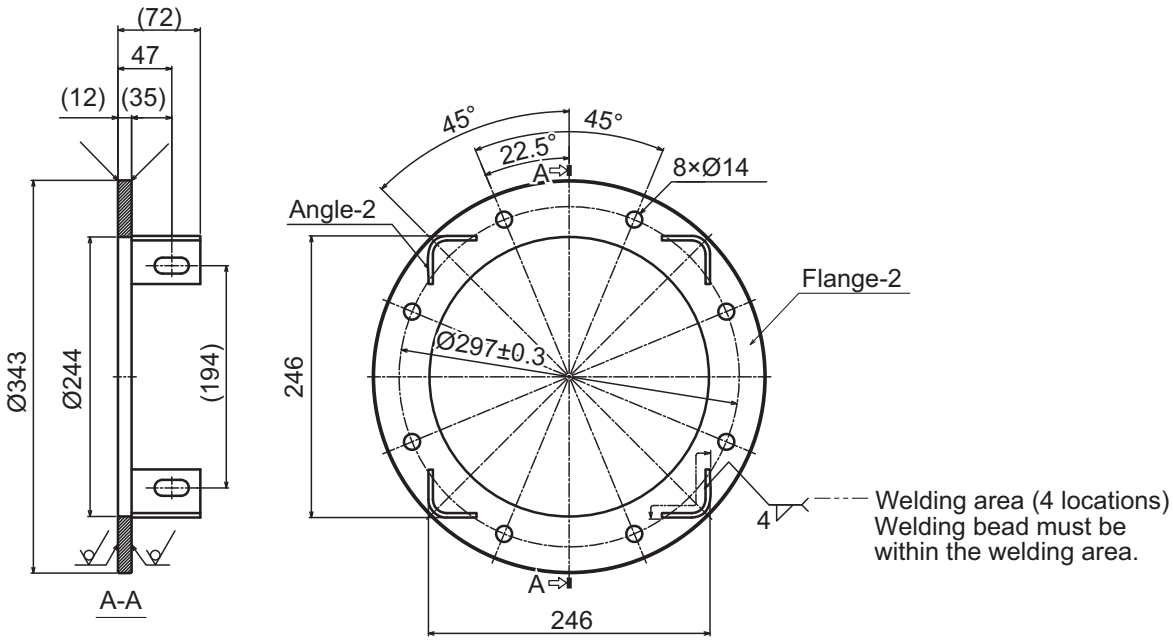
Welding the components

Before assembling the retraction tank, weld the components to create the flange assembly 1 and 2.

- **Flange assembly 1**
  Weld the fixing pipe and four angle-1 to the flange-1. After welding, mask the thread groove of the fixing pipe, then apply anticorrosive coating to the flange assembly 1.



- **Flange assembly 2**
  Weld four angle-2 to the flange-2.

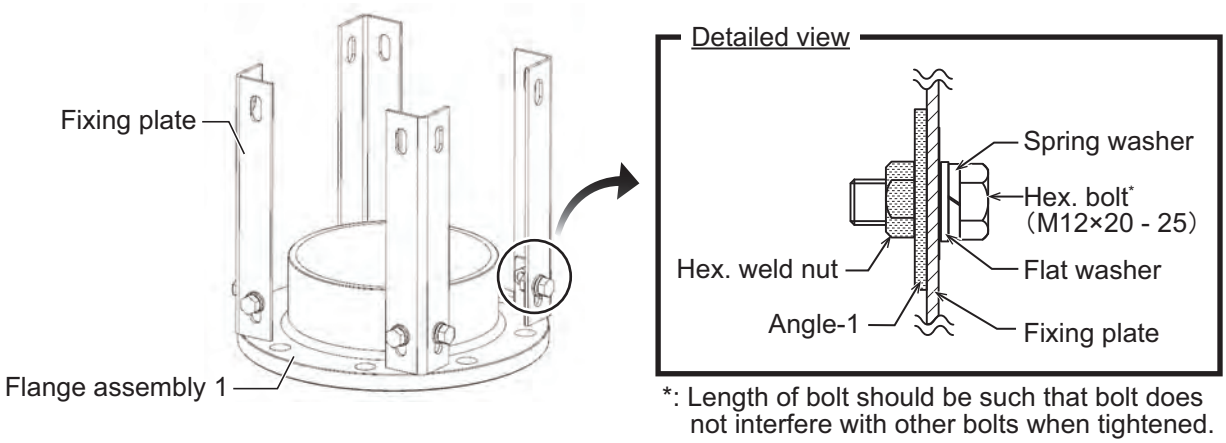


How to assemble the retraction tank

To assemble the retraction tank, prepare the installation materials shown in the following table.

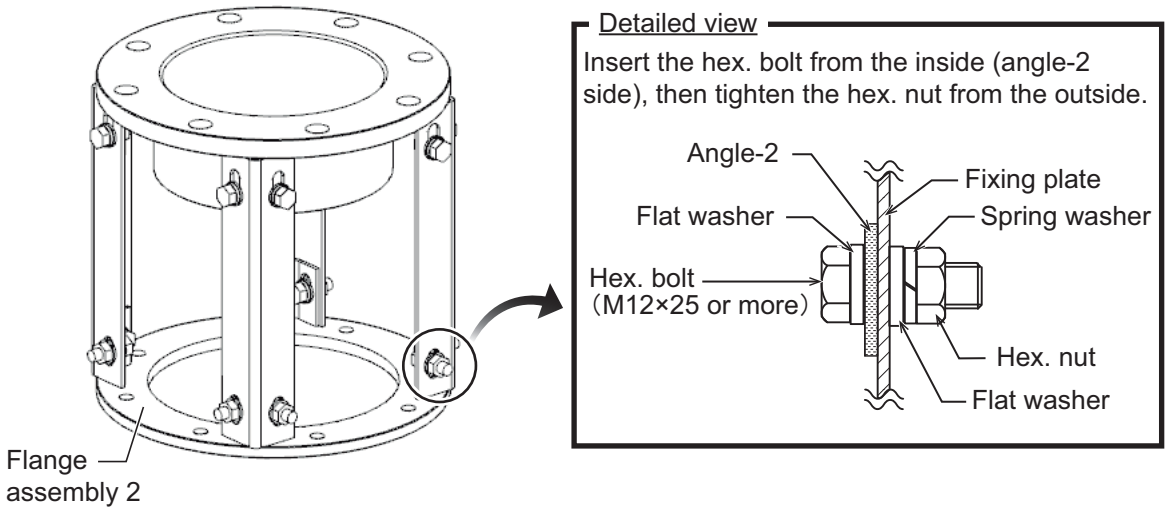
Name	Material	Type	Qty
Hex. Bolt	SUS304	M12×20 - 25	8
	SUS304	M12×25 or more	8
Hex. Nut	SUS304	M12	8
Spring Washer	SUS304	M12	16
Flat Washer	SUS304	M12	24

1. Fix four fixing plates to the flange assembly 1.

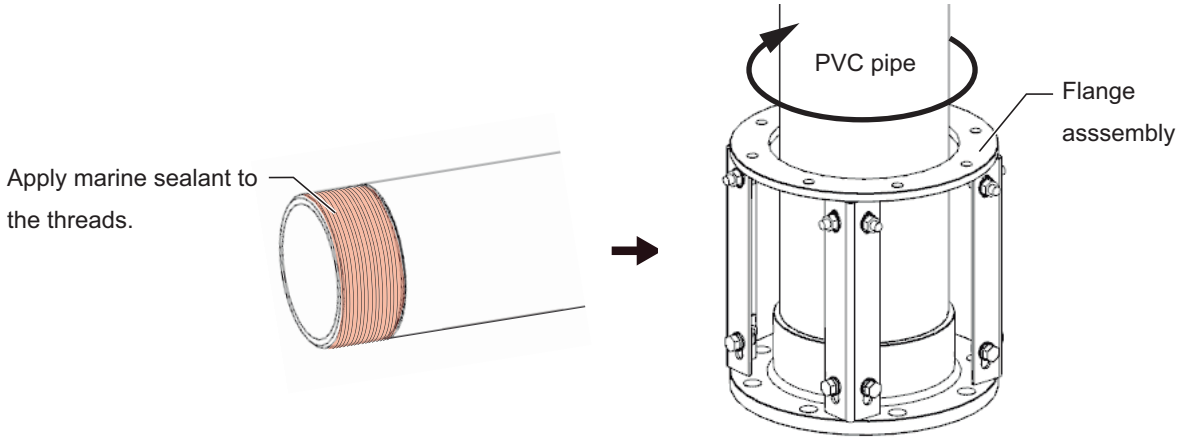


*: Length of bolt should be such that bolt does not interfere with other bolts when tightened.

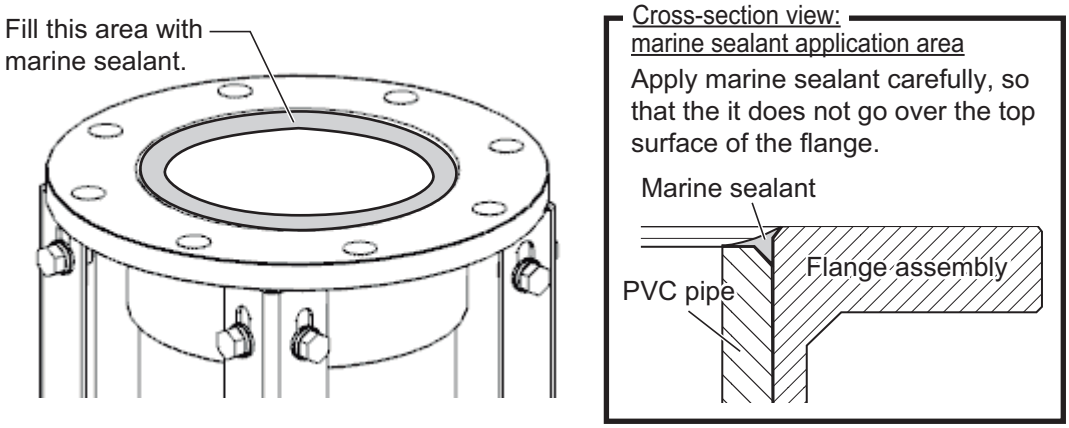
2. Fix the flange assembly 2 to the component assembled at step 1.
   Tighten the bolts temporarily to allow for fine adjustment later.



3. Apply marine sealant to the threads of the PVC pipe, then screw the PVC pipe into the flange assembly.



4. To prevent water from entering at the threads, fill the clearance between the flange assembly and PVC pipe with marine sealant.



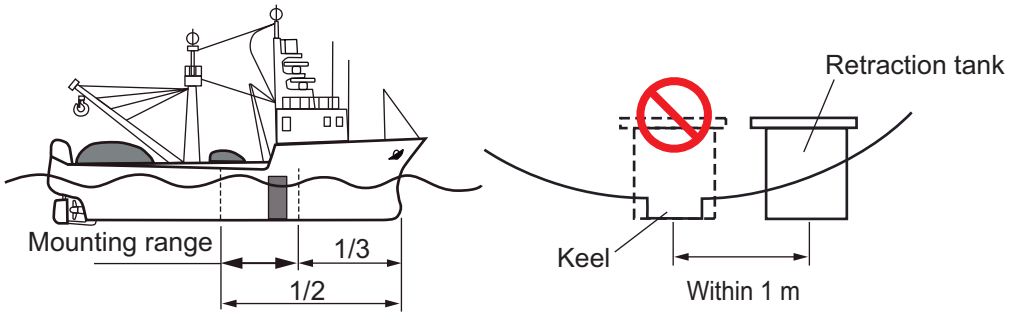
APPENDIX 3 HOW TO INSTALL THE RETRACTION TANK FOR WOODEN VESSEL

Install the retraction tank for wooden vessel (prepared in APPENDIX 2) as shown here.

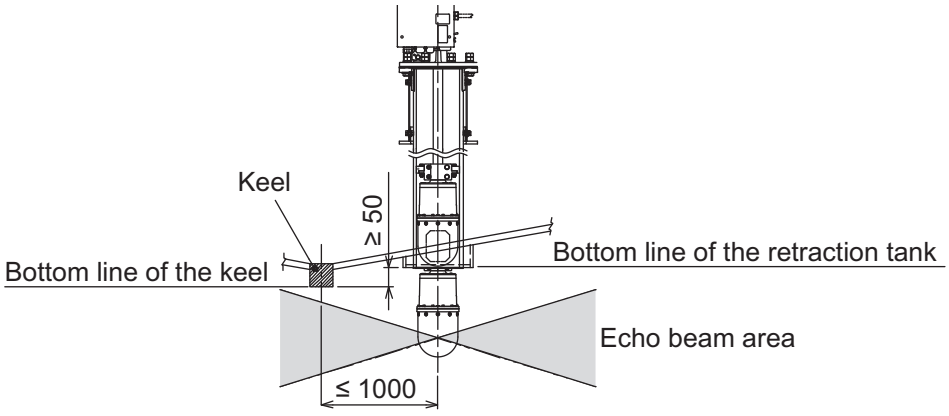
Installation location considerations

Discussion and agreement are required with the dockyard and ship owner in deciding the location for the retraction tank (hull unit). When selecting the installation location, consider the following points:

- **Select an area where the noise and interference are minimal.**
  The point at 1/3 to 1/2 of the ship's length from the bow or near the keel is the best. The center of the retraction tank should be within 1 meter of the keel to prevent a rolling effect.
- **Install the retraction tank off the keel.**
  Do NOT install the retraction tank on the keel and mounting hole for the retraction tank should not be contact with the keel.



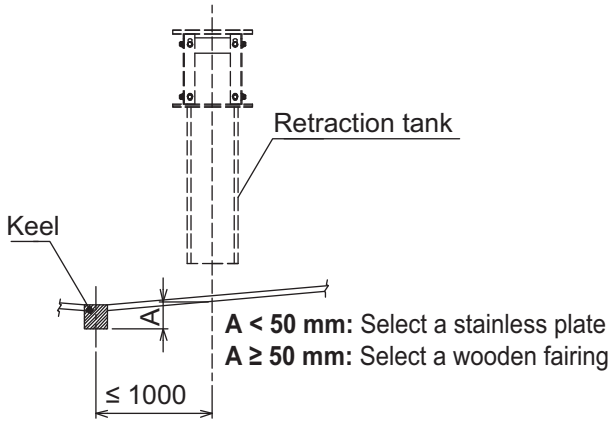
- **Select a place where interference from the transducers of other equipment is minimal.**
  The hull unit should be at least 2.5 meters away from the transducers of other sounding equipment.
- **Select a place where no obstruction should be around the full-lowered transducer.**
  No obstruction should be in the fore direction since it causes a shadow zone and aerated water, resulting in poor sonar performance.
- **The distance between the bottom line of the keel and retraction tank should be 50 mm.**
  When the distance between the bottom line of the keel and retraction tank is more than 50 mm, the echo beam may be interrupted with the keel or other ship's bottom structures.



- **Install a flow rectification component to the hull where the transducer projects.**
  Install a fairing or stainless plate as the flow rectification component. See the next page to select a faring or stainless plate.

Selection of the flow rectification component

According to the vertical distance between the bottom line of the keel and center of the retraction tank, select a fairing or stainless plate as the flow rectification.



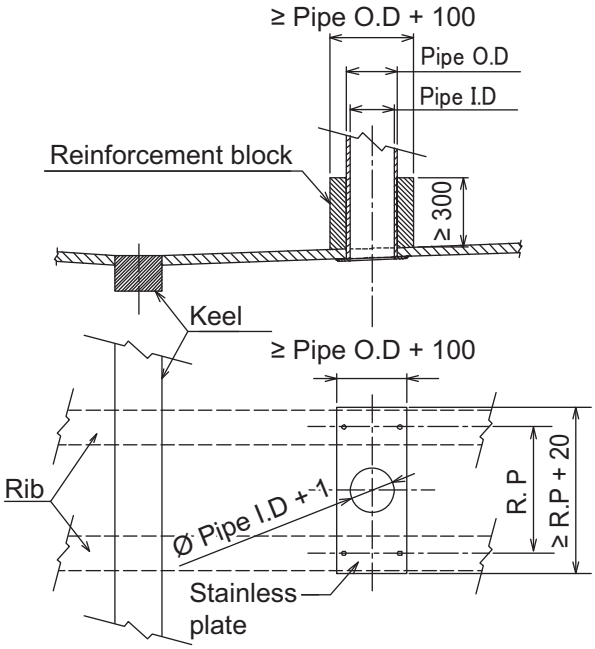
Recommended dimensions for the stainless plate

- Length (bow-stern direction): R. P + 20 mm or more
- Length (both sides direction): Pipe O.D + 100 mm or more
- Thickness (T): 10 mm or more
- Diameter of the hole: Pipe I.D + 1 mm

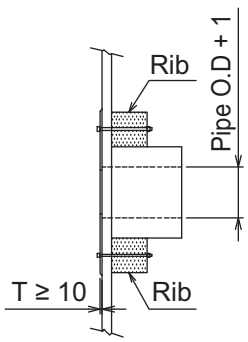
Note: For flat bottom hull, prepare a wooden reinforcement block to decrease the vibration of the retraction tank. The recommended dimensions of the reinforcement block are shown below.

Recommended dimensions for the reinforcement block

- Height: 300 mm or more
- Length (bow-stern direction): Same as the distance between the ribs
- Length (both sides direction): Pipe O.D + 100 mm or more
- Diameter of the hole: Pipe O.D + 1 mm



R.P: Rib pitch
Pipe I.D: Inside diameter of the PVC pipe
Pipe O.D: Outside diameter of the PVC pipe



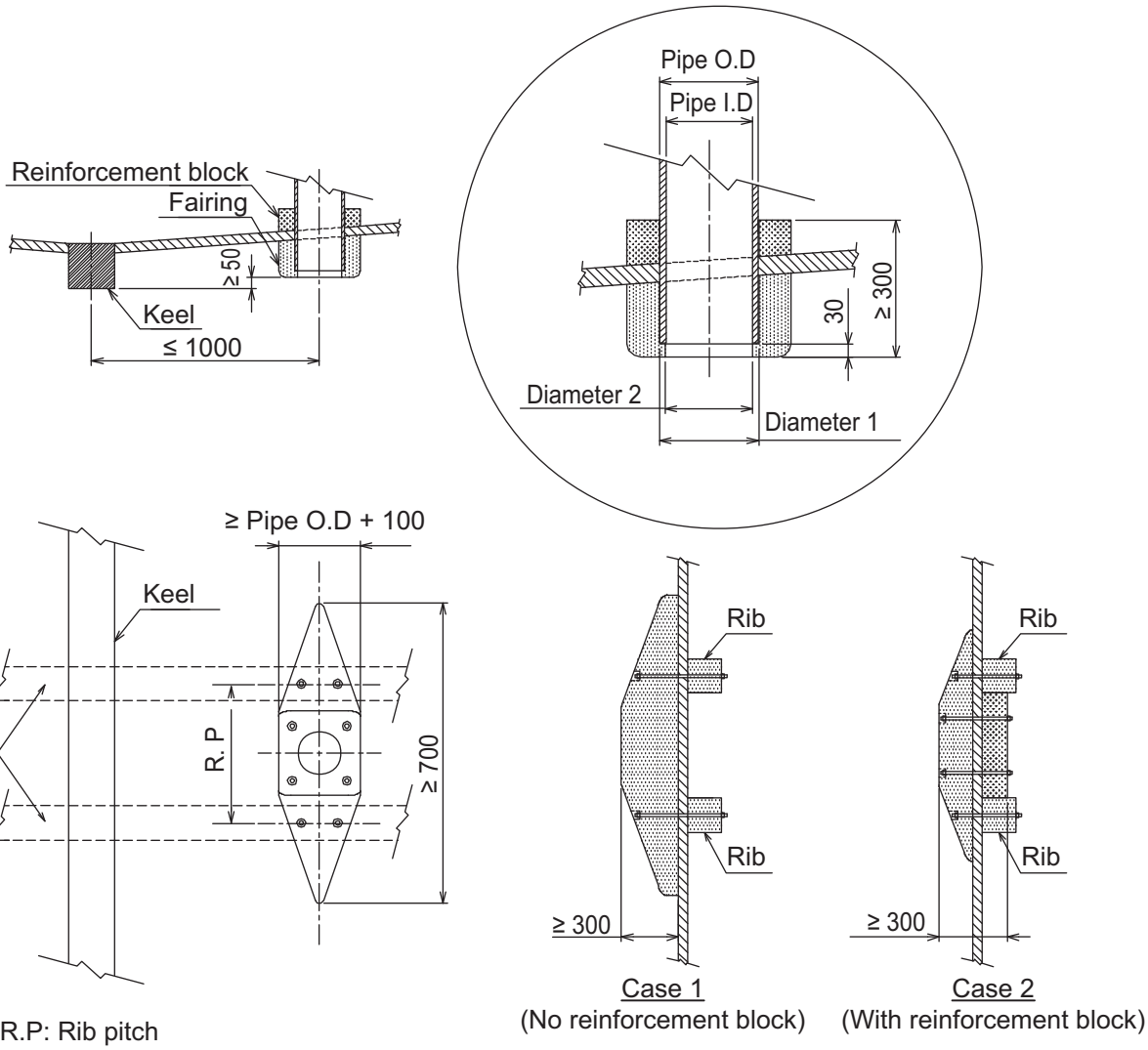
Recommended dimensions for the faring

- Length (bow-stern direction): R. P + 100 mm or more (700 mm or more recommended)
- Length (both sides direction): Pipe O.D + 100 mm or more
- Diameter 1: Pipe O.D + 1 mm
- Diameter 2: Pipe I.D + 1 mm
- Distance between the bottom lines of the fairing and PVC pipe: 30 mm

Note 1: Be sure the fairing does not interfere with the raising or lowering of the transducer.

Note 2: Streamline the fairing to keep water pressure and bubbles minimal.

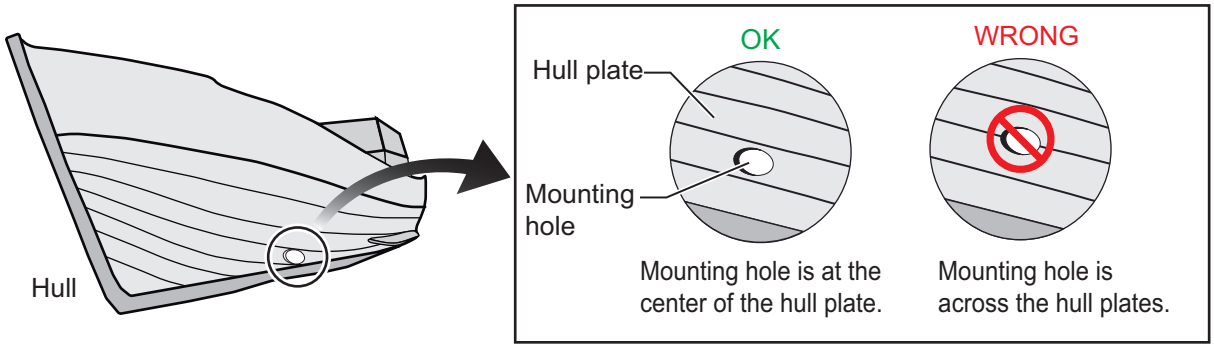
Note 3: If the height of the fairing is less than 300 mm, install a wooden reinforcement block on the inside of the hull.



R.P: Rib pitch
Pipe I.D: Inside diameter of the PVC pipe
Pipe O.D: Outside diameter of the PVC pipe

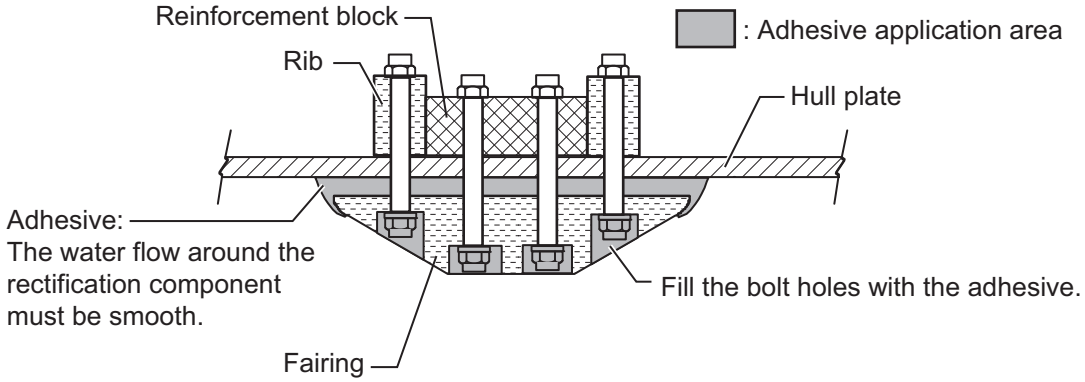
Mounting hole and installation of the flow rectification component

1. Select the installation location referring to "Installation location considerations" on page AP-8.
   For the location of the mounting hole, consider the following points:
   - Make the mounting hole between ribs.
   - The mounting hole should not be across the hull plates of the vessel.

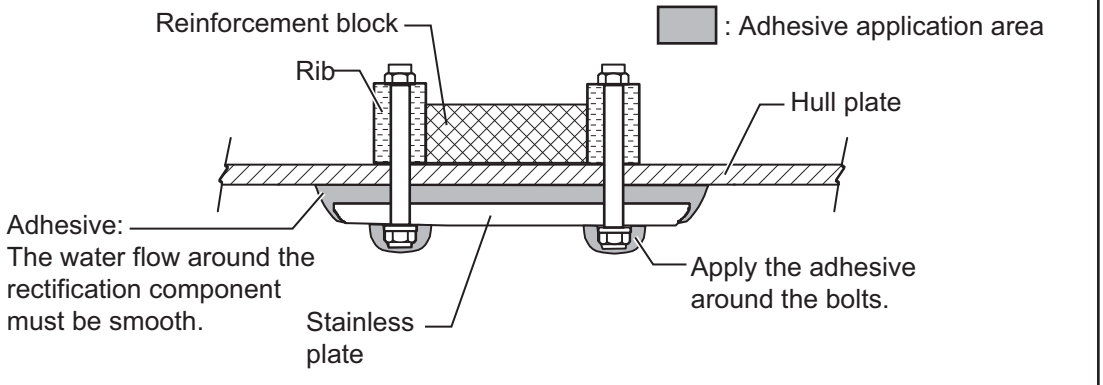


2. Install the flow rectification component (fairing or stainless plate) on the ship's hull.
   Be sure the bolts penetrate through the ribs or wooden reinforcement block.
3. Apply the adhesive to the area between the ship's hull and flow rectification component for waterproofing.
   Apply the adhesive evenly to provide smooth water flow around the flow rectification component.

For the fairing



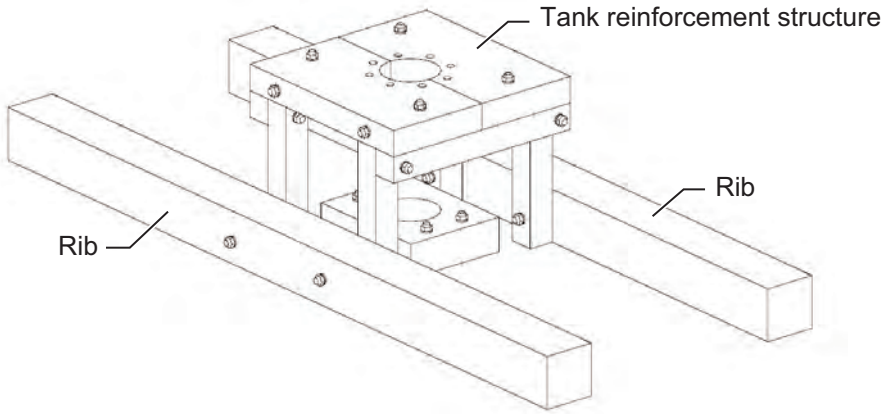
For the stainless plate



4. Open a mounting hole in the hull and flow rectification component perpendicular to the waterline.

Installation of the tank reinforcement structure

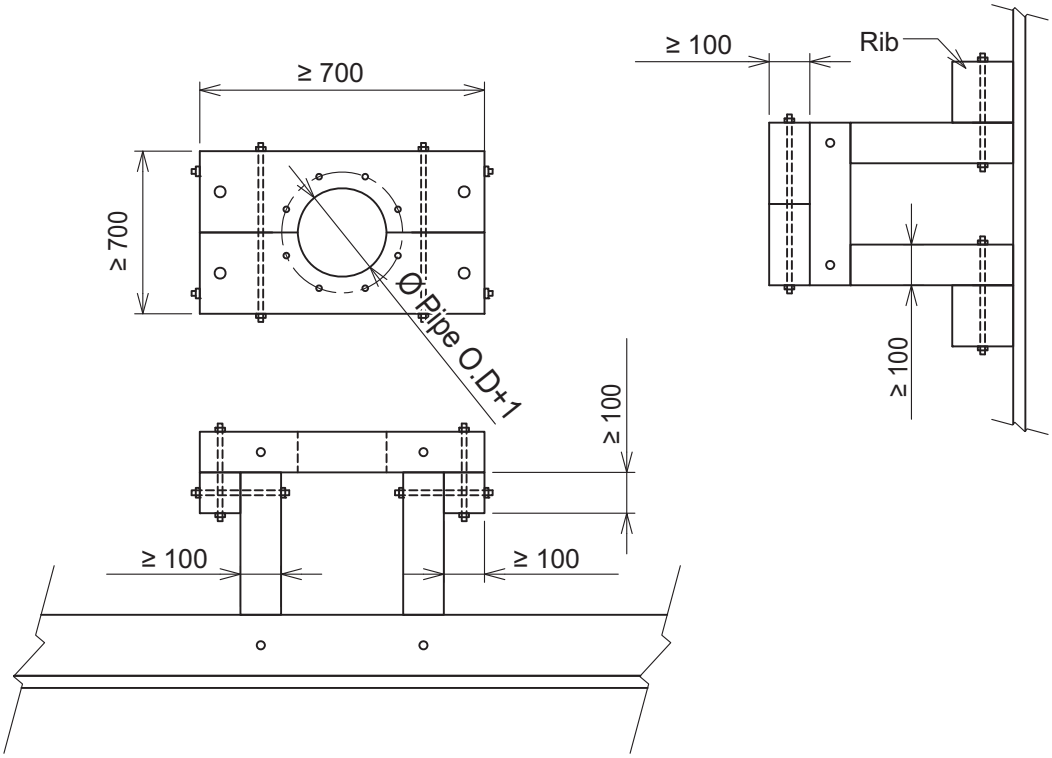
Install the tank reinforcement structure to prevent the retraction tank from coming off and vibrating. Fix the tank reinforcement structure to the ribs or ship's superstructure.



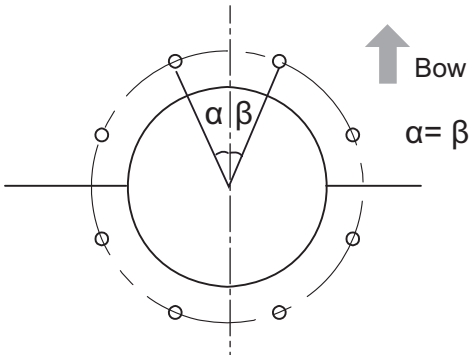
Tank reinforcement structure (conceptual drawing)

Create the tank reinforcement structure considering the structure of the hull. The minimum dimensions of the tank reinforcement structure are shown below. Ensure the reinforcement structure meets the minimum dimensions or better.

To fasten and assemble the tank reinforcement structure, use the M10 (or more) bolts.

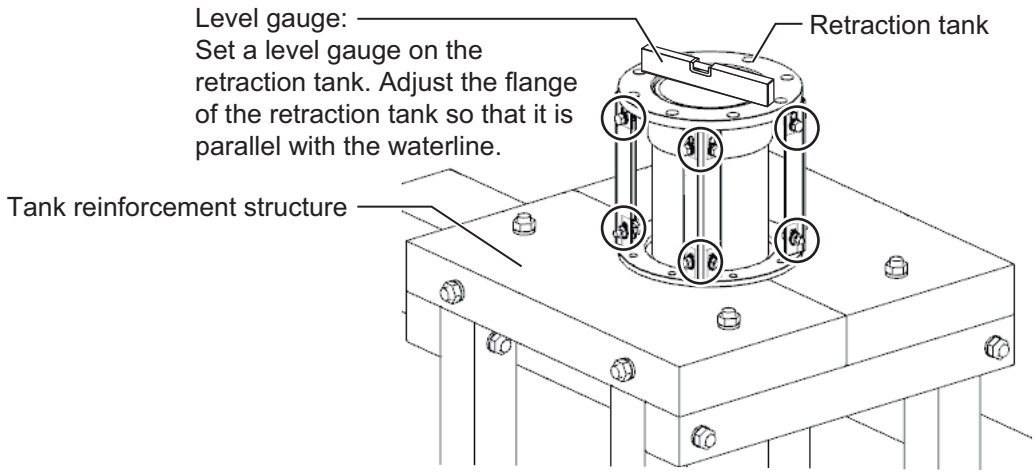


Note: Make the bolt holes for the tank reinforcement structure so that the center of any two bolt holes is facing the ship's bow.

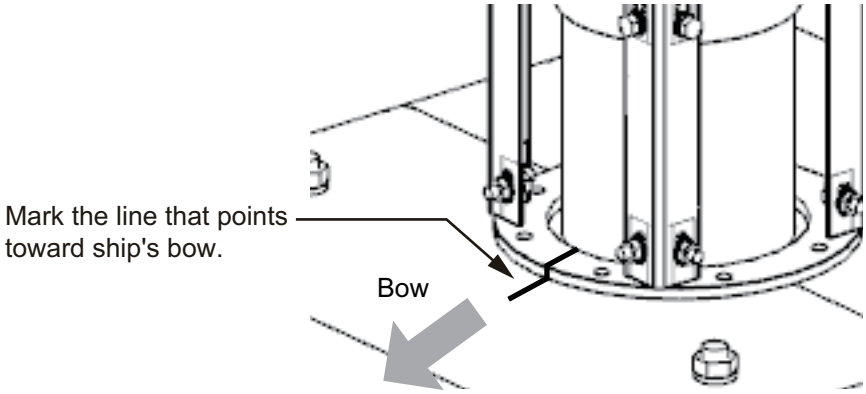


How to install the retraction tank

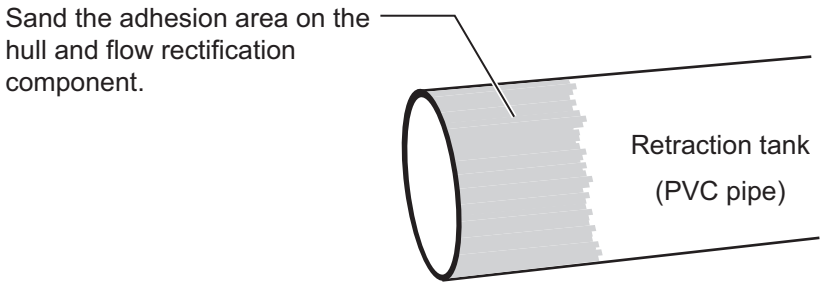
1. Set the retraction tank to the tank reinforcement structure and mounting hole.
2. Loosen the bolts fixing the flange (8 locations, 16 pcs), then adjust the flange of the retraction tank so that it is parallel with the waterline.



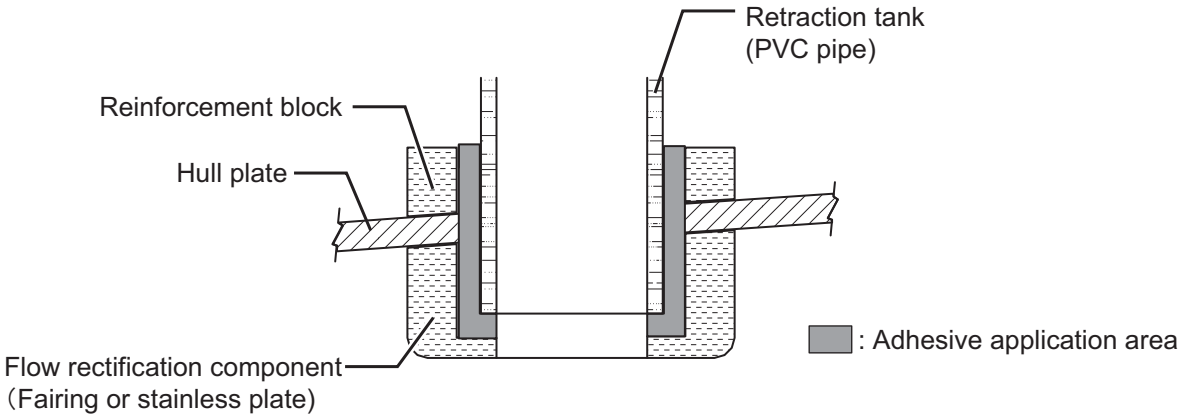
3. Fasten the bolts that are loosened at step 2.
4. Mark a line on the location on the retraction tank and tank reinforcement structure that points toward the ship's bow.



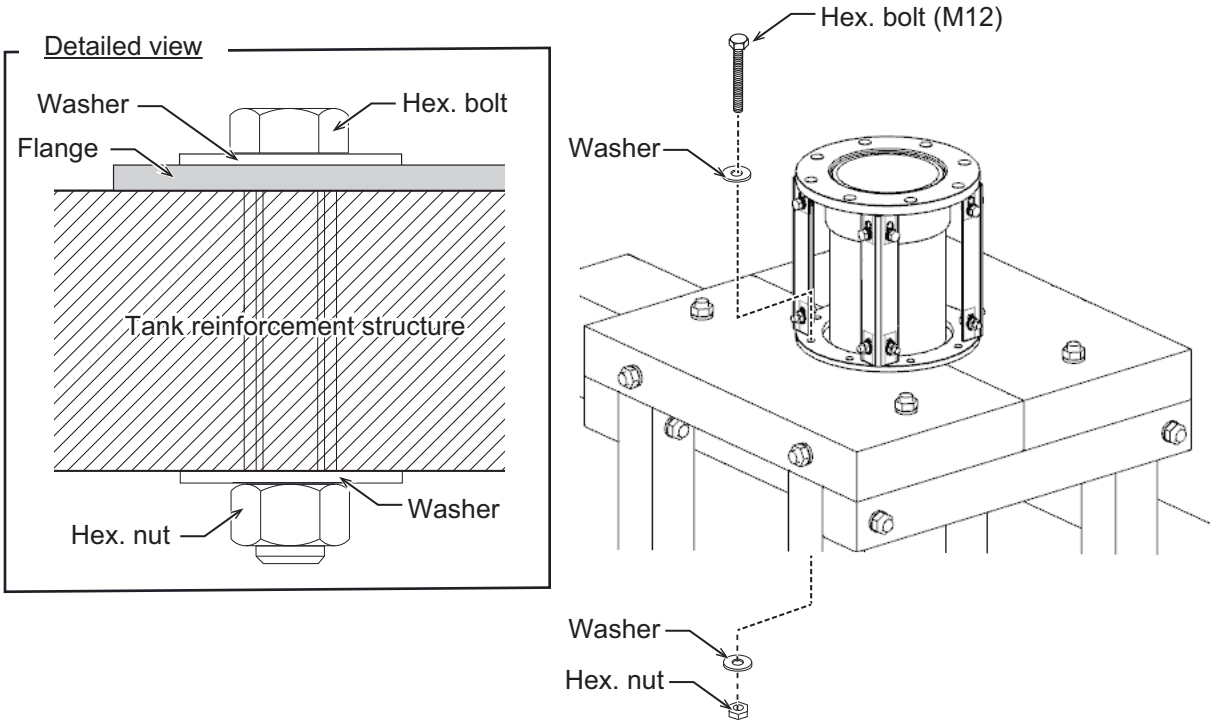
5. Pull out the retraction tank.
6. Sand the retraction tank (PVC pipe) with a grinder to increase adhesion.



7. Use a hair dryer or the like to dry the mounting hole, then apply the adhesive to the contact areas between the retraction tank and mounting hole.
   Apply the adhesive both to the retraction tank and mounting hole.
8. Set the retraction tank to the tank reinforcement structure and mounting hole to align the line marked at step 4.
   After setting the retraction tank, remove the adhesive run over the mounting hole.



9. Fasten the retraction tank to the tank reinforcement structure with eight hex. bolts (M12).



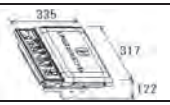
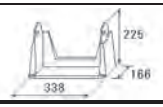
10. Confirm that the flange of the retraction tank is parallel with the waterline.

PACKING LIST

06AY-X-9851 -0 1/1

CH-502/MU-121C

A-1

NAME	OUTLINE	DESCRIPTION/CODE No.	Q'TY
ユニット UNIT			
操作/表示部 CONTROL/DISPLAY UNIT		CH-502/MU-121C-* 000-033-445-00 **	1
付属品 ACCESSORIES			
ﾊﾝｶﾞｰ組品 BRACKET ASSEMBLY		FP06-01901 001-476-930-00	1
付属品 ACCESSORIES		FP06-01902 001-476-920-00	1
工事材料 INSTALLATION MATERIALS			
ｹｰﾌﾞﾙ(ｸﾐﾋﾝ)MJ CABLE ASSEMBLY		MJ-A10SPF0002-0020+ 000-191-482-10	1
工事材料 INSTALLATION MATERIALS		CP06-02101 001-461-210-00	1

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

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

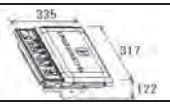
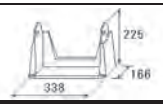
C1354-Z01-A

PACKING LIST

06AZ-X-9851 -0 1/1

CH-602/MU-121C

A-2

NAME	OUTLINE	DESCRIPTION/CODE No.	Q'TY
ユニット UNIT			
操作/表示部 CONTROL/DISPLAY UNIT		CH-602/MU-121C-* 000-034-669-00 **	1
付属品 ACCESSORIES			
ﾊﾝｶﾞｰ組品 BRACKET ASSEMBLY		FP06-01901 001-476-930-00	1
付属品 ACCESSORIES		FP06-01902 001-476-920-00	1
工事材料 INSTALLATION MATERIALS			
ｹｰﾌﾞﾙ(ｸﾐﾋﾝ)MJ CABLE ASSEMBLY		MJ-A10SPF0002-0020+ 000-191-482-10	1
工事材料 INSTALLATION MATERIALS		CP06-02101 001-461-210-00	1

ｺｰﾄﾞ番号末尾の[**]は、選択品の代表ｺｰﾄﾞを表します。
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(略図の寸法は、参考値です。 DIMENSIONS IN DRAWING FOR REFERENCE ONLY.)

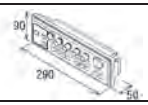
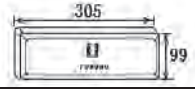
C1355-Z01-A

PACKING LIST

06AY-X-9852 -0 1/1

CH-502

A-3

NAME	OUTLINE	DESCRIPTION/CODE No.	Q'TY
ユニット UNIT			
操作部 CONTROL UNIT		CH-502-* 000-033-447-00 **	1
付属品 ACCESSORIES			
ﾊｰﾄﾞｶﾊﾞｰ DISPLAY COVER		06-021-2121-1 ROHS 100-320-101-10	1

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

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

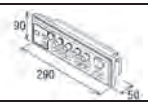
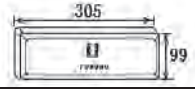
C1354-Z02-A

PACKING LIST

06AZ-X-9852 -0 1/1

CH-602

A-4

NAME	OUTLINE	DESCRIPTION/CODE No.	Q'TY
ユニット UNIT			
操作部 CONTROL UNIT		CH-602-* 000-034-670-00 **	1
付属品 ACCESSORIES			
ﾊｰﾄﾞｶﾊﾞｰ DISPLAY COVER		06-021-2121-1 ROHS 100-320-101-10	1

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

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

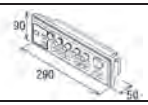
C1355-Z02-A

PACKING LIST

06AY-X-9853 -1 1/1

CH-502-E-5

A-5

NAME	OUTLINE	DESCRIPTION/CODE No.	Q'TY
ユニット UNIT			
操作部 CONTROL UNIT		CH-502-E 000-033-448-00	1
付属品 ACCESSORIES			
ﾊｰﾄﾞｶﾊﾞｰ DISPLAY COVER		06-021-2121-1 ROHS 100-320-101-10	1
付属品 TABLETOP MOUNT KIT(CTRL)		FP06-01601 001-458-100-00	1
工事材料 INSTALLATION MATERIALS			
ｹｰﾌﾞﾙ(ｸﾐﾋﾝ) CBL B/W TRX AND CTRL		MJ-A10SPF0022-050+ 001-471-540-00	1

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

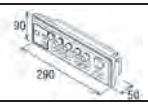
C1354-Z03-B

PACKING LIST

06AZ-X-9853 -0 1/1

CH-602-E-5

A-6

NAME	OUTLINE	DESCRIPTION/CODE No.	Q'TY
ユニット UNIT			
操作部 CONTROL UNIT		CH-602-E 000-034-671-00	1
付属品 ACCESSORIES			
ﾊｰﾄﾞｶﾊﾞｰ DISPLAY COVER		06-021-2121-1 ROHS 100-320-101-10	1
付属品 TABLETOP MOUNT KIT(CTRL)		FP06-01601 001-458-100-00	1
工事材料 INSTALLATION MATERIALS			
ｹｰﾌﾞﾙ(ｸﾐﾋﾝ) CBL B/W TRX AND CTRL		MJ-A10SPF0022-050+ 001-471-540-00	1

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

C1355-Z03-A

PACKING LIST

06AY-X-9854 -0 1/1

MU-121C

A-7

NAME	OUTLINE	DESCRIPTION/CODE No.	Q'TY
ユニット UNIT			
表示部 DISPLAY UNIT		MU-121C 000-032-353-00	1
付属品 ACCESSORIES			
ﾊｰﾄﾞｶﾊﾞｰ HARD COVER		06-027-1503-1 100-409-381-10	1

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

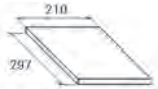
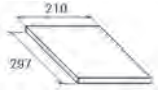
C1354-Z04-A

PACKING LIST

06AY-X-9855 -0 1/1

CH-503

A-8

NAME	OUTLINE	DESCRIPTION/CODE No.	Q'TY
ユニット UNIT			
送受信装置 TRANSCEIVER UNIT		CH-503-* 000-030-335-00 **	1
予備品 SPARE PARTS			
予備品 SPARE PARTS		SP06-01601 001-456-120-00	1
工事材料 INSTALLATION MATERIALS			
工事材料 INSTALLATION MATERIALS		CP06-02301 001-456-130-00	1
図書 DOCUMENT			
取扱説明書 OPERATOR'S MANUAL		OM*-13540-* 000-192-207-1*	1
装備要領書 INSTALLATION MANUAL		IM*-13540-* 000-192-210-1*	1

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

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

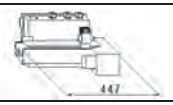
C1354-Z05-A

PACKING LIST

06AY-X-9857 -0 1/1

CH-5051

A-9

NAME	OUTLINE	DESCRIPTION/CODE No.	Q'TY
ユニット UNIT			
上下動部 RAISE/LOWER DRIVE UNIT		CH-5051-1* 001-457-530-00 **	1
予備品 SPARE PARTS			
予備品 SPARE PARTS		SP06-01701 001-456-490-00 (*1)	1
予備品 SPARE PARTS		SP06-01702 001-478-140-00 (*1)	1
工事材料 INSTALLATION MATERIALS			
工事材料 INSTALLATION MATERIALS		CP06-02501 001-468-920-00	1

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

(*1):上下動部の仕様により選択。24VDCはSP06-01701、12VDCはSP06-01702。
(*1):SELECT ONE ACCORDING TO RAISE/LOWER DRIVE UNIT'S SPECIFICATIONS:
SP06-01701 FOR 24VDC OR SP06-01702 FOR 12VDC

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

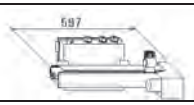
C1354-Z07-A

PACKING LIST

06AY-X-9856 -0 1/1

CH-5041

A-10

NAME	OUTLINE	DESCRIPTION/CODE No.	Q'TY
ユニット UNIT			
上下動部 RAISE/LOWER DRIVE UNIT		CH-5041-* 001-456-190-00 **	1
予備品 SPARE PARTS			
予備品 SPARE PARTS		SP06-01701 001-456-490-00 (*1)	1
予備品 SPARE PARTS		SP06-01702 001-478-140-00 (*1)	1
工事材料 INSTALLATION MATERIALS			
工事材料 INSTALLATION MATERIALS		CP06-02501 001-468-920-00	1

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

(*1):上下動部の仕様により選択。24VDCはSP06-01701、12VDCはSP06-01702。
(*1) : SELECT ONE ACCORDING TO RAISE/LOWER DRIVE UNIT'S SPECIFICATIONS :
SP06-01701 FOR 24VDC OR SP06-01702 FOR 12VDC

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

C1354-Z06-A

PACKING LIST

06AY-X-9858 -0 1/1

CH-5048

A-11

NAME	OUTLINE	DESCRIPTION/CODE No.	Q'TY
ユニット UNIT			
旋回俯仰部 COMPLETE SOUNDOME ASSEMBLY		CH-5048-＊ 001-457-740-00 ＊＊	1

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

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

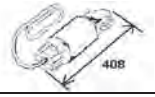
C1354-Z08-A

PACKING LIST

06AY-X-9862 -0 1/1

CH-5046

A-12

NAME	OUTLINE	DESCRIPTION/CODE No.	Q'TY
ユニット UNIT			
旋回俯仰部 COMPLETE SOUNDOME ASSEMBLY		CH-5046-＊ 001-457-820-00 (＊＊)	1

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.

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

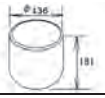
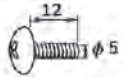
C1354-Z12-A

PACKING LIST

06AY-X-9863 -1 1/1

CH-5046

A-13

NAME	OUTLINE	DESCRIPTION/CODE No.	Q'TY
ユニット UNIT			
ﾄﾞｰﾑ(D) LOWER SOUNDOME ASSEMBLY		CH-1813 006-541-410-00	1
工事材料 INSTALLATION MATERIALS			
+ﾄﾗｽｺﾈｼﾞ TRUSS HEAD SCREW		M5X12 SUS316L 000-192-635-10	8
ﾄﾞｰﾑ抜き用当て板 ATTACHMENT PLATE		06-013-2701-1 ROHS 100-099-170-10	2

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

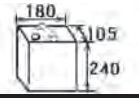
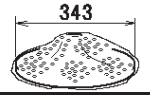
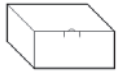
C1354-Z13-B

PACKING LIST

06AY-X-9859 -0 1/1

CH-5081 ,CH-5082

A-14

NAME	OUTLINE	DESCRIPTION/CODE No.	Q'TY
現地組部品 LOCAL ASSEMBLING PARTS			
ｿﾅｰｵｲﾙ SONAR OIL		4ﾘｯﾄﾙｶﾝ 000-824-033-10	1
ﾌﾗﾝｼﾞ MAIN BODY FLANGE ASSEMBLY		CH-5081/5082 001-461-240-00	1
現地組立ｾｯﾄ HULL UNIT ASSEMBLY PARTS		CH-508*-* 001-461-260-00 **	1

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

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

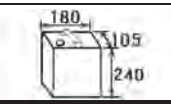
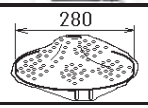
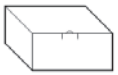
C1354-Z09-A

PACKING LIST

06AY-X-9860 -0 1/1

CH-5061 , CH-5062

A-15

NAME	OUTLINE	DESCRIPTION/CODE No.	Q'TY
現地組部品 LOCAL ASSEMBLING PARTS			
ｿﾅｰｵｲﾙ SONAR OIL		4ﾘｯﾄﾙｶﾝ 000-824-033-10	1
ﾌﾗﾝｼﾞ MAIN BODY FLANGE ASSEMBLY		CH-5061/5062 001-461-250-00	1
現地組立ｾｯﾄ HULL UNIT ASSEMBLY PARTS		CH-506*-* 001-461-300-00 **	1

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

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

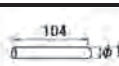
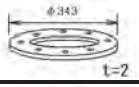
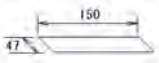
C1354-Z10-A

A-16

FURUNO

CODE NO.	001-461-240-00	06AY-X-9404 -1
TYPE	CH-5081/5082	1/1

ﾌﾗﾝｼﾞ組部品
FLANGE 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	架台載台 BENCH SURPORT		06-021-4020-3 CODE NO. 100-280-373-10	1	
2	ﾄﾗﾆｵﾝﾋﾟﾝ TRUNNION PIN		06-021-4022-2 ROHS CODE NO. 100-280-392-10	1	
3	ｸﾞﾘｽｺｯﾄﾝ押え台 GREASE COTTON COVER		06-021-4025-0 ROHS CODE NO. 100-330-630-10	1	
4	ﾌﾗﾝｼﾞﾌﾞｯｼｭ FLANGE BUSH		80F-1615 CODE NO. 000-166-569-10	2	
5	Oﾘﾝｸﾞ O-RING		AS568-228 CODE NO. 000-172-226-10	1	
6	Oﾘﾝｸﾞ(P) O-RING(P)		CO 0041A(P42) CODE NO. 000-166-368-10	1	
7	ﾌﾗﾝｼﾞﾊﾟｯｷﾝ GASKET		SHJ-0009-1 ROHS CODE NO. 661-000-091-10	1	
8	ｸﾞﾘｽｺｯﾄﾝﾊﾘﾏｰｸ GREASE COTTON SEAL		SHN-0023-0 CODE NO. 661-400-230-10	1	
9	ｸﾞﾗﾝﾄﾞﾊﾟｯｷﾝ GLAND PACKING		V8133L 9.5ｶｸ *0.6M* CODE NO. 000-192-198-10	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.）

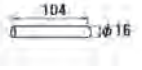
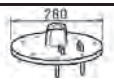
FURUNO ELECTRIC CO . . LTD.

C1354-M04-B

FURUNO

CODE NO.	001-461-250-00	06AY-X-9405 -0
TYPE	CH-5061/5062	1/1

ﾌﾗﾝｼﾞ組部品
FLANGE 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	ﾌﾗﾝｼﾞﾊﾟｯｷﾝ GASKET		06-013-2303-1 ROHS CODE NO. 100-098-711-10	1	
2	ｸﾞﾘｽｺｯﾄﾝﾊﾘﾏｰｸ GREASE COTTON SEAL		06-013-2304-0 ROHS CODE NO. 100-098-720-10	1	
3	ﾄﾗﾆｵﾝﾋﾟﾝ TRUNNION PIN		06-021-4022-2 ROHS CODE NO. 100-280-392-10	1	
4	ｸﾞﾘｽｺｯﾄﾝ押え台 GREASE COTTON COVER		06-021-4025-0 ROHS CODE NO. 100-330-630-10	1	
5	架台載台 MAIN BODY FLANGE		06-027-4521-1 CODE NO. 100-409-731-10	1	
6	ﾌﾗﾝｼﾞﾌﾞｯｼｭ FLANGE BUSH		80F-1615 CODE NO. 000-166-569-10	2	
7	Oﾘﾝｸﾞ O-RING		AS568-228 CODE NO. 000-172-226-10	1	
8	Oﾘﾝｸﾞ(P) O-RING(P)		CO 0041A(P42) CODE NO. 000-166-368-10	1	
9	ｸﾞﾗﾝﾄﾞﾊﾟｯｷﾝ GLAND PACKING		V8133L 9.5ｶｸ *0.6M* CODE NO. 000-192-198-10	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.	001-461-210-00	06AY-X-9403 -1
TYPE	CP06-02101	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	+ﾄﾗｽﾀｯﾋﾟﾝﾈｼﾞ 1ｼｭ SELF-TAPPING SCREW		5X20 SUS304 CODE NO. 000-162-608-10	4	

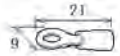
（略図の寸法は、参考値です。 DIMENSIONS IN DRAWING FOR REFERENCE ONLY.）

FURUNO

CODE NO.	001-456-130-00	06AY-X-9401 -0
TYPE	CP06-02301	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	+ﾄﾗｽﾀｯﾋﾟﾝﾈｼﾞ 1ｼｭ SELF-TAPPING SCREW		5X20 SUS304 CODE NO. 000-162-609-10	4	
2	圧着端子 CRIMP-ON LUG		FV2-4 BLU CODE NO. 000-157-247-10	2	

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

FURUNO ELECTRIC CO ., LTD.

C1354-M02-A

FURUNO

CODE NO.		06AY-X-9417 -1
TYPE		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	ｹｰﾌﾞﾙ(ｸﾐﾋﾝ)HDMI CABLE ASSEMBLY		FRU-HDMI-5M-AS CODE NO. 001-471-490-00	1	選択 表示部－送受信装置用 TO BE SELECTED FOR DISPLAY UNIT-TRANSCEIVER UNIT
2	ｹｰﾌﾞﾙ(ｸﾐﾋﾝ)HDMI CABLE ASSEMBLY		FRU-HDMI-10M-AS CODE NO. 001-471-500-00	1	選択 表示部－送受信装置用 TO BE SELECTED FOR DISPLAY UNIT-TRANSCEIVER UNIT
3	ｹｰﾌﾞﾙ(ｸﾐﾋﾝ) CABLE ASSEMBLY		FRU-CCCAF18-05M-B CODE NO. 001-471-470-00	1	選択 表示部－送受信装置用 TO BE SELECTED FOR DISPLAY UNIT-TRANSCEIVER UNIT
4	ｹｰﾌﾞﾙ(ｸﾐﾋﾝ) CABLE ASSEMBLY		FRU-CCCAF18-10M-B CODE NO. 001-471-480-00	1	選択 表示部－送受信装置用 TO BE SELECTED FOR DISPLAY UNIT-TRANSCEIVER UNIT
5	ｹｰﾌﾞﾙ(ｸﾐﾋﾝ) CBL B/W TRX AND HULL		FRU-WH-A-15M CODE NO. 001-471-510-00	1	選択 送受信装置－上下動部用 TO BE SELECTED FOR TRANSCEIVER-RAISE/LOWER DRIVE
6	ｹｰﾌﾞﾙ(ｸﾐﾋﾝ) CBL B/W TRX AND HULL		FRU-WH-A-30M CODE NO. 001-471-520-00	1	選択 送受信装置－上下動部用 TO BE SELECTED FOR TRANSCEIVER-RAISE/LOWER DRIVE
7	ｹｰﾌﾞﾙ(ｸﾐﾋﾝ) CBL B/W TRX AND HULL		FRU-WH-A-50M CODE NO. 001-471-530-00	1	選択 送受信装置－上下動部用 TO BE SELECTED FOR TRANSCEIVER-RAISE/LOWER DRIVE

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

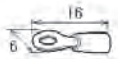
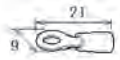
FURUNO ELECTRIC CO ., LTD.

C1354-M17-B

FURUNO

CODE NO.	001-468-920-00	06AY-X-9402 -0
TYPE	CP06-02501	1/1

工事材料表
INSTALLATION MATERIALS

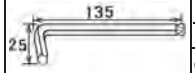
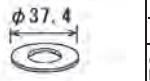
番号 NO.	名称 NAME	略図 OUTLINE	型名／規格 DESCRIPTIONS	数量 Q'TY	用途／備考 REMARKS
1	圧着端子 CRIMP-ON LUG		FV1.25-3(LF) RED CODE NO. 000-166-756-10	1	
2	圧着端子 CRIMP-ON LUG		FV2-4 BLU CODE NO. 000-157-247-10	2	

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

FURUNO

CODE NO.	001-461-270-00	06AY-X-9406 -2
TYPE	CH-5081-N	1/2

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	ﾎﾞｰﾙﾚﾝﾁ BALL WRENCH		TWB-40 CODE NO. 000-162-561-10	1	
2	ﾀﾝｸｶﾞｲﾄﾞ組品 TANKGUIDE ASSEMBLY		CH-5081/82 CODE NO. 001-473-920-00	1	
3	六角ﾎﾞﾙﾄ HEX.BOLT		M10X35 SUS304 CODE NO. 000-162-786-10	2	
4	ﾐｶﾞｷ平座金 FLAT WASHER		M10 SUS304 CODE NO. 000-167-232-10	4	
5	Uﾅｯﾄ U-NUT		M10 SUS CODE NO. 000-167-533-10	2	
6	ｼﾞｭﾋﾞﾘｰｸﾘｯﾌﾟ FASTENING BAND		1X 30/40 SUS304 CODE NO. 000-177-039-10	1	
7	締付ｸﾞﾗﾝﾄﾞ GLAND		06-008-1031-0 ROHS CODE NO. 100-028-520-10	2	
8	座金 WASHER		06-011-2111-0 ROHS CODE NO. 100-057-940-10	4	
9	ﾊﾟｯｷﾝ PACKING		06-011-2209-1 ROHS CODE NO. 100-306-171-10	2	
10	六角ﾎﾞﾙﾄ 全ﾈｼﾞ HEX.BOLT		M20X80 SUS304 CODE NO. 000-162-826-10	8	

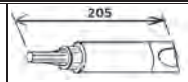
（略図の寸法は、参考値です。 DIMENSIONS IN DRAWING FOR REFERENCE ONLY.）

FURUNO

CODE NO.	001-461-270-00	06AY-X-9406 -2
TYPE	CH-5081-N	2/2

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
11	ﾊﾞﾈ座金 SPRING WASHER		M20 SUS304 CODE NO. 000-167-401-10	8	
12	ﾐｶﾞｷ丸平座金 FLAT WASHER		M20 SUS304 CODE NO. 000-167-452-10	16	
13	六角ﾅｯﾄ 1ｼｭ HEX.NUT		M20 SUS304 CODE NO. 000-167-476-10	16	
14	ｼﾑ(0.5) SHIM(0.5)		06-021-4035-1 CODE NO. 100-295-421-10	4	
15	ｼﾑ(1.0) SHIM(1.0)		06-021-4036-1 CODE NO. 100-295-431-10	2	
16	ｼﾑ(2.0) SHIM(2.0)		06-021-4037-1 CODE NO. 100-295-441-10	4	
17	ｼｰﾙｻﾞｲ SEALANT		ﾛｯｸﾀｲﾄ NO.575 *50ML* CODE NO. 000-194-894-10	1	

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

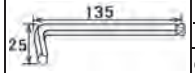
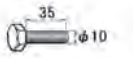
FURUNO ELECTRIC CO ., LTD.

FURUNO

CODE NO.	001-461-260-00	06AY-X-9407 -2
TYPE	CH-5081-A	1/2

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	ﾎﾞｰﾙﾚﾝﾁ BALL WRENCH		TWB-40 CODE NO. 000-162-561-10	1	
2	ﾀﾝｸｶﾞｲﾄﾞ組品 TANKGUIDE ASSEMBLY		CH-5081/82 CODE NO. 001-473-920-00	1	
3	六角ﾎﾞﾙﾄ HEX.BOLT		M10X35 SUS304 CODE NO. 000-162-786-10	2	
4	ﾐｶﾞｷ平座金 FLAT WASHER		M10 SUS304 CODE NO. 000-167-232-10	4	
5	Uﾅｯﾄ U-NUT		M10 SUS CODE NO. 000-167-533-10	2	
6	ｼﾞｭﾋﾞﾘｰｸﾘｯﾌﾟ FASTENING BAND		1X 30/40 SUS304 CODE NO. 000-177-039-10	1	
7	締付ｸﾞﾗﾝﾄﾞ GLAND		06-008-1031-0 ROHS CODE NO. 100-028-520-10	2	
8	座金 WASHER		06-011-2111-0 ROHS CODE NO. 100-057-940-10	4	
9	ﾊﾟｯｷﾝ PACKING		06-011-2209-1 ROHS CODE NO. 100-306-171-10	2	
10	六角ﾎﾞﾙﾄ 全ﾈｼﾞ HEX.BOLT		M20X80 SUS304 CODE NO. 000-162-826-10	8	

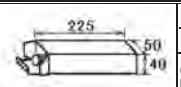
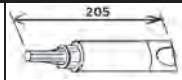
(略図の寸法は、参考値です。 DIMENSIONS IN DRAWING FOR REFERENCE ONLY.)

FURUNO ELECTRIC CO ., LTD.

FURUNO

CODE NO.	001-461-260-00	06AY-X-9407 -2
TYPE	CH-5081-A	2/2

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
11	ﾊﾞﾈ座金 SPRING WASHER		M20 SUS304 CODE NO. 000-167-401-10	8	
12	ﾐｶﾞｷ丸平座金 FLAT WASHER		M20 SUS304 CODE NO. 000-167-452-10	16	
13	六角ﾅｯﾄ 1ｼｭ HEX.NUT		M20 SUS304 CODE NO. 000-167-476-10	16	
14	ｼﾑ(0.5) SHIM(0.5)		06-021-4035-1 CODE NO. 100-295-421-10	4	
15	ｼﾑ(1.0) SHIM(1.0)		06-021-4036-1 CODE NO. 100-295-431-10	2	
16	ｼﾑ(2.0) SHIM(2.0)		06-021-4037-1 CODE NO. 100-295-441-10	4	
17	液状ｶﾞｽｹｯﾄ LIQUID GASKETS		TB1121 200G CODE NO. 000-193-909-10	1	
18	ｼｰﾙｻﾞｲ SEALANT		ﾛｯｸﾀｲﾄ NO.575 *50ML* CODE NO. 000-194-894-10	1	

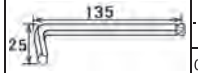
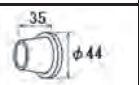
(略図の寸法は、参考値です。 DIMENSIONS IN DRAWING FOR REFERENCE ONLY.)

FURUNO ELECTRIC CO ., LTD.

FURUNO

CODE NO.	001-461-290-00	06AY-X-9408 -2
TYPE	CH-5082-N	1/2

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	ﾎﾞｰﾙﾚﾝﾁ BALL WRENCH		TWB-40 CODE NO. 000-162-561-10	1	
2	ﾀﾝｸｶﾞｲﾄﾞ組品 TANKGUIDE ASSEMBLY		CH-5081/82 CODE NO. 001-473-920-00	1	
3	六角ﾎﾞﾙﾄ HEX.BOLT		M10X35 SUS304 CODE NO. 000-162-786-10	2	
4	ﾐｶﾞｷ平座金 FLAT WASHER		M10 SUS304 CODE NO. 000-167-232-10	4	
5	Uﾅｯﾄ U-NUT		M10 SUS CODE NO. 000-167-533-10	2	
6	ｼﾞｭﾋﾞﾘｰｸﾘｯﾌﾟ FASTENING BAND		1X 30/40 SUS304 CODE NO. 000-177-039-10	1	
7	ﾊﾟｲﾌﾟｷｬｯﾌﾟ PIPE CAP		SHN-0011-1 ROHS CODE NO. 661-400-111-10	1	
8	六角ﾎﾞﾙﾄ 全ﾈｼﾞ HEX.BOLT		M20X80 SUS304 CODE NO. 000-162-826-10	8	
9	ﾊﾞﾈ座金 SPRING WASHER		M20 SUS304 CODE NO. 000-167-401-10	8	
10	ﾐｶﾞｷ丸平座金 FLAT WASHER		M20 SUS304 CODE NO. 000-167-452-10	16	

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

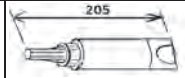
FURUNO ELECTRIC CO ., LTD.

FURUNO

CODE NO.	001-461-290-00	06AY-X-9408 -2
TYPE	CH-5082-N	2/2

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
11	六角ﾅｯﾄ 1ｼｭ HEX.NUT		M20 SUS304 CODE NO. 000-167-476-10	16	
12	ｼﾑ(0.5) SHIM(0.5)		06-021-4035-1 CODE NO. 100-295-421-10	4	
13	ｼﾑ(1.0) SHIM(1.0)		06-021-4036-1 CODE NO. 100-295-431-10	2	
14	ｼﾑ(2.0) SHIM(2.0)		06-021-4037-1 CODE NO. 100-295-441-10	4	
15	ｼｰﾙｻﾞｲ SEALANT		ﾛｯｸﾀｲﾄ NO.575 *50ML* CODE NO. 000-194-894-10	1	

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

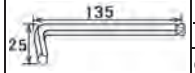
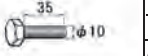
FURUNO ELECTRIC CO ., LTD.

FURUNO

CODE NO.	001-461-280-00	06AY-X-9409 -3
TYPE	CH-5082-A	1/2

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	ﾎﾞｰﾙﾚﾝﾁ BALL WRENCH		TWB-40 CODE NO. 000-162-561-10	1	
2	ﾀﾝｸｶﾞｲﾄﾞ組品 TANKGUIDE ASSEMBLY		CH-5081/82 CODE NO. 001-473-920-00	1	
3	六角ﾎﾞﾙﾄ HEX.BOLT		M10X35 SUS304 CODE NO. 000-162-786-10	2	
4	ﾐｶﾞｷ平座金 FLAT WASHER		M10 SUS304 CODE NO. 000-167-232-10	4	
5	Uﾅｯﾄ U-NUT		M10 SUS CODE NO. 000-167-533-10	2	
6	ｼﾞｭﾋﾞﾘｰｸﾘｯﾌﾟ FASTENING BAND		1X 30/40 SUS304 CODE NO. 000-177-039-10	1	
7	ﾊﾟｲﾌﾟｷｬｯﾌﾟ PIPE CAP		SHN-0011-1 ROHS CODE NO. 661-400-111-10	1	
8	六角ﾎﾞﾙﾄ 全ﾈｼﾞ HEX.BOLT		M20X80 SUS304 CODE NO. 000-162-826-10	8	
9	ﾊﾞﾈ座金 SPRING WASHER		M20 SUS304 CODE NO. 000-167-401-10	8	
10	ﾐｶﾞｷ丸平座金 FLAT WASHER		M20 SUS304 CODE NO. 000-167-452-10	16	

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

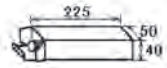
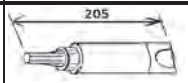
FURUNO ELECTRIC CO ., LTD.

FURUNO

CODE NO.	001-461-280-00	06AY-X-9409 -3
TYPE	CH-5082-A	2/2

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
11	六角ﾅｯﾄ 1ｼｭ HEX.NUT		M20 SUS304 CODE NO. 000-167-476-10	16	
12	ｼﾑ(0.5) SHIM(0.5)		06-021-4035-1 CODE NO. 100-295-421-10	4	
13	ｼﾑ(1.0) SHIM(1.0)		06-021-4036-1 CODE NO. 100-295-431-10	2	
14	ｼﾑ(2.0) SHIM(2.0)		06-021-4037-1 CODE NO. 100-295-441-10	4	
15	液状ｶﾞｽｹｯﾄ LIQUID GASKETS		TB1121 200G CODE NO. 000-193-909-10	1	
16	ｼｰﾙｻﾞｲ SEALANT		ﾛｯｸﾀｲﾄ NO.575 *50ML* CODE NO. 000-194-894-10	1	

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

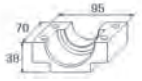
FURUNO ELECTRIC CO ., LTD.

FURUNO

CODE NO.	001-461-310-00	06AY-X-9410 -4
TYPE	CH-5061-N	1/2

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	軸固定具 SHAFT FIXTURE		06-027-4882-2 CODE NO. 100-408-682-10	2	
2	ﾊﾞﾈ座金 SPRING WASHER		M10 SUS316L CODE NO. 000-167-389-10	4	
3	平座金 FLAT WASHER		M10 SUS316L CODE NO. 000-167-416-10	8	
4	六角ﾅｯﾄ 1ｼｭ HEX.NUT		M10 SUS316L CODE NO. 000-167-490-10	4	
5	六角ﾎﾞﾙﾄ全ﾈｼﾞ HEXAGON HEAD SCREW		M10X70 SUS316L CODE NO. 000-192-641-10	4	
6	六角ﾎﾞﾙﾄ HEX.BOLT		M10X35 SUS304 CODE NO. 000-162-786-10	2	
7	ﾐｶﾞｷ平座金 FLAT WASHER		M10 SUS304 CODE NO. 000-167-232-10	4	
8	Uﾅｯﾄ U-NUT		M10 SUS CODE NO. 000-167-533-10	2	
9	ｼﾞｭﾋﾞﾘｰｸﾘｯﾌﾟ FASTENING BAND		1X 30/40 SUS304 CODE NO. 000-177-039-10	1	
10	締付ｸﾞﾗﾝﾄﾞ GLAND		06-008-1031-0 ROHS CODE NO. 100-028-520-10	2	

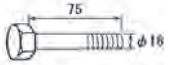
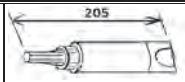
（略図の寸法は、参考値です。 DIMENSIONS IN DRAWING FOR REFERENCE ONLY.）

FURUNO ELECTRIC CO ., LTD.

FURUNO

CODE NO.	001-461-310-00	06AY-X-9410 -4
TYPE	CH-5061-N	2/2

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
11	座金 WASHER		06-011-2111-0 ROHS CODE NO. 100-057-940-10	4	
12	ﾊﾟｯｷﾝ PACKING		06-011-2209-1 ROHS CODE NO. 100-306-171-10	2	
13	六角ﾎﾞﾙﾄ HEX.BOLT		M16X75 SUS304 CODE NO. 000-162-823-10	6	
14	ﾊﾞﾈ座金 SPRING WASHER		M16 SUS304 CODE NO. 000-167-400-10	8	
15	ﾐｶﾞｷﾏﾙ平座金 FLAT WASHER		M16 SUS304 CODE NO. 000-167-448-10	14	
16	六角ﾅｯﾄ 1ｼｭ HEXAGONAL NUT		M16 SUS304 CODE NO. 000-167-474-10	16	
17	ｼｰﾙｻﾞｲ SEALANT		ﾛｯｸﾀｲﾄ NO.575 *50ML* CODE NO. 000-194-894-10	1	

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

FURUNO ELECTRIC CO ., LTD.

FURUNO

CODE NO.	001-461-300-00	06AY-X-9411 -4
TYPE	CH-5061-A	1/2

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	軸固定具 SHAFT FIXTURE		06-027-4882-2 CODE NO. 100-408-682-10	2	
2	ﾊﾞﾈ座金 SPRING WASHER		M10 SUS316L CODE NO. 000-167-389-10	4	
3	平座金 FLAT WASHER		M10 SUS316L CODE NO. 000-167-416-10	8	
4	六角ﾅｯﾄ 1ｼｭ HEX.NUT		M10 SUS316L CODE NO. 000-167-490-10	4	
5	六角ﾎﾞﾙﾄ全ﾈｼﾞ HEXAGON HEAD SCREW		M10X70 SUS316L CODE NO. 000-192-641-10	4	
6	六角ﾎﾞﾙﾄ HEX.BOLT		M10X35 SUS304 CODE NO. 000-162-786-10	2	
7	ﾐｶﾞｷ平座金 FLAT WASHER		M10 SUS304 CODE NO. 000-167-232-10	4	
8	Uﾅｯﾄ U-NUT		M10 SUS CODE NO. 000-167-533-10	2	
9	ｼﾞｭﾋﾞﾘｰｸﾘｯﾌﾟ FASTENING BAND		1X 30/40 SUS304 CODE NO. 000-177-039-10	1	
10	締付ｸﾞﾗﾝﾄﾞ GLAND		06-008-1031-0 ROHS CODE NO. 100-028-520-10	2	

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

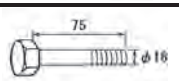
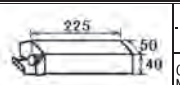
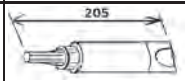
FURUNO ELECTRIC CO ., LTD.

FURUNO

CODE NO.	001-461-300-00	06AY-X-9411 -4
TYPE	CH-5061-A	2/2

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
11	座金 WASHER		06-011-2111-0 ROHS CODE NO. 100-057-940-10	4	
12	ﾊﾟｯｷﾝ PACKING		06-011-2209-1 ROHS CODE NO. 100-306-171-10	2	
13	六角ﾎﾞﾙﾄ HEX.BOLT		M16X75 SUS304 CODE NO. 000-162-823-10	6	
14	ﾊﾞﾈ座金 SPRING WASHER		M16 SUS304 CODE NO. 000-167-400-10	8	
15	ﾐｶﾞｷﾏﾙ平座金 FLAT WASHER		M16 SUS304 CODE NO. 000-167-448-10	14	
16	六角ﾅｯﾄ 1ｼｭ HEXAGONAL NUT		M16 SUS304 CODE NO. 000-167-474-10	16	
17	液状ｶﾞｽｹｯﾄ LIQUID GASKETS		TB1121 200G CODE NO. 000-193-909-10	1	
18	ｼｰﾙｻﾞｲ SEALANT		ﾛｯｸﾀｲﾄ NO.575 *50ML* CODE NO. 000-194-894-10	1	

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

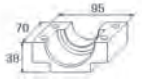
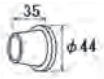
FURUNO ELECTRIC CO ., LTD.

FURUNO

CODE NO.	001-461-330-00	06AY-X-9412 -4
TYPE	CH-5062-N	1/2

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	軸固定具 SHAFT FIXTURE		06-027-4882-2 CODE NO. 100-408-682-10	2	
2	ﾊﾞﾈ座金 SPRING WASHER		M10 SUS316L CODE NO. 000-167-389-10	4	
3	平座金 FLAT WASHER		M10 SUS316L CODE NO. 000-167-416-10	8	
4	六角ﾅｯﾄ 1ｼｭ HEX.NUT		M10 SUS316L CODE NO. 000-167-490-10	4	
5	六角ﾎﾞﾙﾄ全ﾈｼﾞ HEXAGON HEAD SCREW		M10X70 SUS316L CODE NO. 000-192-641-10	4	
6	六角ﾎﾞﾙﾄ HEX.BOLT		M10X35 SUS304 CODE NO. 000-162-786-10	2	
7	ﾐｶﾞｷ平座金 FLAT WASHER		M10 SUS304 CODE NO. 000-167-232-10	4	
8	Uﾅｯﾄ U-NUT		M10 SUS CODE NO. 000-167-533-10	2	
9	ｼﾞｭﾋﾞﾘｰｸﾘｯﾌﾟ FASTENING BAND		1X 30/40 SUS304 CODE NO. 000-177-039-10	1	
10	ﾊﾟｲﾌﾟｷｬｯﾌﾟ PIPE CAP		SHN-0011-1 ROHS CODE NO. 661-400-111-10	1	

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

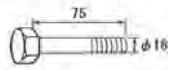
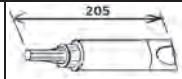
FURUNO ELECTRIC CO ., LTD.

FURUNO

CODE NO.	001-461-330-00	06AY-X-9412 -4
TYPE	CH-5062-N	2/2

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
11	六角ﾎﾞﾙﾄ HEX.BOLT		M16X75 SUS304 CODE NO. 000-162-823-10	6	
12	ﾊﾞﾈ座金 SPRING WASHER		M16 SUS304 CODE NO. 000-167-400-10	8	
13	ﾐｶﾞｷﾏﾙ平座金 FLAT WASHER		M16 SUS304 CODE NO. 000-167-448-10	14	
14	六角ﾅｯﾄ 1ｼｭ HEXAGONAL NUT		M16 SUS304 CODE NO. 000-167-474-10	16	
15	ｼｰﾙｻﾞｲ SEALANT		ﾛｯｸﾀｲﾄ NO.575 *50ML* CODE NO. 000-194-894-10	1	

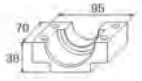
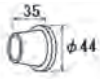
(略図の寸法は、参考値です。 DIMENSIONS IN DRAWING FOR REFERENCE ONLY.)

FURUNO

CODE NO.	001-461-320-00	06AY-X-9413 -4
TYPE	CH-5062-A	1/2

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	軸固定具 SHAFT FIXTURE		06-027-4882-2 CODE NO. 100-408-682-10	2	
2	ﾊﾞﾈ座金 SPRING WASHER		M10 SUS316L CODE NO. 000-167-389-10	4	
3	平座金 FLAT WASHER		M10 SUS316L CODE NO. 000-167-416-10	8	
4	六角ﾅｯﾄ 1ｼｭ HEX.NUT		M10 SUS316L CODE NO. 000-167-490-10	4	
5	六角ﾎﾞﾙﾄ全ﾈｼﾞ HEXAGON HEAD SCREW		M10X70 SUS316L CODE NO. 000-192-641-10	4	
6	六角ﾎﾞﾙﾄ HEX.BOLT		M10X35 SUS304 CODE NO. 000-162-786-10	2	
7	ﾐｶﾞｷ平座金 FLAT WASHER		M10 SUS304 CODE NO. 000-167-232-10	4	
8	Uﾅｯﾄ U-NUT		M10 SUS CODE NO. 000-167-533-10	2	
9	ｼﾞｭﾋﾞﾘｰｸﾘｯﾌﾟ FASTENING BAND		1X 30/40 SUS304 CODE NO. 000-177-039-10	1	
10	ﾊﾟｲﾌﾟｷｬｯﾌﾟ PIPE CAP		SHN-0011-1 ROHS CODE NO. 661-400-111-10	1	

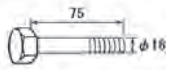
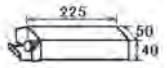
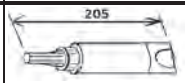
(略図の寸法は、参考値です。 DIMENSIONS IN DRAWING FOR REFERENCE ONLY.)

FURUNO

CODE NO.	001-461-320-00	06AY-X-9413 -4
TYPE	CH-5062-A	2/2

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
11	六角ﾎﾞﾙﾄ HEX.BOLT		M16X75 SUS304 CODE NO. 000-162-823-10	6	
12	ﾊﾞﾈ座金 SPRING WASHER		M16 SUS304 CODE NO. 000-167-400-10	8	
13	ﾐｶﾞｷﾏﾙ平座金 FLAT WASHER		M16 SUS304 CODE NO. 000-167-448-10	14	
14	六角ﾅｯﾄ 1ｼｭ HEXAGONAL NUT		M16 SUS304 CODE NO. 000-167-474-10	16	
15	液状ｶﾞｽｹｯﾄ LIQUID GASKETS		TB1121 200G CODE NO. 000-193-909-10	1	
16	ｼｰﾙｻﾞｲ SEALANT		ﾛｯｸﾀｲﾄ NO.575 *50ML* CODE NO. 000-194-894-10	1	

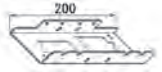
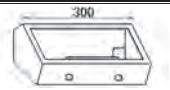
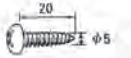
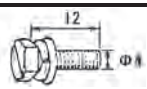
(略図の寸法は、参考値です。 DIMENSIONS IN DRAWING FOR REFERENCE ONLY.)

FURUNO

CODE NO.	001-458-100-00	06AY-X-9502 -1
TYPE	FP06-01601	1/1

付属品表

ACCESSORIES

番号 NO.	名称 NAME	略図 OUTLINE	型名／規格 DESCRIPTIONS	数量 Q'TY	用途／備考 REMARKS
1	ｿｳｻﾌﾞﾗｹｯﾄ CONTROL UNIT BRACKET		06-021-2112-0 ROHS CODE NO. 100-281-880-10	1	
2	操作取付台 CONTROL MOUNTING BASE		06-027-2541-0 CODE NO. 100-409-510-10	1	
3	+ﾄﾗｽﾀｯﾋﾟﾝﾈｼﾞ 1ｼｭ SELF-TAPPING SCREW		5X20 SUS304 CODE NO. 000-162-608-10	2	
4	ﾎｰﾙﾌﾟﾗｸﾞ COSMETIC PLUG		DP-687 ｸﾛ CODE NO. 000-165-997-10	2	
5	六角ｽﾘﾜﾘ ｾﾑｽB HEX.HEAD SLOT BOLT-B WASHER		M4X12 SUS304 CODE NO. 000-162-939-10	4	

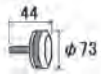
(略図の寸法は、参考値です。 DIMENSIONS IN DRAWING FOR REFERENCE ONLY.)

FURUNO

CODE NO.	001-476-920-00	06AY-X-9501 -0
TYPE	FP06-01902	1/1

付属品表

ACCESSORIES

番号 NO.	名称 NAME	略図 OUTLINE	型名／規格 DESCRIPTIONS	数量 Q'TY	用途／備考 REMARKS
1	ﾊﾝｶﾞｰﾜｯｼｬｰ HANGER WASHER		05-029-0132-1 ROHS CODE NO. 100-087-911-10	2	
2	ﾉﾌﾞ(N2.5) KNOB(N2.5)		19-028-2073-1 CODE NO. 100-340-481-10	2	

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

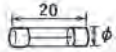
FURUNO ELECTRIC CO . . LTD. KR

C1354-F01-A

FURUNO

CODE NO.	001-456-120-00	06AY-X-9301-1 1/1
TYPE	SP06-01601	BOX NO. P

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

ITEM NO.	NAME OF PART	OUTLINE	DWG. NO. OR TYPE NO.	QUANTITY WORKING PER SET	QUANTITY WORKING PER VES	QUANTITY SPARE	REMARKS/CODE NO.
1	ﾋｭｰｽﾞ GLASS TUBE FUSE		FGMB-S 125V 8A PBF	1	1	2	000-191-004-10

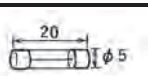
MFR'S NAME	FURUNO ELECTRIC CO.,LTD.	DWG NO.	C1354-P01-B	1/1

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

FURUNO

CODE NO.	001-456-490-00	06AY-X-9302-2 1/1
TYPE	SP06-01701	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 BLADE FUSE		0287010.U	1	1	2	000-193-054-10
2	ﾋｭｰｽﾞ FUSE GLASS TUBE TYPE		FGMB-A 125V 6A PBF	1	1	2	000-157-492-10

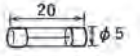
MFR'S NAME	FURUNO ELECTRIC CO.,LTD.	DWG NO.	C1354-P02-B	1/1

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

FURUNO

CODE NO.	001-478-140-00	06AY-X-9303-0 1/1
TYPE	SP06-01702	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 BLADE FUSE		0287015.U	1	1	2	000-193-055-10
2	ﾋｭｰｽﾞ FUSE GLASS TUBE TYPE		FGMB 125V 6A PBF	1	1	2	000-157-492-10

MFR'S NAME	FURUNO ELECTRIC CO.,LTD.	DWG NO.	C1354-P03-A	1/1

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

FURUNO

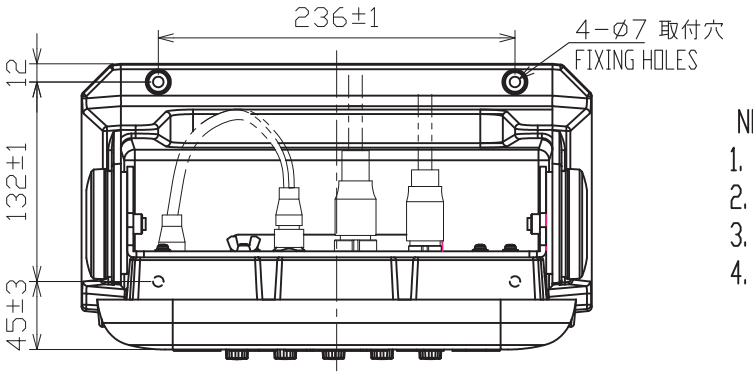
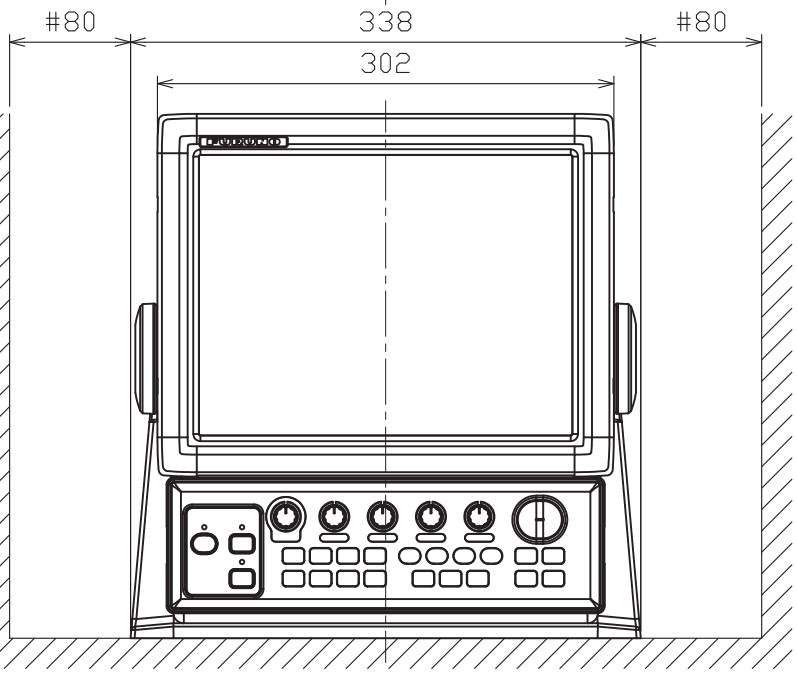
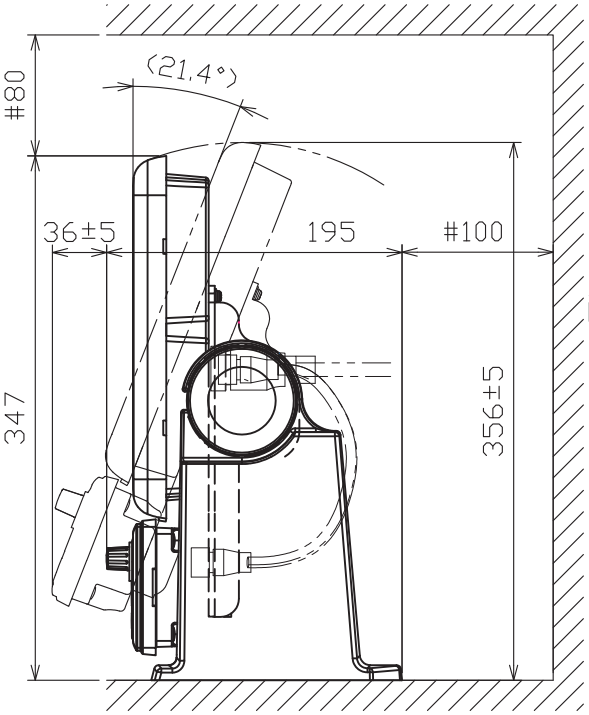


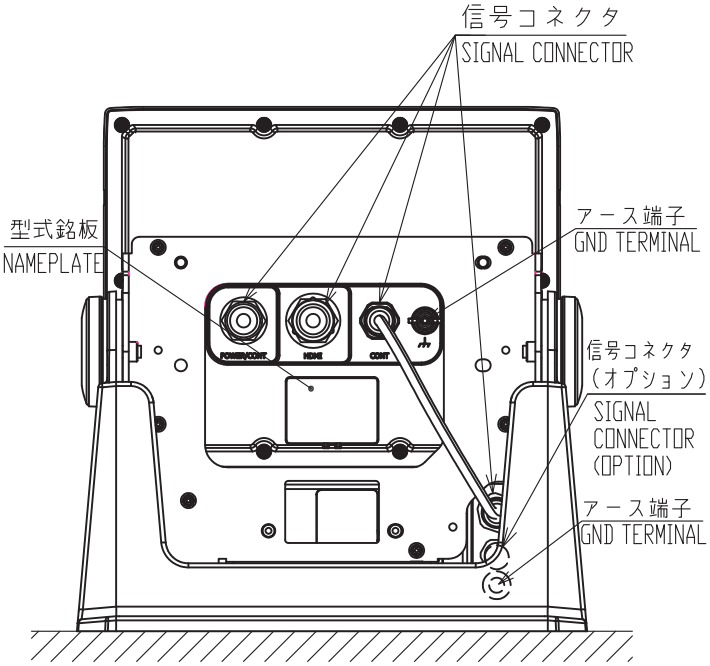
表1 TABLE 1

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

NOTE
1. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS WHICH IS NOT SPECIFIED.
2. #: MINIMUM SERVICE CLEARANCE.
3. USE TAPPING SCREWS ø5x20 FOR FIXING THE UNIT.
4. KEEP SUFFICIENT CABLE LENGTH BEHIND THE UNIT FOR MAINTENANCE.







注　記
1）指定外の寸法公差は表１による。
2）＃印寸法は最小サービス空間寸法とする。
3）取付用ネジはトラスタッピンネジ呼び径５×２０を使用のこと。
4）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。

DRAWN 23/May/2016 T.YAMASAKI			TITLE MU-121C + CH-502/602
CHECKED 23/May/2016 H.MAKI			名称 表示部＋操作部（卓上装備）
APPROVED 27/May/2016 H.MAKI		CH-500/600	外寸図
SCALE 1/5	MASS 4.0 ±10% kg	質量はケーブルを含まず。 MASS DOES NOT INCLUDE CABLES.	NAME DISPLAY UNIT + CONTROL UNIT (TABLETOP MOUNT)
DWG. No. C1354-G01- A		REF. No. 06-027-151G-0	OUTLINE DRAWING

FURUNO ELECTRIC CO., LTD.

FURUNO

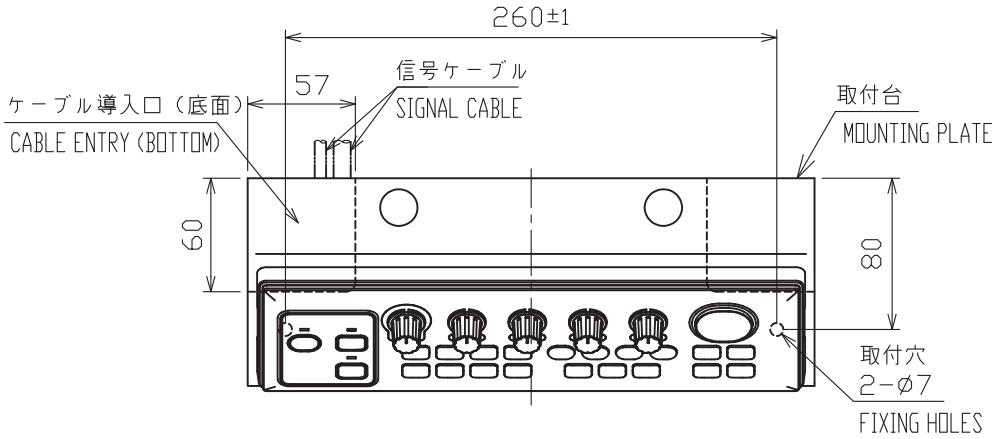
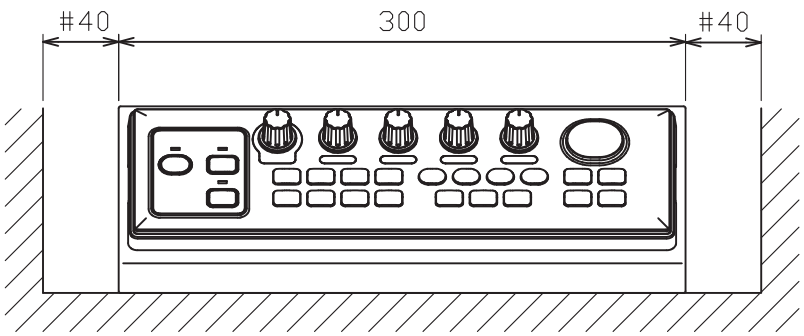
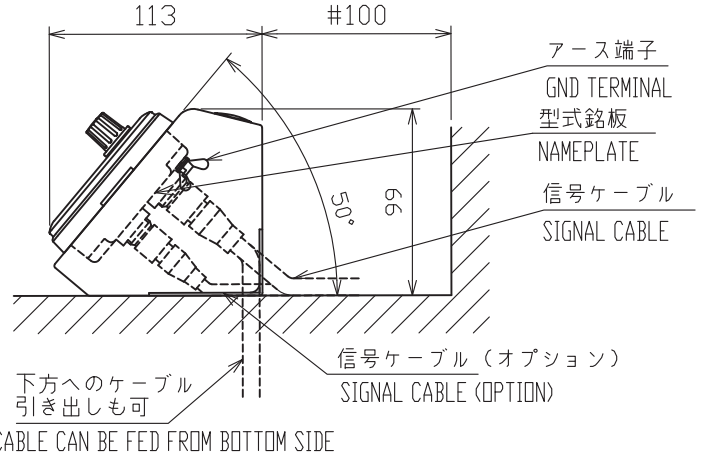


表1 TABLE 1

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





注 記

1）指定外の寸法公差は表１による。
2）＃印寸法は最小サービス空間寸法とする。
3）取付用ネジは＋トラスタッピンネジ呼び径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. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS WHICH IS NOT SPECIFIED.
2. #: MINIMUM SERVICE CLEARANCE.
3. USE TAPPING SCREWS ø5x20 FOR FIXING THE UNIT.
4. KEEP SUFFICIENT CABLE LENGTH BEHIND THE UNIT FOR MAINTENANCE.

DRAWN 25/May/2016 T.YAMASAKI			TITLE CH-502/602
CHECKED 25/May/2016 H.MAKI			名称 操作部（卓上装備）
APPROVED 27/May/2016 H.MAKI		CH-500/600	外寸図
SCALE 1/4	MASS 1.3 ±10% kg	質量はケーブルを含まず。 MASS DOES NOT INCLUDE CABLES.	NAME CONTROL UNIT (TABLETOP MOUNT)
DWG. No. C1354-G03- A		REF. No. 06-027-251G-0	OUTLINE DRAWING

FURUNO ELECTRIC CO., LTD.

FURUNO

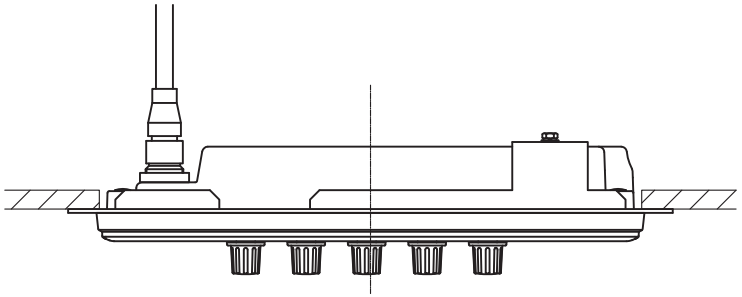
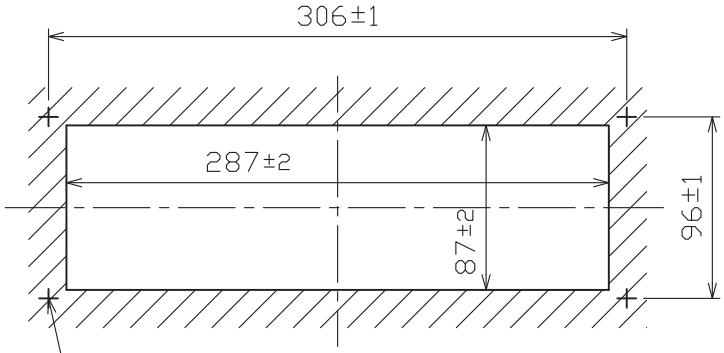
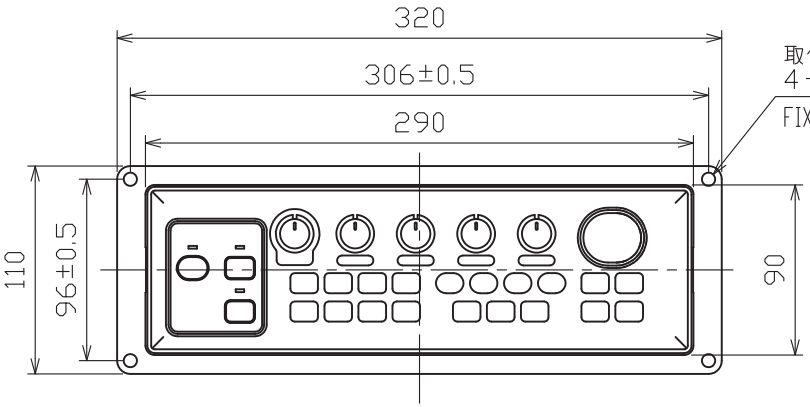
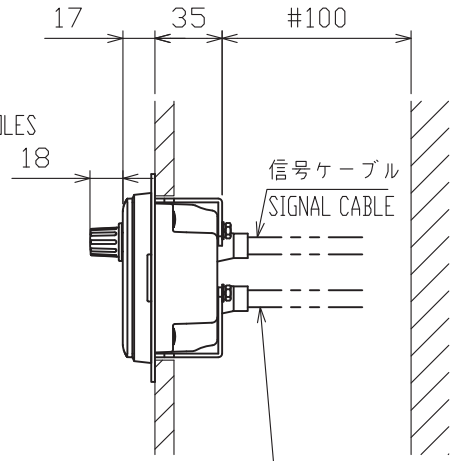


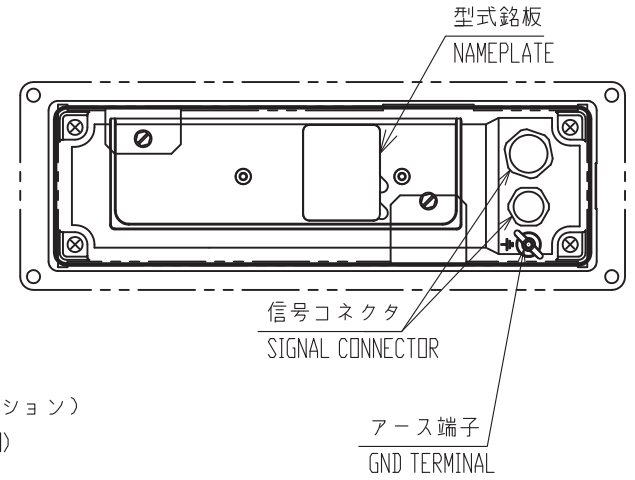
表1 TABLE 1

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









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き出せるよう
　　余裕を持たせること。

NOTE

1. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS WHICH IS NOT SPECIFIED.
2. #: MINIMUM SERVICE CLEARANCE.
3. USE TAPPING SCREWS ø5x20 FOR FIXING THE UNIT.
4. KEEP SUFFICIENT CABLE LENGTH BEHIND THE UNIT FOR MAINTENANCE.

DRAWN 25/May/2016 T.YAMASAKI			TITLE CH-502/602
CHECKED 25/May/2016 H.MAKI			名称 操作部（埋込装備）
APPROVED 30/May/2016 H.MAKI		CH-500/600	外寸図
SCALE 1/4	MASS 0.96 ±10% kg	質量はケーブルを含まず。 MASS DOES NOT INCLUDE CABLES.	NAME CONTROL UNIT (FLUSH MOUNT)
DWG. No. C1354-G04- A		REF. No. 06-027-252G-0	OUTLINE DRAWING

FURUNO ELECTRIC CO., LTD.

FURUNO

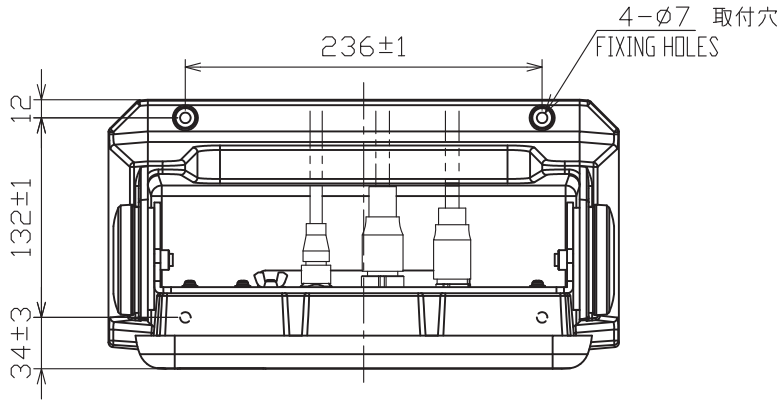
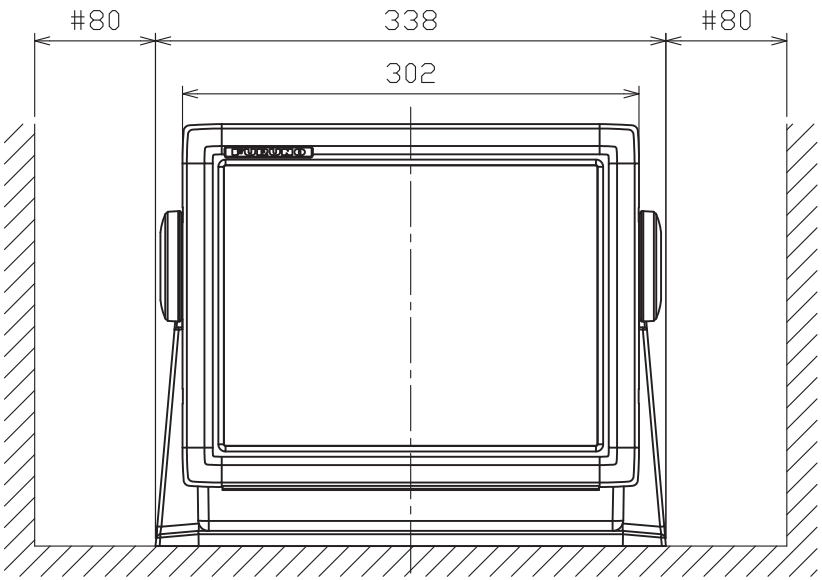
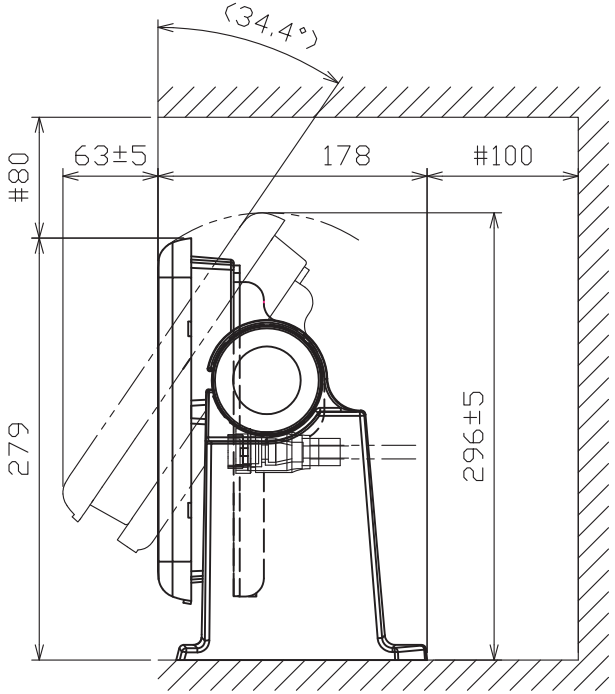
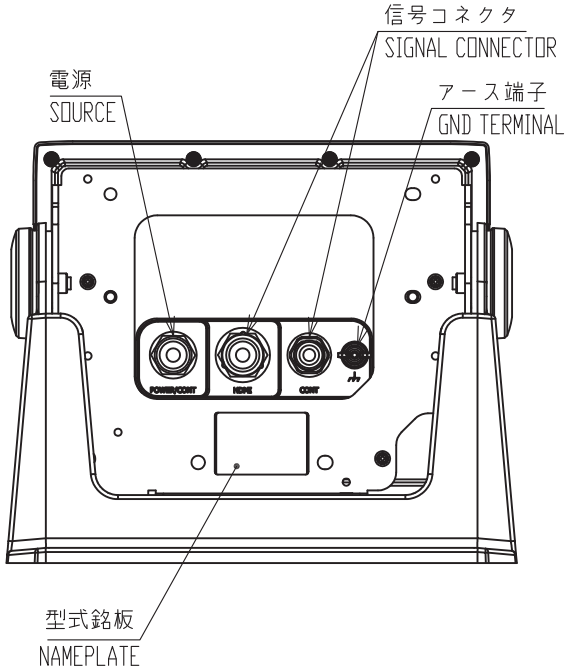


表1 TABLE 1

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







注 記 1） 指定外の寸法公差は表１による。
2） ＃印寸法は最小サービス空間寸法とする。
3） 取付用ネジはトラスタッピンネジ呼び径５×２０を使用のこと。
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. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS WHICH IS NOT SPECIFIED.
2. #: MINIMUM SERVICE CLEARANCE.
3. USE TAPPING SCREWS Ø5x20 FOR FIXING THE UNIT.
4. KEEP SUFFICIENT CABLE LENGTH BEHIND THE UNIT FOR MAINTENANCE.

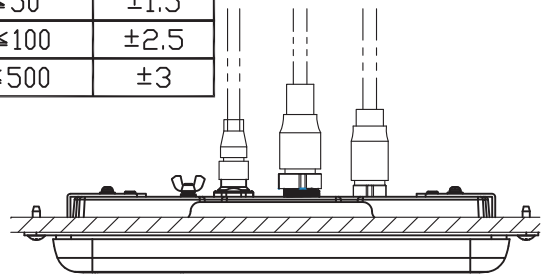
DRAWN 29/Sep/2016 T.YAMASAKI		TITLE	MU-121C
CHECKED 30/Sep/2016 H.MAKI		名称	表示部（卓上装備）
APPROVED 3/Oct/2016 H.MAKI	CH-500		外寸図
SCALE 1/5 MASS 3.0 ±10% kg		NAME	DISPLAY UNIT(TABLETOP MOUNT)
DWG.No. C1354-G09- A	REF.No. 06-027-161G-0		OUTLINE DRAWING

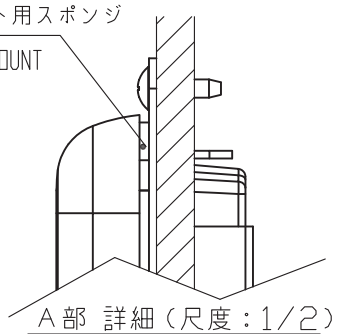
FURUNO ELECTRIC CO., LTD.

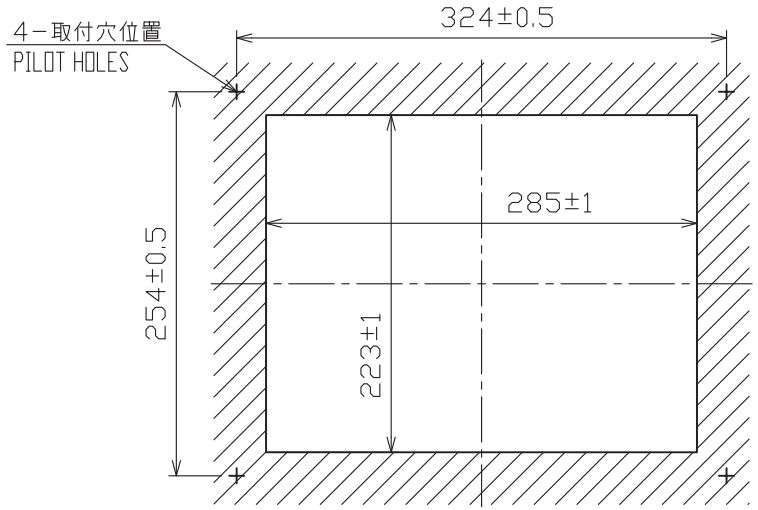
FURUNO

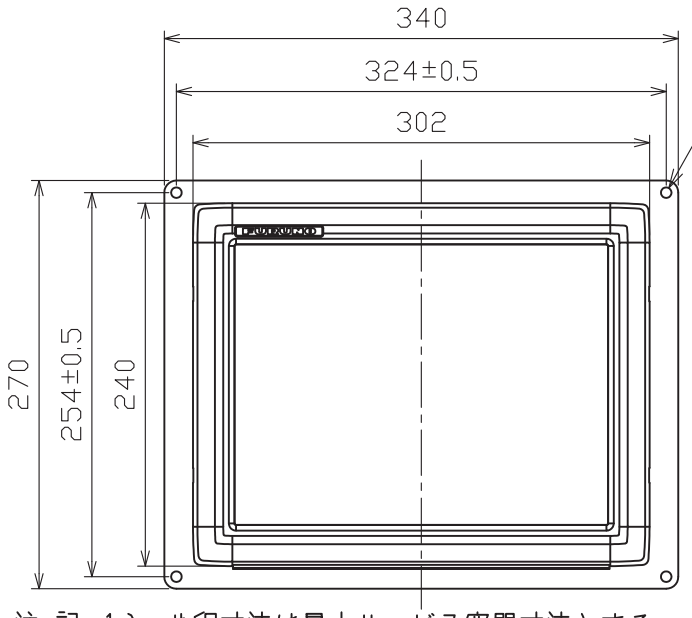
表1 TABLE 1

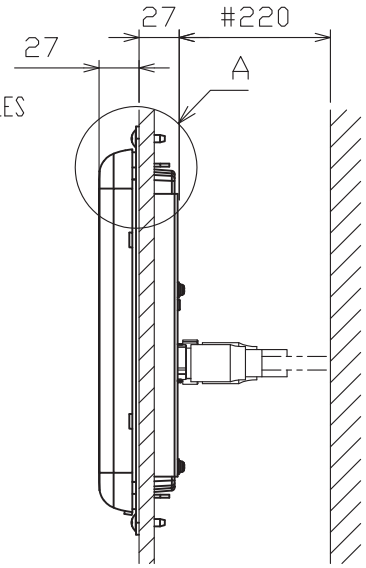
寸法区分 (mm) DIMENSION	公差 (mm) TOLERANCE
L≦50	±1.5
50<L≦100	±2.5
100<L≦500	±3

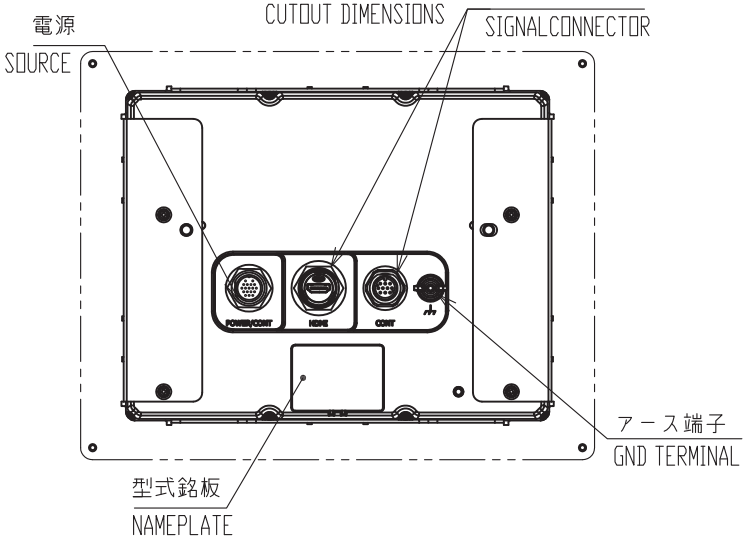












注 記 1） #印寸法は最小サービス空間寸法とする。
2） 指定外の寸法公差は表１による。
3） 取付用ネジはトラスタッピンネジ呼び径５×２０を使用のこと。
4） 装備ケーブルはサービス時、本体を前方に十分引き出せるよう余裕を持たせること。

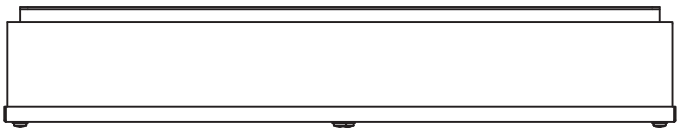
NOTE 1. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS WHICH IS NOT SPECIFIED.
2. #: MINIMUM SERVICE CLEARANCE.
3. USE TAPPING SCREWS ø5x20 FOR FIXING THE UNIT.
4. KEEP SUFFICIENT CABLE LENGTH BEHIND THE UNIT FOR MAINTENANCE.

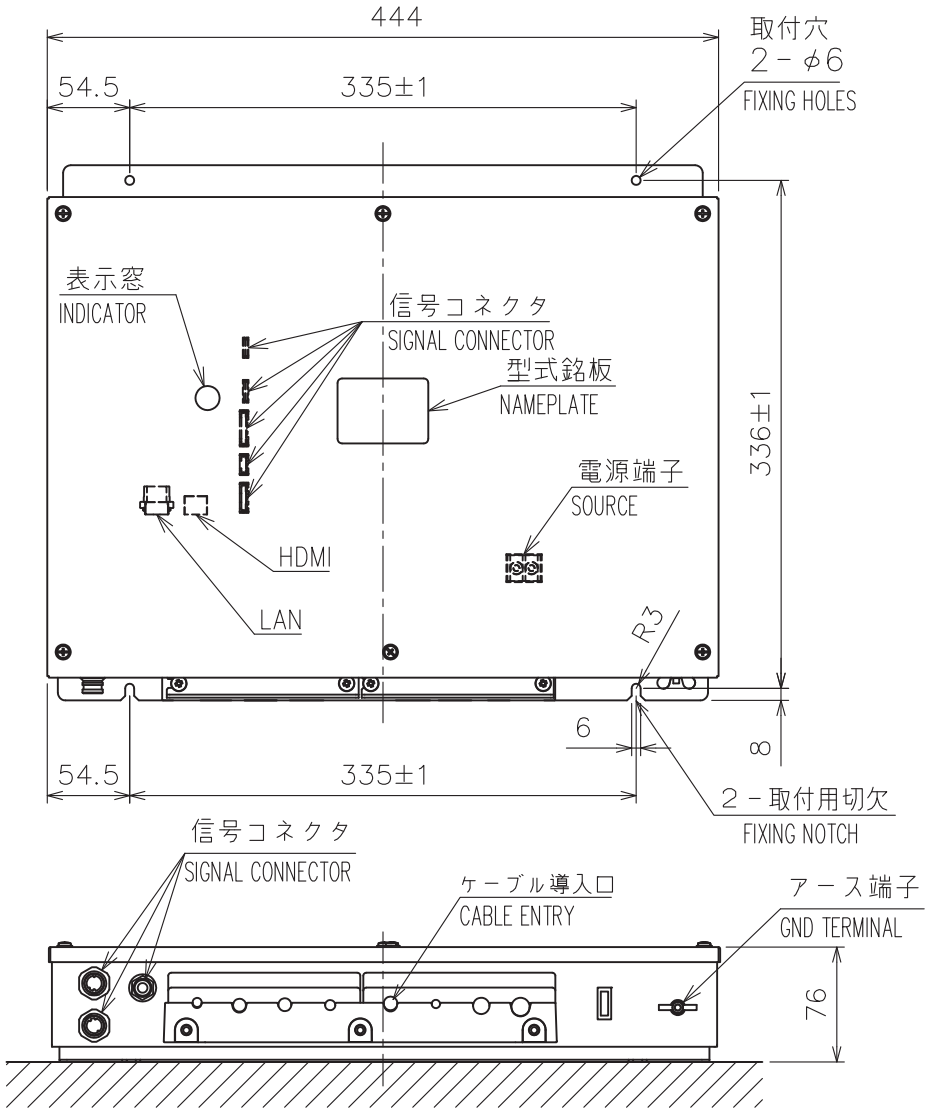
DRAWN 30/Sep/2016 I.YAMASAKI		TITLE	MU-121C
CHECKED 30/Sep/2016 H.MAKI		名称	表示部（埋込装備F）
APPROVED 3/Oct/2016 H.MAKI	CH-500		外寸図
SCALE 1/5	MASS 2.0 ±10% kg	NAME	DISPLAY UNIT (FLUSH MOUNT F)
DWG.No. C1354-G10- A	REF.No. 06-027-162G-0		OUTLINE DRAWING

FURUNO ELECTRIC CO., LTD.

表1 TABLE 1

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





注 記 1）指定外の寸法公差は表1による。
2）＃印寸法は最小サービス空間寸法とする。
3）取付用ネジはトラスタッピンネジ呼び径５×２０を使用のこと。
4）ケーブル導入口は下方に向けること。

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

DRAWN 17/Feb/2017 T.YAMASAKI		TITLE	CH-503
CHECKED 17/Feb/2017 H.MAKI		名称	送受信装置（壁掛装備）
APPROVED 27/May/2016 H.MAKI	CH-500/600		外寸図
SCALE 1/5 MASS 3.3 ±10% kg		NAME	TRANSCEIVER UNIT (BULKHEAD MOUNT)
DWG.No. C1354-G02- B	REF.No. 06-027-350G-1		OUTLINE DRAWING

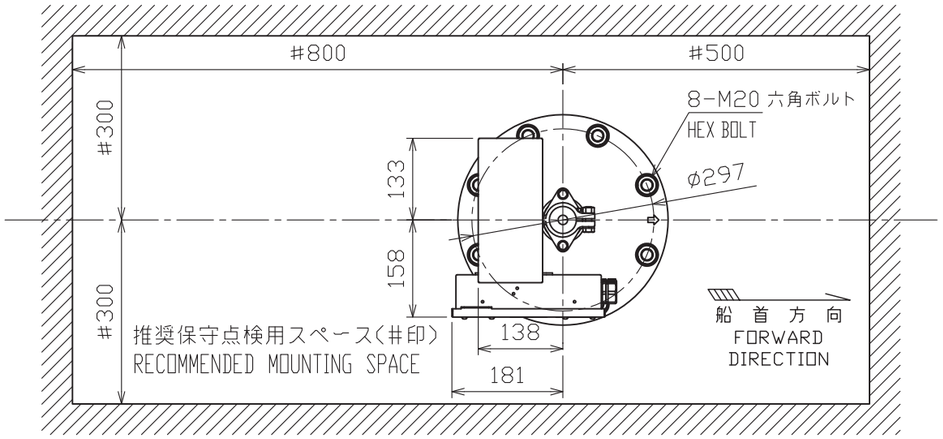
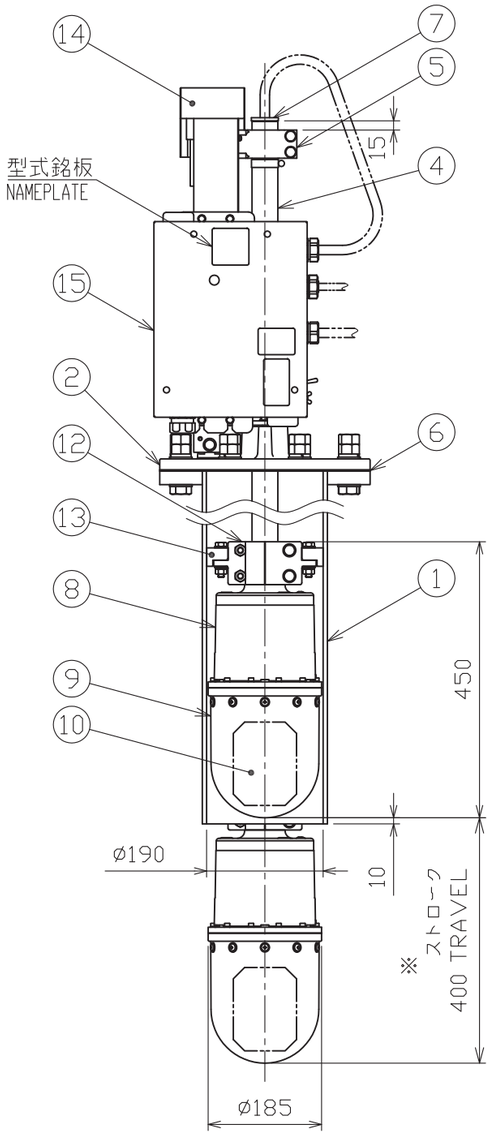


表1 TABLE 1

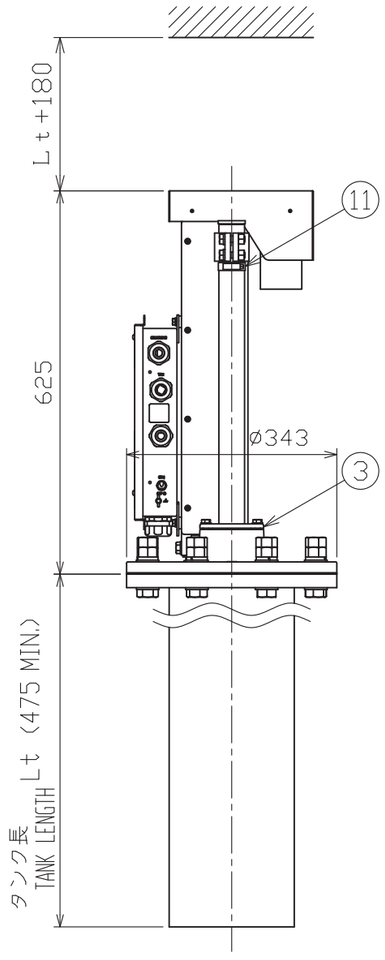
寸法区分（mm） DIMENSION	公差（mm） TOLERANCE
L≦50	±1.5
50<L≦100	±2.5
100<L≦500	±3
500<L≦1000	±4

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、２００ｍｍを加えた値で切断すること。
Ｌｓ＝Ｌｔ＋２００（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。

NOTE
1. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS WHICH IS NOT SPECIFIED.
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 + 200 (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 300×300 mm ON THE CEILING FOR FACILITATING INSTALLATION AND FUTURE SOUNDOME SERVICE.



※ストローク
TRAVEL
400mm標準。250mmは400mmを現地改造。
STANDARD SUPPLY LENGTH: 400mm.
MODIFY THE SHAFT LENGTH LOCALLY FOR 250mm USE.



品番 ITEM	品名 NAME	材質 MATERIAL	数量 QTY	図番 DWG. No.	摘要 REMARKS
15	上下動制御部 RAISE/LOWER CONTROL UNIT		1		
14	ギヤカバー GEAR COVER	SUS304	1	06-021-4006	
13	タンクガイド（２） TANK GUIDE (2)	ｼﾞｭﾗｺﾝM90	2	06-021-4032	
12	タンクガイド（１） TANK GUIDE (1)	FRP(SMC)	2	06-021-4031	
11	ジュビリークリップ FASTENING BAND	SUS304	1	1X 30/40	
10	送受波器 TRANSDUCER		1		
9	ドーム DOME	ABS	1	06-027-4711	
8	ＢＣドーム BC DOME	BC2	1	06-027-4701	
7	パイプキャップ PIPE CAP	CRｺﾞﾑ	1	SHN-0011	
6	フランジパッキン GASKET	CRｺﾞﾑ	1	SHJ-0009	
5	スライド金具 SHAFT RETAINER	ﾛｰｽﾞｱﾛﾝｽﾞRB-8	1	06-021-4009	
4	上下シャフト MAIN SHAFT	SUS304	1		
3	グリスコットン押え台 GREASE COTTON RETAINER	BC2	1	06-021-4025	
2	架台載台 SHAFT SLEEVE	FC200	1	06-021-4020	
1	格納タンク RETRACTION TANK		1		

DRAWN 10/Jan/2017 T.YAMASAKI		TITLE CH-504
CHECKED 10/Jan/2017 H.MAKI		名称 上下装置（８インチ）400ストローク
APPROVED 10/Jan/2017 H.MAKI	CH-500/600	外寸図
SCALE 1/10 MASS 41 ±10% kg	質量はタンク、シャフト、ケーブルを含まず。 MASS DOES NOT INCLUDE TANK/SHAFT/CABLE.	NAME HULL UNIT (8-INCH) 400 TRAVEL
DWG. No. C1354-G05- B	REF. No. 06-027-450G-1	OUTLINE DRAWING

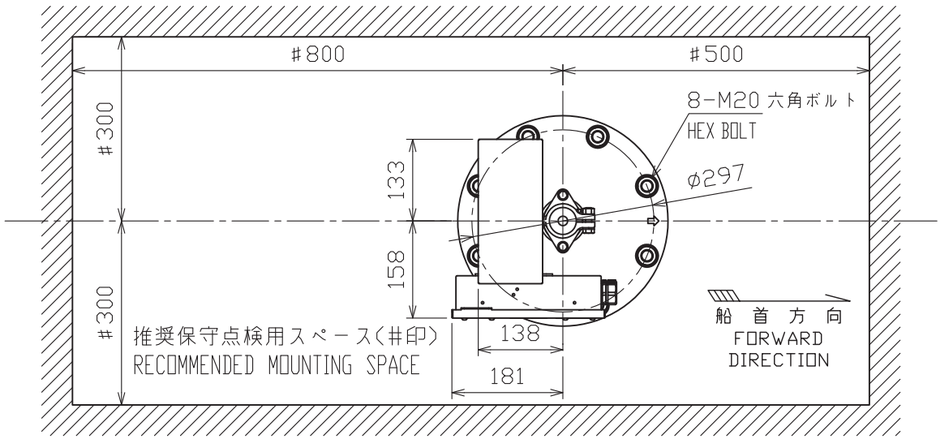
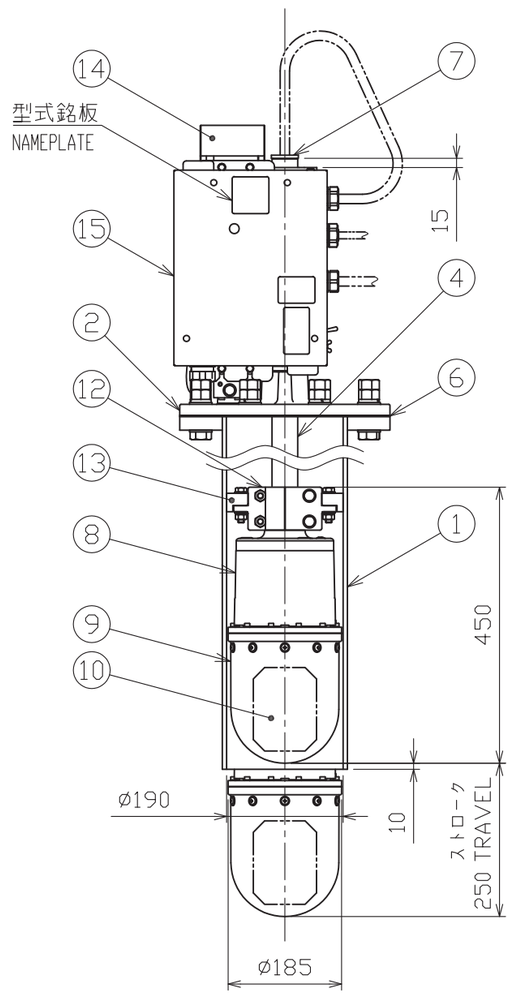


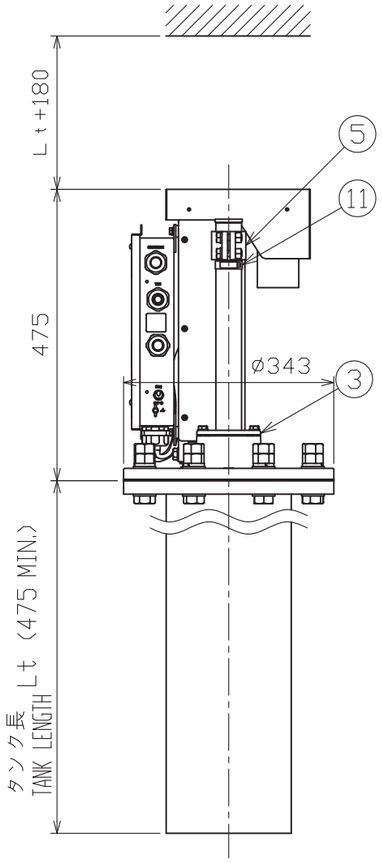
表1 TABLE 1

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

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、
　　５０ｍｍを加えた値で切断すること。
　　Ｌｓ＝Ｌｔ＋５０（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。

NOTE　1.　TABLE 1 INDICATES TOLERANCE OF DIMENSIONS WHICH IS NOT SPECIFIED.
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 + 50 (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 300×300 mm ON THE CEILING FOR FACILITATING INSTALLATION AND FUTURE SOUNDOME SERVICE.





ITEM	NAME	MATERIAL	QTY	DWG. No.	REMARKS
15	上下動制御部 RAISE/LOWER CONTROL UNIT		1		
14	ギヤカバー GEAR COVER	SUS304	1	06-021-4006	
13	タンクガイド（２） TANK GUIDE (2)	ｼﾞｭﾗｺﾝM90	2	06-021-4032	
12	タンクガイド（１） TANK GUIDE (1)	FRP(SMC)	2	06-021-4031	
11	ジュビリークリップ FASTENING BAND	SUS304	1	1X 30/40	
10	送受波器 TRANSDUCER		1		
9	ドーム DOME	ABS	1	06-027-4711	
8	ＢＣドーム BC DOME	BC2	1	06-027-4701	
7	パイプキャップ PIPE CAP	CRｺﾞﾑ	1	SHN-0011	
6	フランジパッキン GASKET	CRｺﾞﾑ	1	SHJ-0009	
5	スライド金具 SHAFT RETAINER	ﾛｰｱﾌﾟﾛﾝｽﾞRB-8	1	06-021-4009	
4	上下シャフト MAIN SHAFT	SUS304	1		
3	グリスコットン押え台 GREASE COTTON RETAINER	BC2	1	06-021-4025	
2	架台載台 SHAFT SLEEVE	FC200	1	06-021-4020	
1	格納タンク RETRACTION TANK		1		

DRAWN 10/Jan/2017 T.YAMASAKI		TITLE	CH-505
CHECKED 10/Jan/2017 H.MAKI		名称	上下装置（８インチ）250ストローク
APPROVED 10/Jan/2017 H.MAKI	CH-500/600		外寸図
SCALE 1/10	MASS 40 ±10% kg 質量はタンク、シャフト、ケーブルを含まず。 MASS DOES NOT INCLUDE TANK/SHAFT/CABLE.	NAME	HULL UNIT (8-INCH) 250 TRAVEL
DWG. No. C1354-G06- B	REF. No. 06-027-451G-1		OUTLINE DRAWING

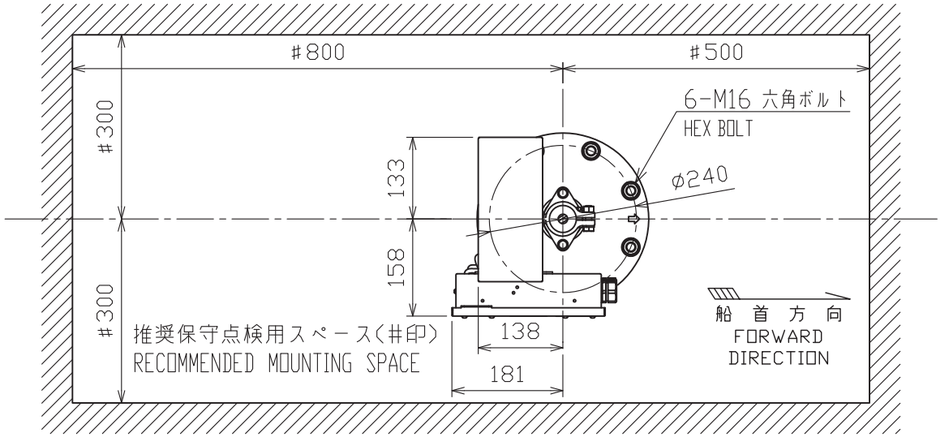
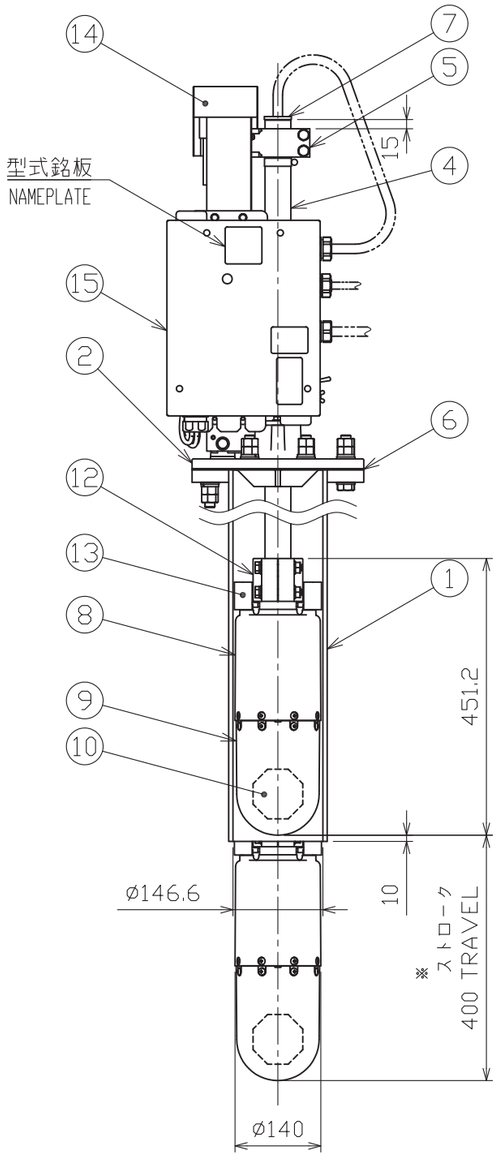


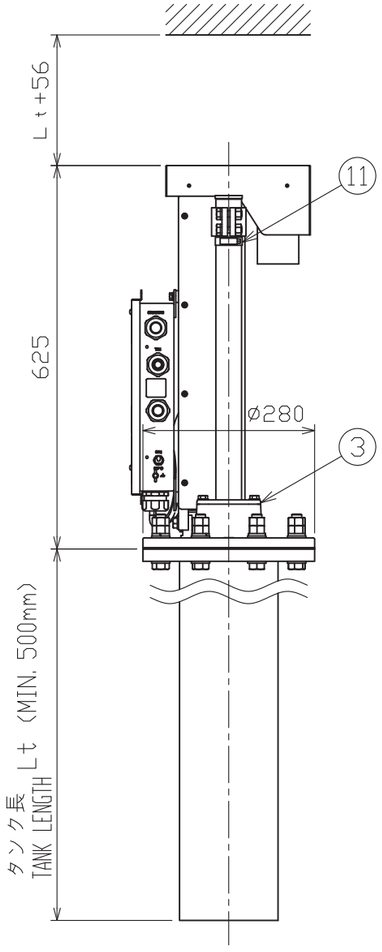
表1 TABLE 1

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

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、１９０ｍｍを加えた値で切断すること。
Ｌｓ＝Ｌｔ＋１９０（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。

NOTE
1. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS WHICH IS NOT SPECIFIED.
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 + 190 (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 300×300 mm ON THE CEILING FOR FACILITATING INSTALLATION AND FUTURE SOUNDOME SERVICE.





※ストローク
TRAVEL
400mm標準。250mmは400mmを現地改造。
STANDARD SUPPLY LENGTH: 400mm.
MODIFY THE SHAFT LENGTH LOCALLY FOR 250mm USE.

ITEM 品番	NAME 品名	MATERIAL 材質	QTY 数量	DWG. No. 図番	REMARKS 摘要
15	上下動制御部 RAISE/LOWER CONTROL UNIT		1		
14	ギヤカバー GEAR COVER	SUS304	1	06-021-4006	
13	タンクガイド TANK GUIDE	POM	2	06-027-4881	
12	軸固定具 SHAFT FIXTURE	SMC	2	06-027-4882	
11	ジュビリークリップ FASTENING BAND	SUS304	1	1X 30/40	
10	送受波器 TRANSDUCER		1		
9	ドーム（D） SOUNDOME	ABS	1	06-013-2101	
8	ドーム（U） TOP HOUSING(U)	BC2	1	06-013-2102	
7	パイプキャップ PIPE CAP	CRｺﾞﾑ	1	SHN-0011	
6	フランジパッキン GASKET	CRｺﾞﾑ	1	06-013-2303	
5	スライド金具 SHAFT RETAINER	ﾛｰｽﾞｱﾛﾝｽﾞRB-8	1	06-021-4009	
4	上下シャフト MAIN SHAFT	SUS304	1		
3	グリスコットン押え台 GREASE COTTON RETAINER	BC2	1	06-021-4025	
2	架台載台 SHAFT SLEEVE	FC200	1	06-027-4521	
1	格納タンク RETRACTION TANK		1		

DRAWN 13/Jul/2017 T.YAMASAKI		TITLE CH-504
CHECKED 13/Jul/2017 H.MAKI		名称 上下装置（6インチ）400ストローク
APPROVED 14/Jul/2017 H.MAKI	CH-500	外寸図
SCALE 1/10 MASS 34 ±10% kg	質量はタンク、シャフト、ケーブルを含まず。 MASS DOES NOT INCLUDE TANK/SHAFT/CABLE.	NAME HULL UNIT (6-INCH) 400 TRAVEL
DWG. No. C1354-G07- C	REF. No. 06-027-452G-2	OUTLINE DRAWING

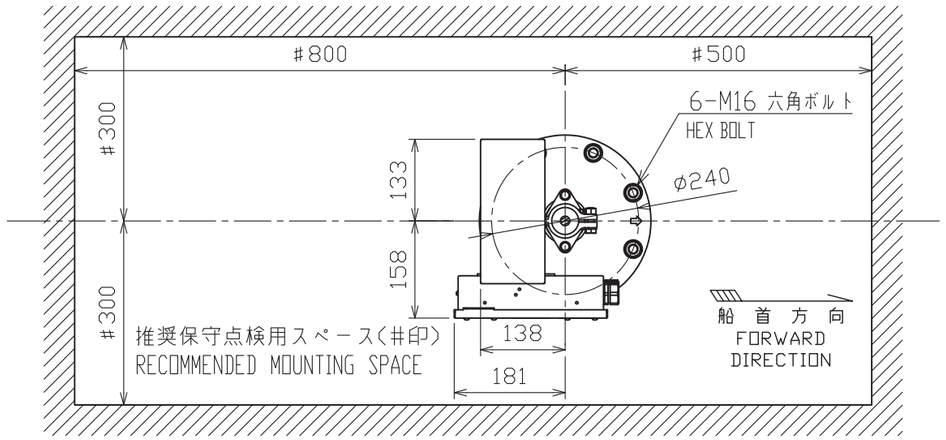
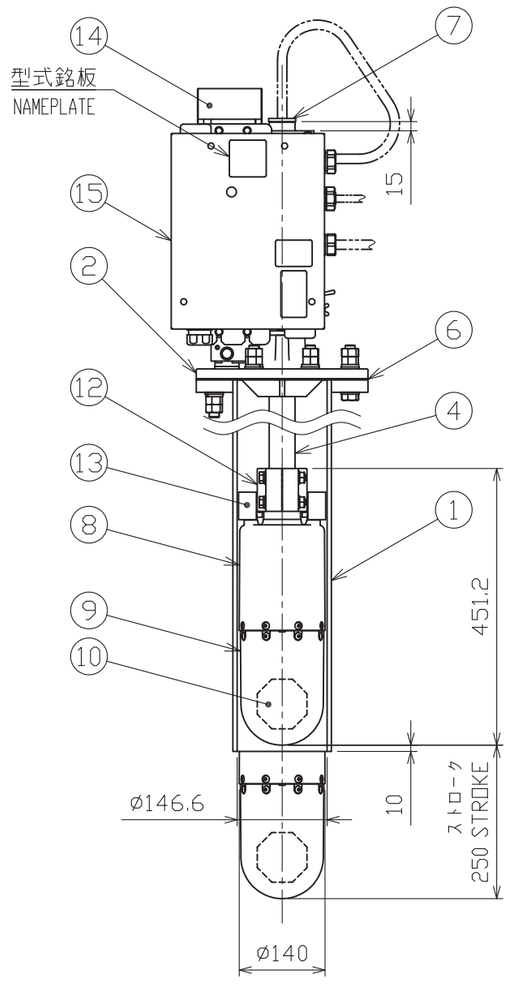


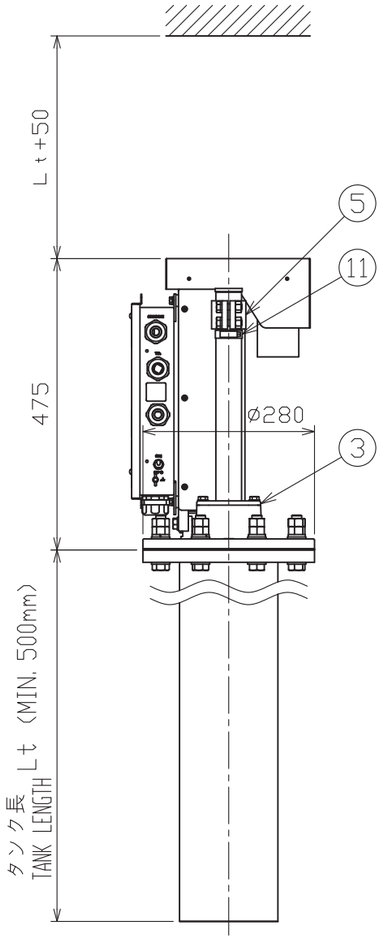
表1 TABLE 1

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

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、１９０ｍｍを加えた値で切断すること。
Ｌｓ＝Ｌｔ＋１９０（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。

NOTE
1. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS WHICH IS NOT SPECIFIED.
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 + 190 (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 300×300 mm ON THE CEILING FOR FACILITATING INSTALLATION AND FUTURE SOUNDOME SERVICE.



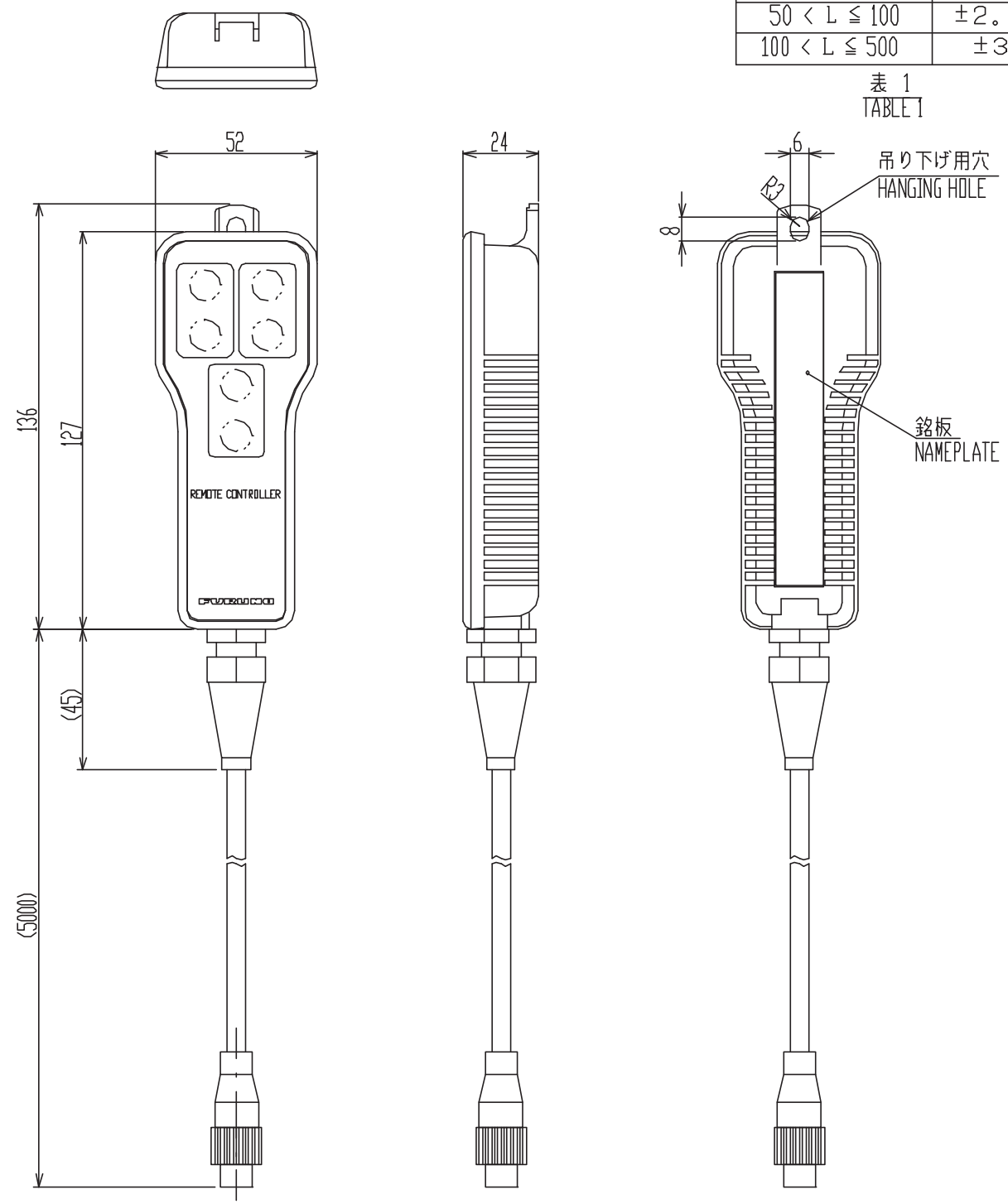


ITEM	NAME	MATERIAL	QTY	DWG. No.	REMARKS
15	上下動制御部 RAISE/LOWER CONTROL UNIT		1		
14	ギヤカバー GEAR COVER	SUS304	1	06-021-4006	
13	タンクガイド TANK GUIDE	POM	2	06-027-4881	
12	軸固定具 SHAFT FIXTURE	SMC	2	06-027-4882	
11	ジュビリークリップ FASTENING BAND	SUS304	1	1X 30/40	
10	送受波器 TRANSDUCER		1		
9	ドーム（D） SOUNDOME	ABS	1	06-013-2101	
8	ドーム（U） TOP HOUSING(U)	BC2	1	06-013-2102	
7	パイプキャップ PIPE CAP	CRｺﾞﾑ	1	SHN-0011	
6	フランジパッキン GASKET	CRｺﾞﾑ	1	06-013-2303	
5	スライド金具 SHAFT RETAINER	ﾛｰｽﾞﾌﾞﾛﾝｽﾞRB-8	1	06-021-4009	
4	上下シャフト MAIN SHAFT	SUS304	1		
3	グリスコットン押え台 GREASE COTTON RETAINER	BC2	1	06-021-4025	
2	架台載台 SHAFT SLEEVE	FC200	1	06-027-4521	
1	格納タンク RETRACTION TANK		1		

DRAWN	15/Dec/2017 T.YAMASAKI
CHECKED	15/Dec/2017 H.MAKI
APPROVED	18/Dec/2017 H.MAKI
SCALE	1/10
MASS	33 ±10% kg
質量はタンク、シャフト、ケーブルを含まず。 MASS DOES NOT INCLUDE TANK/SHAFT/CABLE.	
DWG. No.	C1354-G08- D
REF. No.	06-027-453G-2
CH-500	
TITLE	CH-505
名称	上下装置（6インチ）250ストローク
	外寸図
NAME	HULL UNIT (6-INCH) 250 TRAVEL
	OUTLINE DRAWING

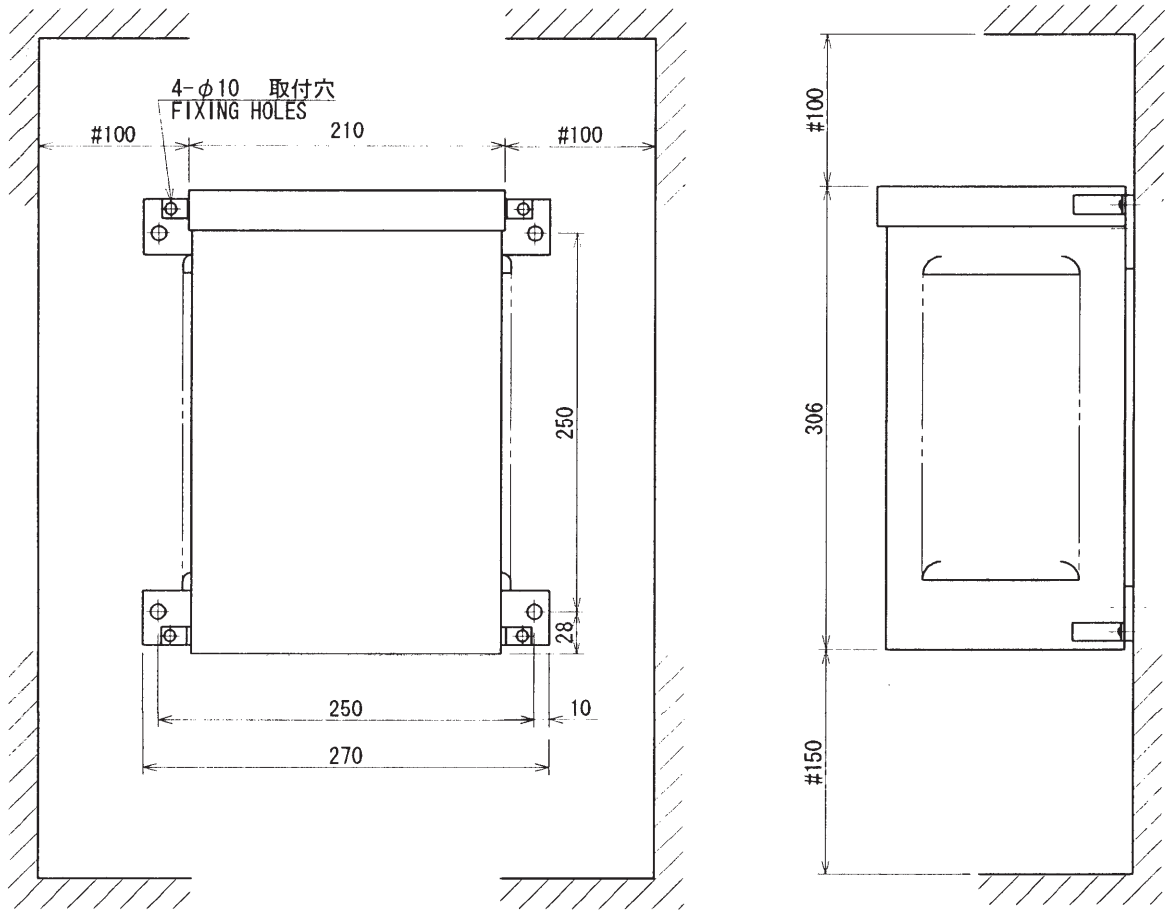
寸法区分（mm）DIMENSION	公差（mm）TOLERANCE
0 < L ≦ 50	±1.5
50 < L ≦ 100	±2.5
100 < L ≦ 500	±3

表 1
TABLE 1

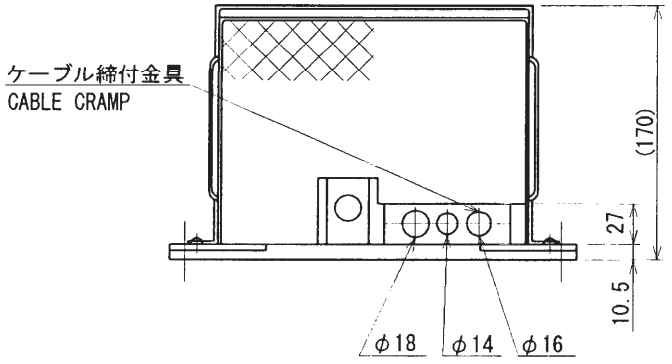


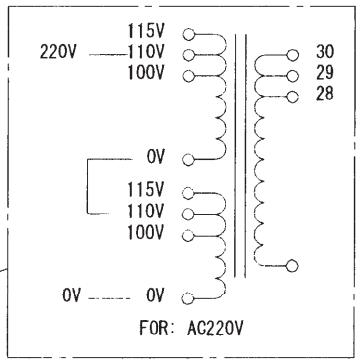
注記　1）　指定なき寸法公差は表 1 による。
NOTE　1. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS.

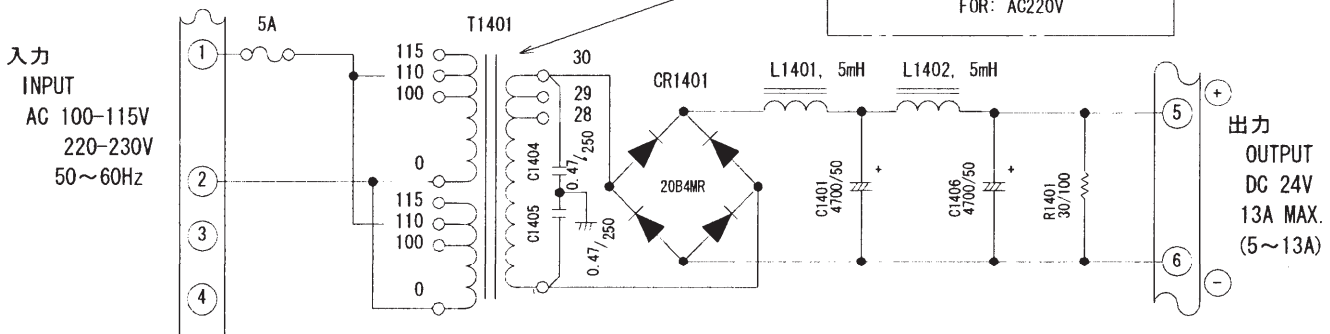
DRAWN June 1, 2003 H. MAKI		TITLE	CH-256
CHECKED Takahashi T.		名称	リモートコントローラ
APPROVED Takahashi T.	CH-250/CH-270		外寸図
SCALE 1/2 MASS 0.3 ±10% kg	質量はケーブル重さを含む MASS W/ CABLE	NAME	REMOTE CONTROLLER
DWG.No. C1316-G06- D	06-021-6000-G2		OUTLINE DRAWING



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



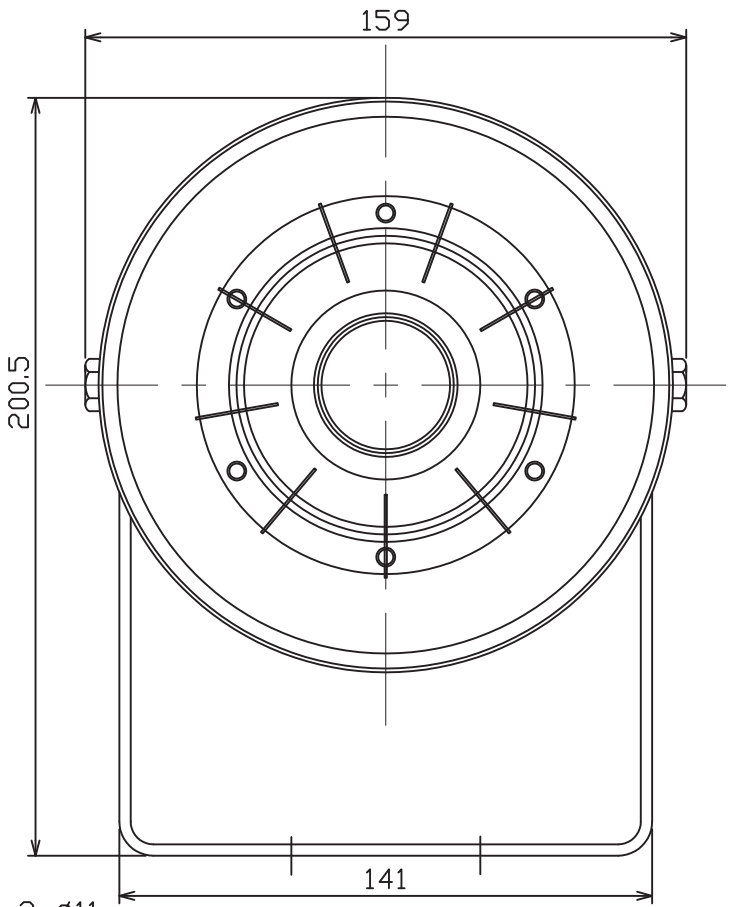


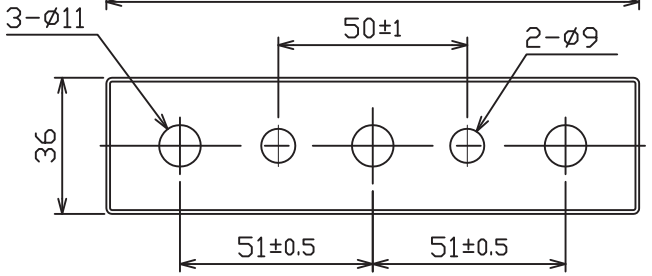


注記 AC220V入力に対しては T1401の一次巻線を直列に接続する。
NOTE FOR 220V AC INPUT, CONNECT T1401 PRIMARY WINDINGS IN SERIES.

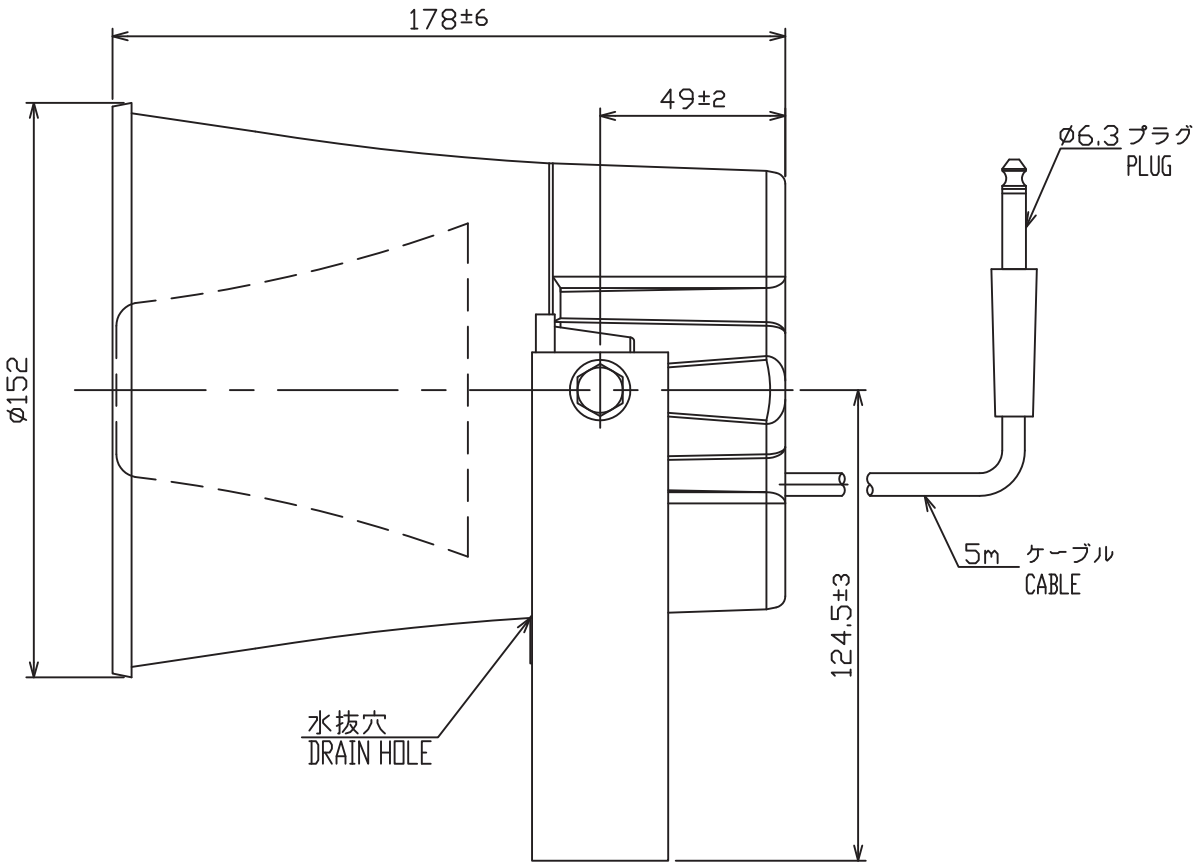
DRAWN Aug16'00 T.YAMASAKI		TITLE	RU-1746B-2
CHECKED Aug17'00 Y.K		名称	整流器
APPROVED Aug17'00 Y.K			外寸図
SCALE 1/5	MASS 17 kg ±10%	NAME	RECTIFIER UNIT
DWG. No. C3002-002- N			OUTLINE DRAWING

FURUNO





取付寸法
FIXING DIMENSIONS



DRAWN 25/Jul/2016 T.YAMASAKI		TITLE	CA-151S-ASSY
CHECKED 25/Jul/2016 H.MAKI		名称	5Wトランペットスピーカ
APPROVED 25/Jul/2016 H.MAKI			外寸図
SCALE 1/2 / MASS 1.4 ±10% kg	質量はケーブルを含む。 MASS INCLUDES CABLE.	NAME	TRUMPET SPEAKER
DWG.No. C5016-G08- A	REF.No.		OUTLINE DRAWING

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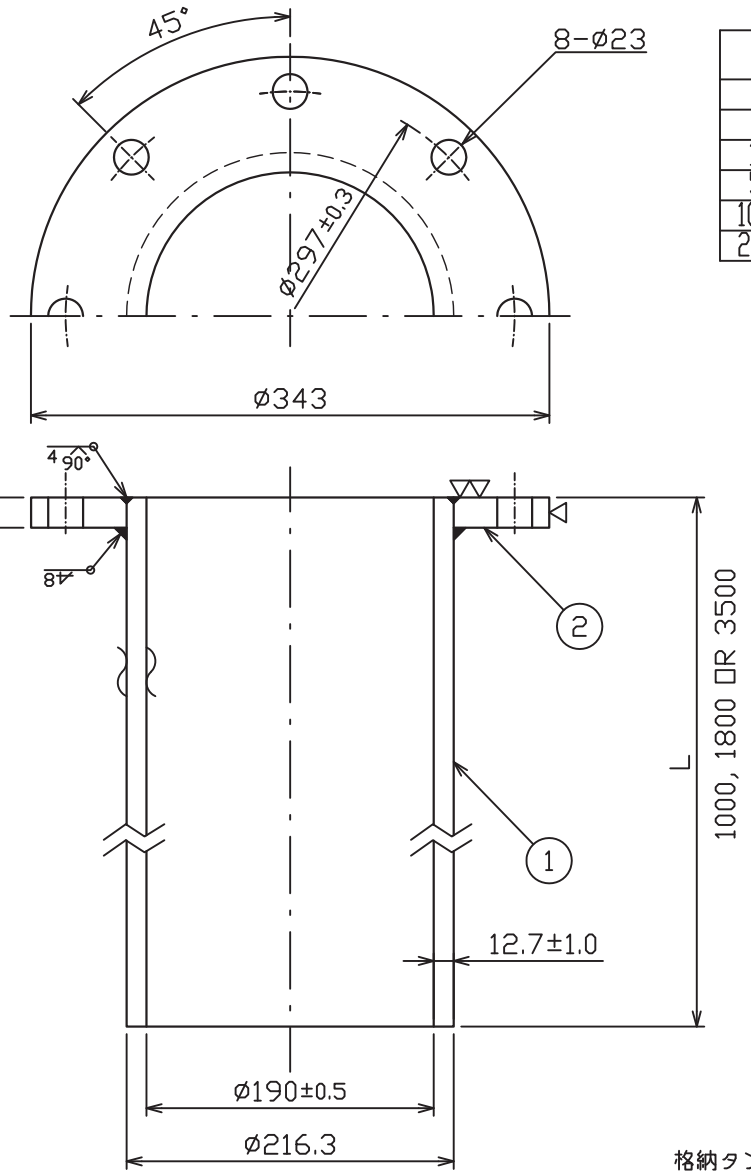


表1 TABLE 1

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

格納タンクの長さ：Lt
LENGTH OF RETRACTION TANK: Lt
Lt = [ ] mm

注記
1）指定なき寸法公差は表1による。
2）フランジ面は塗装しないこと。
3）タンク側面はエピコンジンクリッチプライマ（中国塗料製）を塗布すること。
4）タンク内面はビニル防汚塗料を二重に塗布すること。

NOTE
1. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS WHICH IS NOT SPECIFIED.
2. DO NOT PAINT ON SURFACE OF FLANGE.
3. APPLY ZINC RICH PRIMER ON OUTSIDE OF TANK.
4. APPLY VINYL ANTI-FOULING PAINT TWICE ON INSIDE OF TANK.

長さ L (mm) LENGTH (mm)	質量(kg±10%) MASS
1000	73
1800	123
3500	231

品番 ITEM	品名 NAME	材質 MATERIAL	数量 QTY	図番 DWG. No.	摘要 REMARKS
2	フランジ FLANGE	SS41P	1	JIS G3101	ROLLED STEEL FOR GENERAL STRUCTURE
1	本体 BODY	STPG-38-E-C	1	200A, 8" SCHEDULE 80	

DRAWN 7/May/2013 T.YAMASAKI		TITLE	06-007-1570
CHECKED 7/May/2013 H.MAKI		名称	格納タンク（鋼製）
APPROVED 8/May/2013 H.MAKI			外寸図
SCALE 1/5 MASS 表2参照 SEE TABLE 2		NAME	RETRACTION TANK (STEEL HULL)
DWG. No. C1229-006- H	REF. No. 06-007-1570-2		OUTLINE DRAWING

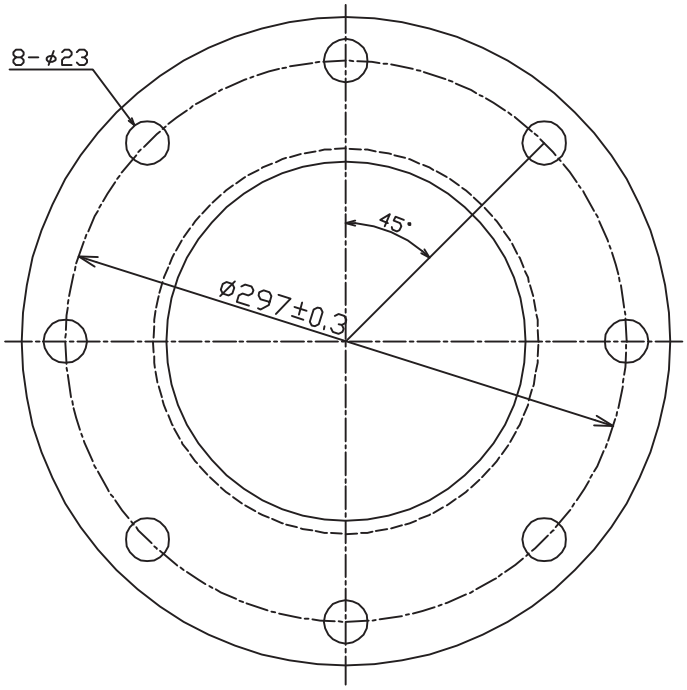
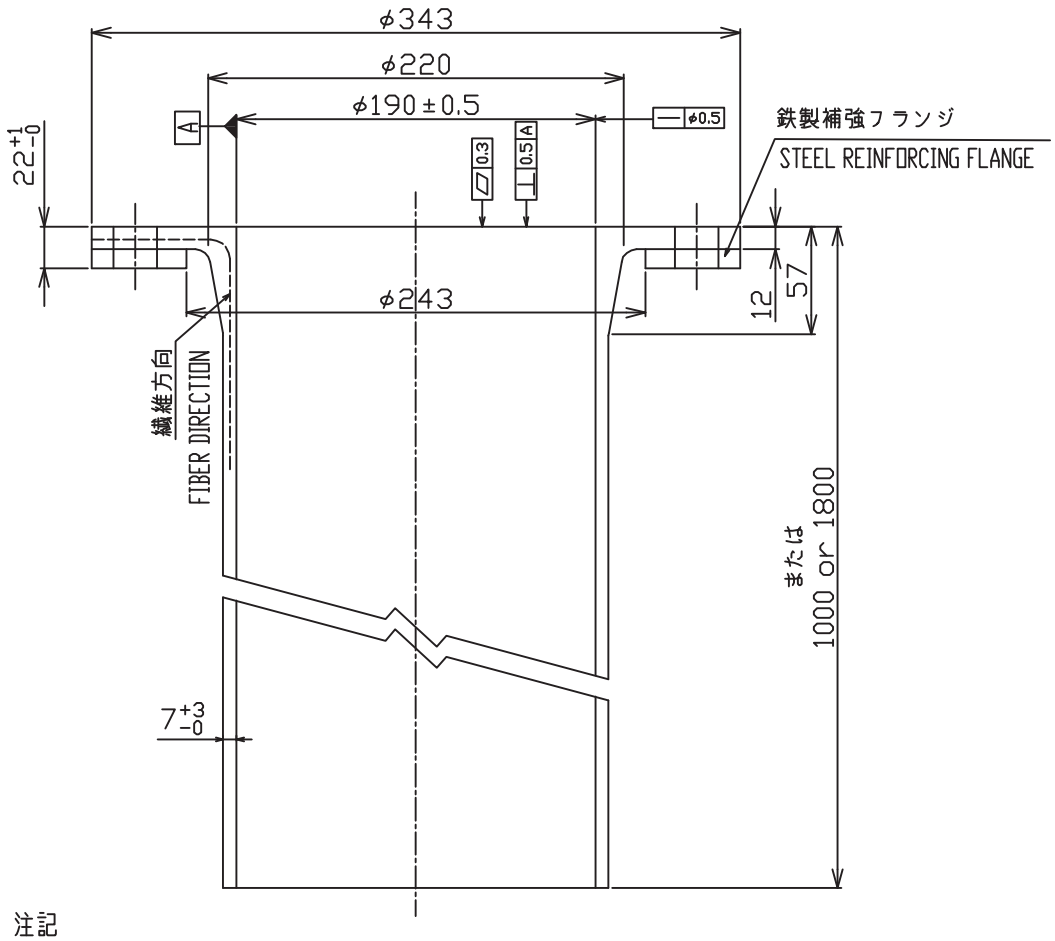


表1 TABLE 1

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

表2 TABLE 2

タンク長 (mm) TANK LENGTH	質量 (kg) MASS(±10%)	タンク型式 TANK TYPE
1000	12	06-021-4024
1800	18	06-007-1573



注記

1）指定外の寸法公差は表1による。

NOTE

1. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS WHICH IS NOT SPECIFIED.

DRAWN Nov. 04 '05 E. MIYOSHI		TITLE	06-021-4024/06-007-1573
CHECKED TAKAHASHI.T		名称	FRP格納タンク
APPROVED Y. Hatai	CH-250		外寸図
SCALE 1/4 MASS 表2参照 SEE TABLE 2	質量は鉄製補強フランジを含む MASS W/ STEEL REINFORCING FLANGE	NAME	RETRUCTION TANK (FOR FRP HULL)
DWG.No. C1315-G14- C	06-021-4024-0/06-07-1573-0		OUTLINE DRAWING

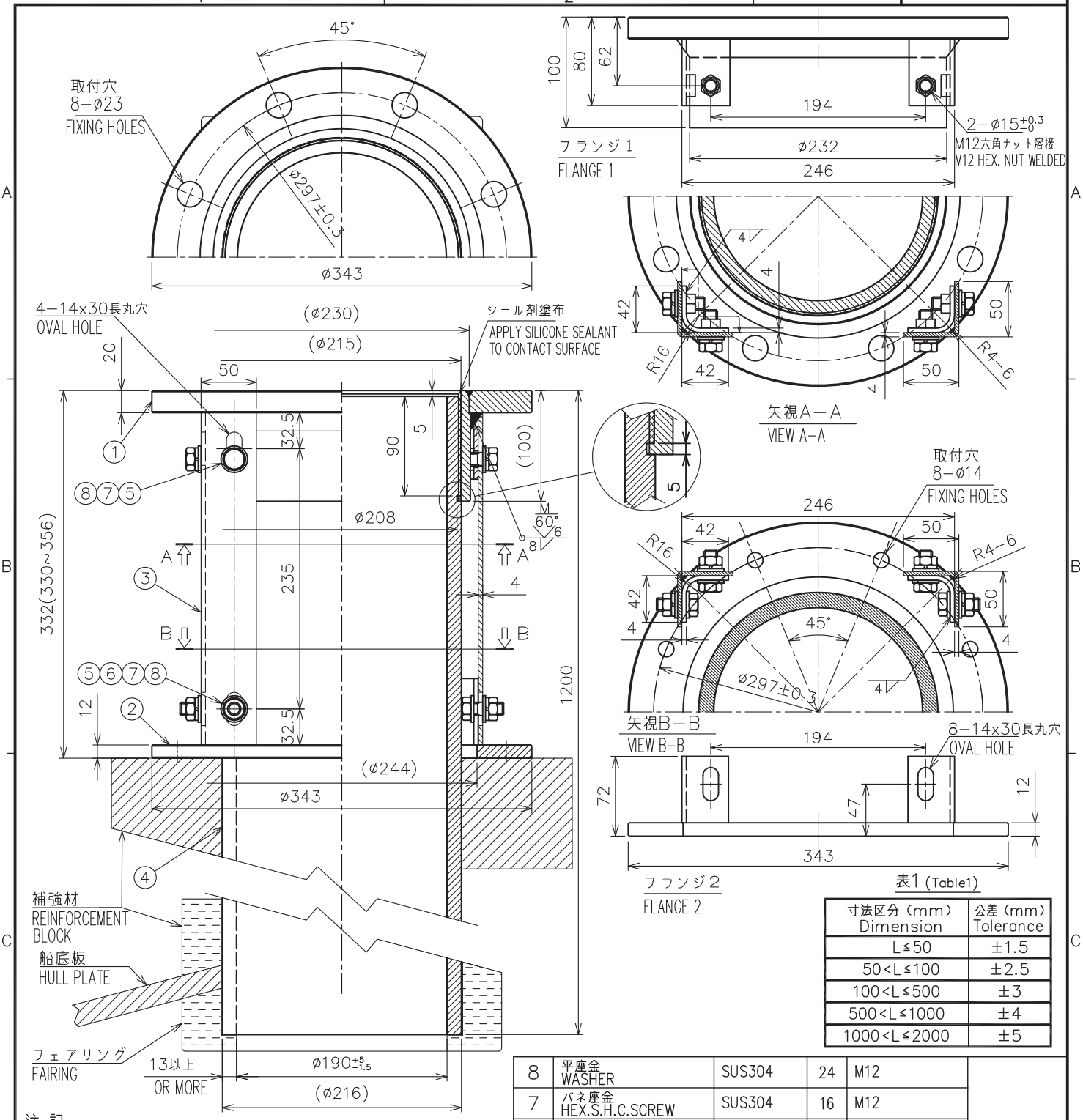


表1 (Table1)

寸法区分 (mm) Dimension	公差 (mm) Tolerance
L≦50	±1.5
50<L≦100	±2.5
100<L≦500	±3
500<L≦1000	±4
1000<L≦2000	±5

注 記
1） 指定なき寸法公差は表１による。
2） フランジ① と②,取付板③ を組立後、防錆塗装を行うこと。
3） フランジ① とＰＶＣパイプ④ をシリコンゴムで接着のこと。

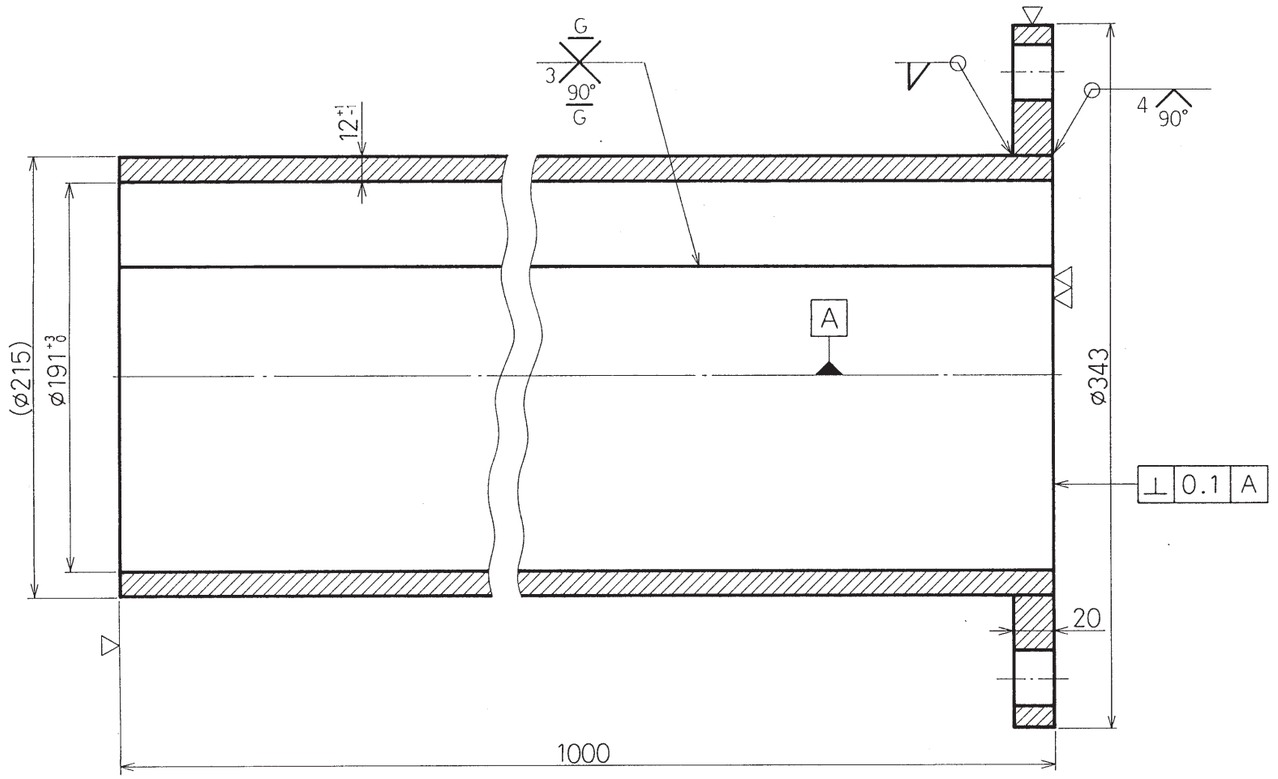
NOTE
1. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS WHICH IS NOT SPECIFIED.
2. AFTER THE FLANGES ① ② AND FIXING PLATE ③ ARE ASSEMBLED, APPLY PAINT FOR ANTICORROSION.
3. COAT THE PIPE ④ AND THE FLANGE ① WITH SILICONE SEALANT.

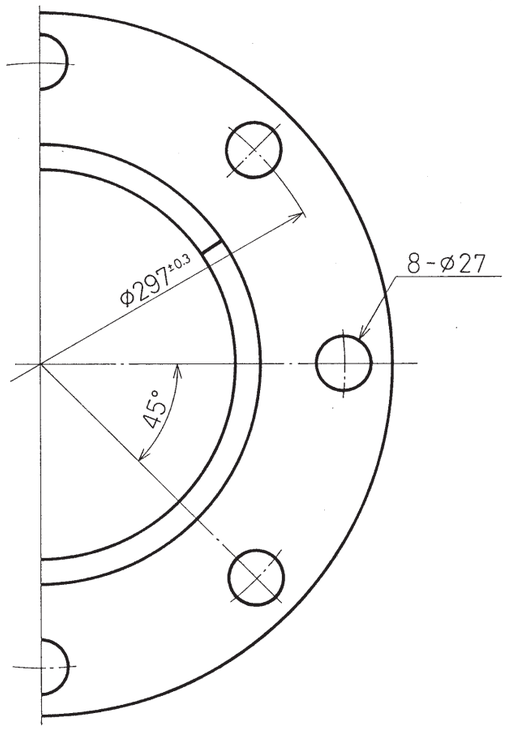
品番 ITEM	品名 NAME	材質 MATERIAL	数量 QTY	図番 DWG.NO.	摘要 REMARKS
8	平座金 WASHER	SUS304	24	M12	現地手配 LOCAL SUPPLY
7	バネ座金 HEX.S.H.C.SCREW	SUS304	16	M12	
6	六角ナット HEX. NUT	SUS304	8	M12	
5	六角ボルト HEX. BOLT	SUS304	16	M12×20	
4	ＰＶＣパイプ PVC PIPE	PVC−U	1	79−002−5875	
3	取付板 FIXING PLATE	SUS304	4	79−002−5874	
2	フランジ2 FLANGE2	SUS304	1	79−002−5873	
1	フランジ1 FLANGE1	SS400	1	79−002−5913	

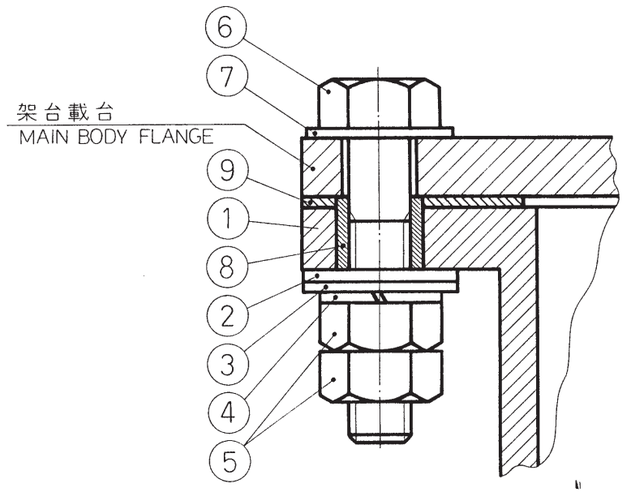
DRAWN 26/Jun/2014 T.YAMASAKI		TITLE	PVC TANK
CHECKED 26/Jun/2014 H.MAKI		名称	格納タンク（木船用）
APPROVED 26/Jun/2014 H.MAKI	CH-250		外寸図
SCALE 1/5 MASS 35.1 ±10% kg		NAME	RETRACTION TANK (WOODEN HULL)
DWG. No. C1316-G14- B	REF. No. 79-002-5903-1		OUTLINE DRAWING

FURUNO

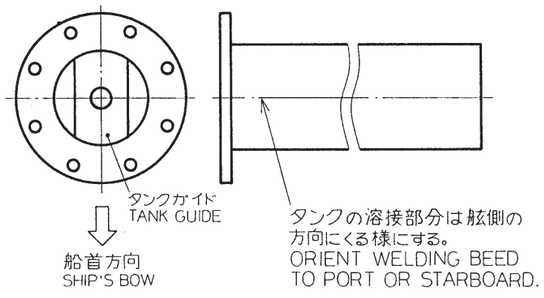
D-17







a) 格納タンク装備要領
ORIENTATION OF TANK



注）架台，格納タンクに他の電気機器のアースを取らないこと。
NOTE. DO NOT CONNECT GROUNDING WIRE OF OTHER EQUIPMENT TO RETRACTION TANK.

ITEM	NAME	MATERIAL	Q'TY	DWG.NO.	REMARKS
9	フランジパッキン GASKET	CR	1	SHJ-0009-1	
8	絶縁パッキン (2) INSULATION PACKING (2)	CR	8	MS-1000-68	
7	平座金 FLAT WASHER	SUS304	8	M20用	
6	六角ボルト HEX. BOLT	SUS304	8	M20 × 100	
5	六角ナット HEX. NUT	SUS304	8	M20	
4	スプリングワッシャ SPRING WASHER		8		
3	ワッシャ WASHER	SUS304	8	SHG-0002	
2	絶縁板 (2) INSULATION WASHER (2)	CR	8	SHG-0004	
1	格納タンク（アルミ） RETRACTION TANK	A5083	1	10-044-2601	

承認 APPROVED	DEC・27・'90 T.NAKANO	三角法 THIRD ANGLE PROJECTION		名称 TITLE	格納タンク(アルミ)外寸図 RETRACTION TANK (ALUMINUM)
検図 CHECKED	DEC・27・'90 T. MIYOSHI	尺度 SCALE	1/3		
製図 DRAWN	DEC・27・'90 M. USUDA	重量 WEIGHT	35 kg	図番 DWG.NO.	C1273-G09-A

CSH-5

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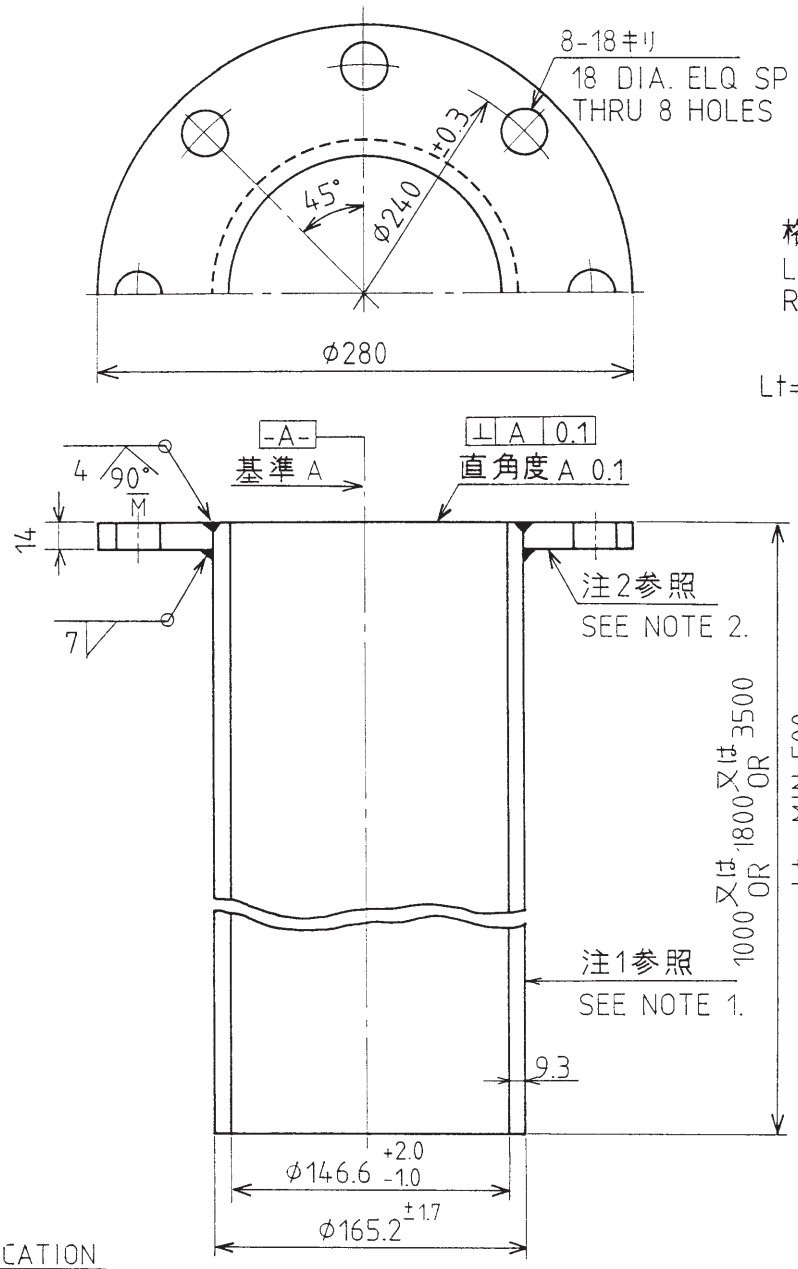


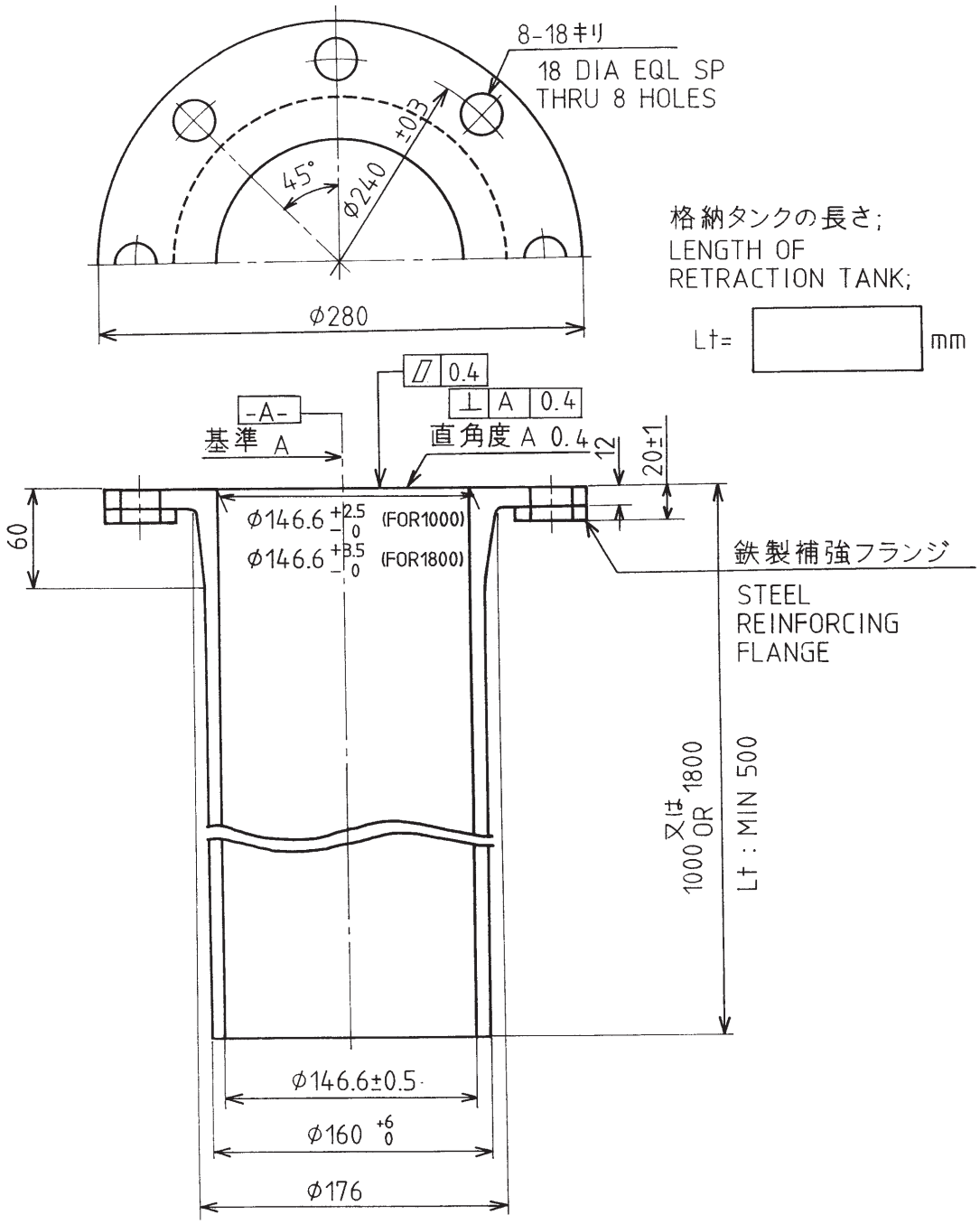
製作時の注意
NOTE FOR FABRICATION

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



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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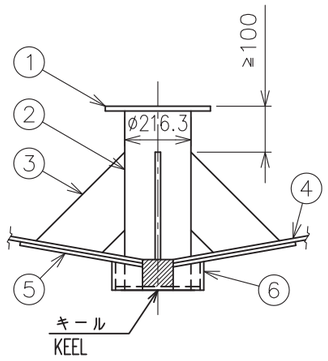
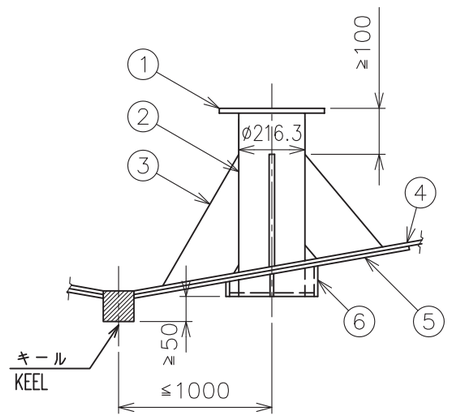
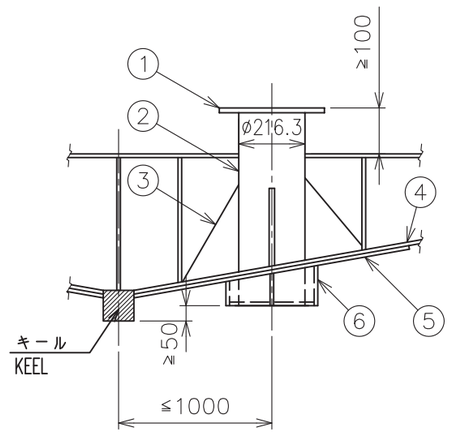
Ⓐキール上（突出） ON KEEL(PROJECTED)



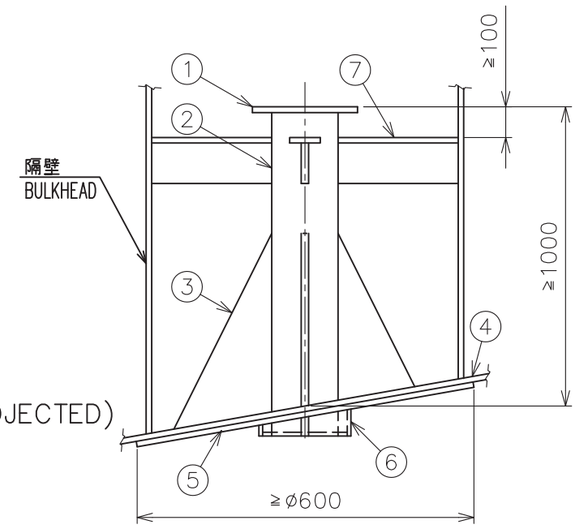
Ⓑキール横（突出） OFF KEEL(PROJECTED)



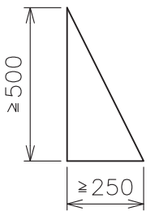
Ⓒキール横（二重船底） OFF KEEL (DOUBLE HULL)



Ⓓタンク長１ｍ以上の場合(TANK'S LENGTH ≧ 1m)

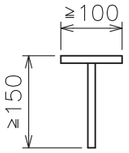


※タンク長１ｍ以上の場合の補強板③
③REINFORCEMENT PLATE 1 FOR THE TANK LENGTH 1000 OR MORE.



厚み（ｔ）：船底板厚以上
THICKNESS (t): MORE THAN HULL PLATE

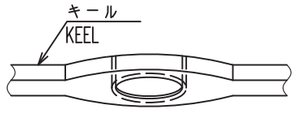
※タンク長１ｍ以上の場合の補強板⑦
⑦REINFORCEMENT PLATE 2 FOR THE TANK LENGTH 1000 OR MORE.



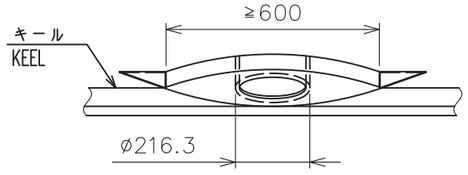
厚み（ｔ）：船底板厚以上
THICKNESS (t): MORE THAN HULL PLATE

Ⓔ整流覆 FAIRING PLATE

※キール上 ON KEEL



※キール横 OFF KEEL



装備手順

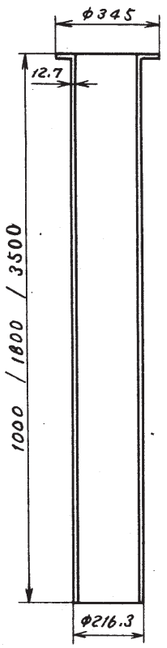
1．次の点に注意して、格納タンク船底板に連続スミ肉溶接する。
＊喫水線の上までタンク長を取る方が望ましい。
＊タンクのフランジ面が、標準走行時に水平になる事。
＊送受波器を突出させた時に送受波器ビームがキールで遮られないようにすること。
＊タンク下は、キールの下端より５０ｍｍ以上、上であること。
2．格納タンクの周囲に外径φ６００ｍｍ程度のダブリング⑤を取付ける。又、突出装備（Ⓐ，Ⓑ）の場合には、網除けを兼ねた整流覆⑥（Ｅ図）を取り付ける。ダブリングと整流覆には、船底板と同じ材質、肉厚のものを使用すること。
3．タンク周囲４ヶ所以上に補強板③を溶接する。
4．上下装置本体を格納タンクにボルト締めするのに必要なスペースとして、フランジ面の位置が補強板・二重船底板より１００ｍｍ以上離す。二重船底が高い船にはⒸ図の方法で二重船底板を下げ、スペースを確保すること。

INSTALLATION METHOD OF RETRUCTION TANK

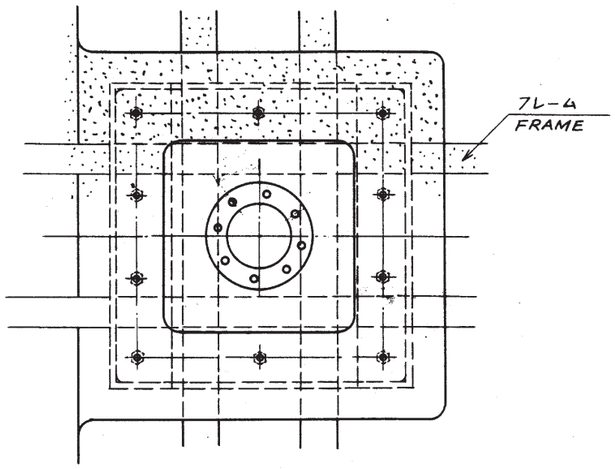
1．Install tank to hull plate with fillet welding taking the following points into account;
＊The tank flange position is desired to be above water line.
＊Flange face is exactly harizontal at normal ship's trim.
＊When transducer is fully lowered,transducer beam is desired not to be blocked by the keel.
＊The tank bottom, it is above 50mm from the lower end of the keel.
2．Fit doubling plate ⑤ of outer dia. about φ600mm around the tank on hull plate. Fit fairing plate ⑥ referring to the drawing Ⓔ for installation method Ⓐ and Ⓑ. Use same material and thickness of doubling and fairing plate as hull plate.
3．A reinforcement plate ③ is welded to the 4 pcs or more around the tank.
4．Allow clearance of more than 100mm below the flange face for easy bolting. Lower the inner hull plate as shown in the drawing Ⓒ if the specified clearance is not secured.

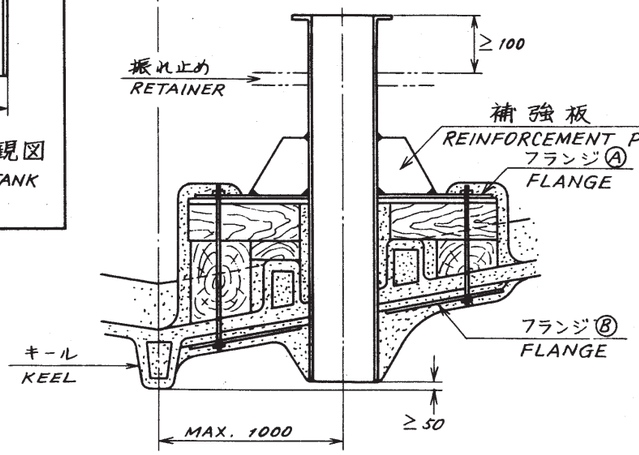
品番 ITEM	品名 NAME	材質 MATERIAL	数量 Q'TY	図番 DWG.NO.	摘要 REMARKS
7	補強板（２） REINFORCEMENT PLATE				
6	整流覆 FAIRING PLATE				
5	ダブリング DOUBLING				
4	船底板 HULL PLATE				
3	補強板（１） REINFORCEMENT PLATE				
2	格納タンク RETRACTION TANK				
1	タンクフランジ TANK FLANGE				

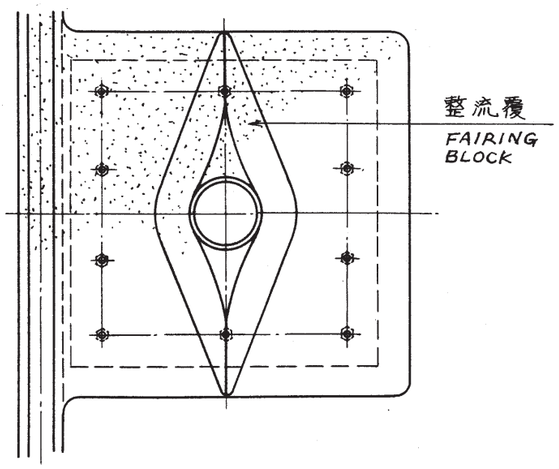
DRAWN 2/Sep/2013 T.YAMASAKI		TITLE 06-007-1570
CHECKED 2/Sep/2013 H.MAKI		名称 格納タンク（鋼船、アルミ船）
APPROVED 3/Sep/2013 H.MAKI		装備要領
SCALE 1/20 MASS ±10% kg		NAME RETRACTION TANK (STEEL/ALUMINUM HULL)
DWG. No. C1316-Y01- C	REF. No. 06-021-401G-2	INSTALLATION PROCEDURE



鉄製格納タンク外観図
STEEL RETRACTION TANK
OUTLINE DRAWING







1. 格納タンクの装備は次の条件を満すこと。
   1) 取付位置は船首から 1/3 (小型船の場合は 1/2) 程度。
   2) キールより 1 m 以内。
   3) フランジのボルト締めのため フランジ下面と障害物 (二重船底等) との間に 100 mm 以上のスペースがあること。
   4) タンクの先端はキールの先端より 50 mm 上であること。
   5) タンクのフランジ面は標準走航時に水平であること。

2. 格納タンクの装備は、次の要領を参考にして行うこと。
   1) フレーム間の船底にタンクが通る穴をあける。
   2) タンクあるいは タンクと同径の中子を貫通させ、その回りに フランジⒶの乗せられる取付台を作り FRP で フレーム、船底間に固定する。
   3) フランジⒶの取付穴に合わせて取付台にボルトを立てておく。必要があれば フランジⒷを作り ボルトを船底から貫通させる。
   4) FRP 硬化後タンクあるいは中子を抜き取る。
   5) フランジⒶをタンクに溶接する。
   6) フランジⒶ下面及びタンク外周に FRP－鉄接着剤を塗布した後 タンクを取りつける。
   7) 漫水を防ぐため充分に FRP で必要個所を塗り固める。特にタンク回りは流線型に成型し 水による抵抗及び気泡発生を最少限におさえる様努めること。
   8) 必要に応じて タンクのフランジ面下部 100 mm の位置より 隔壁等に向けて振れ止めを設けること。 また フランジⒶ溶接時、タンクの周囲 3, 4 ヶ所で フランジⒶに向けて、補強板を溶接する。

注：強度及び水密性について、船主、造船所担当者、施工者の間で充分協議し、取付位置、方法、材料等を決定すること。

1. SATISFY THE FOLLOWING CONDITIONS IN DECIDING THE RETRACTION TANK MOUNTING SITE.
   1) ABOUT 1/3 (1/2 IN CASE OF SMALL BOAT) OF SHIP'S LENGTH FROM BOW.
   2) WITHIN 1000 mm FROM KEEL LINE.
   3) ALLOW CLEARANCE OF MORE THAN 100 mm BENEATH TANK FLANGE TO FACILITATE BOLTING.
   4) KEEP LOWEST END OF TANK 50 mm ABOVE BOTTOM OF KEEL.
   5) TANK FLANGE SHOULD BE EXACTLY HORIZONTAL WHEN SHIP IS NORMALLY TRIMMED.

2. INSTALL THE RETRACTION TANK REFERRING TO THE PROCEDURE BELOW.
   1) CUT OUT A HOLE FOR PASSING THE TANK ON THE HULL PLATE.
   2) PASS THE TANK OR A CORE HAVING THE SAME DIAMETER AS THE TANK THRU THE HULL PLATE. MAKE A MOUNTING BED WITH WOODEN BLOCK AND FRP AROUND THE TANK OR THE CORE. THIS BED IS USED TO MOUNT THE FLANGE Ⓐ.
   3) WHEN FABRICATING THE MOUNTING BED, STAND THE BOLTS ON THE BED FOR FIXING THE FLANGE Ⓐ. IF NECESSARY, MAKE THE FLANGE Ⓑ TO ENSURE FIXING OF THE FLANGE Ⓐ.
   4) AFTER FRP IS STIFFENED, DRAW OUT THE TANK OR THE CORE FROM THE MOUNTING BED.
   5) WELD THE FLANGE Ⓐ TO THE TANK.
   6) APPLY A STEEL-FRP ADHESIVE TO THE TANK AND THE FLANGE Ⓐ, AND INSTALL THE TANK WITH FLANGE Ⓐ IN PLACE. SETTLE THE FLANGE Ⓐ WITH BOLTS AND NUTS.
   7) APPLY FRP AROUND THE PARTS OF THE TANK PROTRUDING FROM THE HULL BOTTOM FOR SUFFICIENT REINFORCEMENT. MAKE A FAIRING BLOCK WITH FRP AROUND THE PROTRUDING PARTS OF THE TANK TO MINIMIZE THE EFFECT OF AERATION
   8) IF REQUIRED, INSTALL A REINFORCEMENT PLATE WHEN THE FLANGE Ⓐ IS WELDED TO THE TANK. IT IS ADVISABLE TO PROVIDE REINFORCEMENT ANGLES BETWEEN THE TANK AND THE ADJACENT BULKHEAD OR CEILING.

CAUTION: DISCUSSION SHOULD TAKE PLACE AND AGREEMENT BE REACHED WITH THE SHIPYARD FOR SUFFICIENT REINFORCEMENT AND WATERTIGHTNESS OF THE HULL TO COMPLY WITH THE REGULATIONS CONCERNED.

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

承認 APPROVED	NOV. 9. '77	三角法 THIRD ANGLE PROJECTION		名称 TITLE	鉄製格納タンク船底装備図(FRP船) STEEL RETRACTION TANK INSTALLATION ON FRP HULL
検図 CHECKED	NOV. 8. '77	尺度 SCALE	1/20		
製図 DRAWN	1977. 11. 7	重量 WEIGHT	kg	図番 DWG.NO.	C1243-019-F

CSH-5
CSH-5 MARK-2
CH-12/14/16/24/26

単位 UNIT: mm

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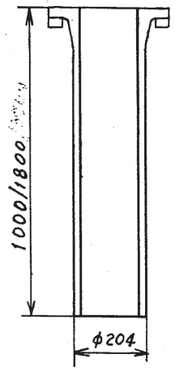
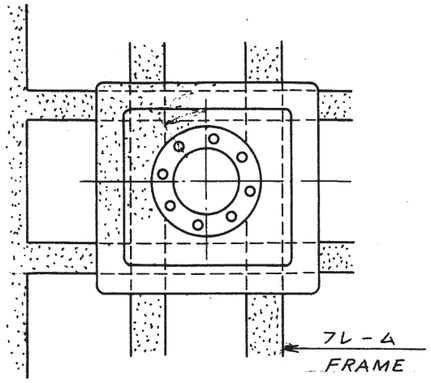
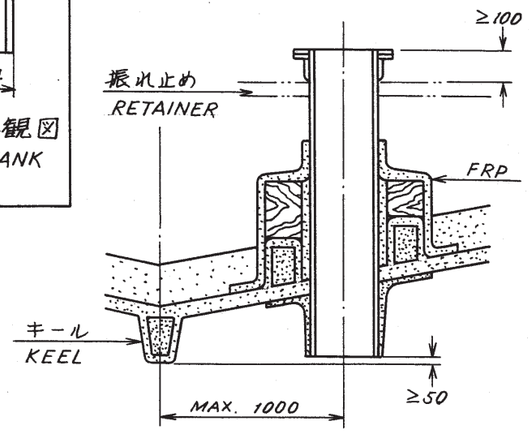
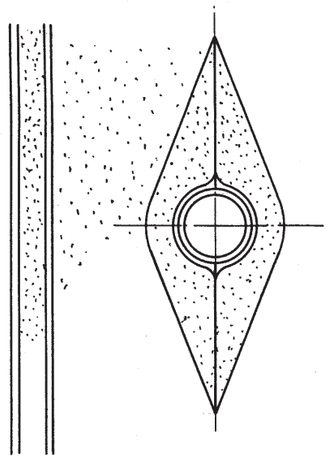


FRP製格納タンク外観図
FRP RETRACTION TANK OUTLINE DRAWING







1. 格納タンクの装備は次の条件を満すこと。
   1) 取付位置は船首から1/3（小型船の場合は1/2）程度。
   2) キールより1m以内。
   3) フランジのボルト締めのためフランジ下面と障害物（二重船底等）との間に100mm以上のスペースがあること。
   4) タンクの先端はキールの先端より50mm上であること。
   5) タンクのフランジ面は標準走航時に水平であること。

2. 浸水を防ぐため充分にFRPで必要個所を塗り固める。特にタンク回りは流線型に成型し水による抵抗及び気泡発生を最少限におさえる様努めること。
3. 必要に応じてタンクのフランジ面下部100mmの位置より隔壁等に向けて振れ止めを設けること。

注：強度及び水密性について、船主、造船所担当者、施工者の間で充分協議し、取付位置、方法、材料等を決定すること。

1. SATISFY THE FOLLOWING CONDITIONS IN DECIDING THE RETRACTION TANK MOUNTING SITE.
   1) ABOUT 1/3 (1/2 IN CASE OF SMALL BOAT) OF SHIP'S LENGTH FROM BOW.
   2) WITHIN 1000mm FROM KEEL LINE.
   3) ALLOW CLEARANCE OF MORE THAN 100mm BENEATH TANK FLANGE TO FACILITATE BOLTING.
   4) KEEP LOWEST END OF TANK 50mm ABOVE BOTTOM OF KEEL.
   5) TANK FLANGE SHOULD BE EXACTLY HORIZONTAL WHEN SHIP IS NORMALLY TRIMMED.

2. APPLY FRP AROUND THE PARTS OF THE TANK PROTRUDING FROM THE HULL BOTTOM FOR SUFFICIENT REINFORCEMENT. MAKE A FAIRING BLOCK WITH FRP AROUND THE PROTRUDING PARTS OF THE TANK TO MINIMIZE THE EFFECT OF AERATION.
3. IT IS ADVISABLE TO PROVIDE REINFORCEMENT ANGLES BETWEEN THE TANK AND THE ADJACENT BULKHEAD OR CEILING.

CAUTION: DISCUSSION SHOULD TAKE PLACE AND AGREEMENT BE REACHED WITH THE SHIPYARD FOR SUFFICIENT REINFORCEMENT AND WATERTIGHTNESS OF THE HULL TO COMPLY WITH THE REGULATIONS CONCERNED.

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: FRP製格納タンク船底装備図(FRP船) FRP RETRACTION TANK INSTALLATION ON FRP HULL
検図 CHECKED	May・14・1980	尺度 SCALE: 1/20	
製図 DRAWN	July・18・1978 M. Mori.	重量 WEIGHT: kg	図番 DWG.NO.: C1220-038-F

CSH-5
CSH-5 MARK-2
CH-12/14/16/24/26

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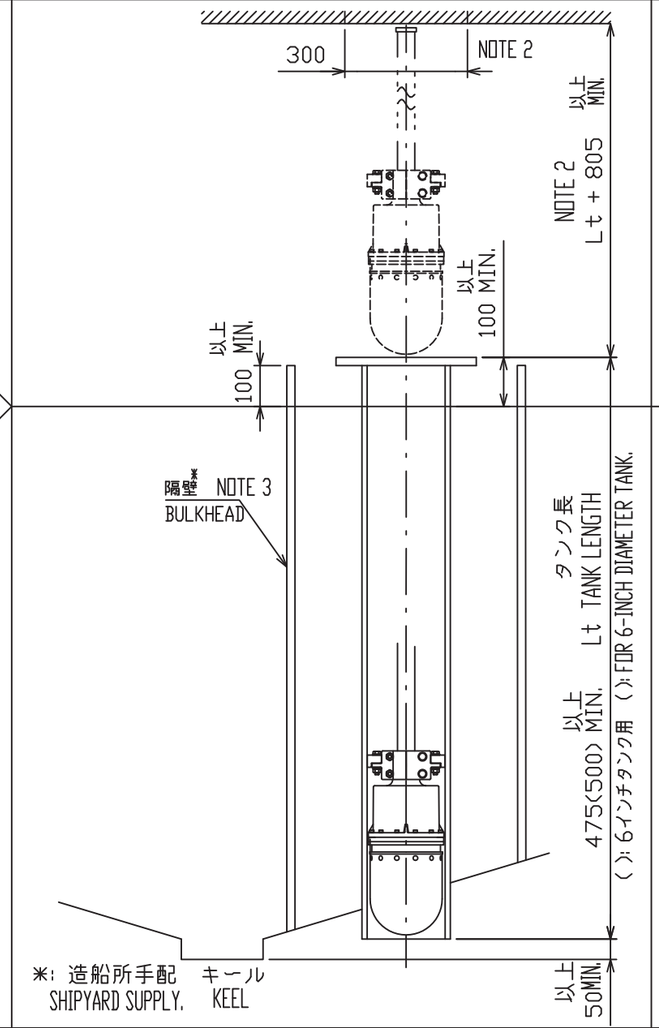
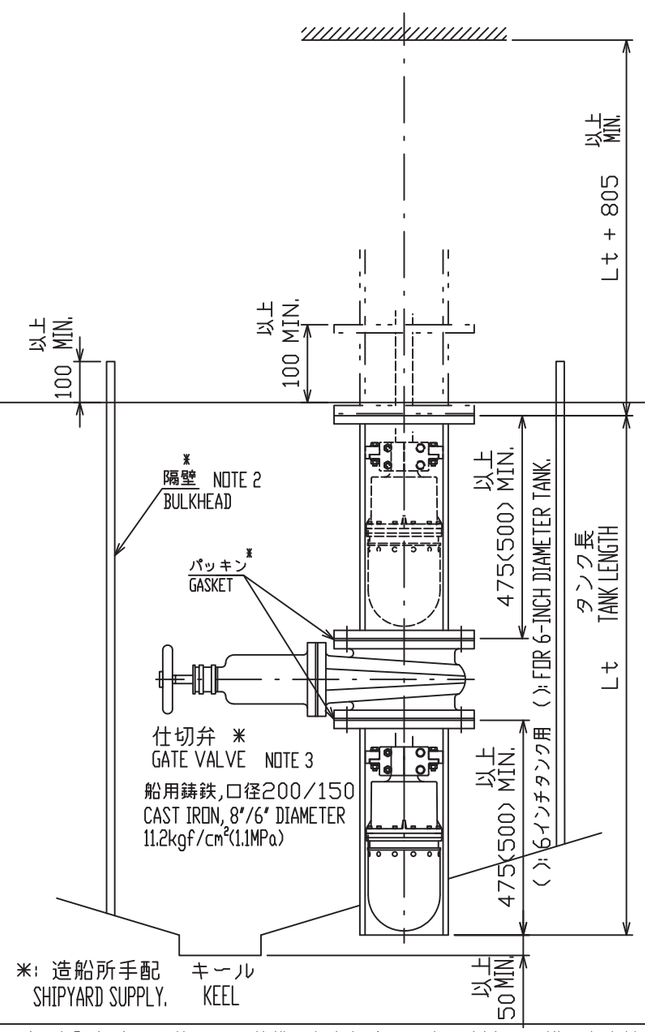
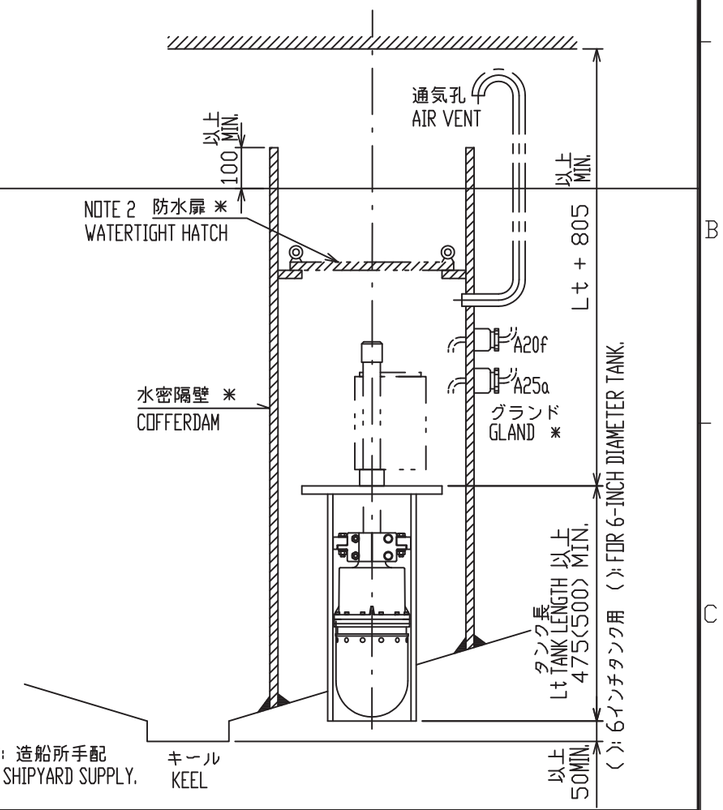
条件 CONDITION	A 満載時喫水線の上までタンク長が取れる場合。 WHEN THE LONGER TANK IS USED SO THAT ITS FLANGE POSITIONS ABOVE WATER LINE.	B 1。オフシーズンに上下装置を取りはずしておく場合。 WHEN THE OUT OF SEASON, HULL UNIT IS REMOUNTED FROM THE TANK. 2。満載時喫水線の上までタンク長が取れない場合。 WHEN THE LONGER TANK IS NOT USED DUE TO LIMITED CLEARANCE.	C タンク長を喫水線まで取れない場合で、仕切弁を使用しないとき。 WHEN THE LONGER TANK OR A GATE VALVE CANNOT BE USED.
装備法 METHOD			
注 記 NOTE	1. この装備法を標準として推奨する。 THIS METHOD IS RECOMMENDED AS STANDARD INSTALLATION. 2. 上下装置の上部に十分なサービス空間が取れない場合は、天井に 300×300の穴をあけておくこと。 WHEN OVERHEAD CLEARANCE IS NOT ALLOWED, MAKE A HOLE OF 300x300 mm ON CEILING FOR FACILITATING INSTALLATION AND FUTURE SOUNDOME SERVICE. 3. 隔壁の強度は船底外板と同等以上とする。 BULKHEAD SHOULD BE STRONG AS WELL AS HULL PLATE OR MORE.	1. 上記〈1〉の目的でこの装備を行う場合は、左図〈A〉と同様に喫水線の上までタンク長を取る方が望ましい。 THE TANK FLANGE POSITION IS DESIRED TO BE ABOVE WATER LINE, AS LIKE THE INSTALLATION METHODE 'A'. 2. 隔壁の強度は船底外板と同等以上とする。 BULKHEAD SHOULD BE STRONG AS WELL AS HULL PLATE OR MORE. 3. 仕切弁はタンク口径に合わせて選択する。 SELECT A SUITABLE GATE VALVE FOR DEPENDING ON TANK DIAMETER.	1. 水密隔壁は、船級協会規則を参照し、造船所で製作してください。 その際、サービス空間も考慮してください。 FABRICATE THE COFFERDAM BY SHIPYARD IN ACCORDANCE WITH CONCERNED REGULATIONS, ALSO PROVIDE ENOUGH SERVICE CLEARANCE. 2。水密隔壁の上限を喫水線の上までとれない場合にも、上下装置取り外しのため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.

注 記
船底から甲板まで他の船室と区切られたソナールーム以外に船底タンクを装備するとき、上記基準を遵守すること。
装備法の決定に際しては、安全性（強度、水密性等）を重視し、保守・点検の容易さにも配慮すること。

NOTE
FOLLOW THE ABOVE INSTALLATION METHODS OTHERWISE INSTALLATION IN A SONAR ROOM PARTED FROM OTHER ROOMS WITH BULKHEAD BETWEEN HULL AND DECK. DECIDE THE METHOD CONSIDERING SUFFICIENT REINFORCEMENT, WATERTIGHT OF THE SHIP'S HULL AND MAINTENANCE CLEARANCE AROUND THE UNIT ALSO.

DRAWN 6/Jul/2017 T.YAMASAKI		TITLE TANK FOR CH SERIES
CHECKED 6/Jul/2017 H.MAKI		名称 格納タンク
APPROVED 7/Jul/2017 H.MAKI	CH-250/300/500/600	送受波器装備図
SCALE 1/15 MASS - kg		NAME RETRACTION TANK
DWG No. C1316-T01- C		TRANSDUCER INSTALLATION

FURUNO

S-1

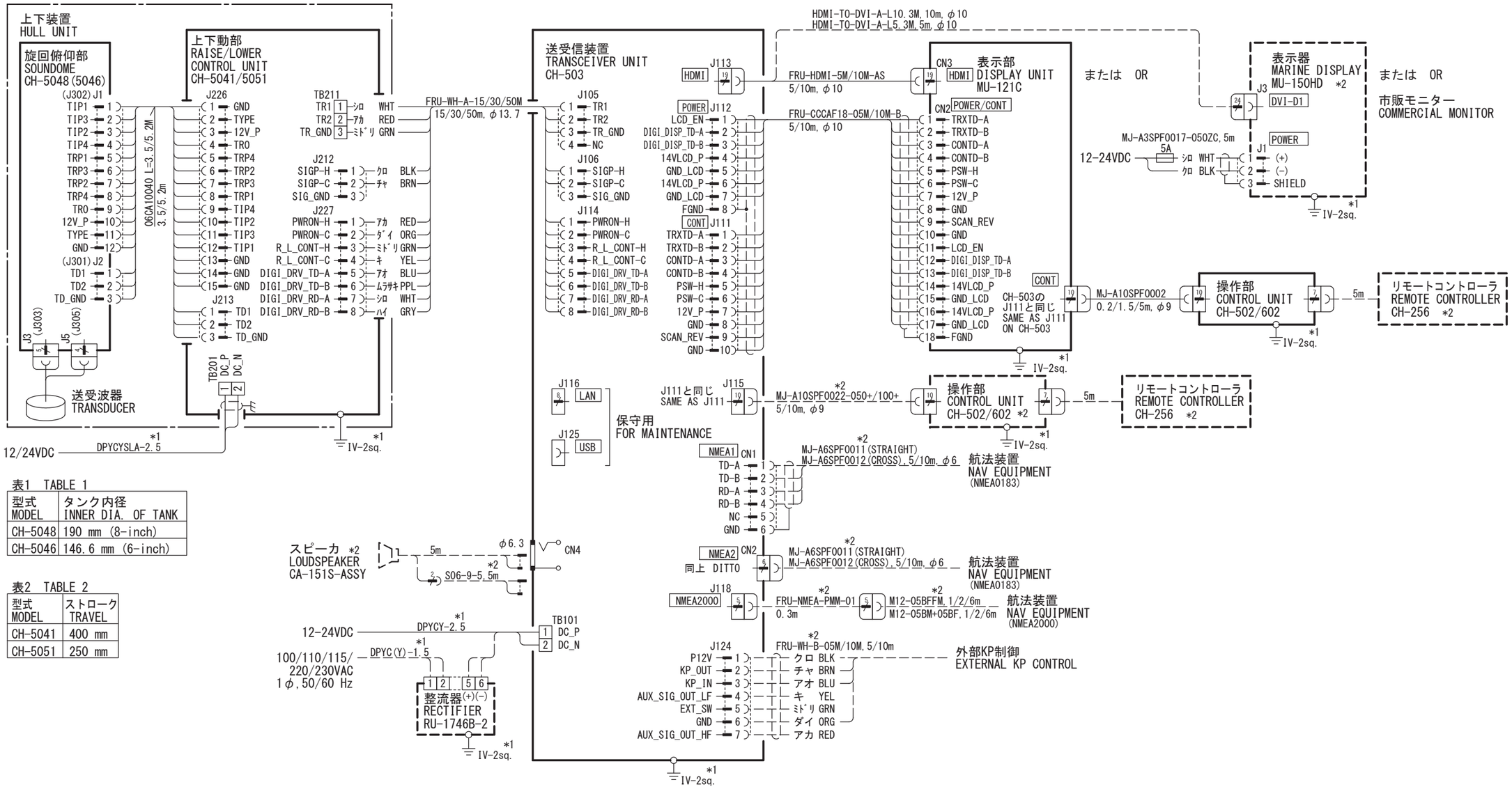


表1 TABLE 1

型式 MODEL	タンク内径 INNER DIA. OF TANK
CH-5048	190 mm (8-inch)
CH-5046	146.6 mm (6-inch)

表2 TABLE 2

型式 MODEL	ストローク TRAVEL
CH-5041	400 mm
CH-5051	250 mm

注記
＊1）造船所手配。
＊2）オプション。

NOTE
*1: SHIPYARD SUPPLY.
*2: OPTION.

DRAWN 21/Dec/2017 T.YAMASAKI		TITLE	CH-500/600
CHECKED 21/Dec/2017 H.MAKI		名称	サーチライトソナー/2周波サーチライトソナー
APPROVED 26/Dec/2017 H.MAKI			相互結線図
SCALE	MASS kg	NAME	SEARCHLIGHT SONAR/DUAL-FREQUENCY SEARCHLIGHT SONAR
DWG No. C1354-C01- F	REF. No. 06-027-0201-0		INTERCONNECTION DIAGRAM

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