

Installation Manual

DOPLER SONAR

Model DS-60

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SAFETY INSTRUCTIONS



WARNING

Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.



CAUTION

Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.



Warning, Caution



Prohibitive Action



Mandatory Action



WARNING



Have a qualified serviceman do the installation.

Only qualified personnel should work inside the equipment.



Turn off the power at the switchboard before installing the equipment.

Fire or electrical shock can result if the power on.



Do not install the unit in a place subject to rain or water splash.

Fire or electrical shock can result.



Use the specified power cable.

Fire can result if an incorrect cable is used.



CAUTION



Attach protective earth securely to the ship's body.

The protective earth (grounding) is required for the AC power supply to prevent electrical shock.



Do not weld the tank with transducer to the ship's hull.



CAUTION



Confirm that the power supply voltage is compatible with the voltage rating of the equipment.

Connection to the wrong power supply can cause fire or damage to the equipment.



The mounting location for the display, distributor and transceiver unit must satisfy the following conditions:

- Away from rain and water splash
- Out of direct sunlight
- Away from air conditioner vents
- Moderate and stable in temperature and humidity



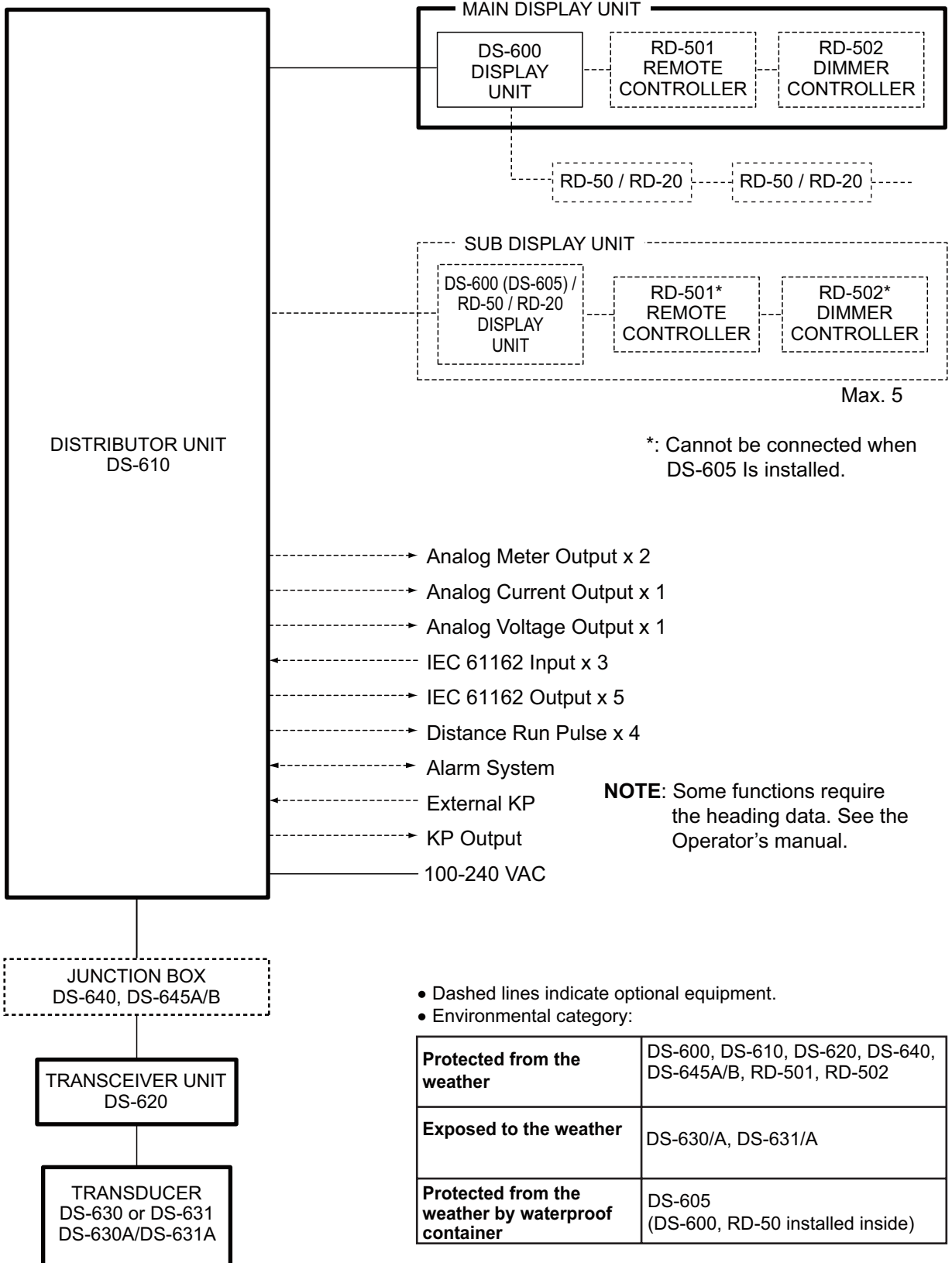
Use Chugoku Toso brand SEATENDER 20 Brown adhesive or the equivalent for the transducer.

Coat thinly and evenly. A thick coat can reduce output power.

Observe the compass safe distances to prevent interference to a magnetic compass.

	Standard	Steering
DS-600	0.60 m	0.40 m
DS-605	0.95 m	0.60 m
DS-610	3.15 m	2.00 m
DS-620	3.20 m	2.05 m
DS-640	1.15 m	0.70 m
DS-645A	1.90 m	1.25 m
DS-645B	2.00 m	1.30 m

SYSTEM CONFIGURATION



EQUIPMENT LISTS

Standard supply

Name	Type	Code No.	Qty	Remarks
Display Unit	DS-600	-	1	8.4" color LCD
Distributor Unit	DS-610	-	1	
Transceiver Unit	DS-620	-	1	
Transducer	DS-630	-	Select one.	No watertight connector. No fixing flange.
	DS-630A	-		No watertight connector. Fixing flange. (Type: 66-027-7003.)
	DS-631	-		With watertight connector. No fixing flange.
	DS-631A	-		With watertight connector and flange. Fixing flange. (Type: 66-027-7003.)
Transducer Tank	DS-660-A	-	Select one.	For DS-630/631. Tank with flange. (Type: 66-027-7002.)
	DS-660-N	-		For DS-630/631. Tank without flange.
	DS-660-S	-		For DS-630/631. Tank with sleeve. (Type: 66-027-7301.)
	DS-660A-A	-		For DS-630A/631A. Tank with flange. (Type: 66-027-7002.)
	DS-660A-N	-		For DS-630A/631A. Tank without flange.
	DS-660A-S	-		For DS-630A/631A. Tank with sleeve. (Type: 66-027-7301.)
Gate Valve	DS-661	-	1	For DS-630 only (Select one.)
Installation Material	CP26-01501	001-081-900	1 set	For DS-600
	CP66-01701	001-407-270	1 set	For DS-610
	CP66-01702	001-082-290	1 set	For DS-620
	CP66-01703	001-082-630	1 set	For DS-630
	CP66-01740	000-016-374	1 set	For DS-631 (CP66-01704, 30m cable)
	CP66-01750	000-016-375	1 set	For DS-631 (CP66-01704, 40m cable)
	CP66-01760	000-016-376	1 set	For DS-631 (CP66-01760, 50m cable)
	CP66-01770	000-016-377	1 set	For DS-631 (CP66-01760, 60m cable)
	CP66-01710	001-082-830	1 set	For DS-661 (when shipped assembled.)
	CP66-01711	001-082-800	1 set	For DS-661 (when shipped separate.)
CP66-01712	001-082-820	1 set	For DS-661, gasket (when shipped separate.)	

EQUIPMENT LISTS

Name	Type	Code No.	Qty	Remarks
Spare Parts	SP26-00101	001-076-450	1 set	For DS-600 (other than Deep Sea)
		001-077-030	1 set	For DS-600 (Deep Sea)
	SP66-00901	001-407-280	1 set	For DS-610 (other than Deep Sea)
		001-082-210	1 set	For DS-610 (Deep Sea)
	SP66-00902	001-082-520	1 set	For DS-620 (other than Deep Sea)
		001-082-530	1 set	For DS 620 (Deep Sea)
Accessories	FP66-00701	001-082-140	1 set	For DS-600

Optional Supply

Name	Type	Code No.	Qty	Remarks
Display Unit	DS-600	-	1	8.4" color LCD
Hanger	OP26-8	000-016-313	1	For DS-600
Junction Box	DS-640	-	1	w/installation materials (CP66-01721)
	DS-645A/B	-	1	
Waterproof Box	DS-605-R	000-016-398	1	w/Installation materials (CP66-01731), right-hand open door
	DS-605-L	000-016-727	1	w/installation materials (CP66-01731), left-hand open door
Flange	OP66-6	000-016-400	1	For DS-660
Tightening Handle	OP66-7	001-082-950	1	
Remote Controller	RD-501	000-016-197	1	
Dimmer Controller	RD-502	000-016-198	1	
Analog Indicator	FL-200S-1	000-015-997-10	1	-10 to 30kn, flush mount
	FL-200S-2	000-015-998-10	1	-10 to 40kn, flush mount
	SL-200-1	000-016-000-10	1	-10 to 30kn, bulkhead mount
	SL-200-2	000-016-164-10	1	-10 to 40kn, bulkhead mount
	FL-200S-1W	000-174-599-10	1	-10 to 30kn, flush mount
	FL-200S-3	000-174-600-10	1	-10 to 40kn, flush mount
	FE-90	006-931-140	1	-10 to 30 kn, panel flush mount
	FL-90	006-931-150	1	-10 to 30 kn, panel flush mount
Operator's Manual	OME-72640-*	000-172-334-1*	1	Hard copy manual, English
	OMJ-72640-*	000-172-333-1*	1	Hard copy manual, Japanese

1. INSTALLATION

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 Display Unit DS-600

Mounting Consideration

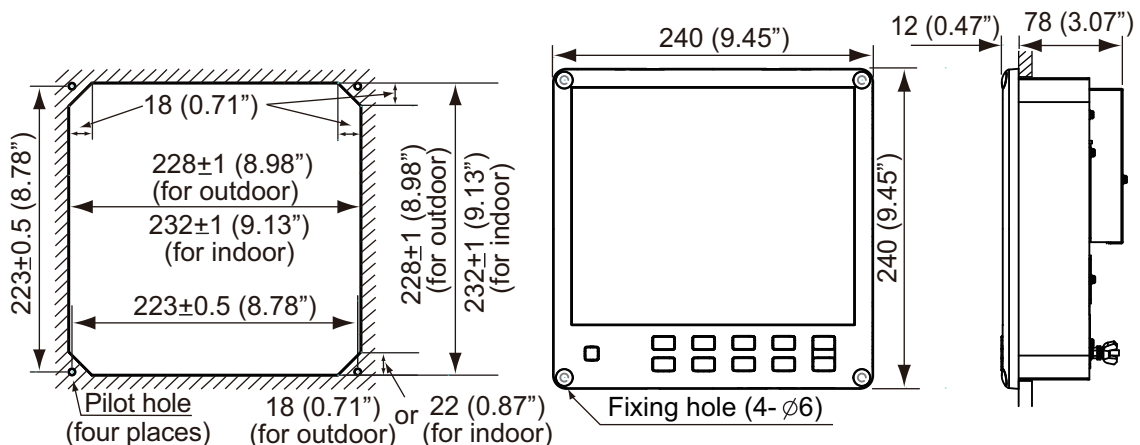
The display unit can be installed on a desktop, on the underside of a table, or flush mounted in a panel. When you select a mounting location, keep in mind the following points:

- Locate the display unit away from exhaust pipes and vents.
- Select an installation location that is well ventilated.
- Locate the display unit where shock and vibration are minimal.
- Allow enough maintenance space at the sides and rear of the display unit and leave enough slack in cables to facilitate maintenance and servicing.
- Observe the compass safe distances (see page i) to prevent the interference to a magnetic compass.
- The nominal viewing distance for the display unit is 1 m. Select a suitable mounting location considering that distance.

Flush Mount

See the outline drawing in the back of this manual. Before you fasten the display unit to the cutout, first connect the cables referring to chapter 2.

1. Make a cutout in the mounting location as shown in the illustration below.



Note: Dimensions for the cutout are different depending on the mounting location, indoor or out-door. For the outdoor mounting, ask dockyard to construct a water-proof case for the display unit.

1. INSTALLATION

2. Make four pilot holes for self-tapping screws (diameter: 5 mm) in the location indicated in the illustration on "Flush Mount" on page 1-1.
3. Insert the sponge to the display unit from the rear side.
4. Set the display unit to the cutout and fasten the display unit with four self-tapping screws (5x20).
5. Set a cosmetic cap to each fixing hole on the front panel. See page 1-3.

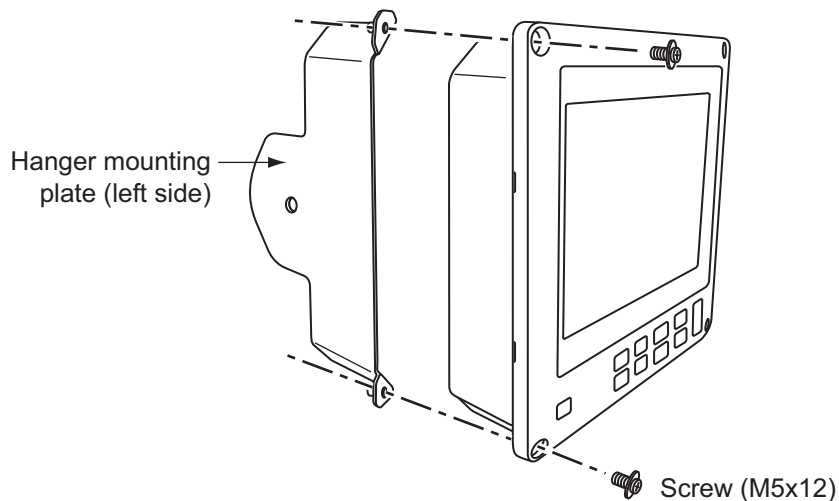
Desktop or table underside mount

The display unit can be mounted on a desktop or on the underside of a table using the optional hanger. See the outline drawing for details.

Hanger assembly (Type: OP26-8, Code No.: 000-016-313-00)

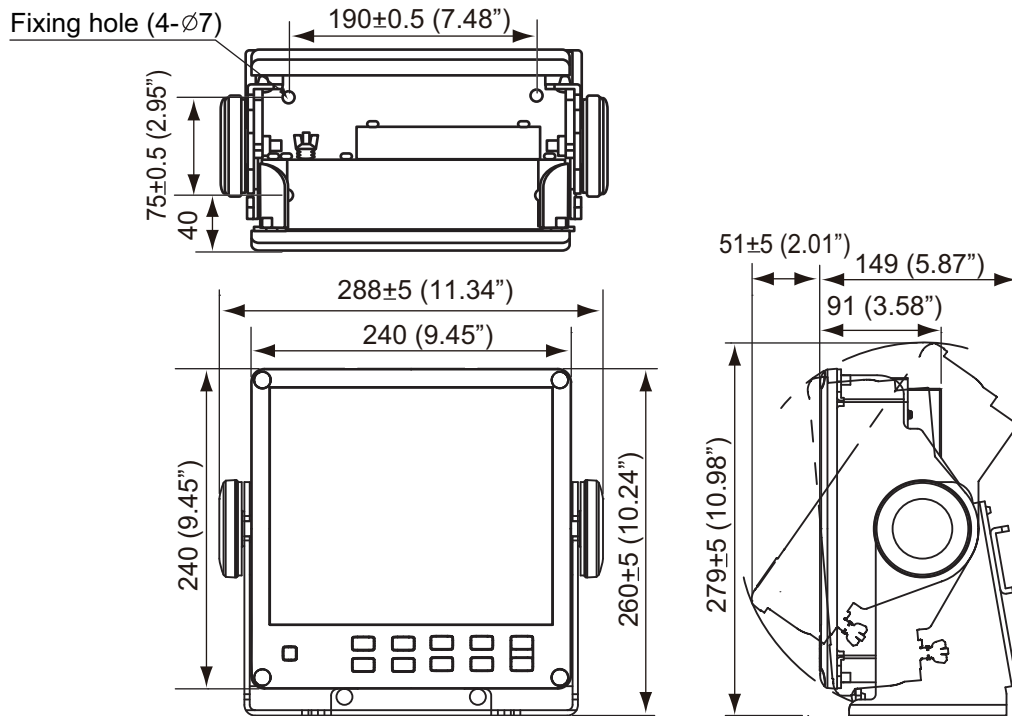
Name	Type	Code No.	Qty
Self-tapping screw	5x20	000-171-997-10	4
Binding head screw	M5x12	000-171-999-10	4
Hanger Assembly	OP26-8-1	001-081-920-00	1

1. Remove the hanger mounting plate from the hanger assembly.
2. Fasten the hanger mounting plate to the display unit from the left side and right side with four binding head screws (M5x12).



3. Make a four pilot holes for self-tapping screws (5x20) in the mounting location.
4. Fix the hanger to the mounting location with four self-tapping screws (5x20).
5. Screw knobs into the display unit loosely.
6. Set the display unit to the hanger.
7. Tighten the knobs to fasten the hanger to the display unit.

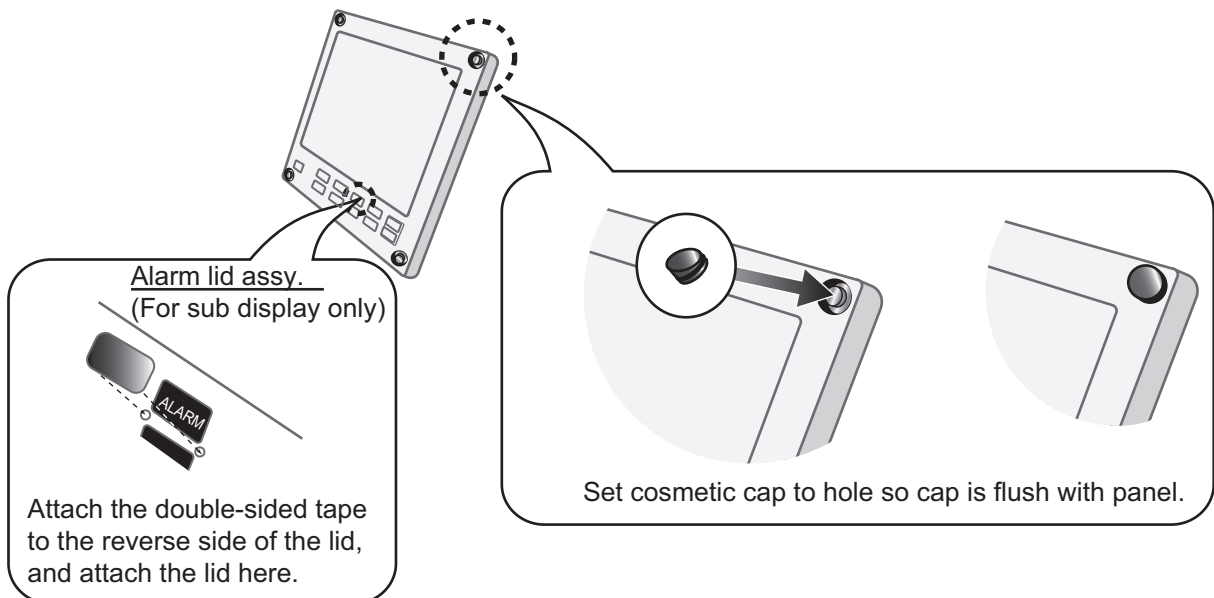
- Set a cosmetic cap to each fixing hole on the front panel.



How to set the cosmetic cap and alarm lid assembly

Set a cosmetic cap to each fixing hole on the front panel as shown in the illustration below.

For the display unit to be used as a sub display, attach the alarm lid (supplied as accessories) to the **ALARM ACK** key to prevent accidental operation of the key.



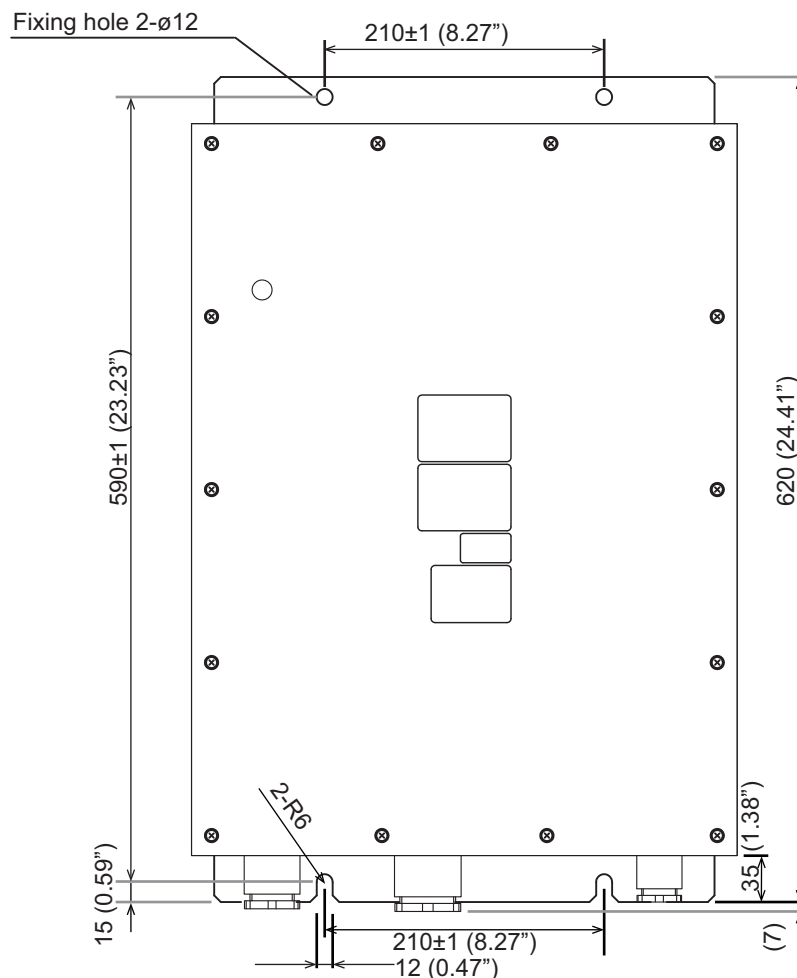
1.2 Transceiver Unit DS-620

Installation considerations

- Since the transceiver unit generates heat, install it in a dry, well-ventilated place. The cooling fans at the top of the unit must not be obstructed, to allow heat to escape.
- This unit is designed for bulkhead mounting to permit dissipation of heat. If bulkhead mounting is absolutely impossible, mount the unit on the floor leaving at least 350 mm clearance between it and the floor to permit dissipation of heat.
- Reinforce the mounting area, if necessary.
- Leave space around the unit for maintenance and checking. Refer to the drawing at the back of this manual for minimum recommended maintenance space.
- A magnetic compass will be affected if the transceiver unit is placed too close to it. Observe the compass safe distances to prevent disturbance to the magnetic compass (page i).

Use four hex. bolts (M10x20) to fix the transceiver unit to the mounting area. See the outline drawing at the back of this manual.

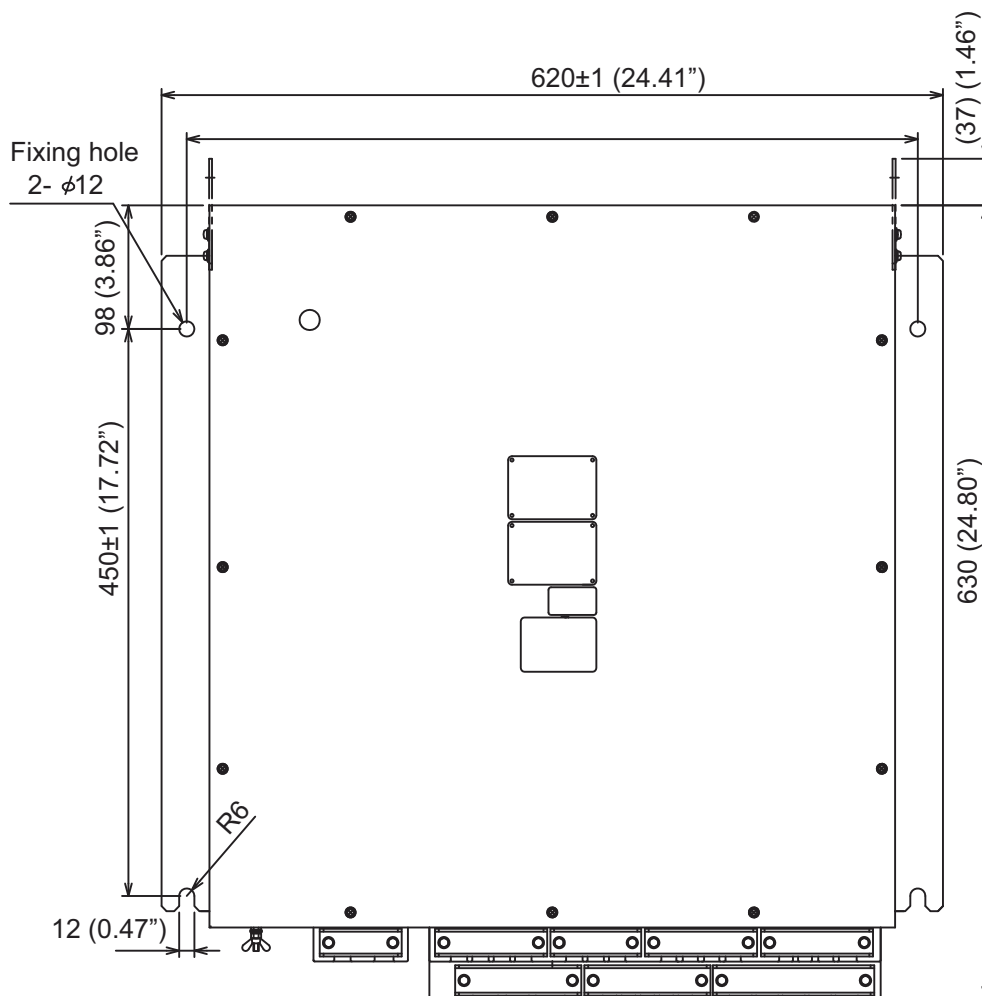
1. Screw in lower hex. bolts so there is 5 mm clearance between bottom of screw head and bulkhead.
2. Hang the unit on the bolts, then tighten the bolts.
3. Fasten the unit with upper hex. bolts.



1.3 Distributor Unit DS-610

The distributor unit can be mounted on the deck or on a bulkhead. Consider the following points when selecting a mounting location.

- Select a location which is both well ventilated and low in humidity to keep the unit cool.
 - For bulkhead mounting, be sure the mounting location is strong enough to support the weight under the continued vibration normally encountered on the vessel.
 - A magnetic compass will be affected if the distribution box is too close. Observe the compass safe distances to prevent disturbance to the magnetic compass.
1. Screw in lower hex. bolts so there is 5 mm clearance between bottom of screw head and bulkhead.
 2. Hang the unit on the bolts, then tighten the bolts.
 3. Fasten the unit with upper hex. bolts.



1.4 Transducer

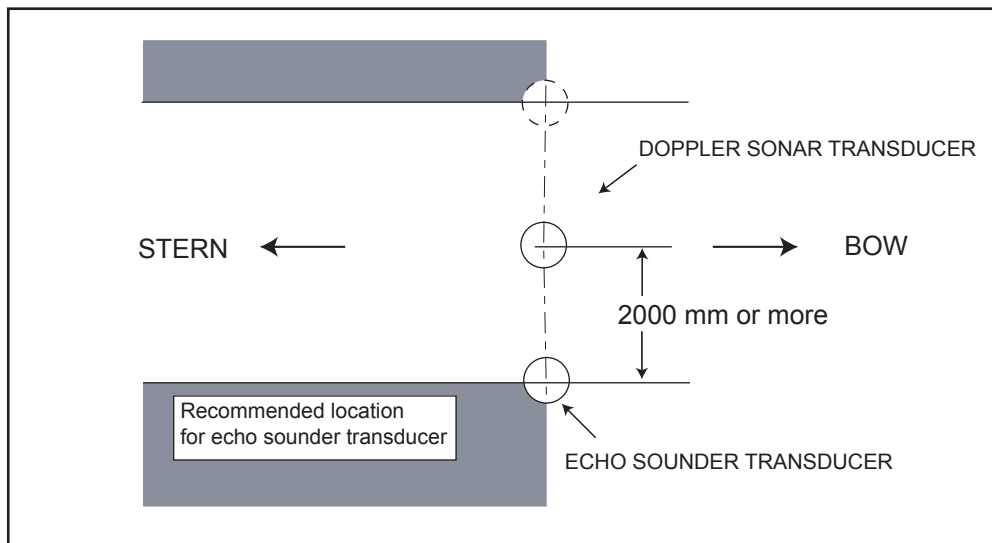
The performance of this equipment is directly dependent on the installation of the transducer.

The installation of the transducer and the tank must be accomplished by a dockyard referring to the installation drawings at the later part of this manual.

1.4.1 Installation location

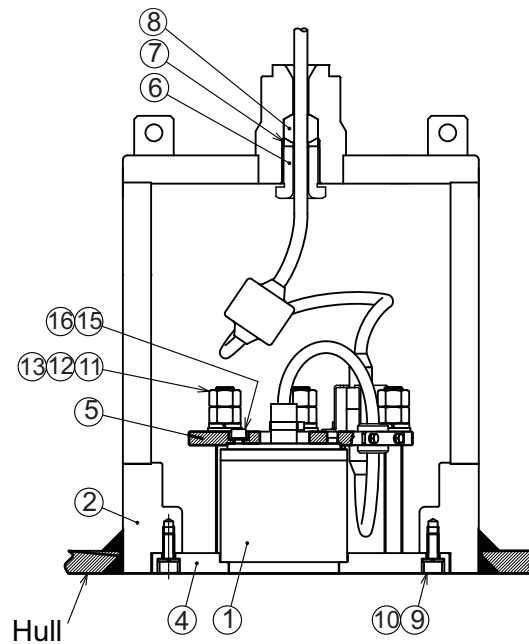
To decide the location of the transducer, the following points must be taken into account.

- Locate the transducer of DS-60 at least 2 m from the transducer of an echo sounder.



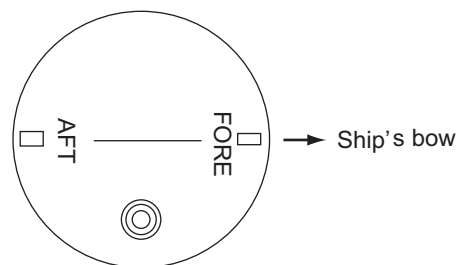
- Separate as far as possible from air bubble sources; e.g., side thruster and water disposal pipes.
- Install in close proximity to the keel, for uniform water flow.
- Generally, best performance is obtained by mounting on the bow; the stern side is influenced easily by air bubbles and propeller cavitation.
- Do not apply any paint to the transducer face.
- Visually confirm that the "FORE" mark on the transducer is oriented to the ship's bow direction after the installation.

1.4.2 Installation using the transducer tank DS-660



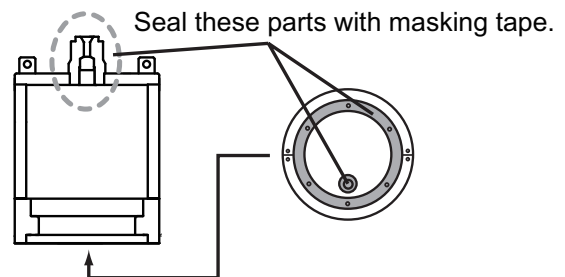
Transducer tank DS-660, sectional view

1. Remove flange (4), fixing plate (5), fixing gland (6), washer (7) and gasket (8) from the tank.
2. Set the tank to the place which was selected at paragraph 1.4.1.
The "FORE-AFT" line on the tank must be parallel with the line between ship's fore and aft (error: within 3°).
For horizontal direction, the bottom of the tank (2) must be parallel to the draft.



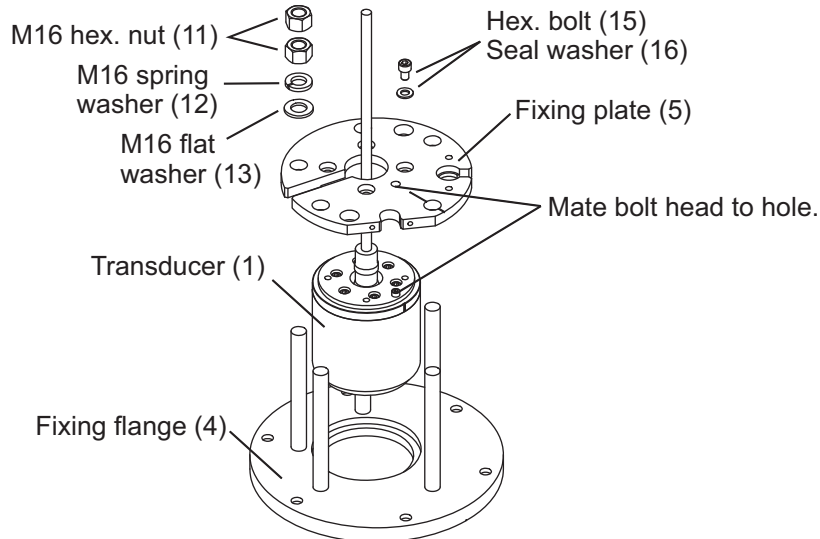
DS-660 Tank, top view

3. Weld the tank (2) to the ship's hull. The doubling and welding methods are left up to the shipyard.
4. Paint the tank (2), flange (4) and fixing plate (5) the same color as the ship's body.
 - The tank (2) is pre-painted with epoxy zinc rich primer.
 - The flange (4) and fixing plate (5) are pre-painted with zinc rich primer and anti-corrosion coat (BANNOH 500). If necessary, remove it with the sandblast, then paint the flange (4) and fixing plate (5) the same color as the ship's body.
5. Apply adhesive (supplied) to the top of the transducer evenly.



1. INSTALLATION

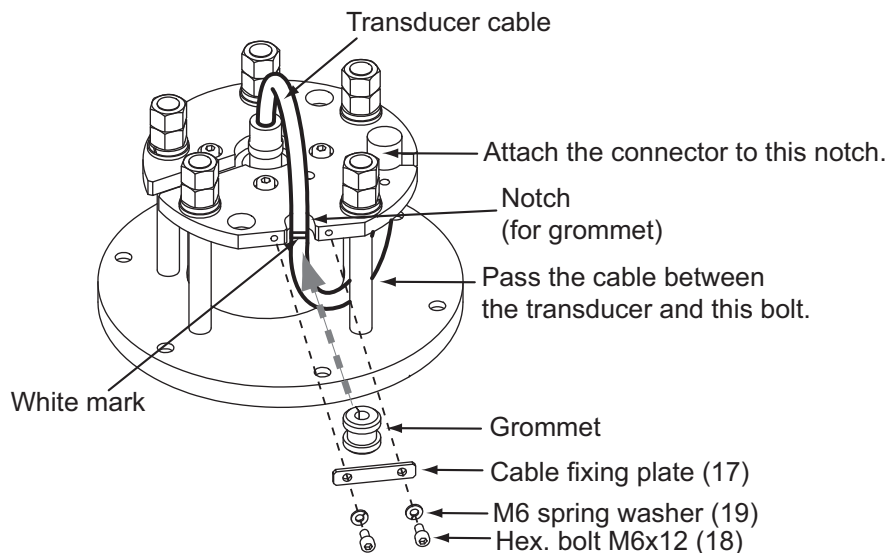
6. Mount the fixing plate (5) on the transducer (1).
7. Attach seal washer (16) to hex. bolt M8x12 (15).
8. Use hex. bolt (15)(16) assembled at step 7 to fasten the transducer (1) and fixing plate (5).
Mate bolt head at the top of the transducer with the hole on the fixing plate as shown in the figure below.
9. Use M16 nut (11), spring washer (12) and flat washer (13) to fix the transducer (1) w/fixing plate to the fixing flange (4).



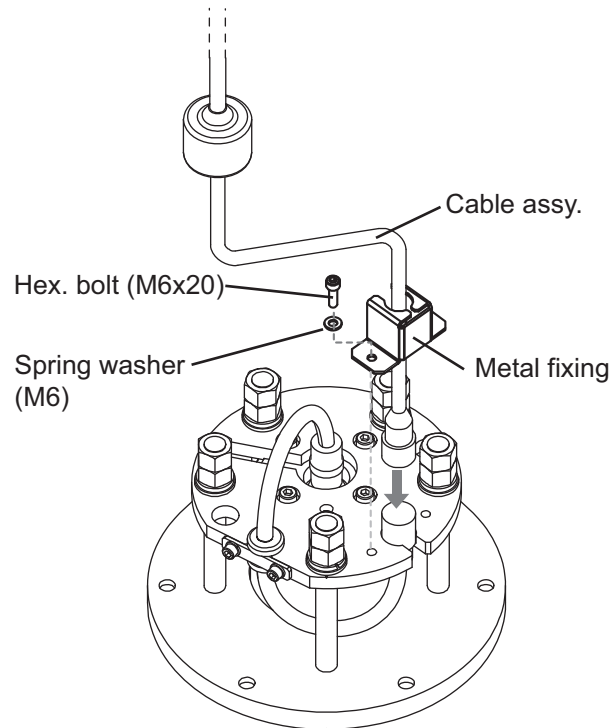
10. For the transducer DS-631, do the following steps:

Note: The underwater connector of DS-631 is applied silicone grease. It is not necessary to apply silicone grease to the connector for installation. The silicone grease supplied should be used to reconnect the connector. Do not use other type grease to the connector.

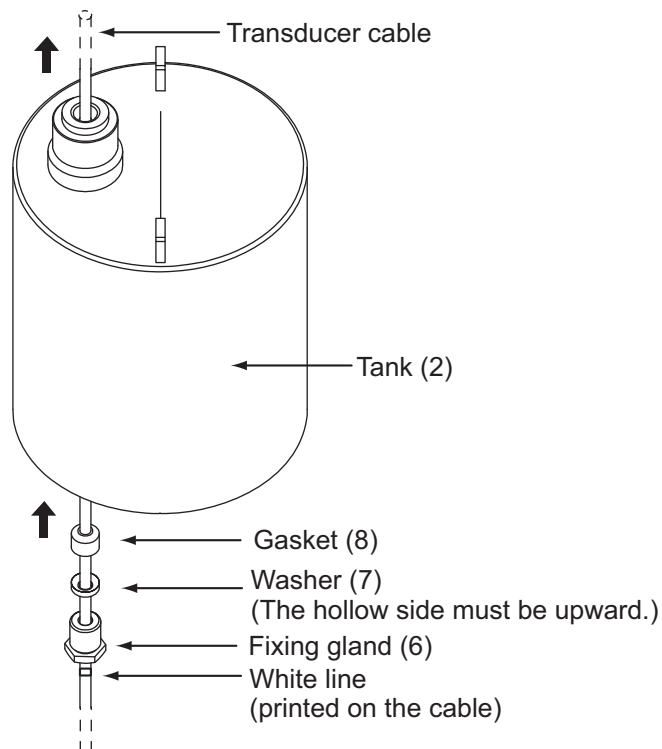
- 1) Attach the grommet (supplied) to the location marked with a white line on the transducer cable.
- 2) Fix the grommet attached at step 1) to the notch shown below, by using the cable fixing plate (17), hex. bolt M6x12 (18), spring washer M6 (19).
- 3) Pass the connector at the end of the transducer cable between the transducer and M16 bolt, and attach the notch as shown below.



- 4) Connect the cable assy. (supplied) to the connector attached at step 3).
Clean the connector faces and pins before the connection.
- 5) Attach the metal fixing (supplied) to the connector, and use two bolts M6x20 and spring washers M6 to fix them.

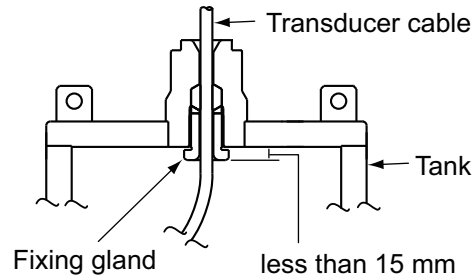


11. Pass the fixing gland (6), washer (7) and gasket (8) through the transducer cable (DS-631: cable assy), and slide them to the white line on the cable.
12. Pass the cable through the hole at the top of the tank (2).



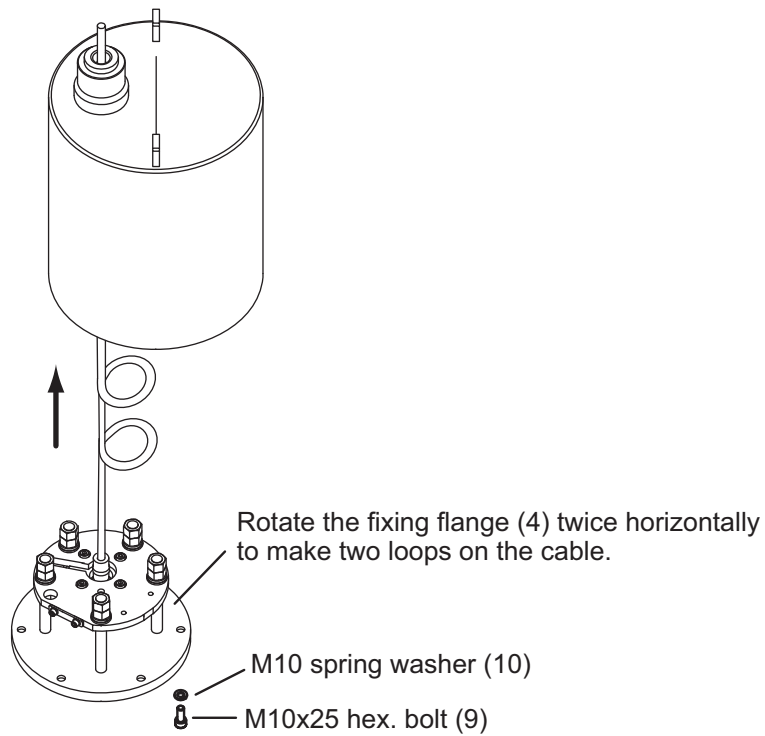
1. INSTALLATION

13. Use the tightening handle (option) to fasten the fixing gland (6) from the inside of the tank (2). The distance between the bottom of the fixing gland (6) and tank must be less than 15 mm.

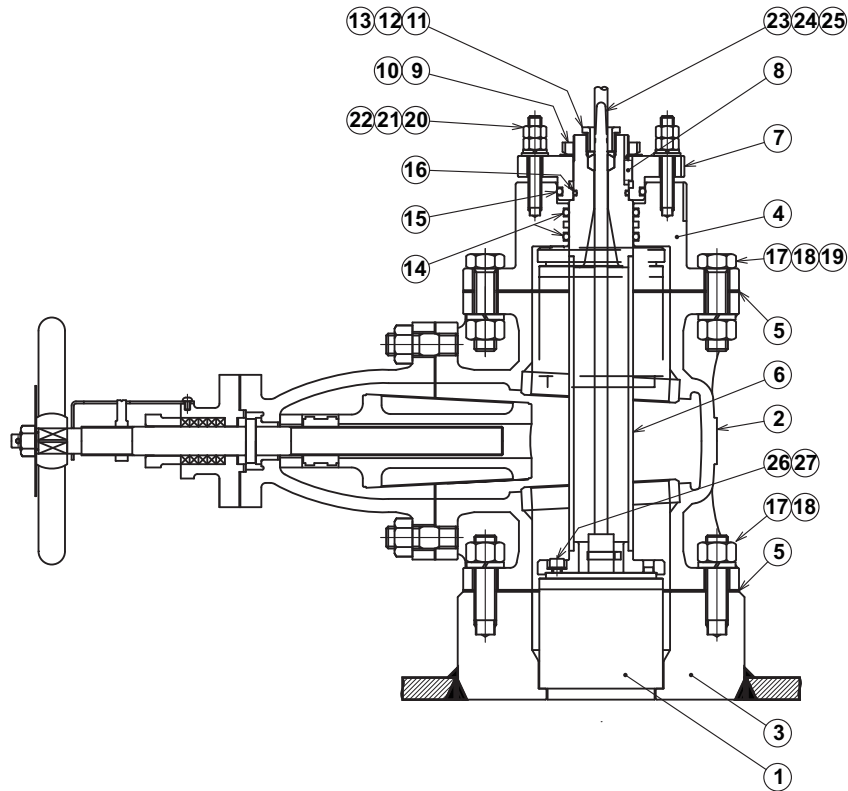


Transducer tank, sectional view

14. Rotate the fixing flange (4) twice horizontally to make two loops. These loops make it easy to put the cable in the tank.
15. Use the bolt M10x25 (9) and spring washer M10 (10) to fasten the fixing flange (4) to the tank (2).



1.4.3 Installation with gate valve DS-661

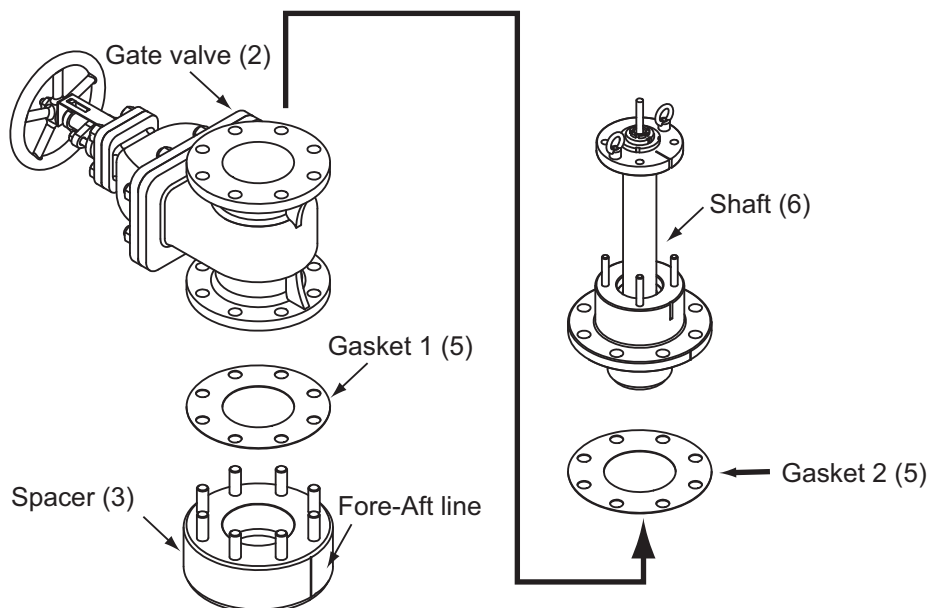


DS-661 gate valve, sectional view

Note: To install the gate valve, service space of 1000 mm height is necessary. For details, see the installation drawing at the back of this manual.

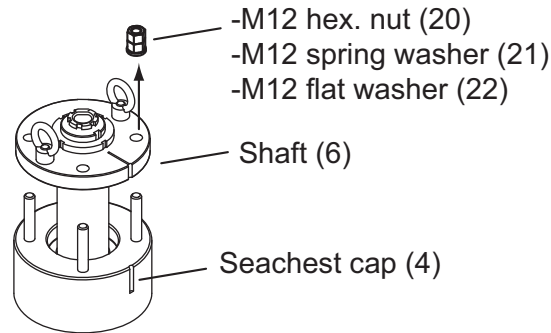
1. When your unit is shipped assembled, remove the five items shown below:

- Gate valve (2)
- Spacer (3)
- Gasket (5), 2 pcs.
- Shaft (6)

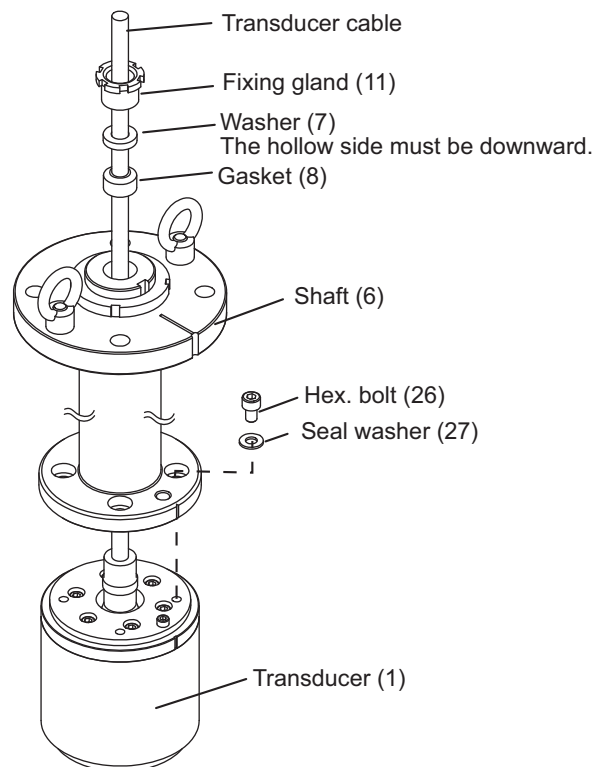


1. INSTALLATION

- Set the spacer (3) to the place selected at paragraph 1.4.1.
The "FORE-AFT" line on the spacer must be parallel with the ship's fore and aft line (within 3°). For horizontal direction, the bottom of the spacer must be parallel with the ship's draft.
- Weld the spacer (3) to the ship's hull. The welding and doubling methods are left up to the shipyard.
- Unfasten M12 hex. nut (20), spring washer (21) and flat washer (22) to remove the shaft (6) from the seachest cap (4).

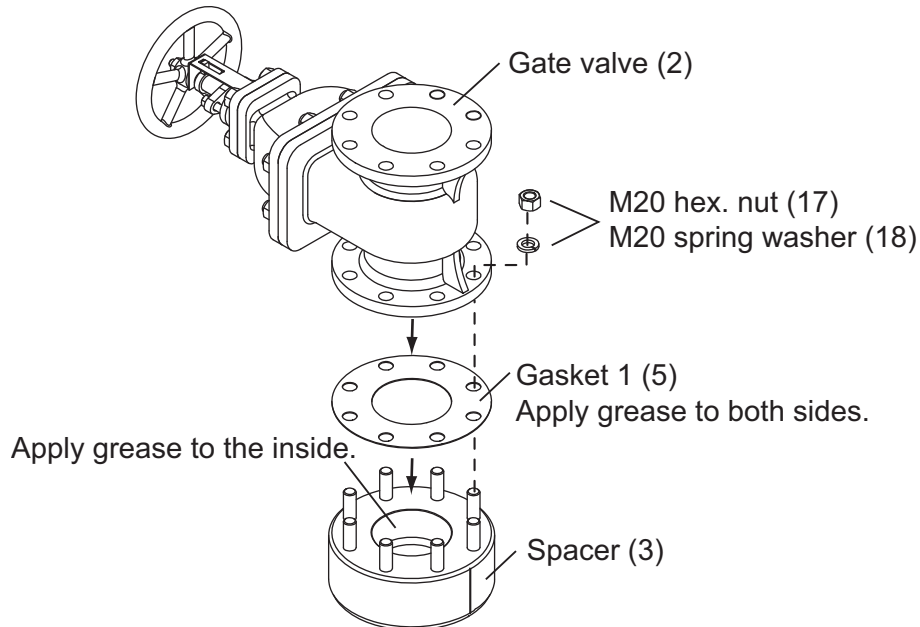


- Paint the gate valve (2), spacer (3) and seachest cap (4) the same color as ship's body. Paint only gray-colored areas; for other part, seal with a masking tape.
- Pass the cable from the transducer (1) through the shaft (6) from the bottom.
- Apply adhesive (supplied) on the top of the transducer (1).
- Use hex. bolt (26) and seal washer (27) to fasten the transducer (1) to the shaft (6).
- Pass the gasket (8), flat washer (7) and fixing gland (11) through the transducer cable.

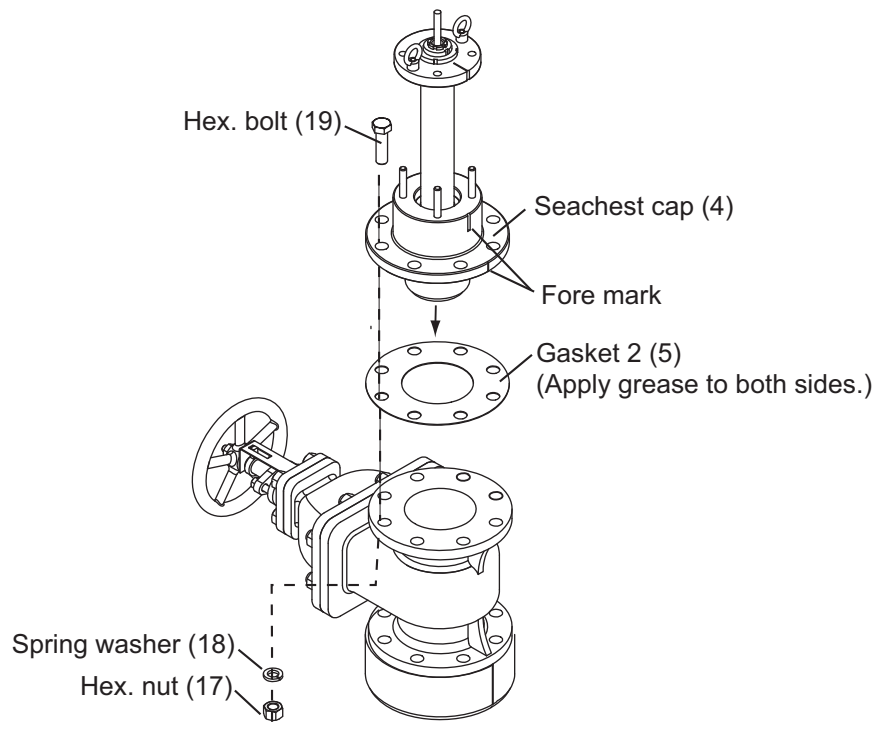


- Fasten the fixing gland (11) to the top of the shaft (6).
The height between the top of the fixing gland (11) and the top of the shaft (6) must be less than 7 mm.

11. Apply grease (supplied) to both sides of the gasket 1 (5), and set it on the spacer (3).
12. Apply grease (supplied) to the inside of the spacer (3).
13. Clean the top and bottom of the gate valve (2), and mount it on the gasket 1 (5) mounted on the spacer (3) at step 11.
14. Fasten M20 hex. nut (17) and spring washer (18) loosely to the stud bolt of the spacer (3).



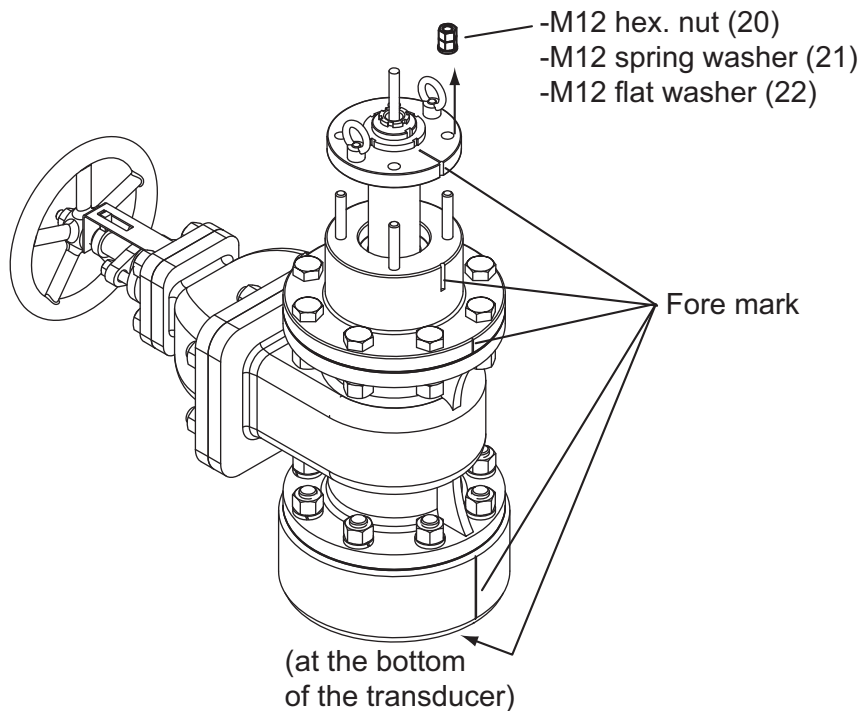
15. Apply grease (supplied) to both sides of the gasket 2 (5), and set it on the gate valve (2).
16. Use hex. nut (17), spring washer (18) and hex. bolt (19) to mount the seachest cap (4) of the shaft (6) on the gate valve (2).



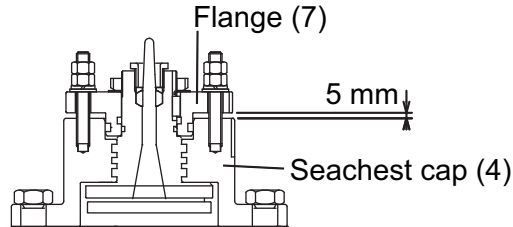
17. Move the shaft (6) upward and downward by hands to check if it moves smoothly.

1. INSTALLATION

18. Check that fore marks are aligned, and fasten hex. nut (17), spring washer (18) and hex. bolt (19) tightly.
19. Fasten hex. nut (20), spring washer (21) and flat washers (22) removed at step 4 to stud bolt on the seachest cap.

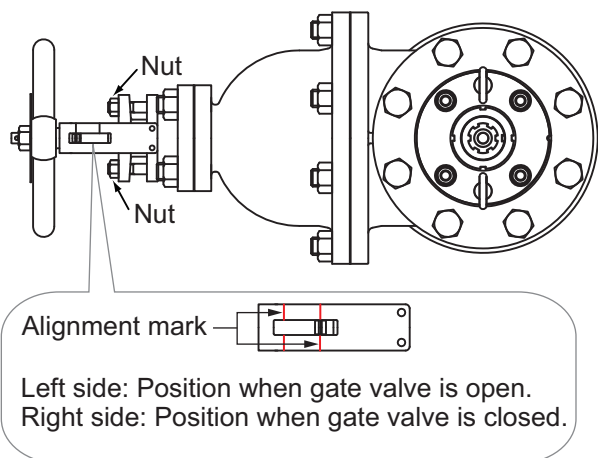


The distance between the seachest cap (4) and flange (7) must be 5 mm.

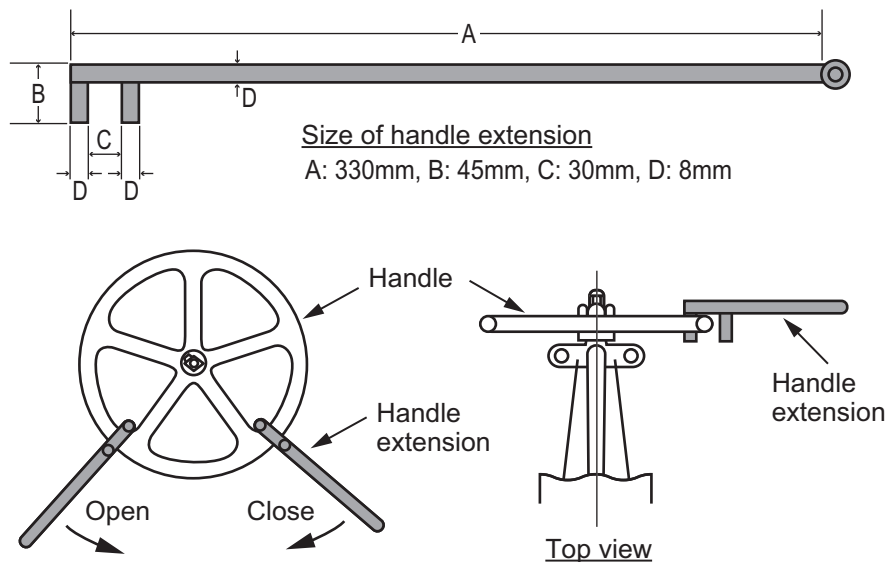


How to open, close the gate valve

1. Loosen the two nuts fixing the gland gasket until the handle can be turned.
2. Operate the handle to open or close the gate valve.
When closing the gate valve
If additional tightening is necessary after turning the handle by hand, prepare separate handle extensions. Tighten again using the handle extensions until the main handle can no longer be turned. For the size and usage of the handle extension, refer to the figure on the next page.



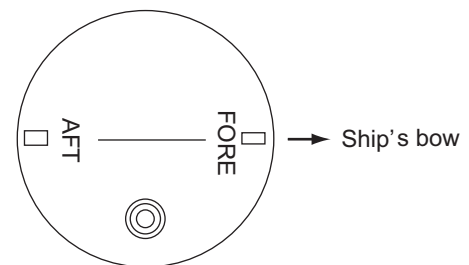
3. After opening or closing the gate valve, tighten the loosened nuts until the handle cannot be turned.



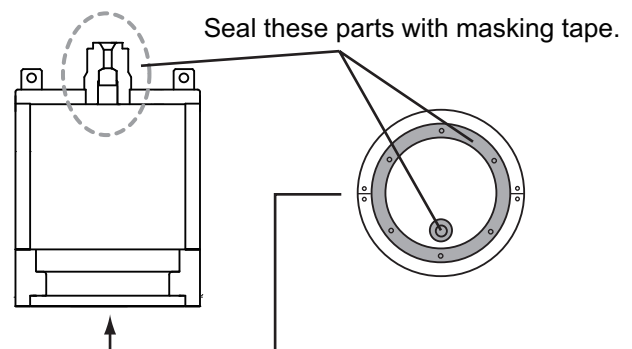
1.4.4 Installation using the transducer tank DS-660A

For the sectional view, see page 1-7.

1. Remove fixing gland (6), washer (7) and gasket (8) from the tank.
2. Set the tank to the place which was selected at paragraph 1.4.1.
The "FORE-AFT" line on the tank must be parallel with the line between ship's fore and aft (error: within 3°).
For horizontal direction, the bottom of the tank (2) must be parallel to the draft.



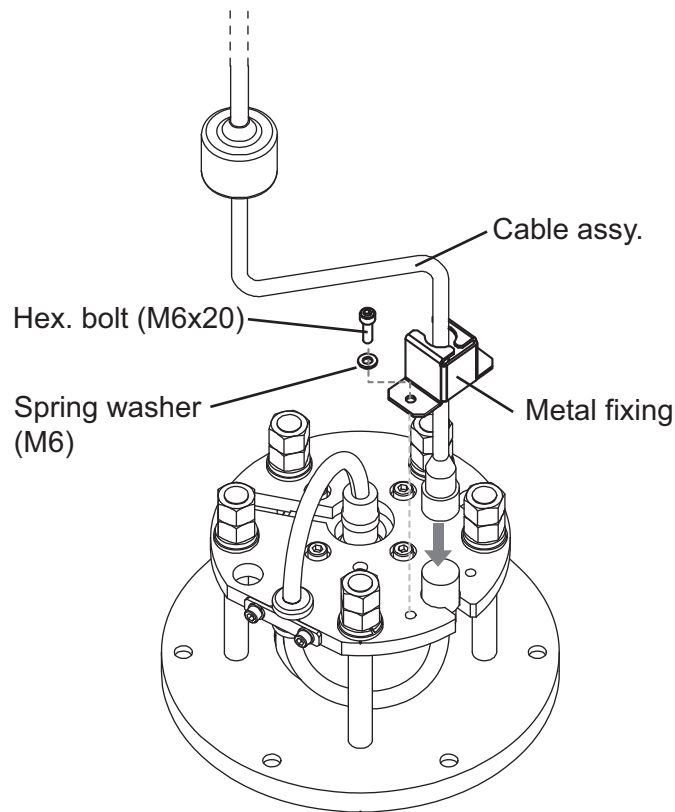
3. Weld the tank (2) to the ship's hull. The doubling and welding methods are left up to the shipyard.
4. Paint the tank (2), flange (4) and fixing plate (5) the same color as the ship's body.
 - The tank (2) is pre-painted with zinc rich primer.
 - The flange (4) and fixing plate (5) are pre-painted with epoxy zinc rich primer and anti-corrosion coat (BANNOH 500). If necessary, remove it with the sand-blast, then paint the flange (4) and fixing plate (5) the same color as the ship's body.



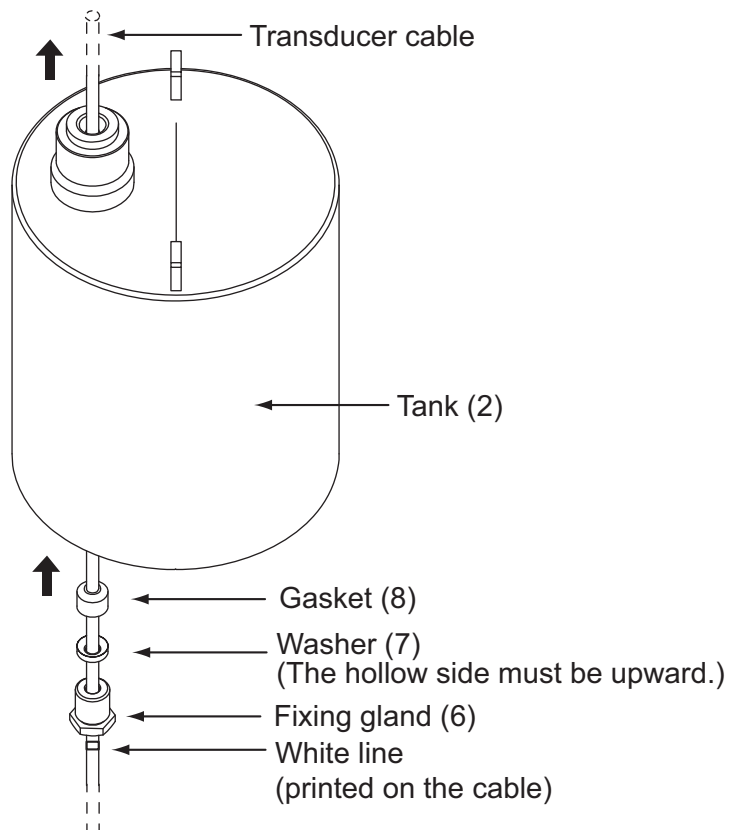
5. For the transducer DS-631A, do the following steps:
 - 1) Unfasten two bolts M6x20 and spring washers M6 to remove the metal fixing.
 - 2) Connect the cable assy. (supplied) to the connector from the transducer.
Clean the connector faces and pins before the connection.

1. INSTALLATION

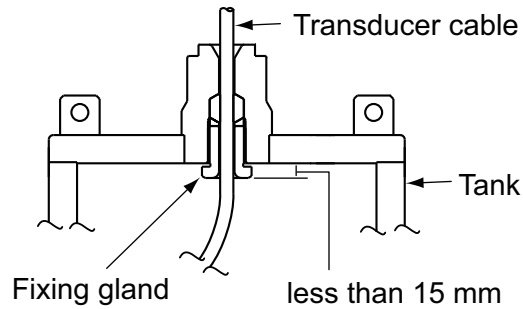
- 3) Attach the metal fixing (supplied) to the connector, and use two bolts M6x20 and spring washers M6 unfastened at step 1) to fix them.



6. Pass the fixing gland (6), washer (7) and gasket (8) through the transducer cable (DS-631A: cable assy), and slide them to the white line on the cable.
7. Pass the cable through the hole at the top of the tank (2).

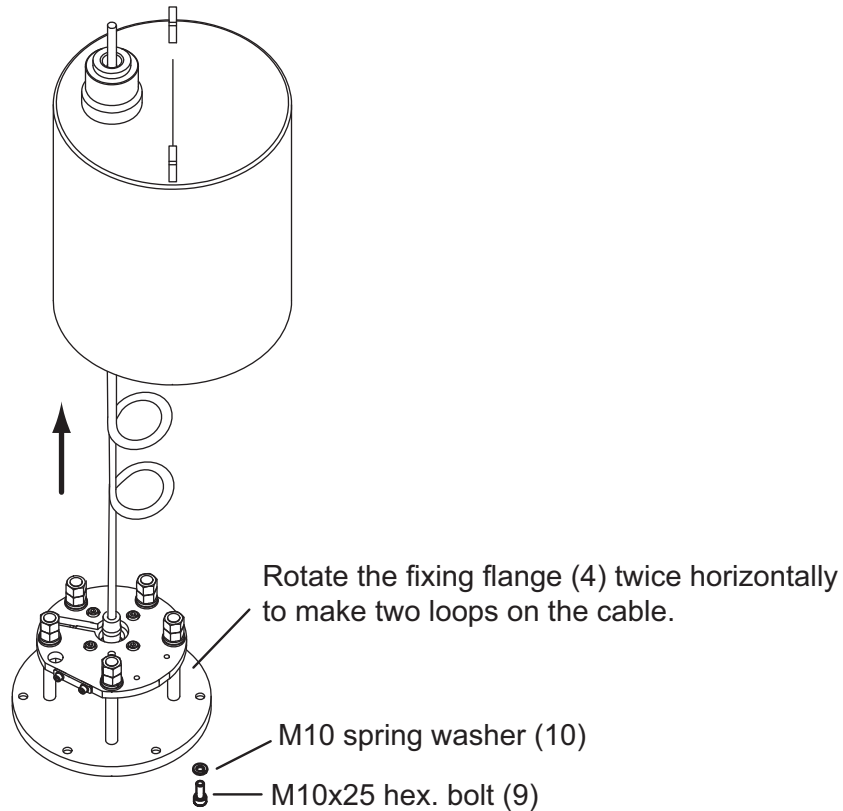


8. Use the tightening handle (option) to fasten the fixing gland (6) from the inside of the tank (2).
The distance between the bottom of the fixing gland (6) and tank must be less than 15 mm.



Transducer tank, sectional view

9. Rotate the fixing flange (4) twice horizontally to make two loops.
These loops make it easy to put the cable in the tank.
10. Use the bolt M10x25 (9) and spring washer M10 (10) to fasten the fixing flange (4) to the tank (2).



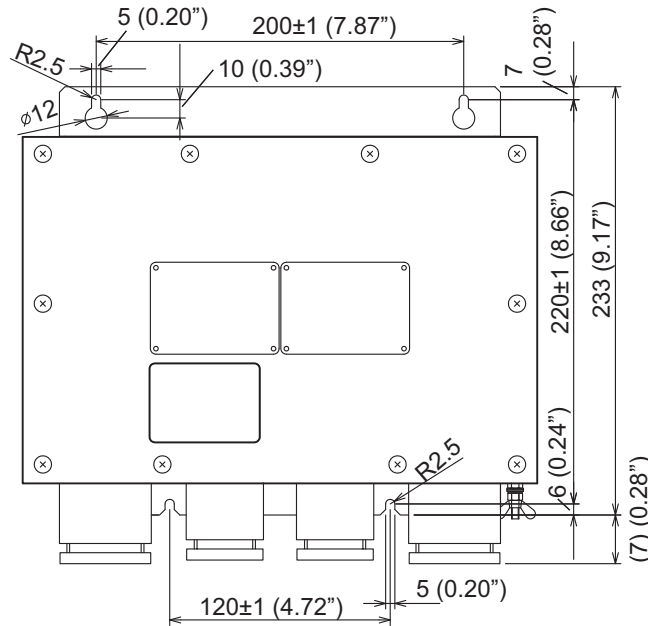
1.5 Junction Box DS-640, DS-645A/B (option)

Installation considerations

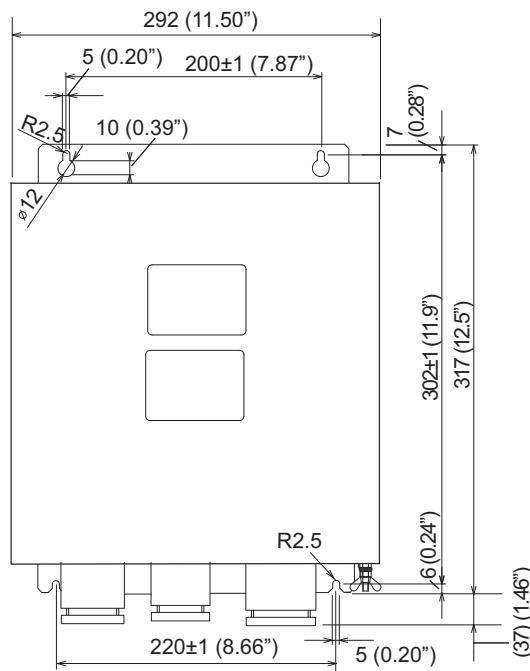
The junction box forms a joint between the distributor and the transceiver unit, and extends the distance between them to max. 500 m. Install it as below:

- Keep the junction box away from noise-emitting electrical machinery, for example, electric generator, radio transmitter and TV.
- Do not install the junction box in place of high temperature and humidity.

See the outline drawing at the back of this manual.



Dimensions for DS-640



Dimensions for DS-645A/B

1.6 Installation of Display Unit with DS-605 (Water-Proof Box, option)

For installation of the display unit on the wings of the bridge, use the optional water proof box DS-605. Fix the DS-605 on the bulkhead and set the display unit therein.

Installation materials for DS-605 (Type: CP66-01731, Code No.: 001-082-660-00)

Name	Type	Code No.	Qty	Comments
Seal Washer	03-001-3002-0 ROHS	300-130-020-10	4	
Gasket (2)	26-003-1605	100-355-310-10	1	
Washer (2)	26-003-1607	100-355-320-10	2	
Cable Gland Washer	JIS F8801 25C	000-172-238-10	2	
Cable Grand Inner gasket	JIS F8801 25C	000-171-892-10	1	
Adhesive	TB5211 50G	000-192-662-10	1	
Binding Head Screw	M5x12 SUS304	000-171-999-10	4	Not included if the flush mount sponge is not attached on the DS-605.

Mounting considerations

The DS-605 has waterproofing protection of IP56. When you select a mounting location for the waterproof box, keep in mind the following points.

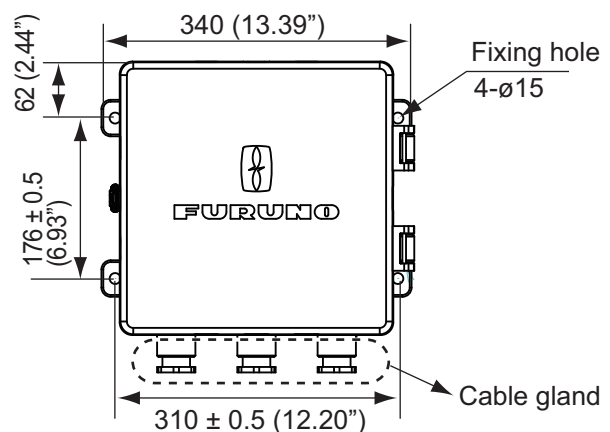
- Keep the unit away from electromagnetic field-generating equipment like motors and generators.
- For maintenance and checking purposes, leave enough space at the sides of the unit and leave slack in cables. See the outline drawing at the back of this manual.
- A magnetic compass will be affected if the waterproof box is too close to the magnetic compass. Observe the compass safe distances (see page i) to prevent interference to a magnetic compass.

Mounting procedure

Note: Mount the DS-605 on the bulkhead so the cable glands and the drain hole are down.

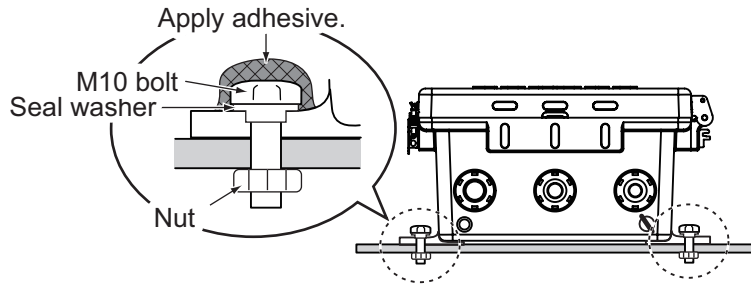
1. Fix the DS-605 on the wings of the bridge.
 - 1) Insert the seal washer (03-001-3002-0 ROHS) to four fixing holes.
 - 2) Fix the DS-605 with four M10 bolts (dockyard supply).

Note: Mount the unit so the cable glands are down.



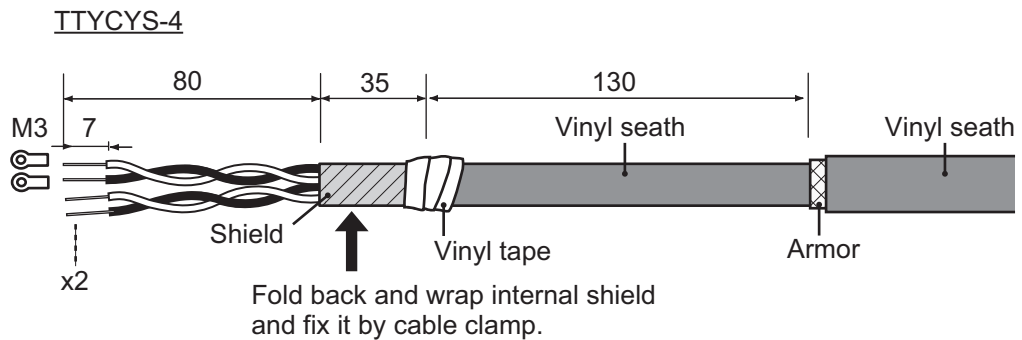
1. INSTALLATION

- 3) Apply adhesive to M10 bolts as shown below.

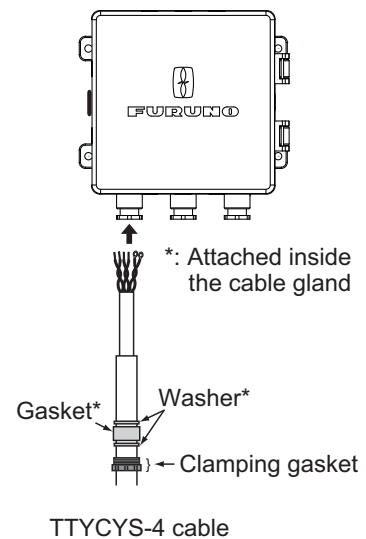


2. Connect the TTYCS-4 cable to the DS-600 through the cable glands for the DS-605.

- 1) Fabricate the cable as shown below.



- 2) Pass the clamping gland, washer (26-003-1607), gasket (26-003-1605) and washer (supplied as installation materials) onto the cable, in that order.
- 3) Pass the cable through the cable gland as shown below.
- 4) Open the front cover of the DS-605 and connect the ground wire attached inside the DS-605 to the ground terminal on the rear of the DS-600.
- 5) Connect the cables to the DS-600. Refer to chapter 2.
3. Remove each binding head screw from four corners of the DS-605 and set the DS-600 to the DS-605. These screws can be discarded.
4. Apply silicon grease to the binding head screws included in CP66-01731 and fix the DS-600 to the DS-605 with four binding head screws.
5. Tighten the clamping glands to fix the cables.
6. Apply putty to the cable glands for waterproofing.
7. Connect the ground terminal for the DS-605 to the ground terminal on the hull with the IV-1.25 sq. wire.

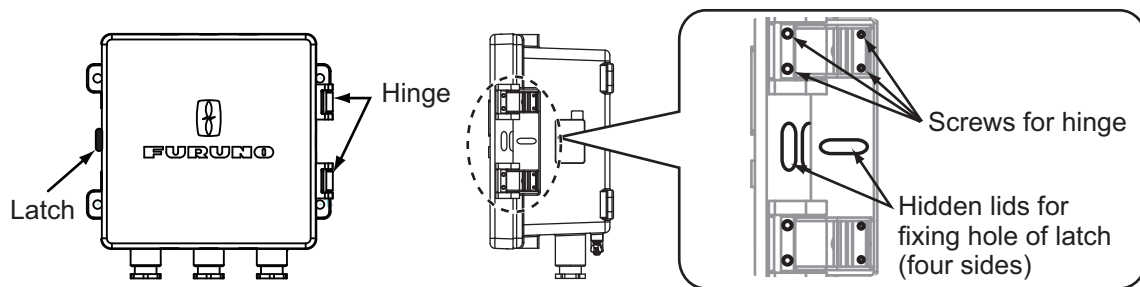


How to change orientation of the front cover of DS-605

The front cover of the DS-605 can be oriented up, down, right or left. To change the orientation of the front cover, do the following.

Note: Set the front cover so the FURUNO logo on the cover is right side up. The drain hole must be down.

1. Remove eight screws from two hinges.
2. Remove two screws from the latch.
3. Remove the hinges and the hidden lids for fixing hole of latch in consideration of the opening direction. The hidden lids for fixing hole of latch are taped on each side.
4. Orient the front cover as desired and fix the hinges and latch.

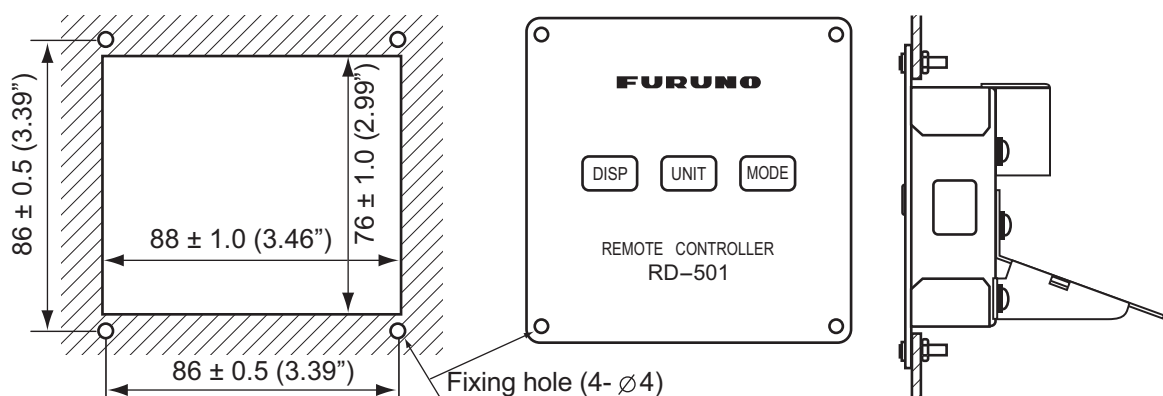


1.7 Remote Controller RD-501/Dimmer Controller RD-502 (option)

The optional remote controller RD-501 and dimmer controller RD-502 can be flush mounted in a panel. The size and the mounting procedure are shared by RD-501 and RD-502. For the mounting location, refer to the mounting considerations for the display unit in section 1.2.

Note: Before you fasten the display unit to the cutout, first connect the cables referring to chapter 2.

1. Make a cutout in the mounting location (88 mm (width) x 76 mm (height)).
2. Make four holes of 4 mm diameter in the locations indicated in the illustration below.
3. Set the remote controller or dimmer controller to the cutout. Insert four binding head screws (M3x12) from the front side then fasten the unit with four sets of flat washers, spring washers and hexagonal nuts from the rear side.

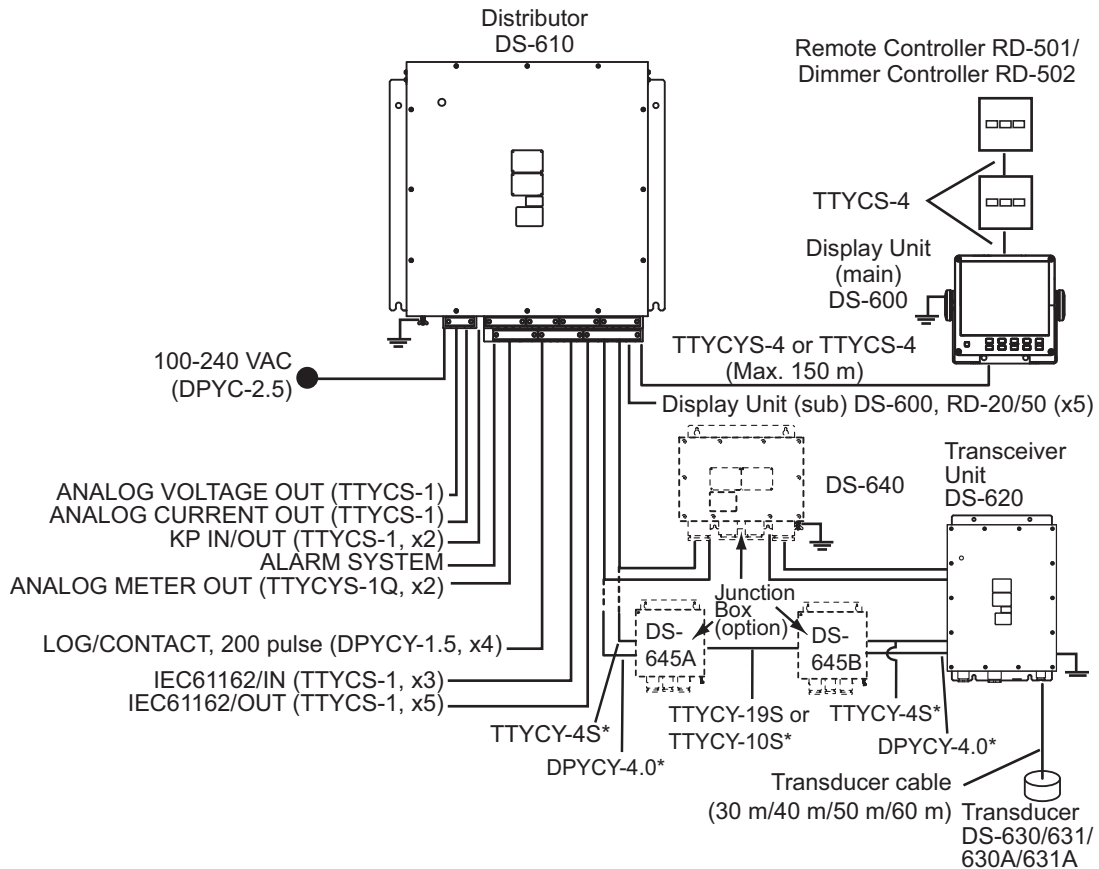


1. INSTALLATION

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2. WIRING

Refer to the interconnection diagram at the back of this manual to connect cables.



*The cable length between DS-620 and DS-610 must be less than 500 m.

Note: For details of JIS (Japan Industrial Standard) cables, see "JIS CABLE GUIDE" on page AP-4.

Precautions for cable installation

Observe the following guidelines to prevent noise, interference problem.

- The transducer cable carries very weak signals (amplitude less than $0.1 \mu\text{V}$), which are easily interfered by noise. The need for a good ground cannot be overemphasized. Pass the transducer cable through dedicated conduit. Fill the conduit with vibration absorbing material (sand, etc.) to prevent vibration. The part of the cable extending from the conduit should be as short as possible. Separate the transducer cable at least 40 cm from other cables.
- Locate DS-60 cables away from the transmission antenna cable or radio equipment.
- Locate the DS-60 cables away from the power cables mentioned below. Also, separate cables at least 40 cm when the cables are run parallel with power cables.
 - Cable carrying more than a few kilowatts power to fluctuating loads
 - Cable carrying switching waves generated by thyristor, etc.

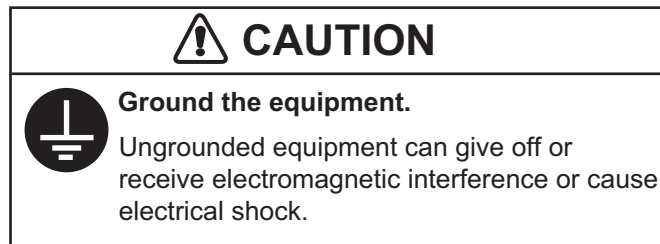
2. WIRING

- If the cables run through conduit or duct behind a non-metallic bulkhead, use a sheathless armored cable and ground the cable to the ship's hull every 50 cm.

Grounding

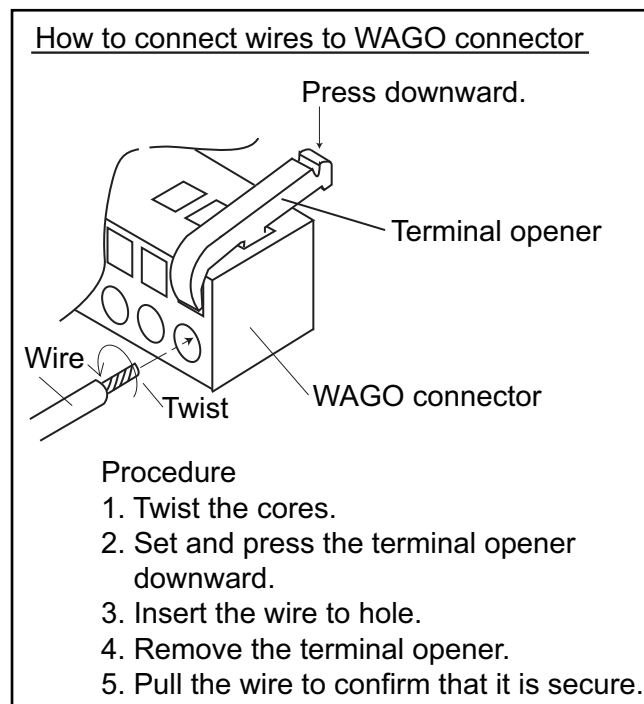
Connect the units and cables to the ground to prevent interference to the system and other equipment, referring to the following points:

- Keep all the units of the DS-60 as far away as possible from other radio equipment.
- Do not put the cables close to the cables of other radio equipment.
- All cables should be as short as possible.
- Ground the units of the DS-60 with suitable grounding wire (local supply).



Connection of WAGO connector

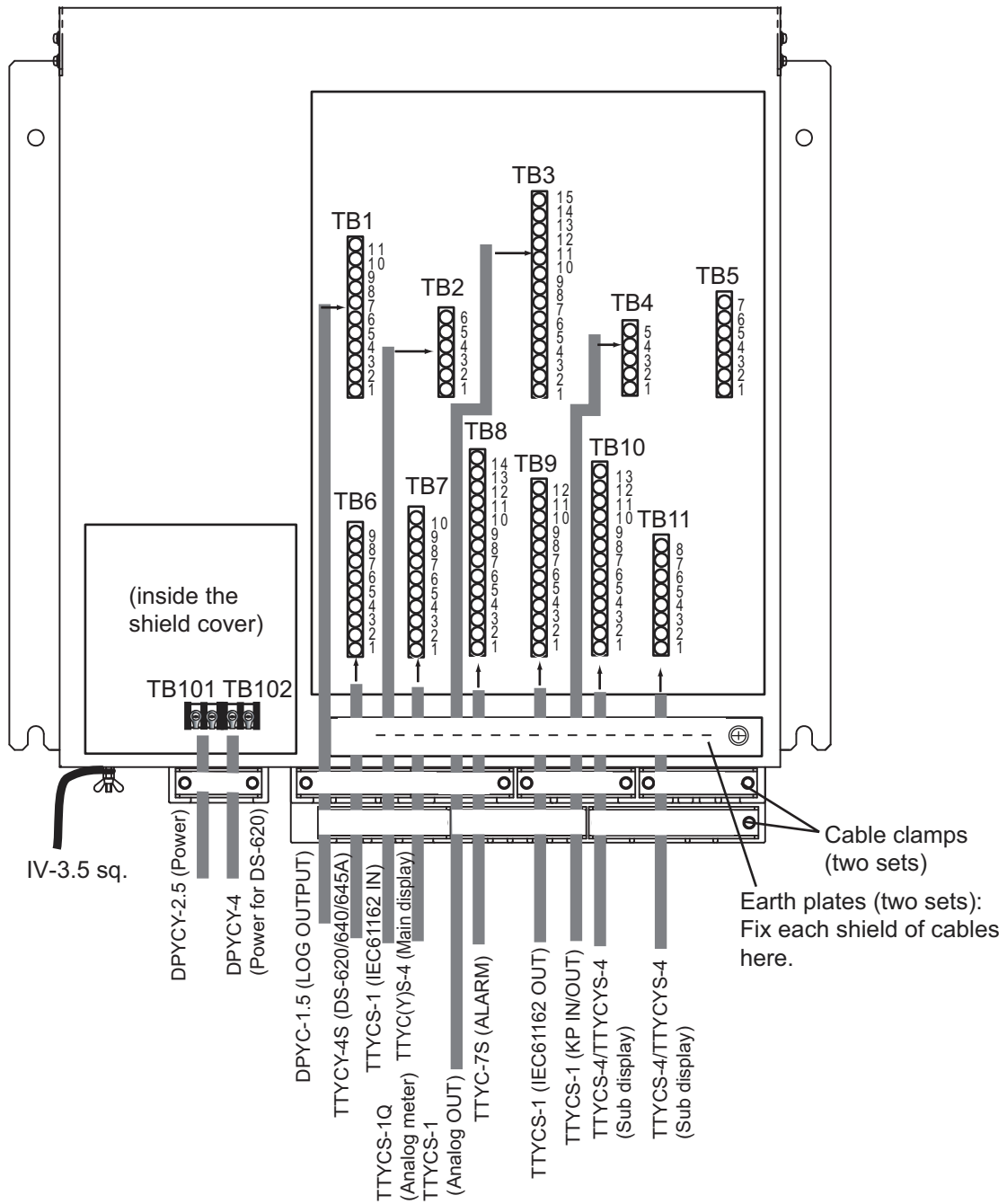
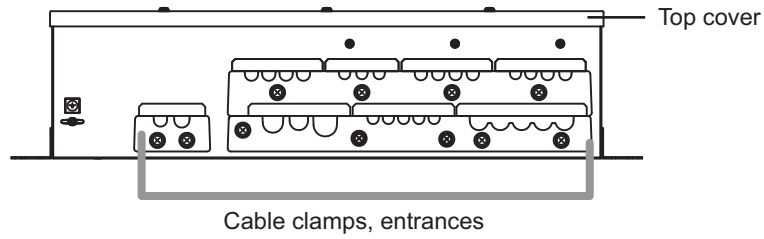
Remove the WAGO connector from each unit and connect each cable core to the WAGO connector. See the interconnection diagram at the back of this manual. The terminal opener is attached inside each unit.



2.1 Distributor Unit DS-610

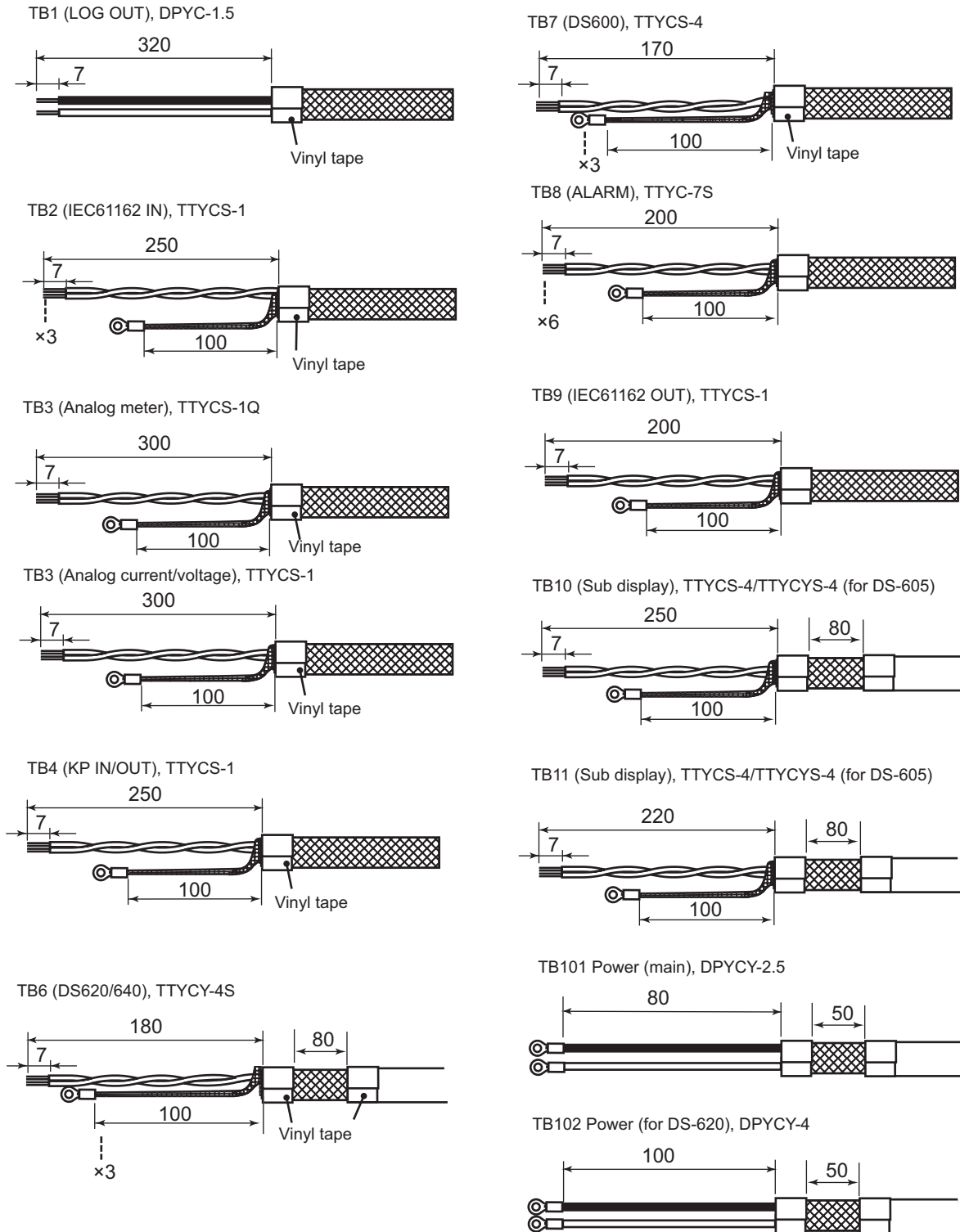
The Distributor Unit DS-610 has two lines of cable clamps, and there are 13 cable entrances in total. The cables and corresponding cable entrances are shown on the reverse side of the top cover of the DS-610. Fabricate cables referring to page 2-4. Pass

the cables through their respective cable entrances and connect them to WAGO connectors.



2. WIRING

DS-610 Distributor Unit



2.2 DIPSW S3 Settings

DIPSW S3 is on the MAIN Board (66P3950) inside the Distribution Unit DS-610.

S3-#1,2

When the analog indicator is connected to the DS-610 Distributor Unit (TB3 #1,2 and #5,6), set the output voltage range according to the speed scale and range. The table below shows the corresponding settings.

DIPSW	Setting		
S3-#1	OFF (Factory default)	ON	
S3-#2	ON	OFF (Factory default)	
Output voltage range (mA)	-5.0 to 10	-3.3 to 10	-2.5 to 10
Analog indicator speed scale range (kn)	-10 to 20	-10 to 30	-10 to 40

Note: These settings do not affect the analog output ports (TB3 #9 through #12).

S3-#4 to #8

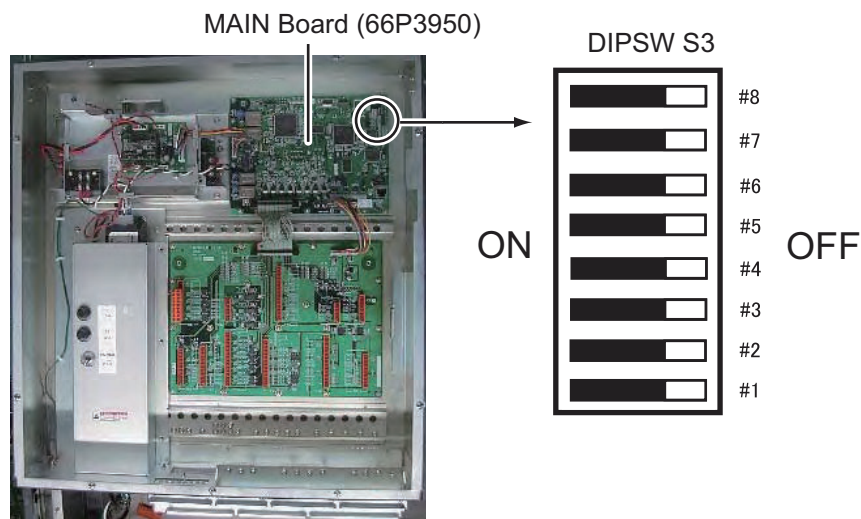
Alarm contact input/output settings by the DIPSW S3 are shown below.

	OFF (Default settings)	ON
S3-#4 REMOTE ACK	Contact input For ACK, close input	Contact input For ACK, open input
S3-#5 LOCAL ACK	Contact output For ACK, close output	Contact output For ACK, open output
S3-#6 ECHO FAIL	Contact output Normal open output	Contact output Normal close output
S3-#7 SPEED LIMIT	Contact output Normal open output	Contact output Normal close output
S3-#8 SYSTEM FAIL	Contact output Normal open output	Contact output Normal close output

Note 1: S3-#3 should remain OFF, the default setting.

Note 2: [POWER FAIL] is normal close output regardless of the settings of DIPSW.

When the power is off, all contact outputs are open output.

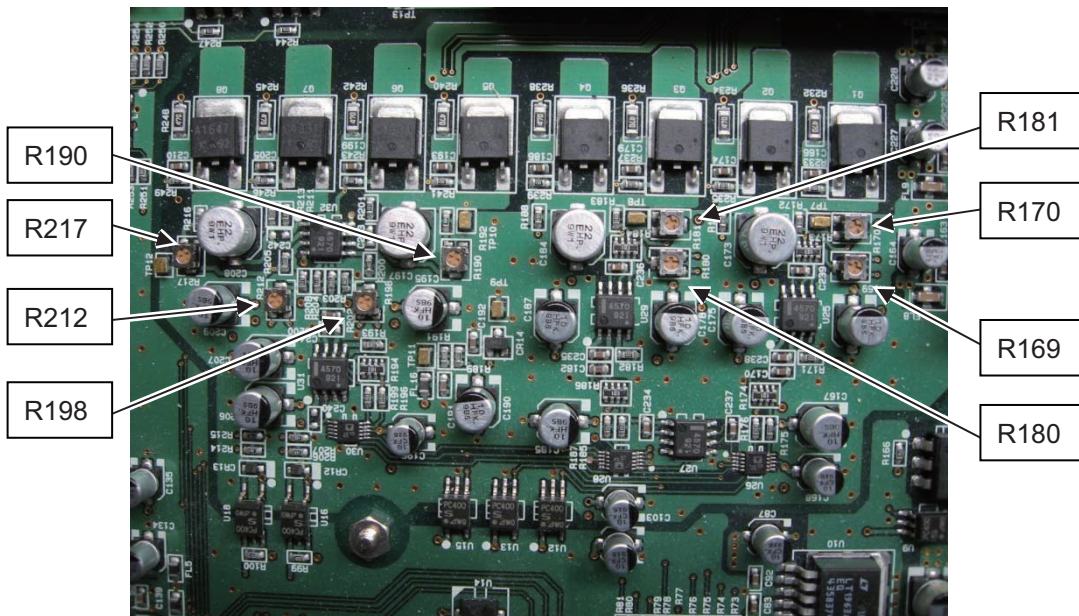


Distribution Unit DS-610, cover removed

2.3 How to Adjust the Analog Indicator

If it is necessary to adjust the offset or gain of the analog indicator or analog output, output dummy speed from the demo mode then adjust the applicable potentiometer on the MAIN board in the DS-610.

- 1) ANA_DISP1 offset adjustment: R180 (Rotate clockwise to offset in the AST direction)
- 2) ANA_DISP1 gain adjustment: R181 (Rotate clockwise to decrease the gain)
- 3) ANA_DISP2 offset adjustment: R169 (Rotate clockwise to offset in the AST direction)
- 4) ANA_DISP2 gain adjustment: R181 (Rotate clockwise to decrease the gain)
- 5) ANA_V offset adjustment: R198 (Rotate clockwise to increase the offset value)
- 6) ANA_V gain adjustment: R190 (Rotate clockwise to increase the gain)
- 7) ANA_C offset adjustment: R212 (Rotate clockwise to increase the offset value)
- 8) ANA_C gain adjustment: R217 (Rotate clockwise to increase the gain)



How to adjust the analog indicator

1. Set 0 kn for test speed in the demo mode, then adjust the offset of the analog indicator.
2. Set 15 kn or 20 kn for test speed in the demo mode, then adjust the gain of the analog indicator.

Note: Do the test for the gain adjustment with the ship's cruising speed.

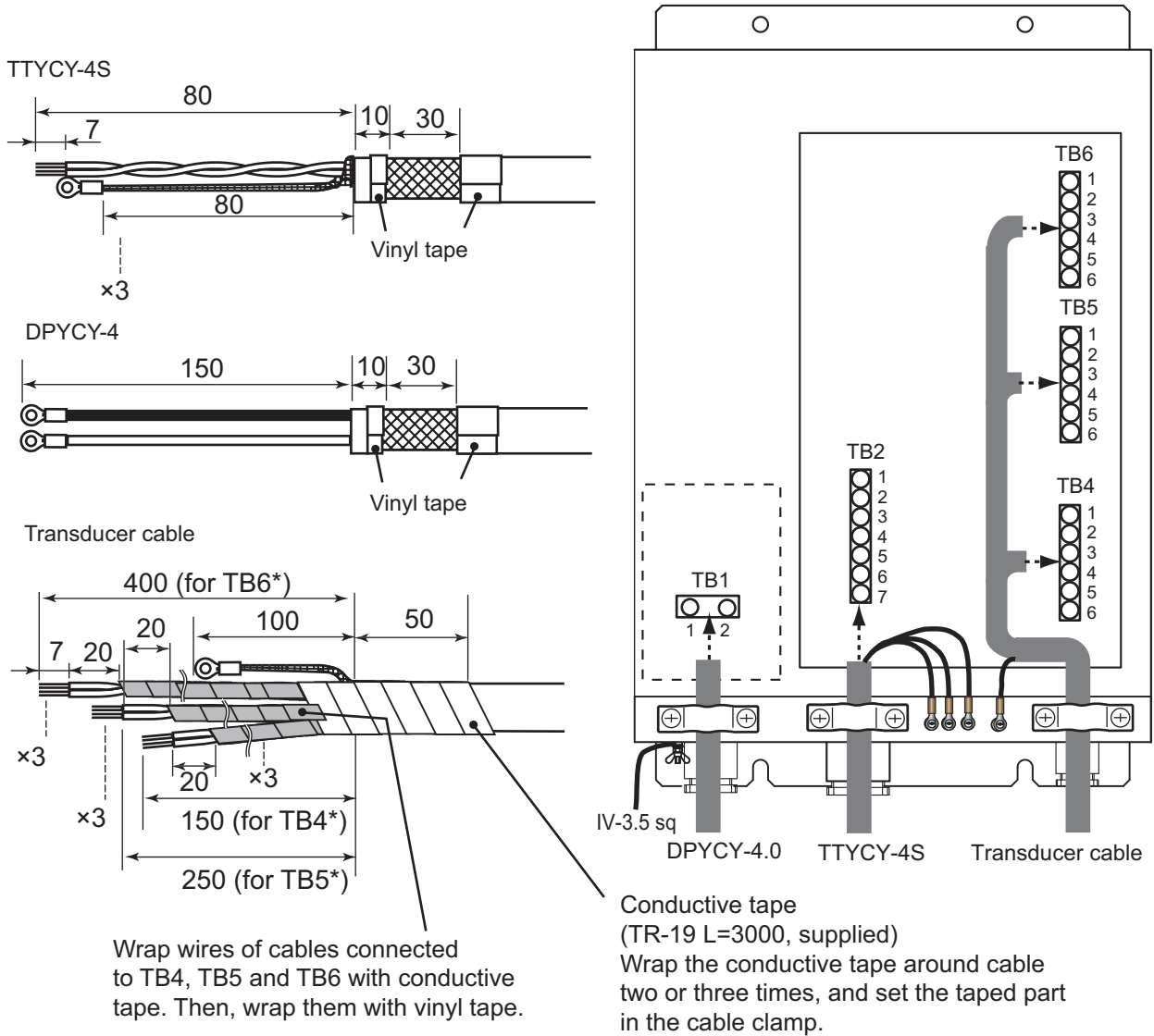
The specifications of voltage and current for analog indicator

Voltage output	-10 to 30 kn: -3.33 to 10.0 V
Current output	-10 to 30 kn: 4.0 to 20.0 mA (0 kn: 8.0 mA)

2.4 Transceiver Unit DS-620

Cables TTYCY-4S, DPYCY-4 and the transducer cable are connected to the DS-620. Fabricate and pass them through their respective the cable clamps at the bottom.

DS-620 Transceiver unit



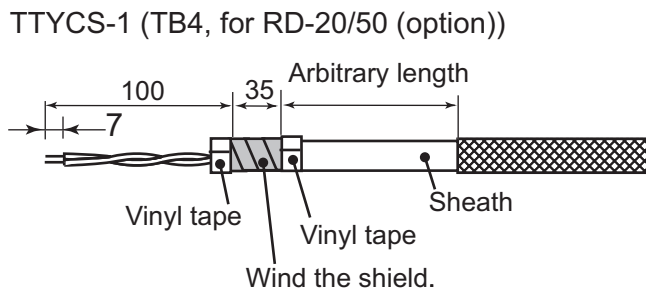
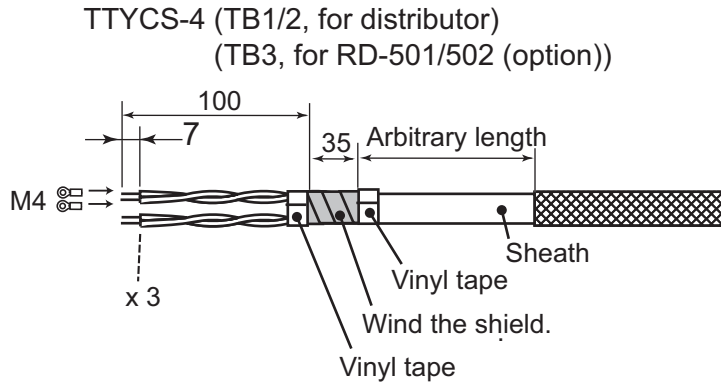
Note: The transducer cable has nine twisted-pairs of signal lines (w/polarity). Be careful to connect them to the correct connectors in the transceiver unit.

2.5 Display Unit DS-600, Remote Controller RD-501/ Dimmer Controller RD-502 (option)

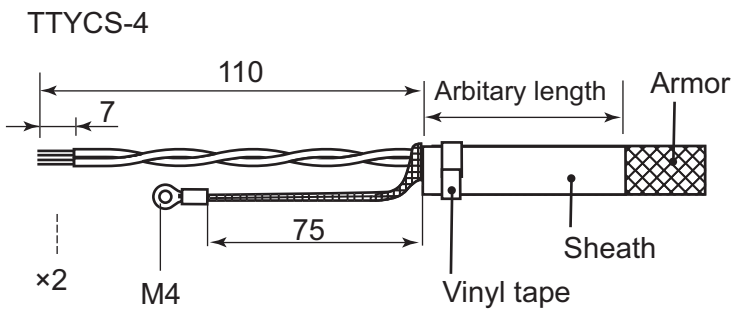
Use the TTYCS-4 cable to connect the display unit DS-600 to the distributor.

Note: The cable length must be less than 150 m.

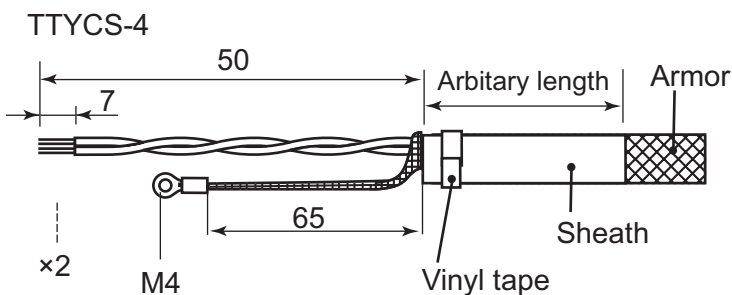
DS-600 Display unit



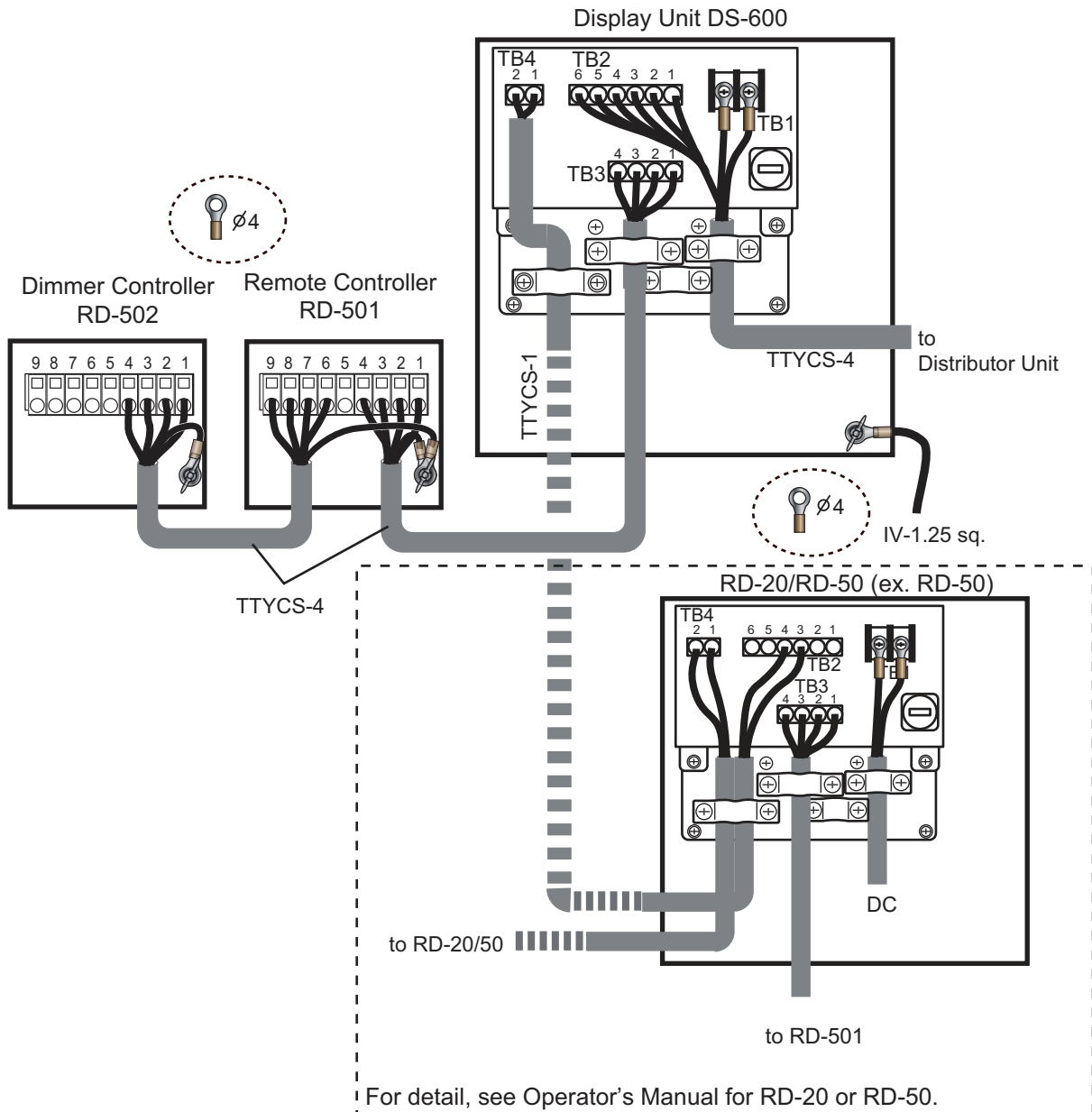
RD-501 (end of RD-501)



RD-502 (end of RD-502)



Connect cables fabricated on the previous page to terminals on the back of the unit, and fix them with clamps.



DS-600, example of connection

When using the optional water proof box DS-605, TTYCYS-4 cable is necessary.

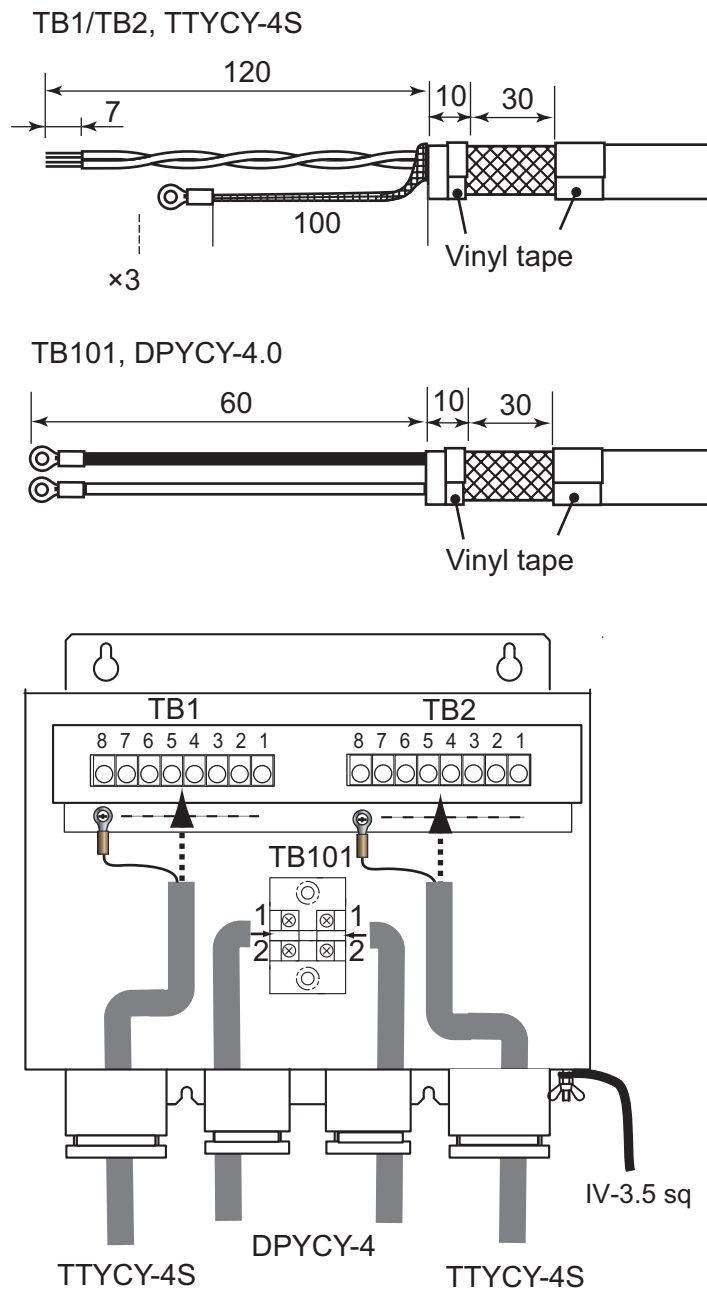
2.6 Junction Box (option)

The optional Junction Box DS-640 permits extension of the cable connected between the Junction Box and the Transceiver Unit up to maximum of 500 m.

2.6.1 DS-640

Fabricate two TTYCY-4S and DPYCY-4 cables as shown below.

DS-640 Junction Box

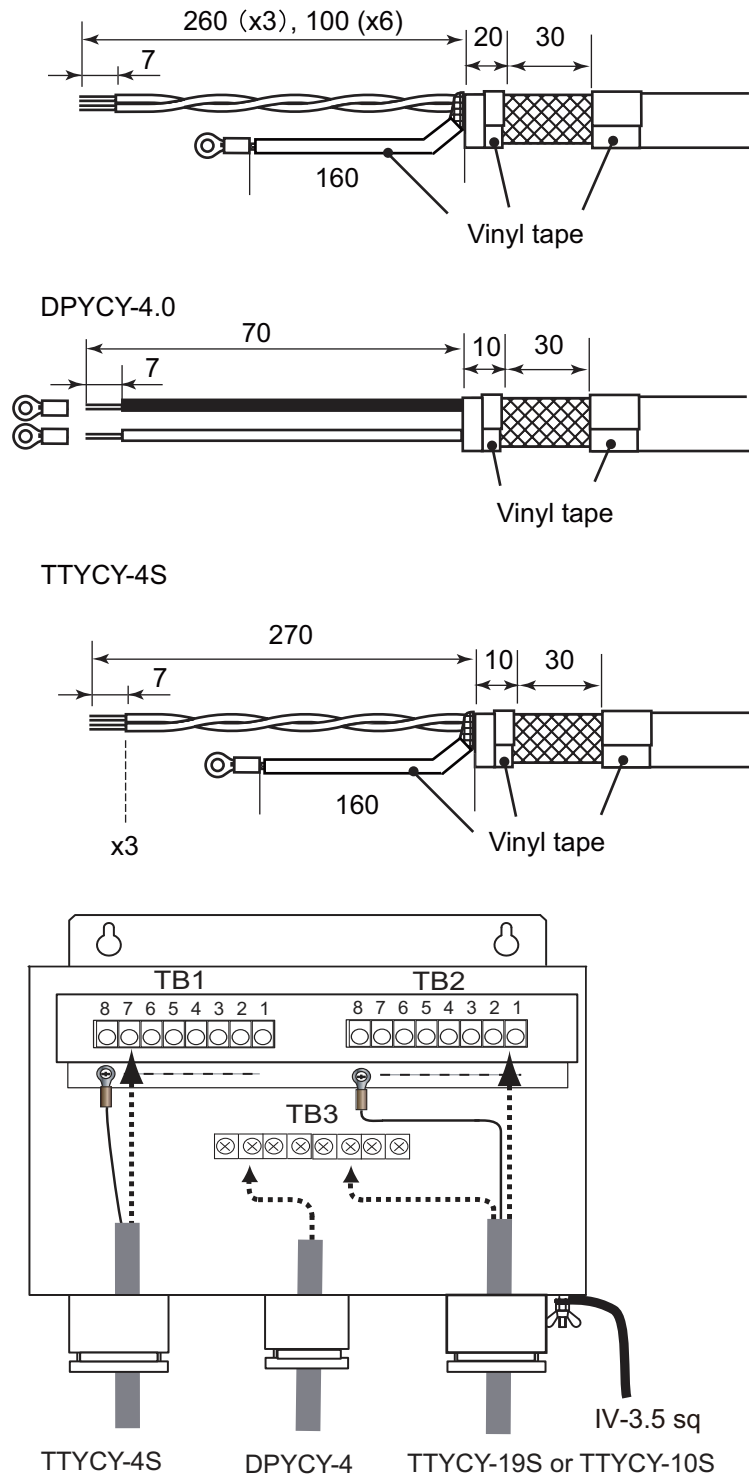


DS-640, internal view

2.6.2 DS-645A/645B

When using the JIS cable TTYCY-19S or TTYCY-10S between the distributor and the transceiver unit, select the optional DS-645A and B. These units are supplied with one pair, and you should take care to install them correctly; DS-645A: connected to the distributor unit, DS-645B: connected to the transceiver unit.

DS-645A/B Junction Box



2. WIRING

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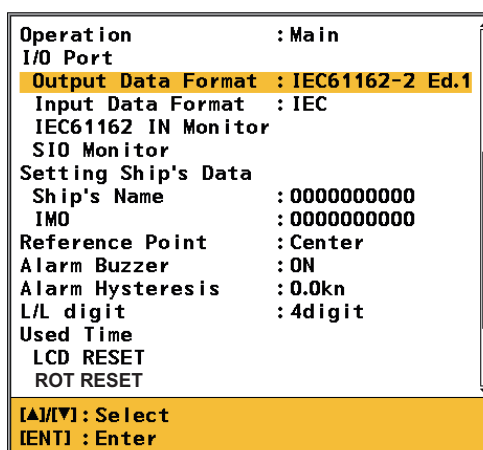
3. MENU SETTINGS

After the installation is completed, set up the system from the [Service] and [System] menus.

3.1 How to Use the [Service] Menu

1. With the power off, press and hold the **DISP** key, then press the **PWR** key to show the [Service] menu.

Note: Do not release the **DISP** key until the system releases a audible beep.

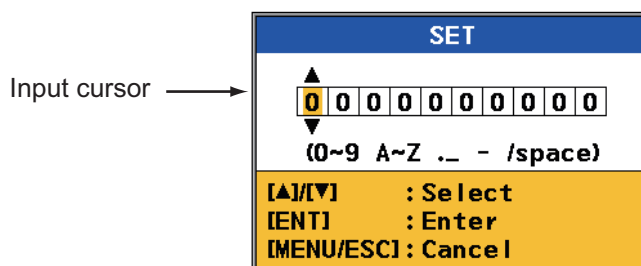


[Service] menu

2. Press **▲** or **▼** to select a menu item, and press the **ENT** key to show the setting window.
3. Press **▲** or **▼** to change the setting, and press the **ENT** key. To return to the menu, press the **MENU/ESC** key.

To enter alphanumeric data; for example, [Ship's Name], do the following:

- 1) A character input box appears, with the input cursor at the far-left position.



- 2) Press **▲** or **▼** to select character.
- 3) Press the **ENT** key to confirm selection.
- 4) Repeat step 2) and step 3) to complete the item.
You can move the input cursor with the **ENT** and **MENU/ESC** keys.
ENT: Move right.
MENU/ESC: Move left.
4. Repeat step 2 and step 3 to complete the setting.
For items to be set at the installation, see the table on next page.
5. Press the **PWR** key to turn the power off.

3. MENU SETTINGS

Menu item			Meaning	Option (default in boldface)	
[Operation]			Select [Main], [Sub] or [Satellite] to use. For display units connected to TB7 in the DS-610, select [Main]. For sub display units connected to a GS-100 and DS-60 (dual input), select [Satellite].	[Main] , [Sub], [Satellite]	
[Alarm Mode]			Select the alarm mode. (Select [Alert I/F1] or [Alert I/F2] when connected to AMS.)	[Legacy], [Alert I/F1] , [Alert I/F2]	
[Buzzer Stop]			Select the signal to input to TB8 #11 and #12 of DS-610 (main display only). Note: This item is grayed out (inoperative) when [Alarm Mode] is [Alert I/F1] or [Alert I/F2]. [Enable]: Stop the audible alarm at the external equipment. To “ACK” the alarm, press the ALARM ACK key. [Disable]: Stop the audible alarm and “ACK” the alarm at the external equipment.	[Enable], [Disable]	
[Output Data Format]			Select the version of IEC61162 data to output from DS-610.	[IEC61162-1 Ed.2] [IEC61162-1 Ed.3] [IEC61162-2 Ed.1] [IEC61162-1 Ed.4]	
[Input Data Format]	[IEC]	[61162_IN_1]	Select IEC data format input to the channel 1 of the IN port, TB2-#1, 2 in DS-610. (main display only)	[IEC61162-1 Ed.2] [IEC61162-1 Ed.3] [IEC61162-2 Ed.1] [IEC61162-1 Ed.4]	
		[61162_IN_2]	Select IEC data format to input to the channel 2 of the IN port, TB2-#3, 4 in DS-610. (main display only)		
		[61162_IN_3]	Select IEC data format to input to the channel 3 of the IN port, TB2-#5, 6 in DS-610. (main display only)		
	[NMEA]	[61162_IN_1]	Select NMEA data baud rate to input to the channel 1 of the IN port, TB2-#1, 2 in DS-610. (main display only)		[4800] [38400]
		[61162_IN_2]	Select NMEA data baud rate to input to the channel 2 of the IN port, TB2-#3, 4 in DS-610. (main display only)		
		[61162_IN_3]	Select NMEA data baud rate to input to the channel 3 of the IN port, TB2-#5, 6 in DS-610. (main display only)		
	[IEC61162 IN Monitor]			Monitor the IEC input signal described above. (main display only)	
	[SIO Monitor]			Monitor the serial signal input to the display units. (main and sub)	

Menu item	Meaning	Option (default in boldface)
[Reference Point]	Select the reference position to use to calculate ship's speed. (main display only)	[Bow] [Transducer] [Center]
[Alarm Buzzer]	Select [ON] to get the audio alarm when an alarm is violated. (main display only)	[ON], [OFF]
[Alarm Hysteresis]	Set the amount of tolerance to apply to the Speed Limit alarm (main display only). For example, if you set "1 kn" here and "30 kn" for the Speed Limit alarm, that alarm is cancelled when ship's speed drops to 29 kn from 30 kn.	[0 to 5 kn] (Default: 0 kn)
[L/L digit]	Set the number of digits to show for the minutes indication in latitude and longitude position.	[3 digit], [4 digit]
[Others]	For the serviceman. These are not used at the installation.	

3.2 How to Set the [System] Menu

Set the items on the [System] menu after completing those on the [System] menu.

3.2.1 How to show the [System] menu

1. Press the **PWR** key to turn the power on.
2. Press the **MENU/ESC** key to show the main menu.
3. Press **▼** to select [System], and press the **ENT** key.

System	
System Parameters	
Offset Data	
Setting Ship's Data	
[▲]/[▼]	: Select
[ENT]	: Enter
[MENU/ESC]	: Cancel
[DISP]	: Exit

[System] menu

3. MENU SETTINGS

3.2.2 How to set ship's data

Enter the dimensions of your ship's on the [Setting Ships Data] menu.

1. Press ▼ to select [Setting Ship's Data], and press the ENT key to show the Setting Ships Data menu.

Setting Ship's Data

LOA : 300.0m

B : 30.0m

L1 : 15.0m

L2 : 0.0m

L3 : 193.0m

L4 : 0.0m

L5 : 200.0m

D : 0.0m

[▲]/[▼] : Select

[ENT] : Enter

[MENU/ESC] : Cancel

[DISP] : Exit

Ship's data reference

⊗ : DS-60 transducer
 ○ : Nav sensor antenna
 ⊞ : Echo sounder

[Setting Ship's Data] menu

2. Select an item, and press the ENT key to show the setting window. Refer to the table in below to enter the dimensions.

Item	Meaning	Setting range
[LOA]	Ship's length	50.0 to 400.0 m
[B]	Ship's width	5.0 to 100.0 m
[L1]	Horizontal distance from the ship's bow to transducer	0.0 m to the setting value for [LOA]
[L2]	Horizontal distance from port to transducer	0.0 m to the setting value for [B]
[L3]	Horizontal distance from ship's bow to GPS antenna	0.0 m to the setting value for [LOA]
[L4]	Horizontal distance from port to GPS antenna	0.0 m to setting value for [B]
[L5]	Horizontal distance from ship's bow and CCRP (bridge)	0.0 m to setting value for [LOA]
[D]	Horizontal distance between transducers for DS-60 and echo sounder.	0.0 m to ([LOA]-[L1])

3. Press the MENU/ESC key to close the menu.

3.2.3 How to enter offset values

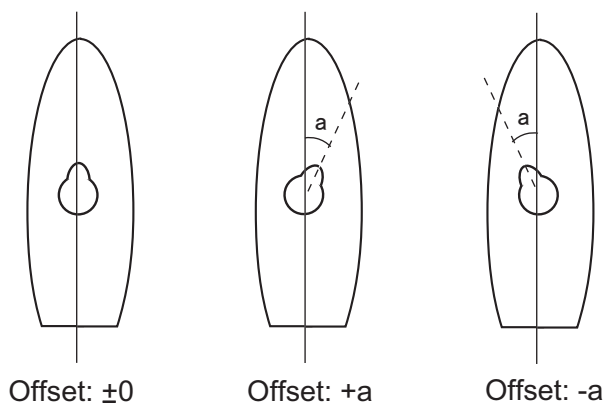
1. Press **▲** to select [Offset Data], and **ENT** key to show the [Offset Data] menu.

Offset Data		
Trim	:	0.0deg
Heel	:	0.0deg
XDCR	:	0.0deg
Compass Calibration	:	0.0deg
SOG Calibration	:	0.0%
STW Calibration	:	0.0%
[▲]/[▼]	:	Select
[ENT]	:	Enter
[MENU/ESC]	:	Cancel
[DISP]	:	Exit

2. Select [Trim], and press the **ENT** key.

SET	
▲	
0.0deg	
▼	
(-12.5~+12.5)	
Step 0.1deg	
[▲]/[▼]	: Select
[ENT]	: Enter
[MENU/ESC]	: Cancel
[DISP]	: Exit

3. Enter the offset value for inclined angle, and press the **ENT** key (setting range: -12.5 to +12.5°, +: rise at bow).
4. Press **▼** to select [Heel], and press the **ENT** key.
5. Enter the offset value for the heel, and press the **ENT** key (setting range: -12.5 to +12.5°, +: rise at port).
6. Press **▼** to select [XDCR], and press the **ENT** key.
7. Enter the offset value if transducer is not installed perfectly with ship's fore-aft line (setting range: -60.0 to +60.0°). Measure the difference between ship's fore-aft line and the line on the transducer, and enter it.



3.2.4 How to correct the ship's speed

Correct the speed error using the test sheet at the back of this manual.

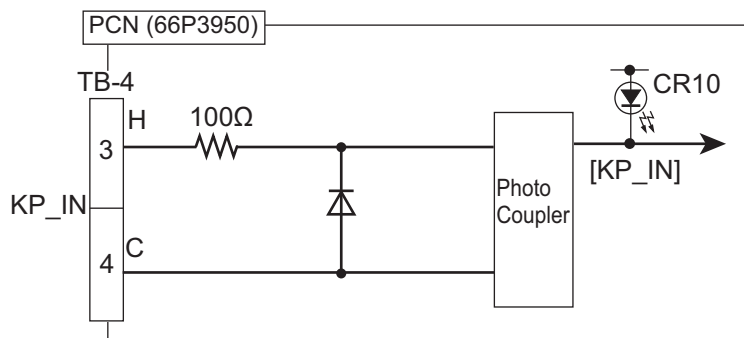
1. Press ▼ to select [SOG Calibration], and press the **ENT** key.
2. Enter the offset value for the speed over ground, and press the **ENT** key (setting range: -12.5 to +12.5%).
3. Press ▼ to select [STW Calibration], and press the **ENT** key.
4. Enter the offset value for the speed through water, and press the **ENT** key (setting range: -12.5 to +12.5%).
5. Press the **MENU/ESC** key several times to close the menu.

3.2.5 Interference rejection

Interference rejection (Input)

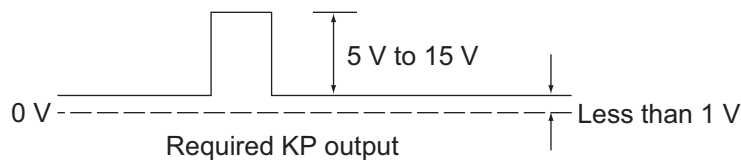
Interference can be detected during a noise test, and the interference may affect the speed log measurements and readings. To reject the interference, you can use the interference rejection circuit inside the transceiver unit.

The circuit uses the keying pulse (KP) from the external equipment to reject interference. External equipment should be connected to the KP_IN terminal.

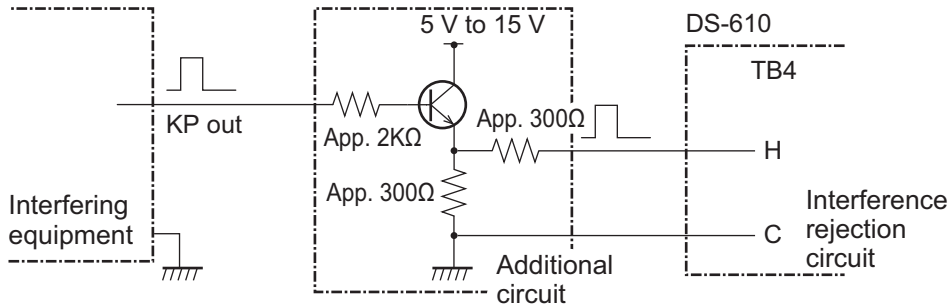


Required KP output

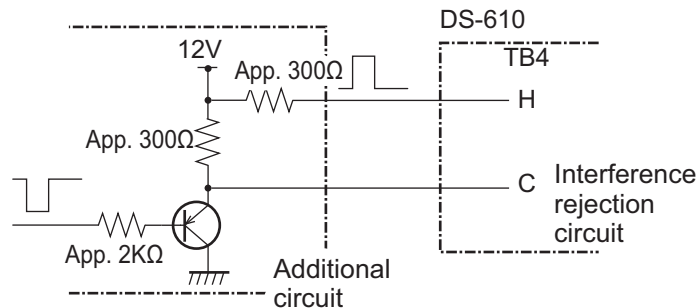
The interference rejection circuit requires the following KP output. If the interfering equipment has KP output outside this range, take the measure shown in “How to buffer the KP” on the following page.



How to buffer the KP



The following method can also be used:



Menu settings

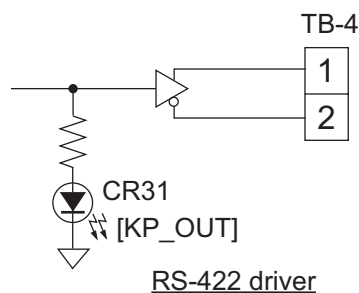
Where external equipment is connected to the KP_IN terminal, the following procedure must also be completed.

1. Press the **MENU/ESC** key to show the main menu.
2. Press **▲** or **▼** to select [System], then press the **ENT** key.
3. Press **▼** to select [System Parameters], then press the **ENT** key.
4. Press **▼** to select [IR], then press the **ENT** key.
5. Press **▲** to select [ON], then press the **ENT** key.

Note: The DS-60 does not have a mode to allow synchronization with external equipment's KP.

Interference rejection (Output)

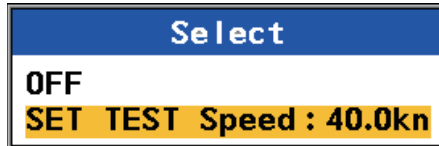
When outputting KP from the DS-60 for the purpose of suppressing interference to other ultrasound equipment, remove the TX trigger pulse from the TB4 (KP_OUT) terminal.



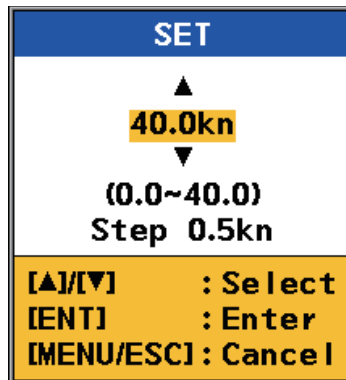
3.3 Demo Mode

The demonstration mode displays and outputs internally generated speed data and requires external input of navigational data. This mode can be used for demonstration and to check output to external equipment. "SIM" appears on the screen when the demonstration mode is active.

1. While pressing the **DISP** key, press the **PWR** key to turn on the power. The [Service] menu appears.
2. Press **▲** or **▼** to select [SIM], and press the **ENT** key.



3. Press **▲** or **▼** to select [SET TEST Speed], and press the **ENT** key. The window for setting of the test speed appears.



4. Press **▲** or **▼** to select the appropriate speed, and press the **ENT** key.
5. Press the **PWR** key to turn off the power.
6. Press the **PWR** key again to turn on the power. The simulation mode starts.
7. To stop the simulation mode, press the **PWR** key to turn off the power. Do step 1 to re-apply the power. Whenever you open the [Service] menu, the [SIM] menu is set to [OFF].
8. Press the **PWR** key to turn off the power.

APPENDIX 1 CALIBRATION

For an accurate display of speed, a speed trial test to find the difference between your actual speed and the speed calculated by the equipment is necessary. The speed trial should be conducted in area where a stable speed can be measured using SOG (speed over ground). If a stable SOG measurement is not possible, conduct the test using STW (speed thru water) with multiple passes. The offset values are calculated from the speed test by comparing the DGPS measurements.

Note: To obtain accurate offset values, it is recommended to conduct the test using similar conditions and speeds to a regular voyage.

Calibration from the speed trial

Calibration values can be calculated by comparing the doppler speed log with DGPS or other similar speed measuring devices.

1) How to use the GPS milepost.

Speed trial result conducted using a GPS milepost may differ depending on the shipyard's measurement methods, as shown below:

- The ship's speed is calculated based on the time traveled.
- The ship's fore/aft (Y-axis) speed is calculated based on the time traveled.
- Calculation is based on a one-mile course, traveled three times.
- Calculation is based on the time traveled over a predetermined time.

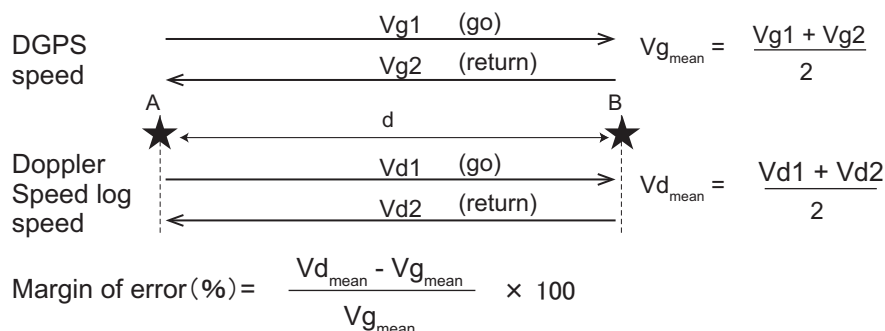
Offset calculation for the above methods is described below.

a) The ship's speed is calculated based on the time traveled.

Vectors are combined to calculate the ship speed. The DS-60 requires vector data in order to calculate the speed. For this reason, use the data sentences VHW or VTG for speed data. Where ground-referenced measurement can be taken, use the VTG sentence; otherwise, use the VHW sentence.

Note 1: The depth of 40 m more is required for STW (VHW) calibrations. Ground (seabed) echoes can interfere with the measurement if the depth is less than 40 m. This can cause an alert to be released.

Note 2: Current influences are taken into account for calculation and comparison. Changes in currents can result in erroneous measurements.



Where; d: distance run (NM), Vg1, Vg2: GPS measured speed (kn), Vd1, Vd2: doppler speed log measured speed (kn). SOG: measured from VTG, STW: measured from VHW.

APPENDIX 1 CALIBRATION

Steer the ship at a steady speed for 10 minutes or longer on the test course (EG: A to B in the figure). The ship's speed data is collected as NMEA output data. Calculate the offset values by averaging the difference between the DS-60's measured speeds and the DGPS speeds. The calibration value should be this calculated average.

- b) The ship's fore/aft (Y-axis) speed is calculated based on the time traveled. This method uses the fore/aft (Y-axis) speed as the GPS milepost. The calculation is made by comparing the VTG speed (taken immediately after switching to ground-based speed) and the VBW speed (taken immediately after switching to water-based speed).
- c) Calculation is based on a one-mile course, traveled three times. Calculation is done with the same method as a).
- d) Calculation is based on the time traveled over a predetermined time. Calculation is done with the same method as a).

- 2) How to use survey poles as a milepost
Calculation is done using b) from method 1).

By conducting the same test using different speed conditions, you can obtain varied sampling data. Use the average values to calculate a calibration value and allow a 2% margin of error.

Note: The procedure for setting the calibration value in the menu is covered at the end of this appendix.

Calibration Setting

The speed error can be corrected at [OFFSET DATA] on the [System] menu as follows:

1. Press the **MENU/ESC** key.
2. Select [System] and press the **ENT** key.
3. Select [OFFSET DATA] and press the **ENT** key.
4. Select [STW CALIBRATION] and press the **ENT** key.
5. Enter offset value (calibration) for STW.
6. Select [SOG CALIBRATION] and press the **ENT** key.
7. Enter offset value (calibration) for SOG.



TEST SHEET FOR DOPPLER SPEED LOG

Type: _____ Serial No.: _____ m
 Date: _____ Place: _____ Ship's length: _____ m Draft: Fore: _____ m
 Ship's Name: _____ Hull No.: _____ Shipyard: _____ Aft: _____ m

RUN No.	Engine		DGPS Speed (kn)	Doppler Speed Log			Shipyard Data			Note	
	Load (%)	Rev. (rpm)		Tracking Mode	Speed (kn)	*1 Error (%)	Calibration (%)	Depth (m)	Course (deg)		Wind (m/s)
-											
-											
Mean											
-											
-											
Mean											
-											
-											
Mean											
-											
-											
Mean											
-											
-											
Mean											
-											
-											
Mean											
-											
-											
Mean											

*1 Error = $\frac{\text{DS Speed (NM)} - \text{DGPS (NM)}}{\text{DGPS (NM)}} \times 100 (\%)$

Owner's Signature: _____
 Company name: _____
 Engineer's Signature: _____

APPENDIX 2 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 (mm²)* 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

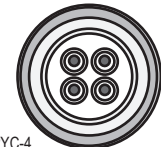
-SLA: Individually shielded cores, plastic tape w/aluminum tape



DPYC



TPYC



MPYC-4



TTYCSLA-4

EX: ^{1 2 3 4 5 6} TTYC Y S L A - 4
Designation type Core Area (mm²)

EX: ^{1 2 3 4} M P Y C - 4
Designation type # of cores

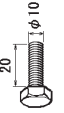
The following reference table lists gives the measurements of JIS cables commonly used with Furuno products:

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

FURUNO

CODE NO.	001-407-270-00	66AT-X-9415 -0
TYPE	CP66-01701	1/1

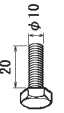
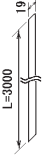
工事材料表

INSTALLATION MATERIALS		DS-620			
番号 NO.	名称 NAME	略図 OUTLINE	型名/規格 DESCRIPTIONS	数量 QTY	用途/備考 REMARKS
1	六角ボルト HEX. BOLT		M10X20 SUS304 CODE NO. 000-102-779-10	4	

FURUNO

CODE NO.	001-082-290-00	66AT-X-9411 -1
TYPE	CP66-01702	1/1

工事材料表

INSTALLATION MATERIALS		DS-620			
番号 NO.	名称 NAME	略図 OUTLINE	型名/規格 DESCRIPTIONS	数量 QTY	用途/備考 REMARKS
1	六角ボルト HEX. BOLT		M10X20 SUS304 CODE NO. 000-102-779-10	4	
2	清電布テープ SHIELDING TAPE		TR-19 L=3000 CODE NO. 000-173-067-10	1	テープ、結線シート処理用 FOR WRAPPING CABLES

型式/コード番号が2段の場合、下段より上段に代わる通線部品であり、どちらかが入っています。なお、品質は変わりません。

TWO TYPES AND CODES MAY BE LISTED FOR AN ITEM. THE LOWER PRODUCT MAY BE SHIPPED IN PLACE OF THE UPPER PRODUCT. QUALITY IS THE SAME.
(略図の寸法は、参考値です。)

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

FURUNO ELECTRIC CO., LTD.


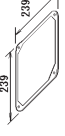
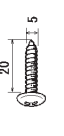
FURUNO ELECTRIC CO., LTD.

KR
C7264-M15-A

C7264-M11-B

CODE NO.	001-081-900-00	26AC-X-9403-3	1/1
TYPE	CP26-01501		


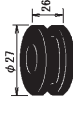

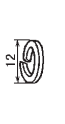
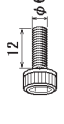
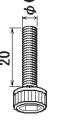
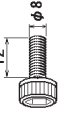
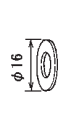
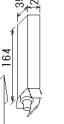

工事材料表

INSTALLATION MATERIALS		DS-631		66AT-X-9407-4	
番号 NO.	名称 NAME	略図 OUTLINE	型名/規格 DESCRIPTIONS	数量 QTY	用途/備考 REMARKS
1	ケーブルクリップ (2) CABLE CLAMP (2)		26-003-1528-0 CODE NO. 100-355-110-10	1	
2	フラッシュマウンティングスポンジ FLUSH MOUNTING SPONGE		26-003-1532-2 CODE NO. 100-355-202-10	1	
3	タップビス TAPPING SCREW		5X20 SUS304 CODE NO. 000-171-997-10	4	

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

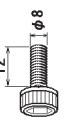

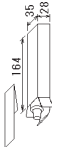
CODE NO.	001-496-120-00	66AT-X-9407-4	1/1
TYPE	CP66-01704		

工事材料表

INSTALLATION MATERIALS		DS-631		66AT-X-9407-4	
番号 NO.	名称 NAME	略図 OUTLINE	型名/規格 DESCRIPTIONS	数量 QTY	用途/備考 REMARKS
1	コネクタ面定金具 METAL FIXING FOR CONNECTOR		06-027-6019-0 CODE NO. 100-354-690-10	1	
2	ゴムパッキン GROMMET		06-027-6021-0 CODE NO. 100-354-700-10	1	
3	ケーブル固定板 CABLE FIXING PLATE		06-027-6022-0 CODE NO. 100-354-710-10	1	
4	ハコばね SPRING WASHER		M6 SUS316L CODE NO. 000-167-409-10	4	
5	六角穴付ねじ HEXAGONAL HEAD BOLT		M6X12 SUS316L CODE NO. 000-172-253-10	2	
6	六角穴付ねじ HEXAGONAL HEAD BOLT		M6X20 SUS316L CODE NO. 000-162-746-10	2	
7	六角穴付ねじ HEXAGONAL HEAD BOLT		M6X12 SUS316L CODE NO. 000-172-255-10	4	
8	シーリングワッシャー SEAL WASHER		SUS M8 CODE NO. 000-167-584-10	4	
9	接着剤袋詰 ADHESIVE		T85211 50G CODE NO. 001-477-870-30	1	
10	シリコングリス GREASE		G-30M-100 CODE NO. 000-169-306-10	1	

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











CODE NO.	001-496-110-00	66AT-X-9406-3
TYPE	CP66-01703	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 QTY	用途/備考 REMARKS
1	六角穴付ボルト HEXAGONAL HEAD BOLT		M2X12 SUS316L CODE NO. 000-172-295-10	4	
2	シーリングワッシャー SEAL WASHER		SUS 16 CODE NO. 000-167-584-10	4	
3	接着剤塗布 ADHESIVE		IBS211 50G CODE NO. 001-477-870-00	1	

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

FURUNO ELECTRIC CO., LTD.

CODE NO.	001-082-800-00	66AT-X-9409-1
TYPE	CP66-01711	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 QTY	用途/備考 REMARKS
1	防水座金 WATERPROOF WASHER		06-027-7206-1 CODE NO. 100-354-071-10	1	
2	防水ワッシャー WATERPROOF GASKET		06-027-7207-1 CODE NO. 100-354-081-10	1	
3	ケーブル用継付 CABLE GLAND NIPPLE		JIS F8801 20#7 CODE NO. 000-171-874-10	1	
4	六角ナット HEXAGONAL NUT		M12 SUS316L CODE NO. 000-167-494-10	8	
5	平座金 FLAT WASHER		M12 SUS316L CODE NO. 000-167-417-10	4	
6	ハネ座金 SPRING WASHER		M12 SUS316L CODE NO. 000-167-396-10	4	
7	六角ナット HEXAGONAL NUT		M20 SUS316L CODE NO. 000-167-495-10	16	
8	ハネ座金 SPRING WASHER		M20 SUS316L CODE NO. 000-167-402-10	16	
9	六角ボルト HEXAGONAL HEAD BOLT		M20X75 SUS316L CODE NO. 000-172-024-10	8	
10	グリス GREASE		No. 1 400G ジェル グリス CODE NO. 000-165-774-10	1	

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

FURUNO ELECTRIC CO., LTD.


FURUNO

CODE NO.	001-082-830-00	66AT-X-9408-0
TYPE	CP66-01710	1/1

工事材料表

INSTALLATION MATERIALS

DS-661

番号 NO.	名称 NAME	略図 OUTLINE	型名/規格 DESCRIPTIONS	数量 Q'TY	用途/備考 REMARKS
1	グリス/グリス GREASE		No.1 400G ノズル (グリス) CODE NO. 000-165-774-10	1	

型式/コード番号が異なる図の場合、下段より上段に代わる適量部品であり、どちらかが入っています。なお、品質は変わりません。
TWO TYPES AND CODES MAY BE LISTED FOR AN ITEM. THE LOWER PRODUCT MAY BE SHIPPED IN PLACE OF THE UPPER PRODUCT.
QUALITY IS THE SAME.
(略図の寸法は、参考値です。)

FURUNO ELECTRIC CO., LTD.

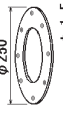
FURUNO

CODE NO.	001-082-820-00	66AT-X-9410-0
TYPE	CP66-01712	1/1

工事材料表

INSTALLATION MATERIALS

DS-661

番号 NO.	名称 NAME	略図 OUTLINE	型名/規格 DESCRIPTIONS	数量 Q'TY	用途/備考 REMARKS
1	ガスケット GASKET		06-027-7203-0 CODE NO. 100-354-040-10	2	

型式/コード番号が異なる図の場合、下段より上段に代わる適量部品であり、どちらかが入っています。なお、品質は変わりません。
TWO TYPES AND CODES MAY BE LISTED FOR AN ITEM. THE LOWER PRODUCT MAY BE SHIPPED IN PLACE OF THE UPPER PRODUCT.
QUALITY IS THE SAME.
(略図の寸法は、参考値です。)

FURUNO ELECTRIC CO., LTD.

取付穴
4-φ7

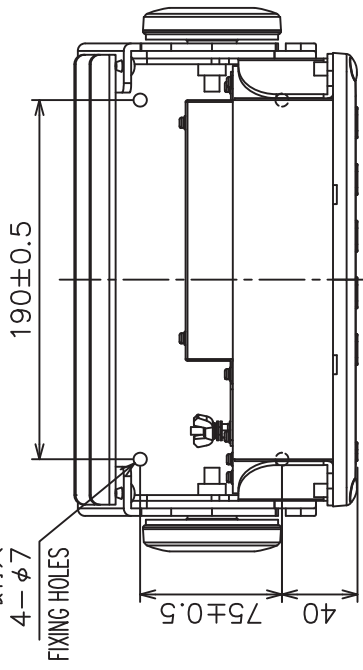
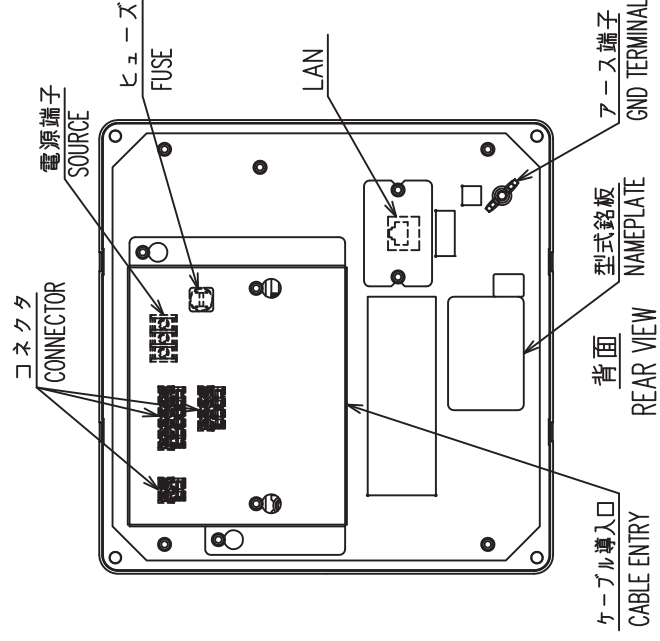
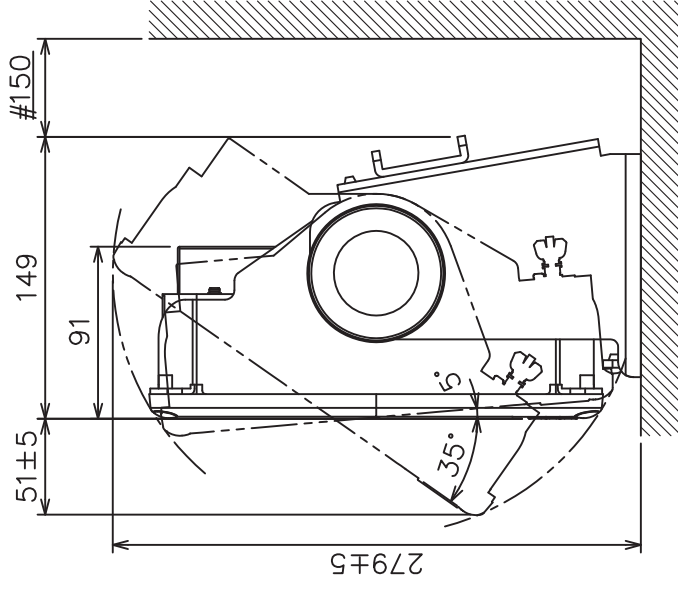
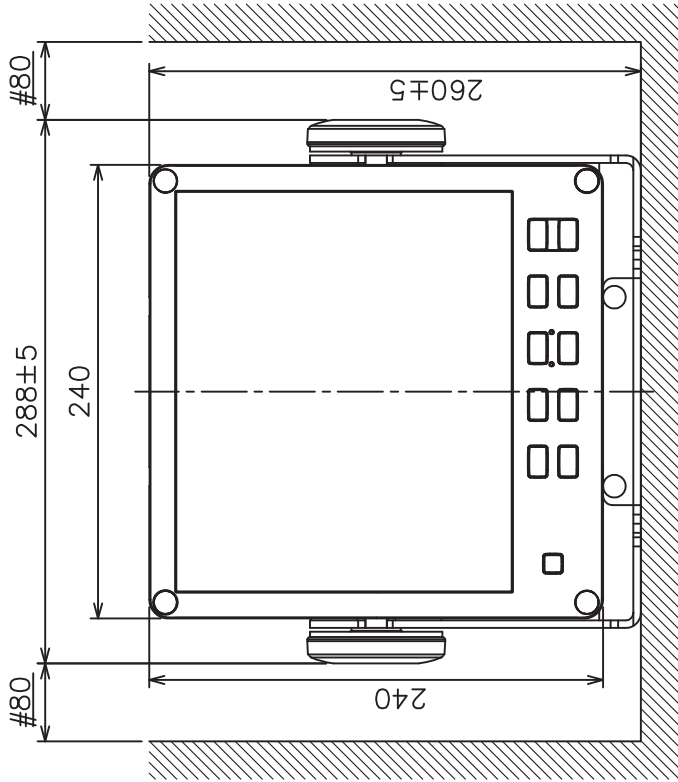


表1 TABLE 1

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クリアランスとする。
 - 3) 取付用ネジはバイネジ呼び径5×20を使用のこと。
- NOTE
1. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS WHICH IS NOT SPECIFIED.
 2. #: MINIMUM SERVICE CLEARANCE.
 3. USE BIND TAPPING SCREWS φ5x20 FOR FIXING THE UNIT.

DRAWN	5/Mar/2010	T.YAMASAKI	TITLE	DS-600
CHECKED	5/Mar/2010	I.TAKAHASHI	名称	指示器 (卓上装備)
APPROVED	8/Mar/2010	Y.NISHIYAMA	外寸図	
SCALE	1/4	1/100	NAME	DISPLAY UNIT (TABLETOP MOUNT)
DWG.No.	C7264-G01-C	REF.No.	66-027-101G-5	OUTLINE DRAWING

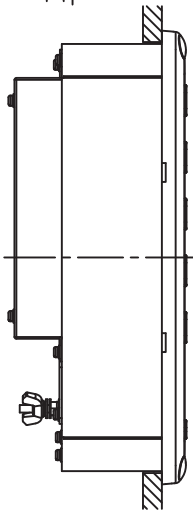
表1 TABLE 1

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

Fマウント用スポンジ (防水用)
FLUSH MOUNT SPONGE
FOR WATERPROOFING

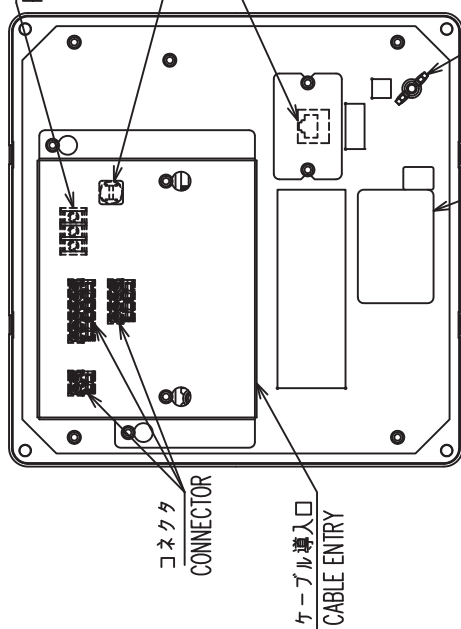
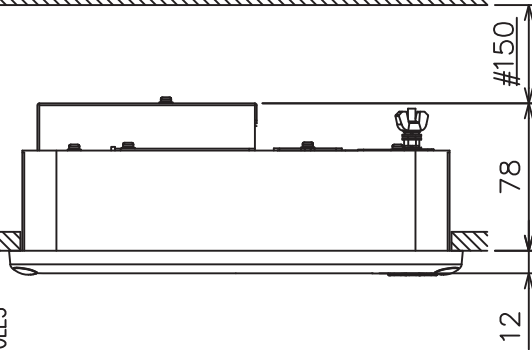
本体
MAIN UNIT

取付部断面 (尺度: 1/1)
SLICE OF FIXING (SCALE: 1/1)

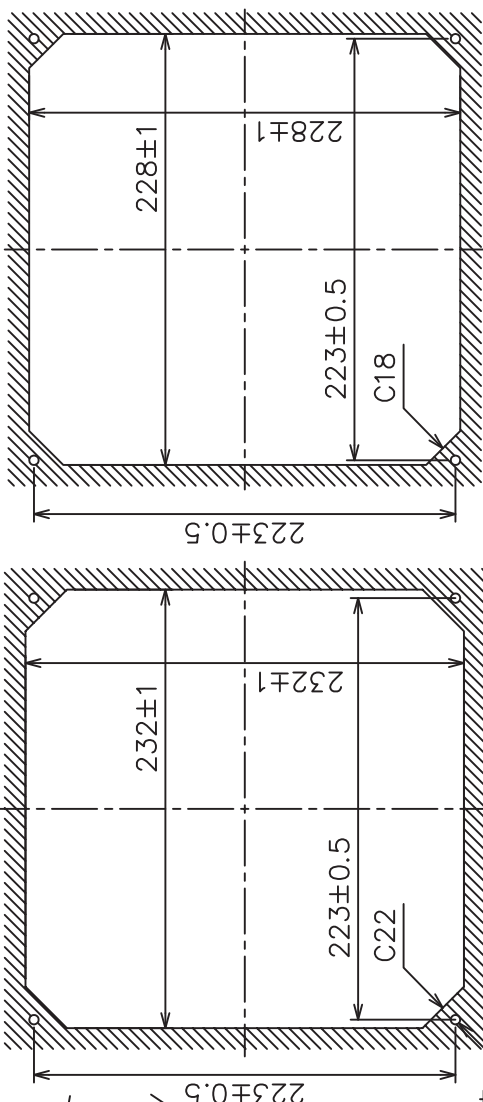


取付穴
4-φ6
FIXING HOLES

4-取付穴
PILOT HOLES



背面
REAR VIEW



取付穴寸法 (屋内装備時)
CUTOOUT DIMENSIONS (INDOOR INSTALLATION)

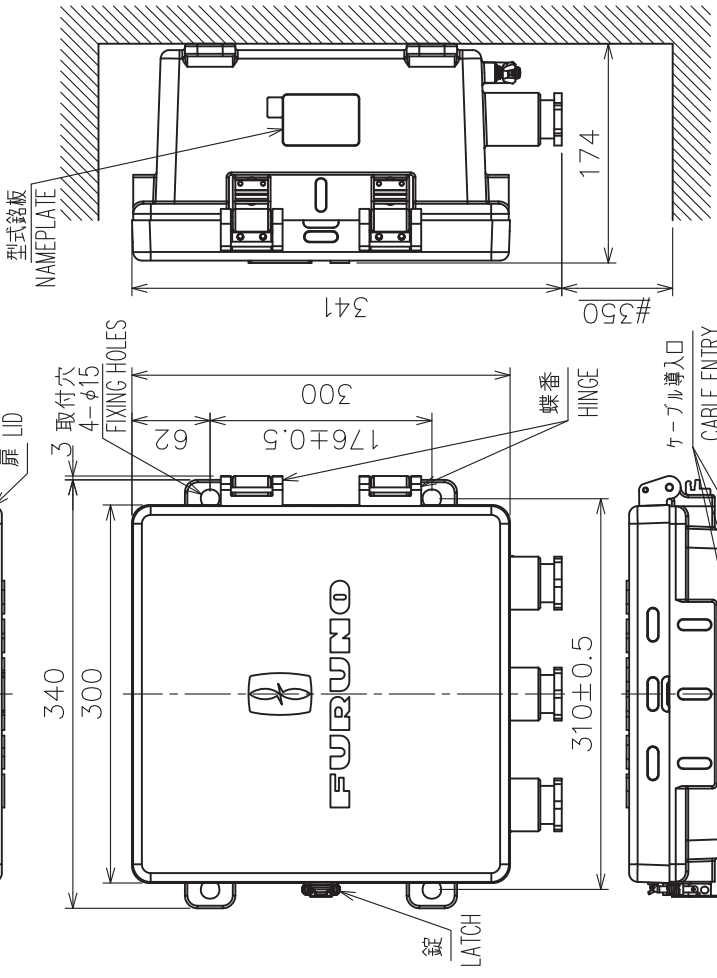
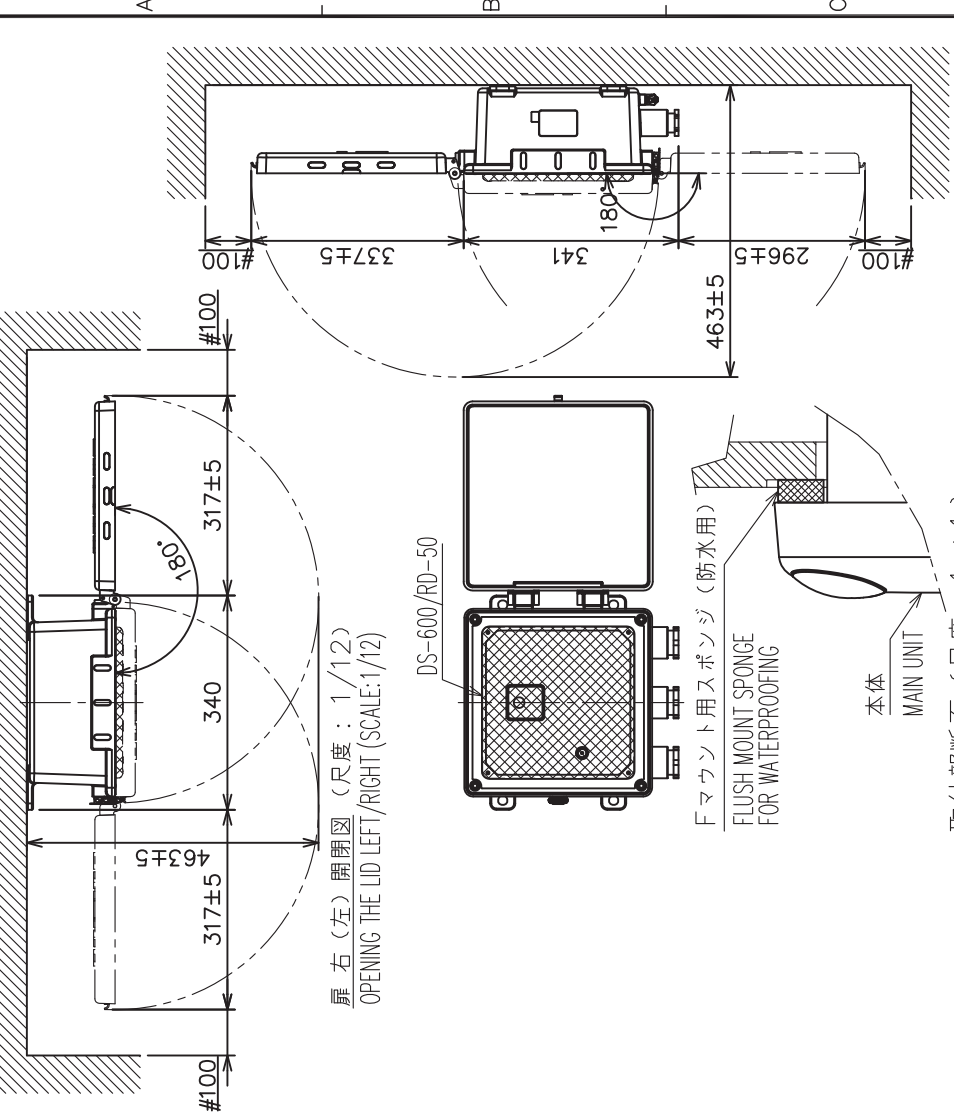
取付穴寸法 (屋外装備時)
CUTOOUT DIMENSIONS (OUTDOOR INSTALLATION)

- 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マウントピッチとする。
 - 3) 取付用ネジはバインドタックピンネジ呼び径5×2.0を使用のこと。
- NOTE
1. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS WHICH IS NOT SPECIFIED.
 2. #: MINIMUM SERVICE CLEARANCE.
 3. USE BIND TAPPING SCREWS $\phi 5 \times 2.0$ FOR FIXING THE UNIT.

DRAWN	17/Dec/2012	T. YAMASAKI	TITLE	DS-600
CHECKED	17/Dec/2012	H. MAKI	名称	指示器 (埋込装備)
APPROVED	18/Dec/2012	Y. NISHIYAMA	NAME	DISPLAY UNIT (FLUSH MOUNT)
SCALE	1/4	MASS 2.1 kg	REF.No.	66-027-102G-6
DWG.No.	C7264-G02-D		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



- NOTE
1. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS WHICH IS NOT SPECIFIED.
 2. #: MINIMUM SERVICE CLEARANCE.
 3. USE M10 BOLTS AND SEAL WASHERS (03-001-3002) FOR FIXING THE UNIT.
 4. EXCHANGE THE POSITION OF LATCH/HINGE TO CHANGE THE LID DIRECTION.

- 注 記
- 1) 指定外の寸法公差は表 1 による。
 - 2) #印寸法は最小サービスペース寸法とする。
 - 3) 取付ネジは M10 ボルト、シールワッシャー (03-001-3002) を使用のこと。
 - 4) 錠と蝶番の取付位置を入れ替えて、扉の開閉方向を変更出来ます。

DRAWN	17/Dec/2012 I.YAMASAKI	TITLE	DS-605
CHECKED	17/Dec/2012 H.MAKI	名称	防水箱
APPROVED	18/Dec/2012 Y.NISHIYAMA	外寸図	
SCALE	1/6	NAME	WATERPROOF BOX
DWG.No.	C7264-G05-F	REF.No.	66-027-104G-3
			OUTLINE DRAWING

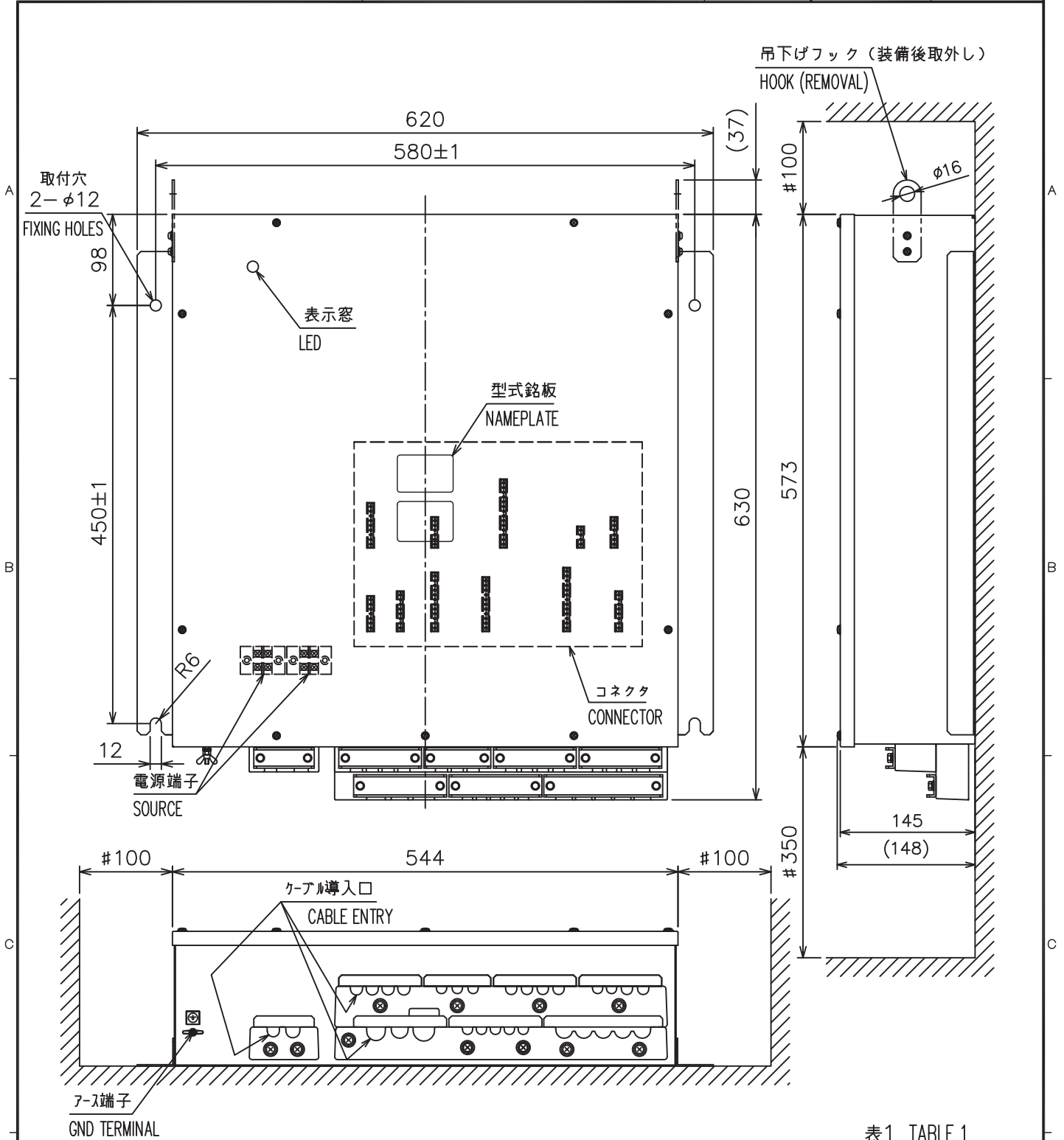


表1 TABLE 1

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) #印寸法は最小サービス空間寸法とする。
 3) 取付用ネジはM10ボルトを使用のこ。

- NOTE 1. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS WHICH IS NOT SPECIFIED.
 2. #: MINIMUM SERVICE CLEARANCE.
 3. USE M10 BOLTS FOR FIXING THE UNIT.

DRAWN 30/Jun/2015 T.YAMASAKI	TITLE DS-610
CHECKED 30/Jun/2015 H.MAKI	名称 分配器
APPROVED 30/Jun/2015 H.MAKI	外寸図
SCALE 1/6	NAME DISTRIBUTOR
MASS 20 ±10% kg	OUTLINE DRAWING
DWG. No. C7264-G03-B	REF. No. 66-027-200G-1

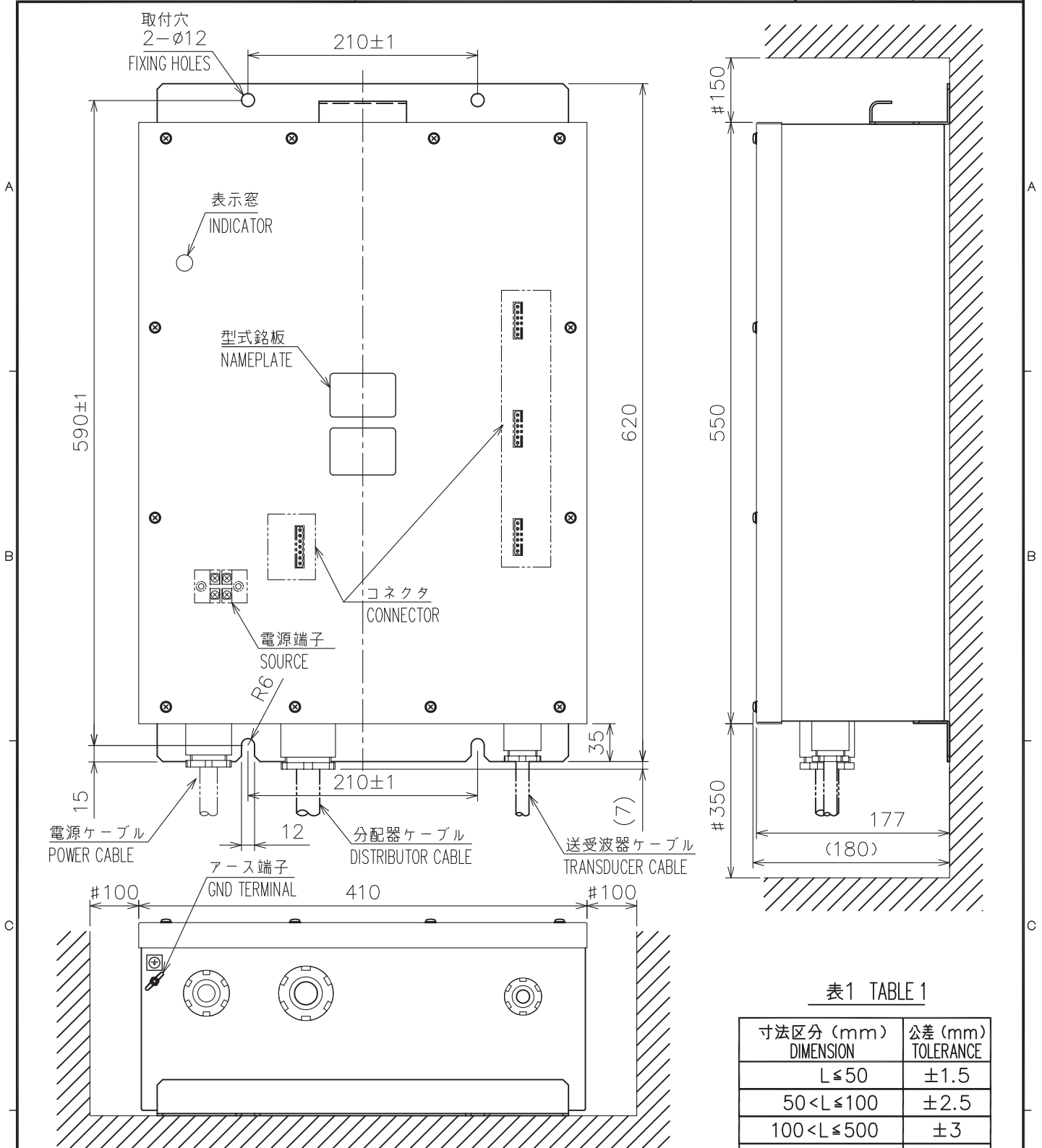


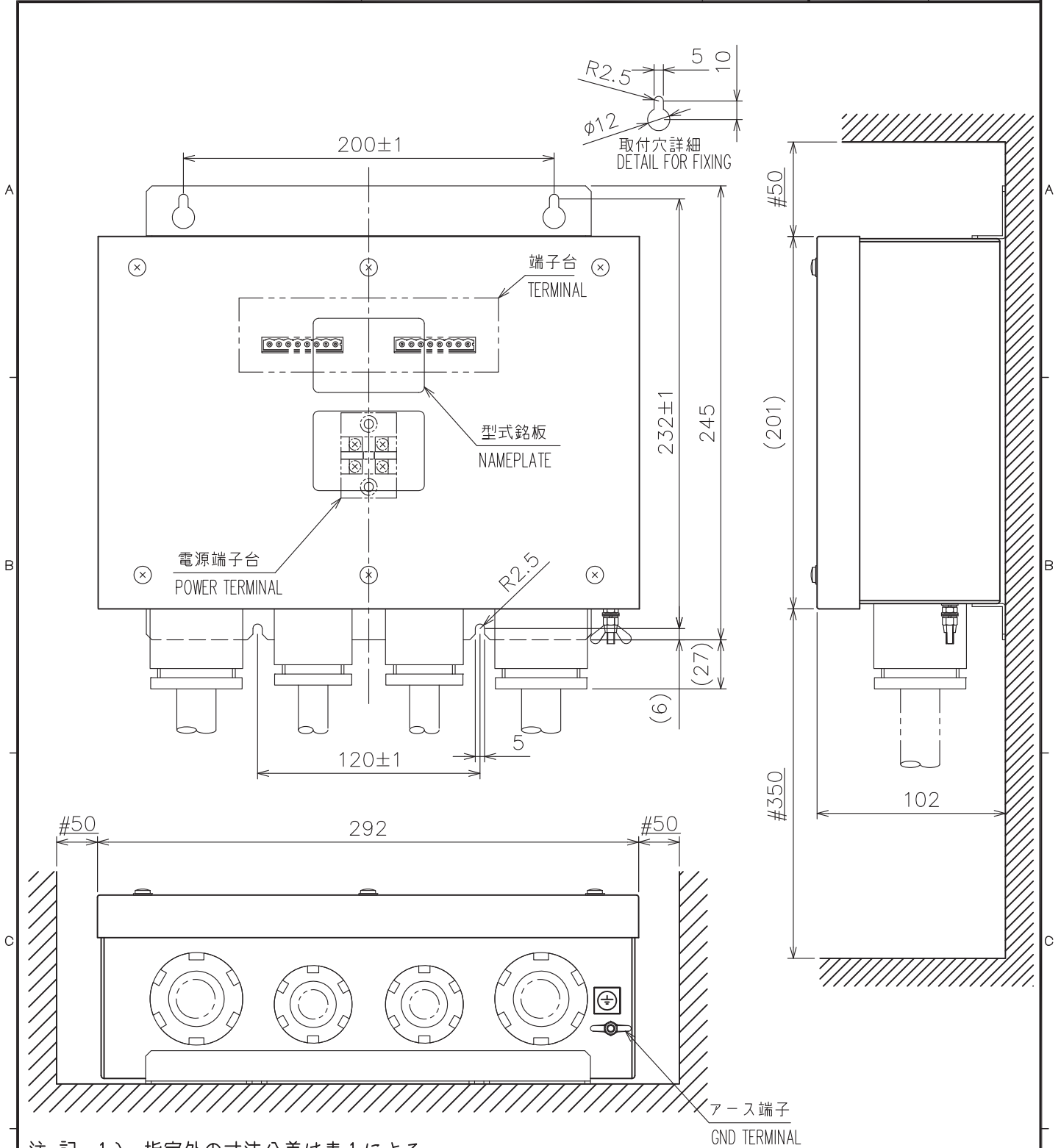
表1 TABLE 1

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

- 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M10ボルトを使用のこと。

- NOTE 1. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS WHICH IS NOT SPECIFIED.
 2. #: MINIMUM SERVICE CLEARANCE.
 3. USE M10 BOLTS FOR FIXING THE UNIT.

DRAWN	30/Jun/2015 T.YAMASAKI	TITLE	DS-620
CHECKED	30/Jun/2015 H.MAKI	名称	送受信部
APPROVED	30/Jun/2015 H.MAKI	DS-60	外寸図
SCALE	1/5	MASS	19 ±10% kg
DWG. No.	C7264-G04-C	REF. No.	66-027-300G-1
		NAME	TRANSCIVER UNIT OUTLINE DRAWING



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

- NOTE 1. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS WHICH IS NOT SPECIFIED.
 2. #: MINIMUM SERVICE CLEARANCE.
 3. USE TAPPING SCREWS $\phi 4 \times 20$ FOR FIXING THE UNIT.

表1 TABLE 1

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

DRAWN 1/Jul/2011 T.YAMASAKI	TITLE DS-640
CHECKED 1/Jul/2011 H.MAKI	名称 接続箱
APPROVED 1/Jul/2011 Y.NISHIYAMA	外寸図
SCALE 1/3	NAME JUNCTION BOX
MASS 5.0 $\pm 10\%$ kg	OUTLINE DRAWING
DWG. No. C7264-G06-B	REF. No. 66-027-400G-1

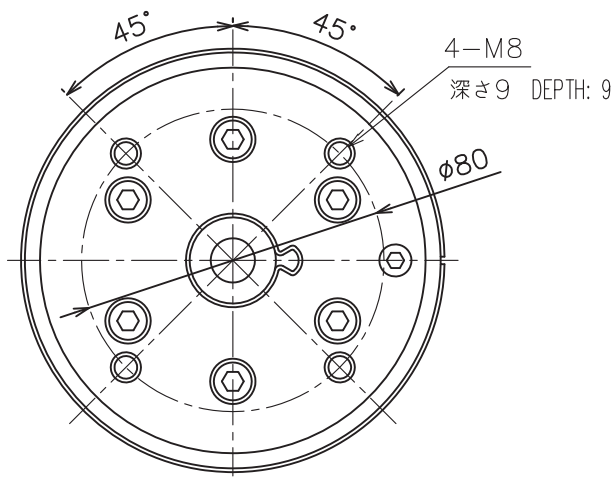


表 1 TABLE 1

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

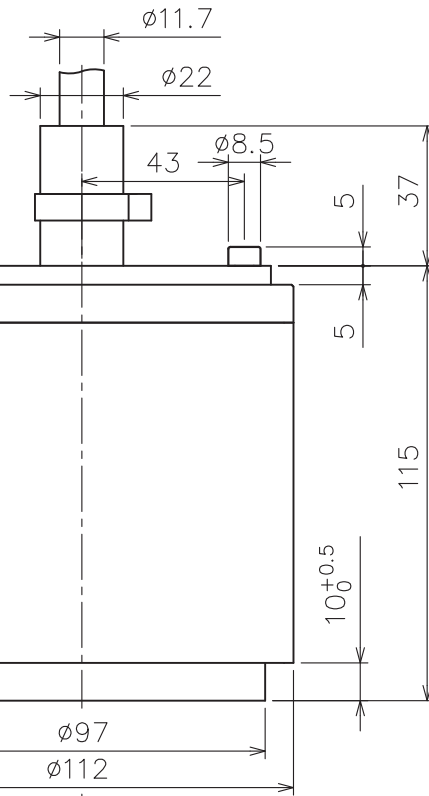
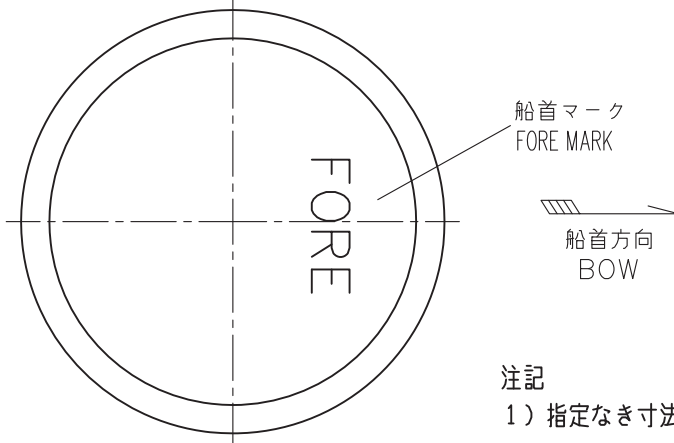


表 2 TABLE 2

ケーブル長 (m) CABLE LENGTH	質量 (kg $\pm 10\%$) MASS
31	9
41	11
51	13
61	14



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 WHICH IS NOT SPECIFIED.

DRAWN 29/Mar/2011 T.YAMASAKI	TITLE DS-630
CHECKED 29/Mar/2011 H.MAKI	名称 送受波器
APPROVED 29/Mar/2011 Y.NISHIYAMA	DS-60 外寸図
SCALE 1/2	MASS 表2参照 SEE TABLE 2
DWG. No. C7264-G07-B	REF. No. 66-027-600G-1
NAME TRANSDUCER OUTLINE DRAWING	

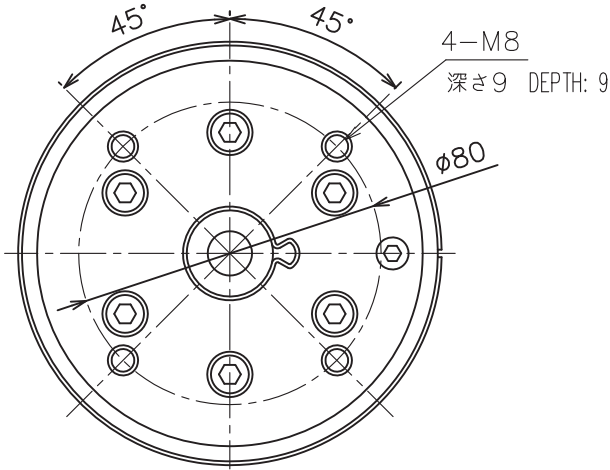
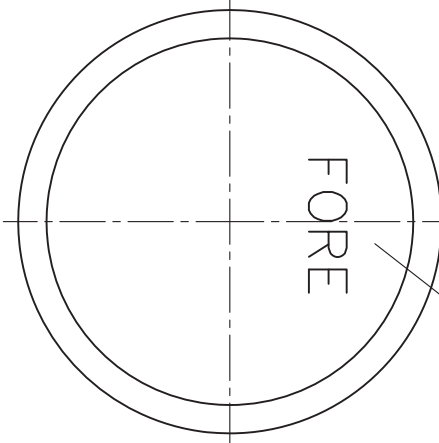
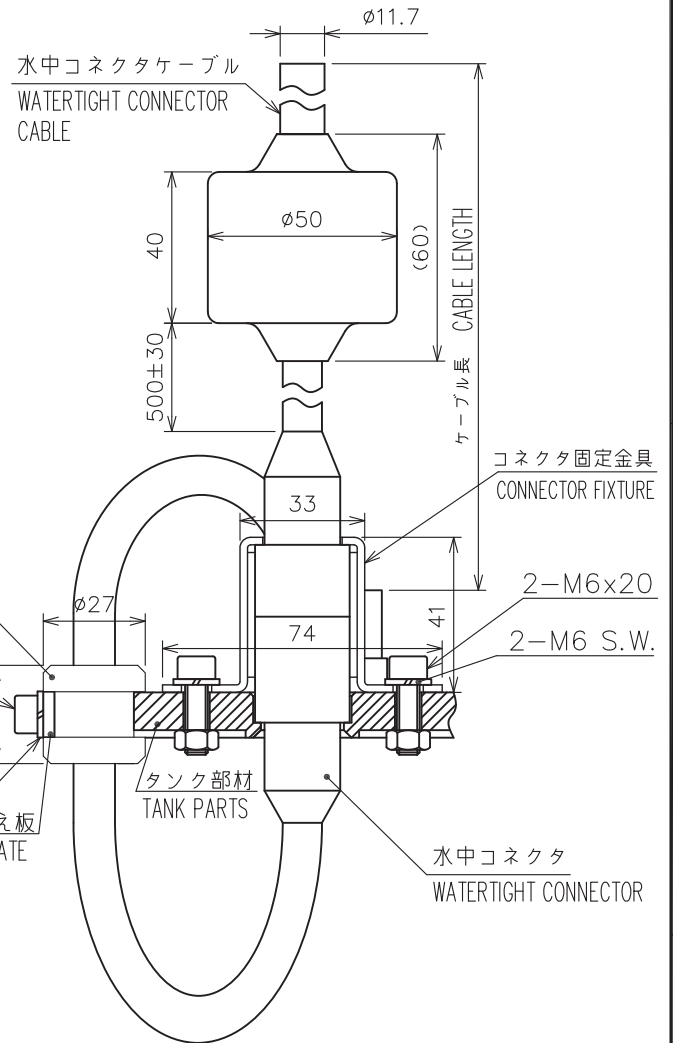
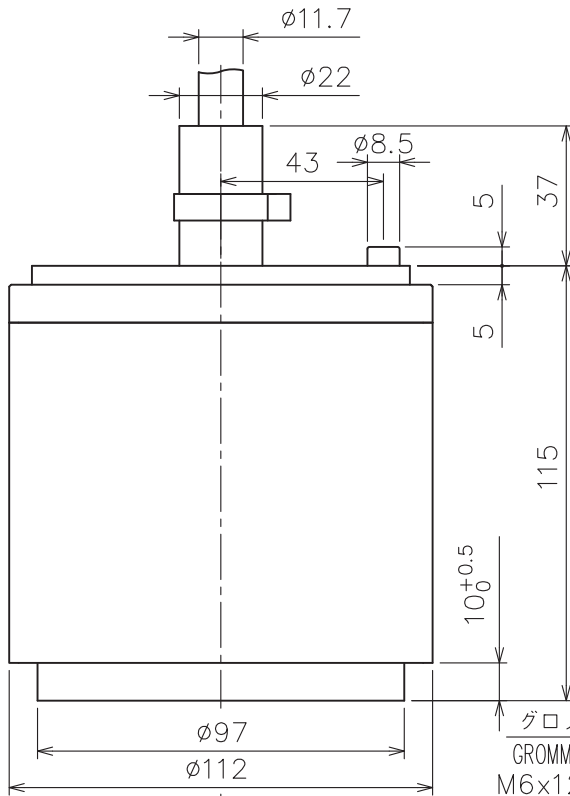


表 1 TABLE 1

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

表 2 TABLE 2

ケーブル長 (m) CABLE LENGTH	質量 (kg±10%) MASS
31	9
41	11
51	13
61	14



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 WHICH IS NOT SPECIFIED.

DRAWN 29/Mar/2011 T.YAMASAKI	TITLE DS-631
CHECKED 29/Mar/2011 H.MAKI	名称 送受波器
APPROVED 29/Mar/2011 Y.NISHIYAMA	外寸図
SCALE 1/2	NAME TRANSDUCER
DWG. No. C7264-G08-B	REF. No. 66-027-610G-1
MASS 表2参照 SEE TABLE 2	OUTLINE DRAWING

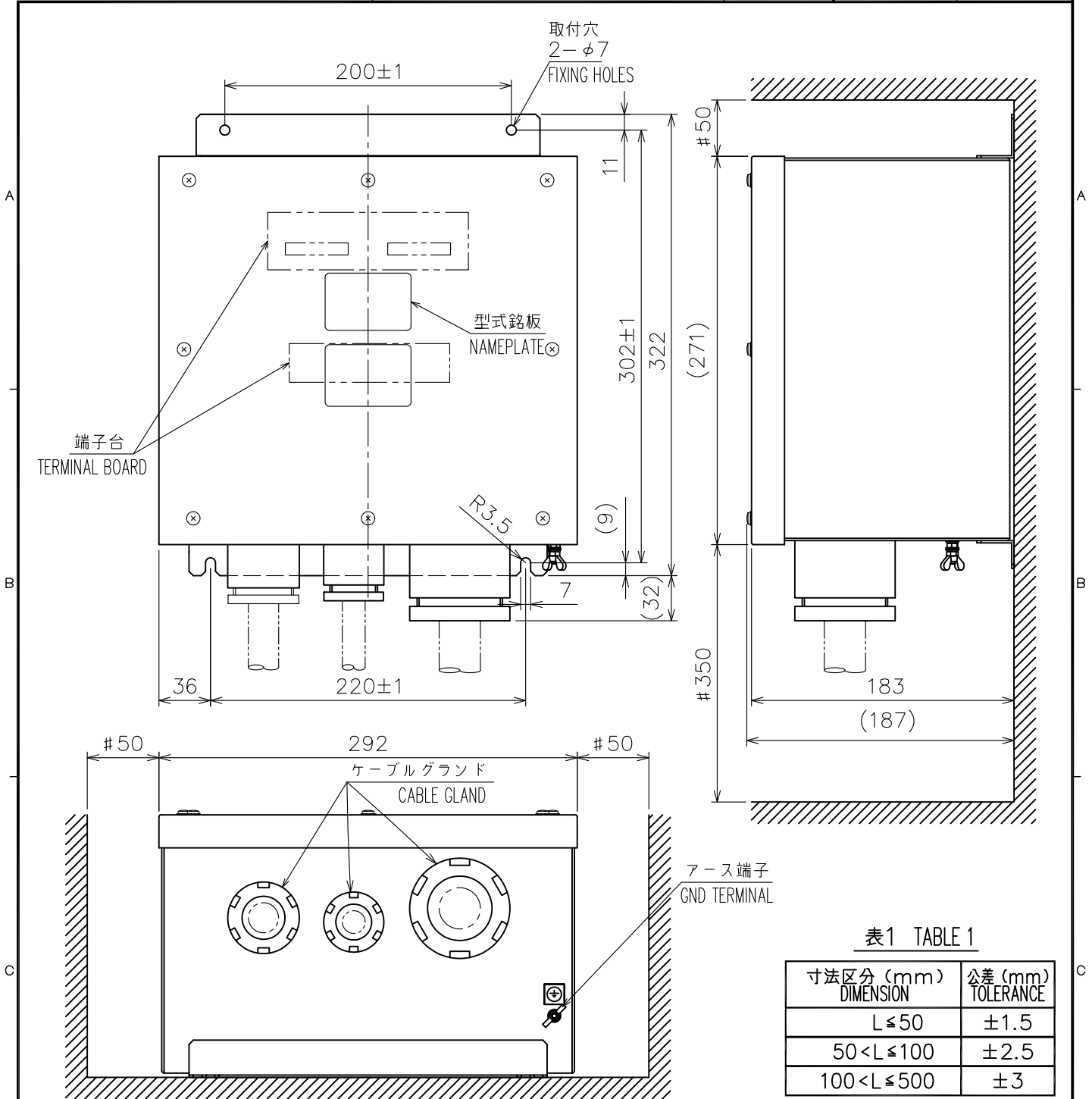


表1 TABLE 1

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

表2 TABLE 2

型式 MODEL	質量 MASS (kg±10%)
DS-645A	11.0
DS-645B	8.0

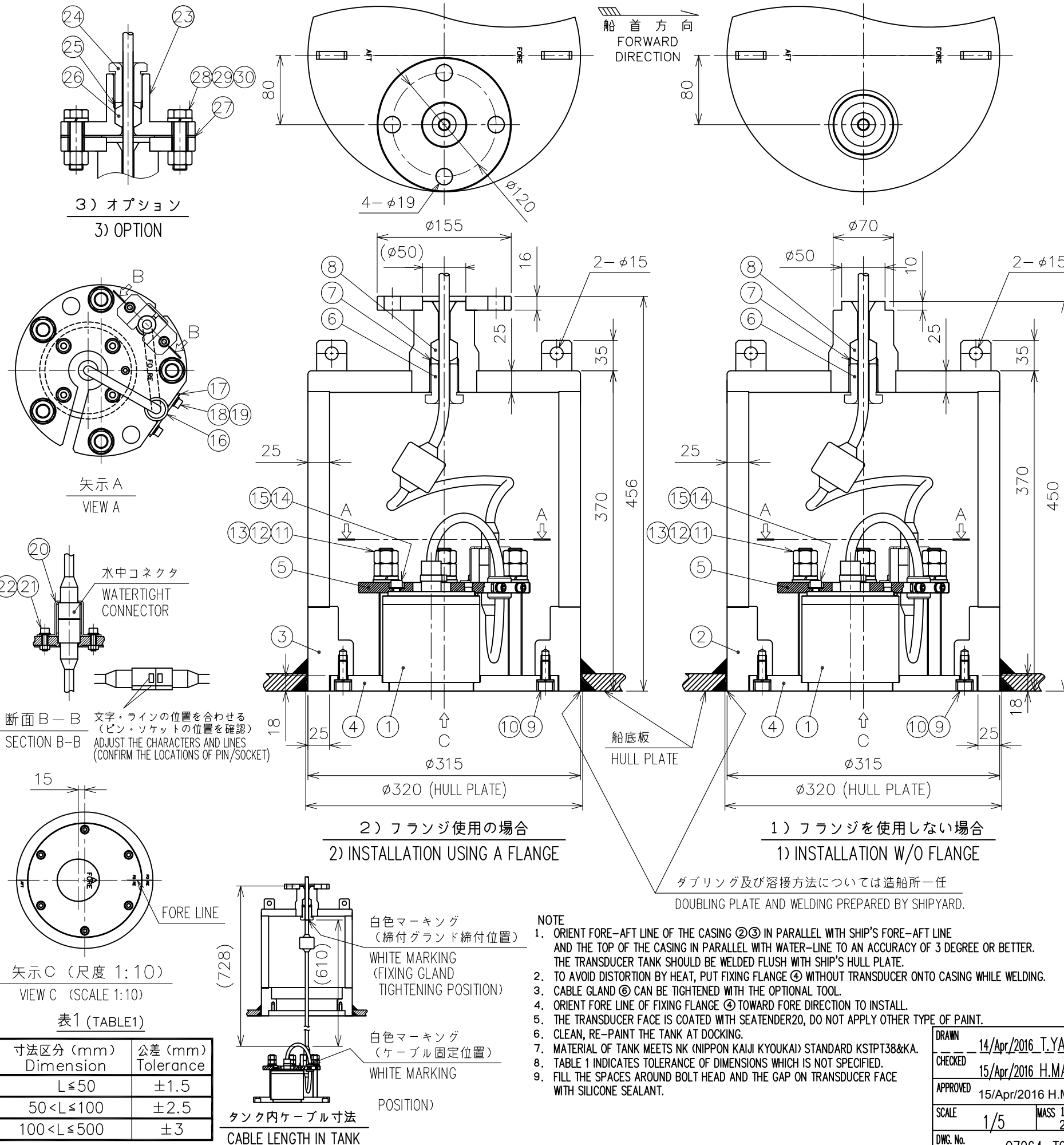
注記

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

NOTE

1. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS WHICH IS NOT SPECIFIED.
2. #: MINIMUM SERVICE CLEARANCE.
3. USE TAPPING SCREWS φ5x20 FOR FIXING THE UNIT.

DRAWN 30/Jun/2015 T.YAMASAKI		TITLE DS-645A/B
CHECKED 30/Jun/2015 H.MAKI		名称 接続箱
APPROVED 30/Jun/2015 H.MAKI	DS-60	外寸図
SCALE 1/4	MASS 表2参照 SEE TABLE 2	NAME JUNCTION BOX
DWG. No. C7264-G09-B	REF. No. 66-027-411G-3	OUTLINE DRAWING



- 注 記
1. タンクを船底に溶接する際、タンク本体②③のFORE-AFT LINEを船体の船首船尾方向に合わせて下さい。船首船尾の方向の据付の誤差は±3°以内として下さい。また、水平方向の取付けはタンクのフランジが吃水線と±3°以内の誤差で平行になるようにして下さい。タンク下面は船底板と面一とし、船底板より凹まないように装着して下さい。
 2. タンク溶接の際は、歪防止のため送受波器を取外した状態の取付フランジ④を取付けて溶接して下さい。
 3. ケーブルグランド⑥はオプションの工具で締付けて下さい。
 4. 装着時は、取付フランジ④のFORE LINEを船首方向に合わせて下さい。
 5. 送受波器面はシーテンドー20（ブラウン）を塗布しています。その他の船底塗料を塗布しないで下さい。
 6. 定期ドック時、タンクのメンテナンス（清掃/再塗装）を行って下さい。
 7. タンクの材質はNK（日本海事協会）規格のKSTPT38及びKA材です。
 8. 指定外の寸法公差は表1の通りです。
 9. 送受波器面のボルト周りの空回りや隙間はシーラントで埋めてください。

30	六角ナット HEX. NUT	SUS316L	(4)	M16	オプション OPTION
29	バネ座金 SPRING WASHER	SUS316L	(4)	M16	オプション OPTION
28	六角ボルト HEX. BOLT	SUS316L	(4)	M16X60	オプション OPTION
27	シートガスケット SHEET GASKET	NON-ASBESTOS JOINT SHEET	(1)	10K-50A	オプション OPTION
26	ガスケット GASKET	CR	(1)	66-027-7007	オプション OPTION
25	座金 WASHER	SUS316L	(1)	66-027-7006	オプション OPTION
24	締付グランド FIXING GLAND	SUS316L	(1)	66-027-7005	オプション OPTION
23	フランジ ZINC RICH PRIMER	SS400	(1)	66-027-7011	オプション OPTION
22	バネ座金 SPRING WASHER	SUS316L	2	M6	
21	六角穴付ボルト HEX.S.H.C.BOLT	SUS316L	2	M6X20	
20	コネクタ固定金具 CONNECTOR FIXING PLATE	SUS316L	1	66-027-6019	
19	バネ座金 SPRING WASHER	SUS316L	2	M6	
18	六角穴付ボルト HEX.S.H.C.BOLT	SUS316L	2	M6X12	
17	ケーブル押え板 CABLE FIXING PLATE	SUS316L	1	66-027-6022	
16	グロメット GROMMET	CR	1	66-027-6021	
15	シールワッシャー SEAL WASHER	SUS304	4	W8	
14	六角穴付ボルト HEX.S.H.C.BOLT	SUS316L	4	M8X12	
13	平座金 FLAT WASHER	SUS316L	5	M16	
12	バネ座金 SPRING WASHER	SUS316L	5	M16	
11	六角ナット HEX. NUT	SUS316L	10	M16	
10	バネ座金 SPRING WASHER	SUS316L	6	M10	
9	六角穴付ボルト HEX.S.H.C.BOLT	SUS316L	6	M10X25	
8	ガスケット GASKET	CR	1	66-027-7007	
7	座金 WASHER	SUS316L	1	66-027-7006	
6	締付グランド FIXING GLAND	SUS316L	1	66-027-7005	
5	押え板 FIXING PLATE ZINC RICH PRIMER/BANNOH500	SS400	1	66-027-7004	
4	取付フランジ FIXING FLANGE ZINC RICH PRIMER/BANNOH500	SS400	1	66-027-7003	
3	フランジ付きタンク本体 CASING WITH FRANGE ZINC RICH PRIMER	KA/KSTPT38	1	66-027-7002	船級認定材 CLASSIFICATION SOCIETY APPROVED MATERIAL
2	タンク本体 CASING ZINC RICH PRIMER	KA/KSTPT38	1	66-027-7001	船級認定材 CLASSIFICATION SOCIETY APPROVED MATERIAL
1	送受波器 TRANSDUCER		1	DS-631	
品番 ITEM	品名 NAME	材質 MATERIAL	数量 Q'TY	図番 DWG.No.	摘要 REMARKS

- NOTE
1. ORIENT FORE-AFT LINE OF THE CASING ②③ IN PARALLEL WITH SHIP'S FORE-AFT LINE AND THE TOP OF THE CASING IN PARALLEL WITH WATER-LINE TO AN ACCURACY OF 3 DEGREE OR BETTER. THE TRANSDUCER TANK SHOULD BE WELDED FLUSH WITH SHIP'S HULL PLATE.
 2. TO AVOID DISTORTION BY HEAT, PUT FIXING FLANGE ④ WITHOUT TRANSDUCER ONTO CASING WHILE WELDING.
 3. CABLE GLAND ⑥ CAN BE TIGHTENED WITH THE OPTIONAL TOOL.
 4. ORIENT FORE LINE OF FIXING FLANGE ④ TOWARD FORE DIRECTION TO INSTALL.
 5. THE TRANSDUCER FACE IS COATED WITH SEATENDER20, DO NOT APPLY OTHER TYPE OF PAINT.
 6. CLEAN, RE-PAINT THE TANK AT DOCKING.
 7. MATERIAL OF TANK MEETS NK (NIPPON KAIJI KYOUKAI) STANDARD KSTPT38&KA.
 8. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS WHICH IS NOT SPECIFIED.
 9. FILL THE SPACES AROUND BOLT HEAD AND THE GAP ON TRANSDUCER FACE WITH SILICONE SEALANT.

断面 B-B
SECTION B-B
文字・ラインの位置を合わせる
(ピン・ソケットの位置を確認)
ADJUST THE CHARACTERS AND LINES
(CONFIRM THE LOCATIONS OF PIN/SOCKET)

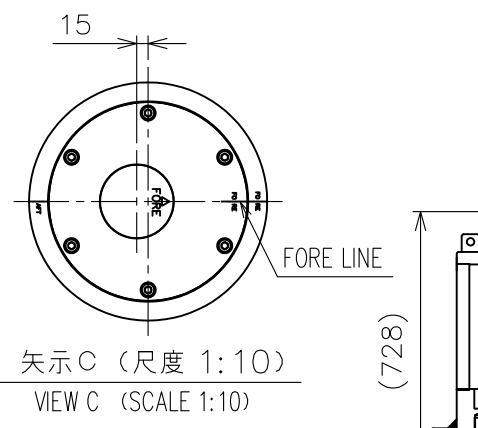
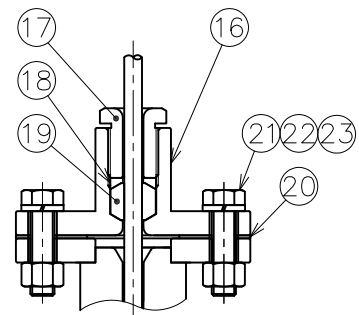


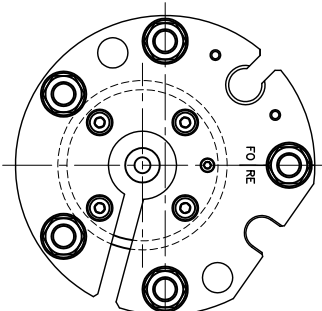
表1 (TABLE1)

寸法区分 (mm) Dimension	公差 (mm) Tolerance
L ≤ 50	±1.5
50 < L ≤ 100	±2.5
100 < L ≤ 500	±3

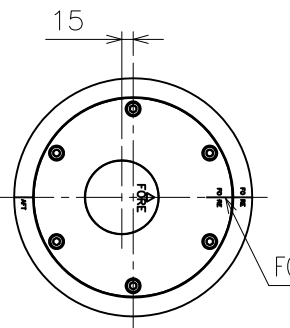
DRAWN	14/Apr/2016 T.YAMASAKI	TITLE	DS-660	
CHECKED	15/Apr/2016 H.MAKI	名称	船底タンク (水中コネクタ付)	
APPROVED	15/Apr/2016 H.MAKI		送受波器装備図	
SCALE	1/5	質量は、送受波器とオプションを除く MASS W/O TRANSDUCER AND OPTION	NAME	TRANSDUCER TANK (W/ WATERTIGHT CONNECTOR)
DWG. No.	C7264-T01-H	REF. No.	66-027-700G-6	TRANSDUCER INSTALLATION



3) オプション
3) OPTION



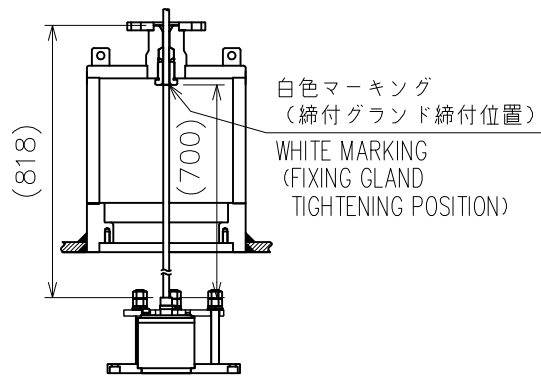
矢視 A
VIEW A



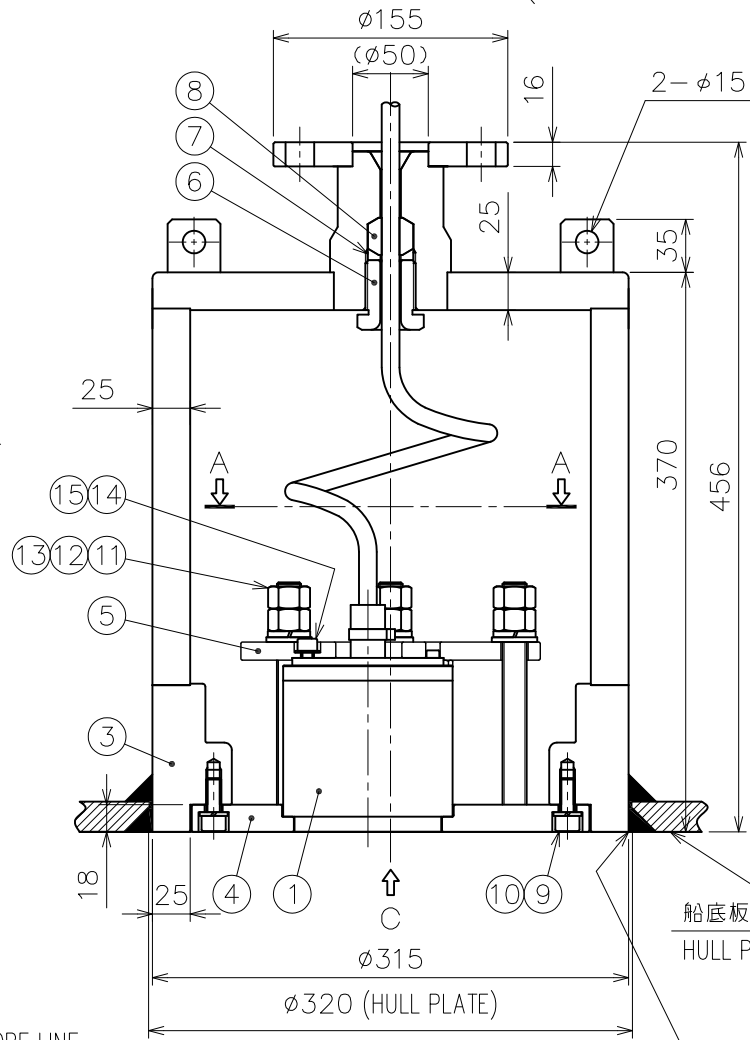
矢視 C (尺度 1:10)
VIEW C (SCALE 1:10)

表1 (TABLE1)

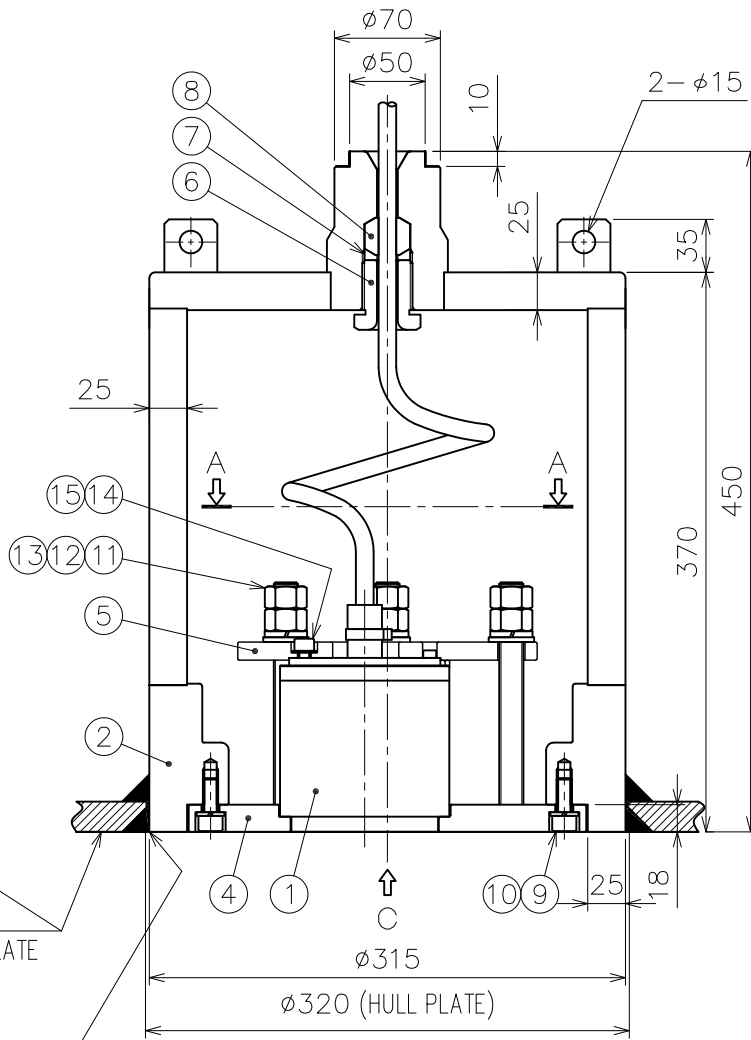
寸法区分 (mm) Dimension	公差 (mm) Tolerance
L ≤ 50	±1.5
50 < L ≤ 100	±2.5
100 < L ≤ 500	±3



タンク内ケーブル寸法
CABLE LENGTH IN TANK



2) フランジ使用の場合
2) INSTALLATION USING A FLANGE



1) フランジを使用しない場合
1) INSTALLATION W/O FLANGE

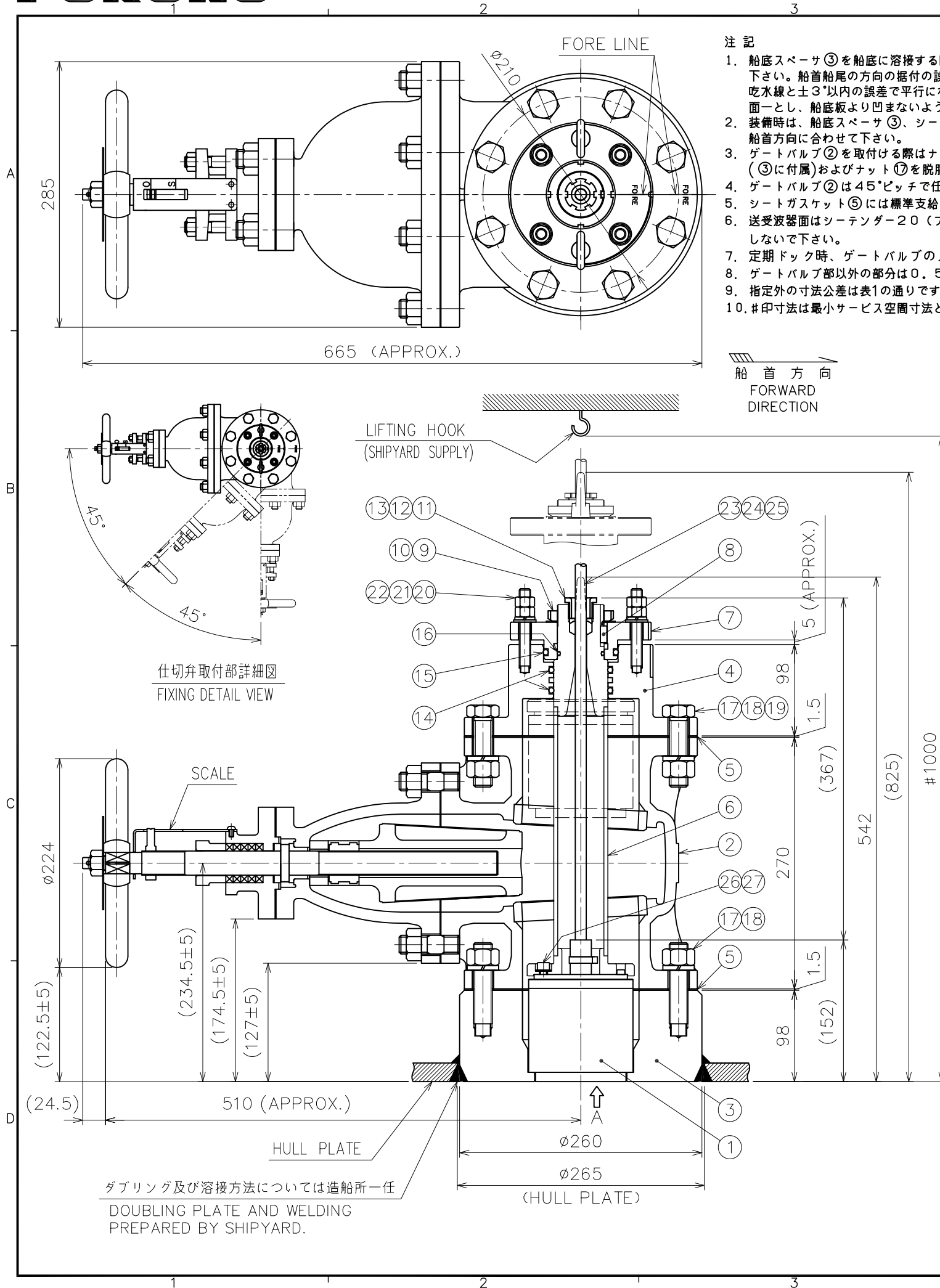
ダブルリング及び溶接方法については造船所一任
DOUBLING PLATE AND WELDING PREPARED BY SHIPYARD.

船首方向
FORWARD
DIRECTION

- 注記
1. タンクを船底に溶接する際、タンク本体 ②③ のFORE-AFT LINEを船体の船首船尾方向に合わせて下さい。船首船尾の方向の据付の誤差は±3°以内として下さい。また、水平方向の取付けはタンクのフランジが吃水線と±3°以内の誤差で平行になるようにして下さい。タンク下面は船底板と面一とし、船底板より凹まないように装着して下さい。
 2. タンク溶接の際は、歪防止のため送受波器を取外した状態の取付フランジ④を取付けて溶接して下さい。
 3. ケーブルグラウンド⑥はオプションの工具で締付けて下さい。
 4. 装着時は、取付フランジ④のFORE LINEを船首方向に合わせて下さい。
 5. 送受波器面はシーテンダー20 (ブラウン) を塗布しています。その他の船底塗料を塗布しないで下さい。
 6. 定期ドック時、タンクのメンテナンス (清掃/再塗装) を行って下さい。
 7. 船底タンクの材質はNK (日本海事協会) 規格のKSTPG370及びKA材です。
 8. 指定外の寸法公差は表1の通りです。
 9. 送受波器面のボルト周りの空間や隙間はシーラントで埋めてください。
- NOTE
1. ORIENT FORE-AFT LINE OF THE CASING ②③ IN PARALLEL WITH SHIP'S FORE-AFT LINE AND THE TOP OF THE CASING IN PARALLEL WITH WATER-LINE TO AN ACCURACY OF 3 DEGREE OR BETTER. THE TRANSDUCER TANK SHOULD BE WELDED FLUSH WITH SHIP'S HULL PLATE.
 2. TO AVOID DISTORTION BY HEAT, PUT FIXING FLANGE ④ WITHOUT TRANSDUCER ONTO CASING WHILE WELDING.
 3. CABLE GLAND ⑥ CAN BE TIGHTENED WITH THE OPTIONAL TOOL.
 4. ORIENT FORE LINE OF FIXING FLANGE ④ TOWARD FORE DIRECTION TO INSTALL.
 5. THE TRANSDUCER FACE IS COATED WITH SEATENDER20, DO NOT APPLY OTHER TYPE OF PAINT.
 6. CLEAN, RE-PAINT THE TANK AT DOCKING.
 7. MATERIAL OF TANK MEETS NK (NIPPON KAIJI KYOUKAI) STANDARD KSTPG370&KA.
 8. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS WHICH IS NOT SPECIFIED.
 9. FILL THE SPACES AROUND BOLT HEAD AND THE GAP ON TRANSDUCER FACE WITH SILICONE SEALANT.

品番 ITEM	品名 NAME	材質 MATERIAL	数量 Q'TY	図番 DWG.No.	摘要 REMARKS
23	六角ナット HEX. NUT	SUS316L	(4)	M16	オプション OPTION
22	バネ座金 SPRING WASHER	SUS316L	(4)	M16	オプション OPTION
21	六角ボルト HEX. BOLT	SUS316L	(4)	M16X60	オプション OPTION
20	シートガスケット SHEET GASKET	NON-ASBESTOS SHEET SHEET	(1)	10K-50A	オプション OPTION
19	ガスケット GASKET	CR	(1)	66-027-7007	オプション OPTION
18	座金 WASHER	SUS316L	(1)	66-027-7006	オプション OPTION
17	締付グラウンド FIXING GLAND	SUS316L	(1)	66-027-7005	オプション OPTION
16	フランジ FLANGE	ZINC RICH PRIMER SS400	(1)	66-027-7011	オプション
15	シーラントワッシャー SEAL WASHER	SUS304	4	W8	
14	六角穴付ボルト HEX.S.H.C.BOLT	SUS316L	4	M8X12	
13	平座金 FLAT WASHER	SUS316L	5	M16	
12	バネ座金 SPRING WASHER	SUS316L	5	M16	
11	六角ナット HEX. NUT	SUS316L	10	M16	
10	バネ座金 SPRING WASHER	SUS316L	6	M10	
9	六角穴付ボルト HEX.S.H.C.BOLT	SUS316L	6	M10X25	
8	ガスケット GASKET	CR	1	66-027-7007	
7	座金 WASHER	SUS316L	1	66-027-7006	
6	締付グラウンド FIXING GLAND	SUS316L	1	66-027-7005	
5	押え板 FIXING PLATE	ZINC RICH PRIMER/BANNOH500 SS400	1	66-027-7004	
4	取付フランジ FIXING FLANGE	ZINC RICH PRIMER/BANNOH500 SS400	1	66-027-7003	
3	フランジ付きタンク本体 CASING WITH FRANGE	ZINC RICH PRIMER KA/KSTPG370	1	66-027-7002	船級認定材 CLASSIFICATION SOCIETY APPROVED MATERIAL
2	タンク本体 CASING	ZINC RICH PRIMER KA/KSTPG370	1	66-027-7001	船級認定材 CLASSIFICATION SOCIETY APPROVED MATERIAL
1	送受波器 TRANSDUCER		1	DS-630	

DRAWN	14/Apr/2016 T.YAMASAKI	TITLE	DS-660	
CHECKED	15/Apr/2016 H.MAKI	名称	船底タンク (水中コネクタなし)	
APPROVED	15/Apr/2016 H.MAKI	図番	DS-60	
SCALE	1/5	質量は、送受波器とオプションを除く MASS W/O TRANSDUCER AND OPTION	NAME	TRANSDUCER TANK (W/O WATERTIGHT CONNECTOR)
DWG. No.	C7264-T02-G	REF. No.	66-027-710G-6	TRANSDUCER INSTALLATION



注記

1. 船底スペース③を船底に溶接する際、FORE-AFT LINEを船体の船首船尾方向に合わせて下さい。船首船尾の方向の据付の誤差は±3°以内として下さい。また、水平方向の取付けは吃水線と±3°以内の誤差で平行になるようにして下さい。船底スペース下面は船底板と面一とし、船底板より凹まないように装備して下さい。
2. 装備時は、船底スペース③、シーチェストキャップ④およびフランジ⑦のFORE LINEを船首方向に合わせて下さい。
3. ゲートバルブ②を取付ける際はナット⑩の回り止め対策として、ボルト⑨、寸切りボルト⑬(③に付属)およびナット⑭を脱脂後、ロックタイト#271を塗布して完全に締めて下さい。
4. ゲートバルブ②は45°ピッチで任意の方向に取付け可能です。
5. シートガスケット⑤には標準支給のグリースを全面に均一塗布して下さい。
6. 送受波器面はシーテnder-20 (ブラウン) を塗布しています。その他の船底塗料を塗布しないで下さい。
7. 定期ドック時、ゲートバルブのメンテナンス(清掃/再塗装)を行って下さい。
8. ゲートバルブ部以外の部分は0.5MPaの水圧試験がされています。
9. 指定外の寸法公差は表1の通りです。
10. #印寸法は最小サービス空間寸法とする。

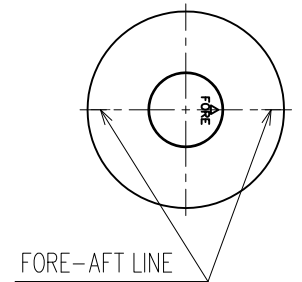
表1 (TABLE1)

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

NOTE

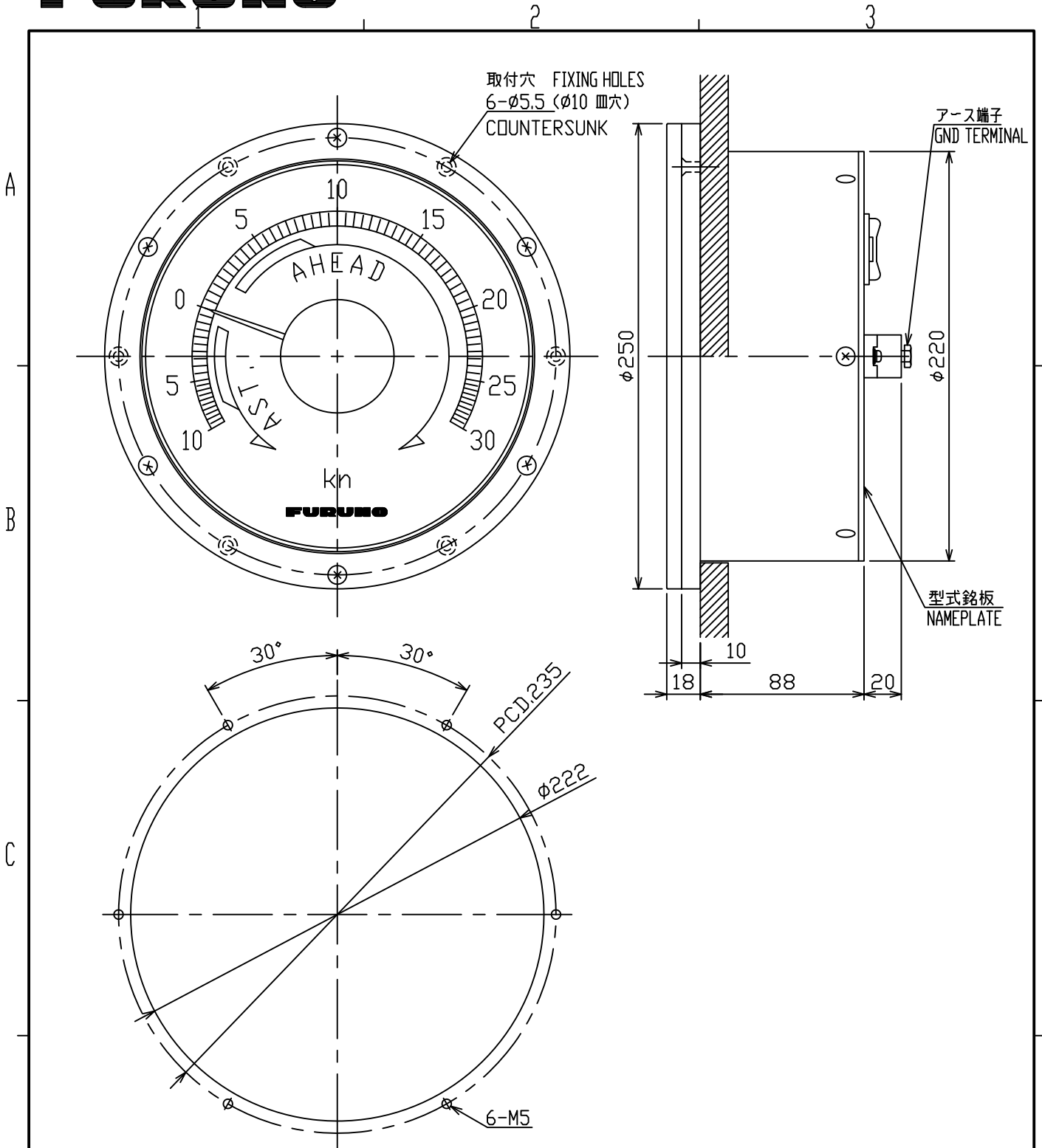
1. ORIENT FORE-AFT LINE OF THE SPACER ③ IN PARALLEL WITH SHIP'S FORE-AFT LINE AND THE TOP OF THE SPACER IN PARALLEL WITH WATER-LINE TO AN ACCURACY OF 3 DEGREE OR BETTER. THE SPACER SHOULD BE WELDED FLUSH WITH SHIP'S HULL PLATE.
2. ORIENT FORE LINES OF SPACER ③ AND SEACHEST CAP ④ AND FLANGE ⑦ TOWARD FORE DIRECTION TO INSTALL.
3. CLEAN NUTS ⑩ AND BOLTS WITH SOLVENT, COAT THEIR THREADS WITH ADHESIVE/SEALANT (LOCTITE#271) AND THEN TIGHTEN THEM SECURELY WHEN MOUNTING GATE VALVE ②.
4. GATE VALVE ② CAN BE ATTACHED IN ANY DIRECTION IN INCREMENT OF 45°.
5. COAT THE SHEET GASKET ⑤ WITH THE SUPPLIED GREASE UNIFORMLY.
6. THE TRANSDUCER FACE IS COATED WITH SEATENDER20, DO NOT APPLY OTHER TYPE OF PAINT.
7. CLEAN, RE-PAINT THE GATE VALVE AT DOCKING.
8. SEACHEST EXCEPT GATE VALVE IS TESTED UNDER 0.5MPa WATER PRESSURE.
9. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS WHICH IS NOT SPECIFIED.
10. #: MINIMUM SERVICE CLEARANCE.

品番 ITEM	品名 NAME	材質 MATERIAL	数量 Q'TY	図番 DWG.No.	摘要 REMARKS
27	シールワッシャー SEAL WASHER	SUS304	4	W8	送受波器付属品 TRANSDUCER ACCESSORY
26	六角穴付ボルト HEX.S.H.C.BOLT	SUS316L	4	M8X12	送受波器付属品 TRANSDUCER ACCESSORY
25	アイナット EYE NUT	SUS304	2	M10	
24	バネ座金 SPRING WASHER	SUS316L	2	M10	
23	六角穴付ボルト HEX.S.H.C.BOLT	SUS316L	2	M10X25	
22	平座金 FLAT WASHER	SUS316L	4	M12	
21	バネ座金 SPRING WASHER	SUS316L	4	M12	
20	六角ナット HEX. NUT	SUS316L	8	M12	
19	六角ボルト HEX. BOLT	SUS316L	8	M20X75	
18	バネ座金 SPRING WASHER	SUS316L	16	M20	
17	六角ナット HEX. NUT	SUS316L	16	M20	
16	リング O-RING	NBR	1	JIS B 2401 P44	
15	リング O-RING	NBR	1	JIS B 2401 P70	
14	リング O-RING	NBR	2	JIS B 2401 P58	
13	ガスケット GASKET	CR	1	66-027-7207	
12	座金 WASHER	SUS316L	1	66-027-7206	
11	締付グランド FIXING GLAND	C3604B	1	JIS F 8801 20 1a	
10	座金 WASHER	SPCC	1	AW10	
9	ナット NUT	SS400	1	AN10	
8	キー TURNING STOPPER	SUS304	1	JIS B 1301 P-B 8X7X18	
7	フランジ ZINC RICH PRIMER	SS400	1	66-027-7205	
6	シャフト SHAFT	SUS316L	1	66-027-7204	
5	シートガスケット SHEET GASKET	NON-ASBESTOS JOINT SHEET	2	66-027-7203	
4	シーチェストキャップ SEACHEST CAP ZINC RICH PRIMER	KA	1	66-027-7202	船級認定材 CLASSIFICATION SOCIETY APPROVED MATERIAL
3	船底スペース SPACER ZINC RICH PRIMER	KA	1	66-027-7201	船級認定材 CLASSIFICATION SOCIETY APPROVED MATERIAL
2	船用錆鋼仕切弁 GATE VALVE ZINC RICH PRIMER	SC480	1	66-027-7211 (JIS F 7366-125S)	船級認定品 CLASSIFICATION SOCIETY APPROVED
1	送受波器 TRANSDUCER		1	DS-630	



矢視 A (尺度1:10)
VIEW A (SCALE 1:10)

DRAWN	15/Apr/2016 T.YAMASAKI	TITLE	DS-661	
CHECKED	15/Apr/2016 H.MAKI	名称	ゲートバルブ	
APPROVED	15/Apr/2016 H.MAKI	送受波器装備図		
SCALE	1/5	質量は送受波器を含まず MASS DOES NOT INCLUDE TRANSDUCER	NAME	GATE VALVE
DWG. No.	C7264-T03-C	REF. No.	66-027-720G-1	TRANSDUCER INSTALLATION


注記

- 1) 指定なき寸法公差は表1による。
- 2) 取付にはM5皿ネジを使用のこと。

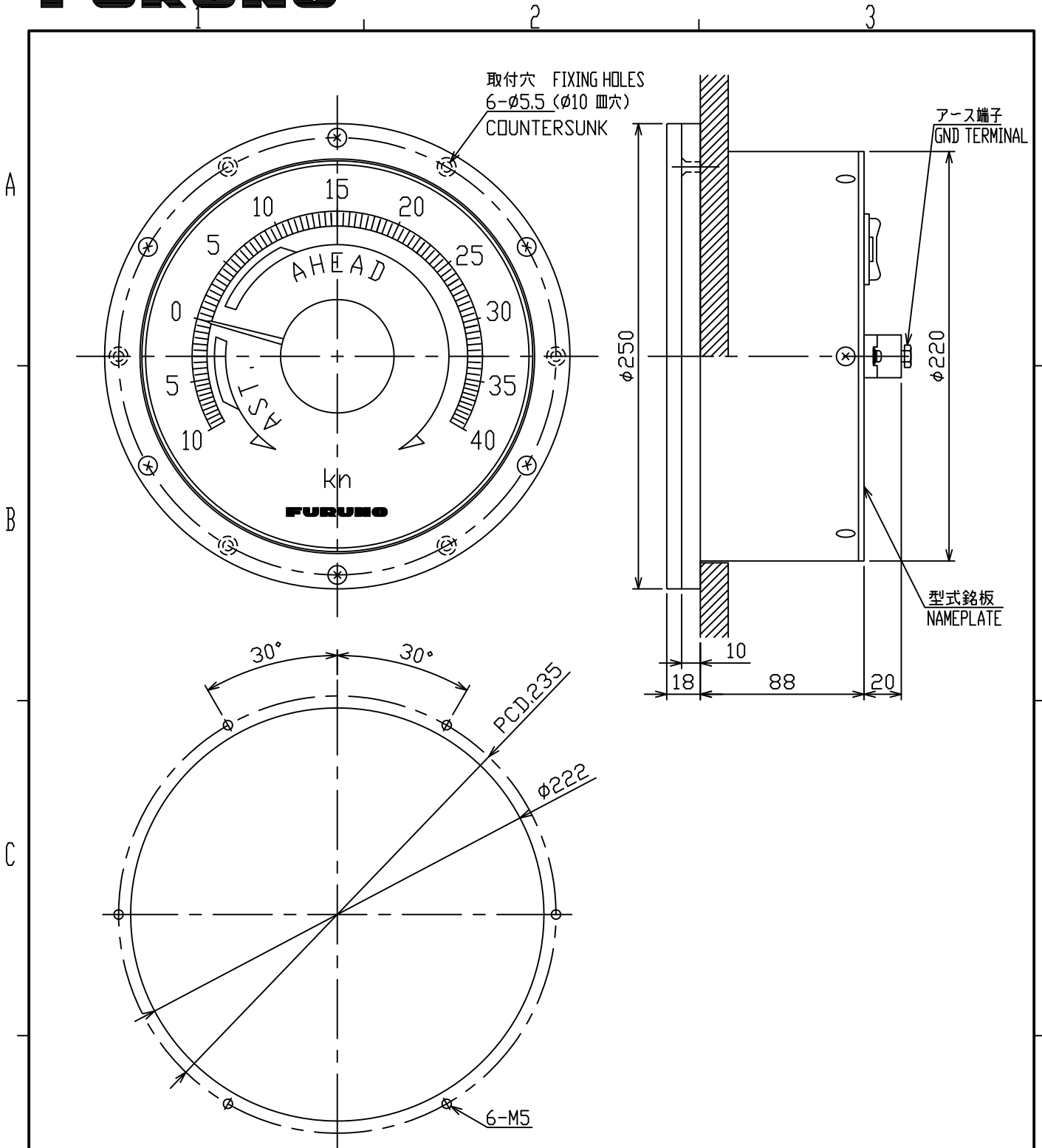
NOTE

1. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS WHICH IS NOT SPECIFIED.
2. USE COUNTERSUNK SCREWS M5 FOR FIXING THE UNIT.

**取付穴寸法
CUTOUT DIMENSIONS**
表1 TABLE 1

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

DRAWN 28/Oct/2011 T.YAMASAKI		TITLE FL-200S-1
CHECKED 28/Oct/2011 H.MAKI		名称 アナログ指示器(埋込装備)
APPROVED 1/Nov/2011 Y.NISHIYAMA	DS-30/50/60/80	外寸図
SCALE 1/3	MASS 3.6 $\pm 10\%$ kg	NAME ANALOG INDICATOR (FLUSH MOUNT)
DWG. No. C7236-G28-B	REF. No. XG05-08009-01	OUTLINE DRAWING



注記

- 1) 指定なき寸法公差は表1による。
- 2) 取付にはM5皿ネジを使用のこと。

NOTE

1. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS WHICH IS NOT SPECIFIED.
2. USE COUNTERSUNK SCREWS M5 FOR FIXING THE UNIT.

取付穴寸法
CUTOUT DIMENSIONS

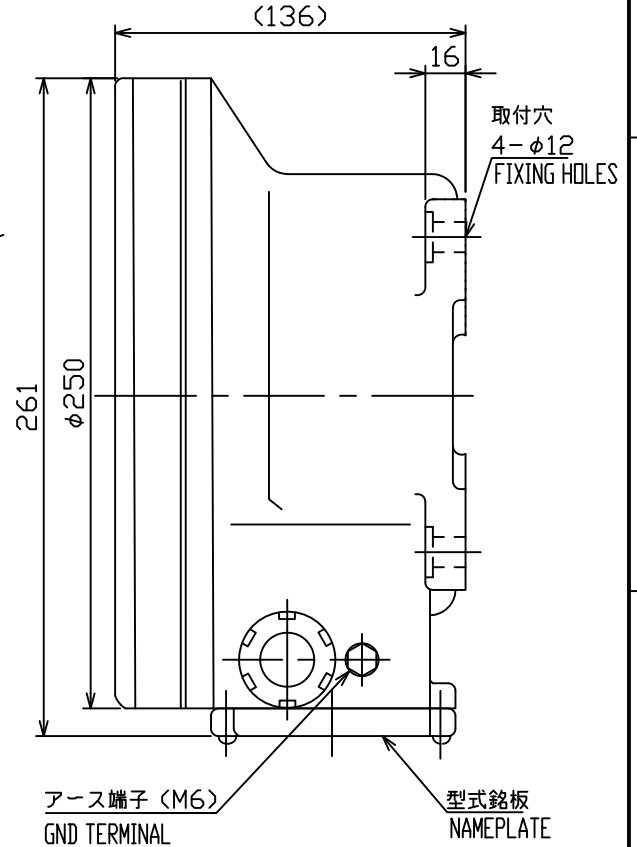
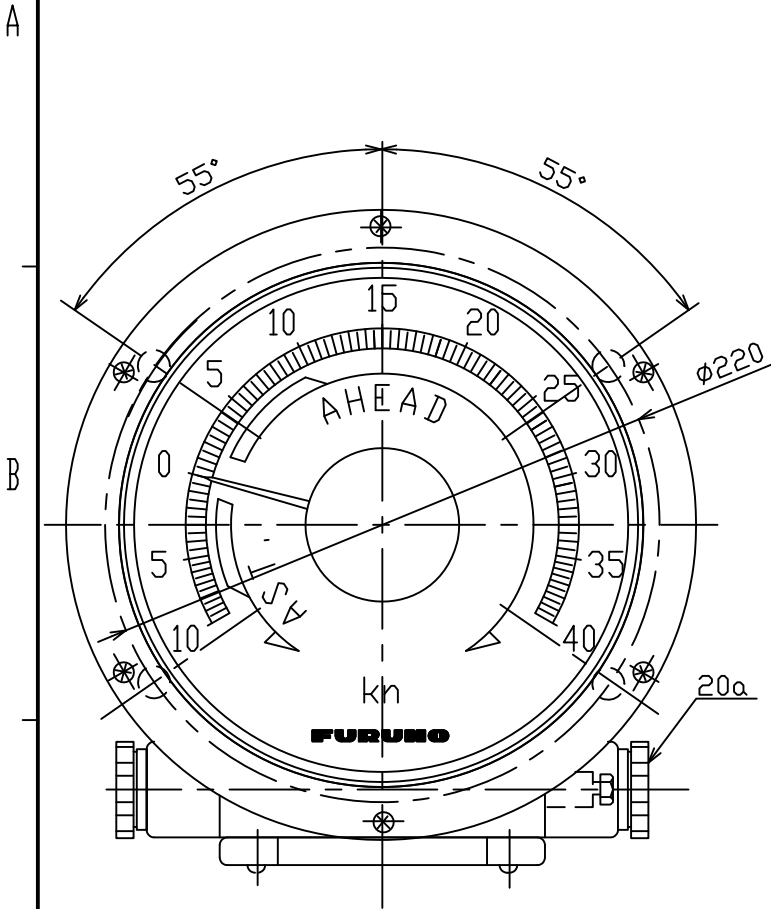
表1 TABLE 1

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

DRAWN 28/Oct/2011 T.YAMASAKI	TITLE FL-200S-2
CHECKED 28/Oct/2011 H.MAKI	名称 アナログ指示器(埋込装備)
APPROVED 1/Nov/2011 Y.NISHIYAMA	DS-30/50/60/80 外寸図
SCALE 1/3	MASS 3.6 $\pm 10\%$ kg
DWG. No. C7236-G30-B	REF. No. XG05-08025-01
NAME ANALOG INDICATOR (FLUSH MOUNT) OUTLINE DRAWING	

表1 TABLE 1

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



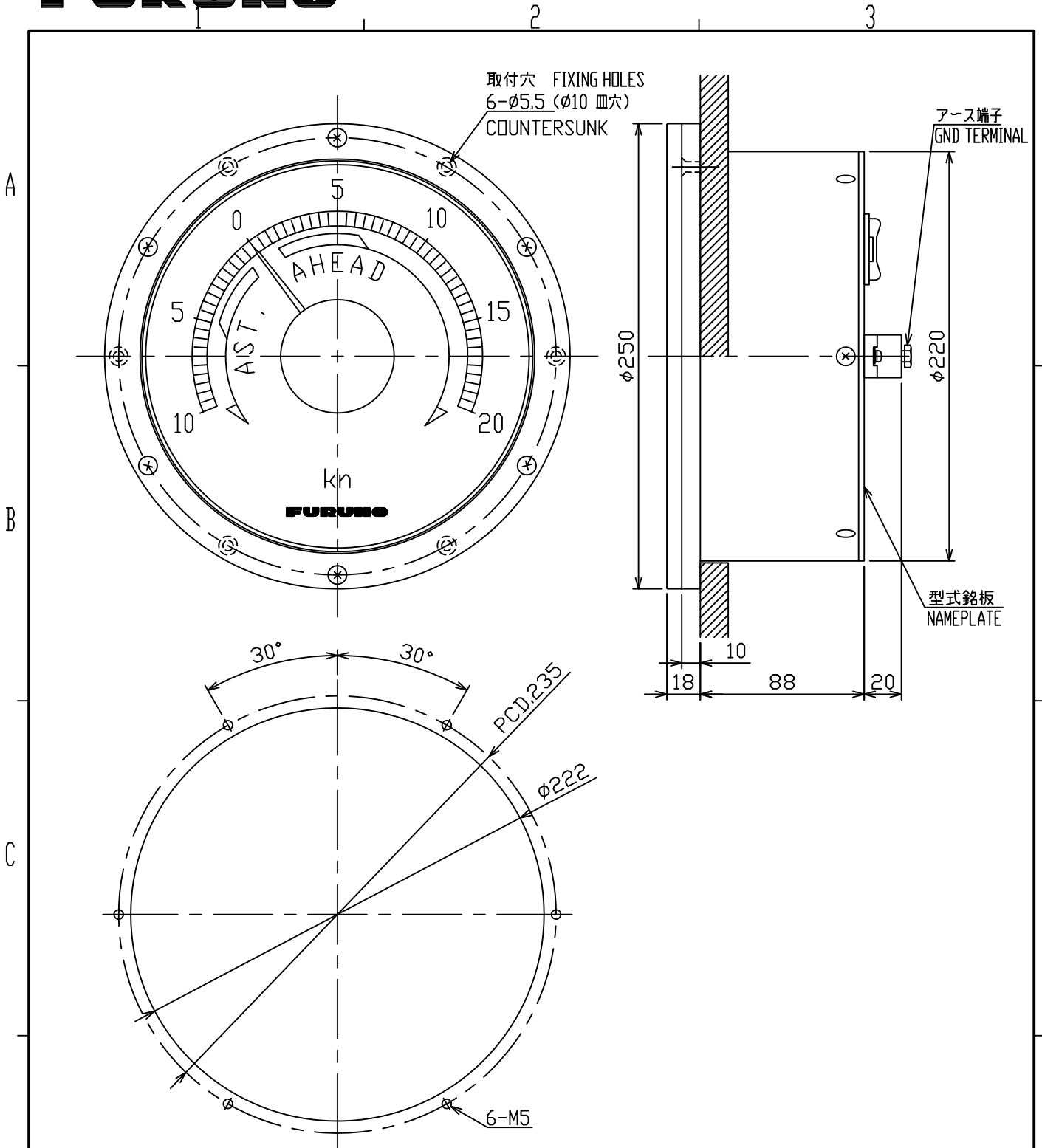
注記

- 1) 指定なき寸法公差は表1による。
- 2) 取付にはM10ボルトを使用のこと。

NOTE

- 1. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS WHICH IS NOT SPECIFIED.
- 2. USE M10 BOLTS FOR FIXING THE UNIT.

DRAWN	28/Oct/2011 T.YAMASAKI	TITLE	SL-200-2
CHECKED	28/Oct/2011 H.MAKI	名称	アナログ指示器 (壁掛装備)
APPROVED	1/Nov/2011 Y.NISHIYAMA	DS-30/50/60/80	外寸図
SCALE	1/3	MASS	5.8 ±10% kg
DWG. No.	C7236-G31-B	REF. No.	XG05-08026-01
		NAME	
		ANALOG INDICATOR (BULKHEAD MOUNT)	
		OUTLINE DRAWING	


注記

- 1) 指定なき寸法公差は表1による。
- 2) 取付にはM5皿ネジを使用のこと。

NOTE

1. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS WHICH IS NOT SPECIFIED.
2. USE COUNTERSUNK SCREWS M5 FOR FIXING THE UNIT.

**取付穴寸法
CUTOUT DIMENSIONS**
表1 TABLE 1

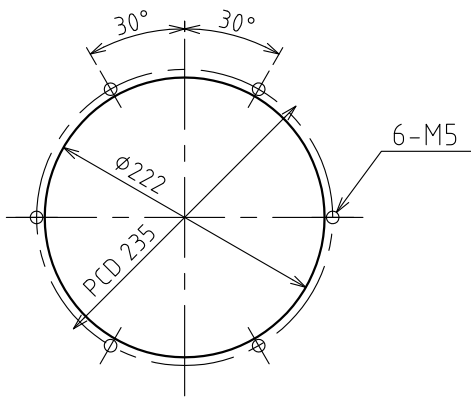
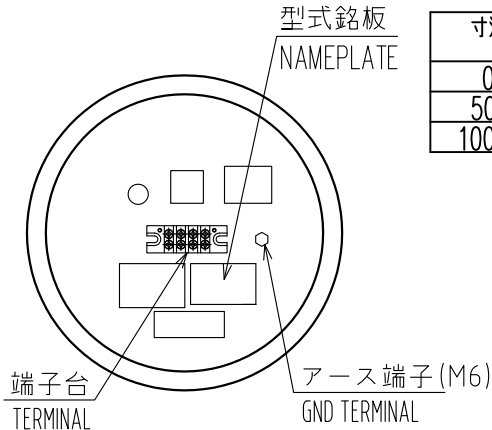
寸法区分(mm) DIMENSION	公差(mm) TOLERANCE
$0 < L \leq 50$	± 1.5
$50 < L \leq 100$	± 2.5
$100 < L \leq 500$	± 3

DRAWN 28/Oct/2011 I.YAMASAKI		TITLE FL-200S-3
CHECKED 28/Oct/2011 H.MAKI		名称 アナログ指示器 (埋込装備)
APPROVED 1/Nov/2011 Y.NISHIYAMA	DS-30/50/60/80	外寸図
SCALE 1/3	MASS 3.6 $\pm 10\%$ kg	NAME ANALOG INDICATOR (FLUSH MOUNT)
DWG. No. C7236-G32-B	REF. No. XG05-09007-01	OUTLINE DRAWING

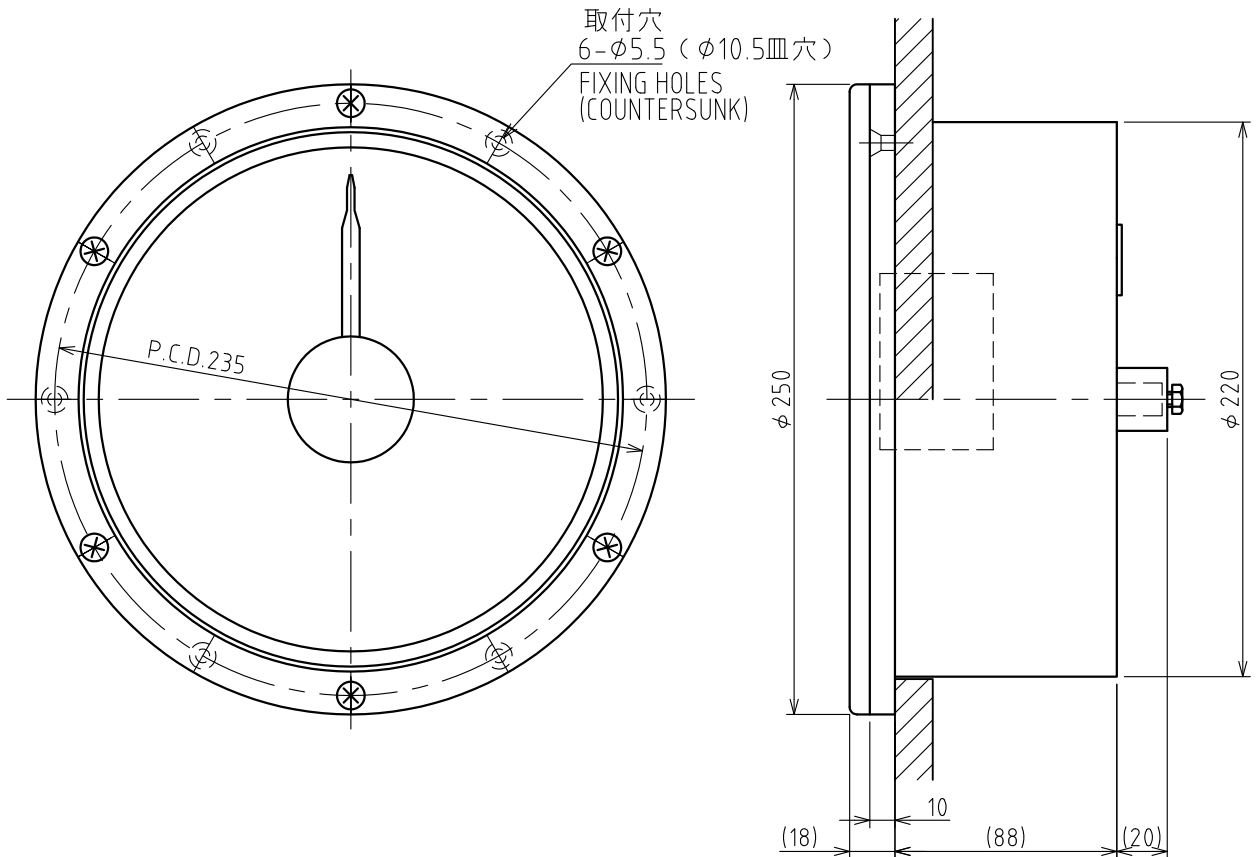
表1 TABLE 1

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

A


 取付穴寸法 (尺度: 1/6)
 CUTOUT DIMENSIONS (SCALE: 1/6)

 背面 (尺度: 1/6)
 REAR VIEW (SCALE: 1/6)

B



C

D

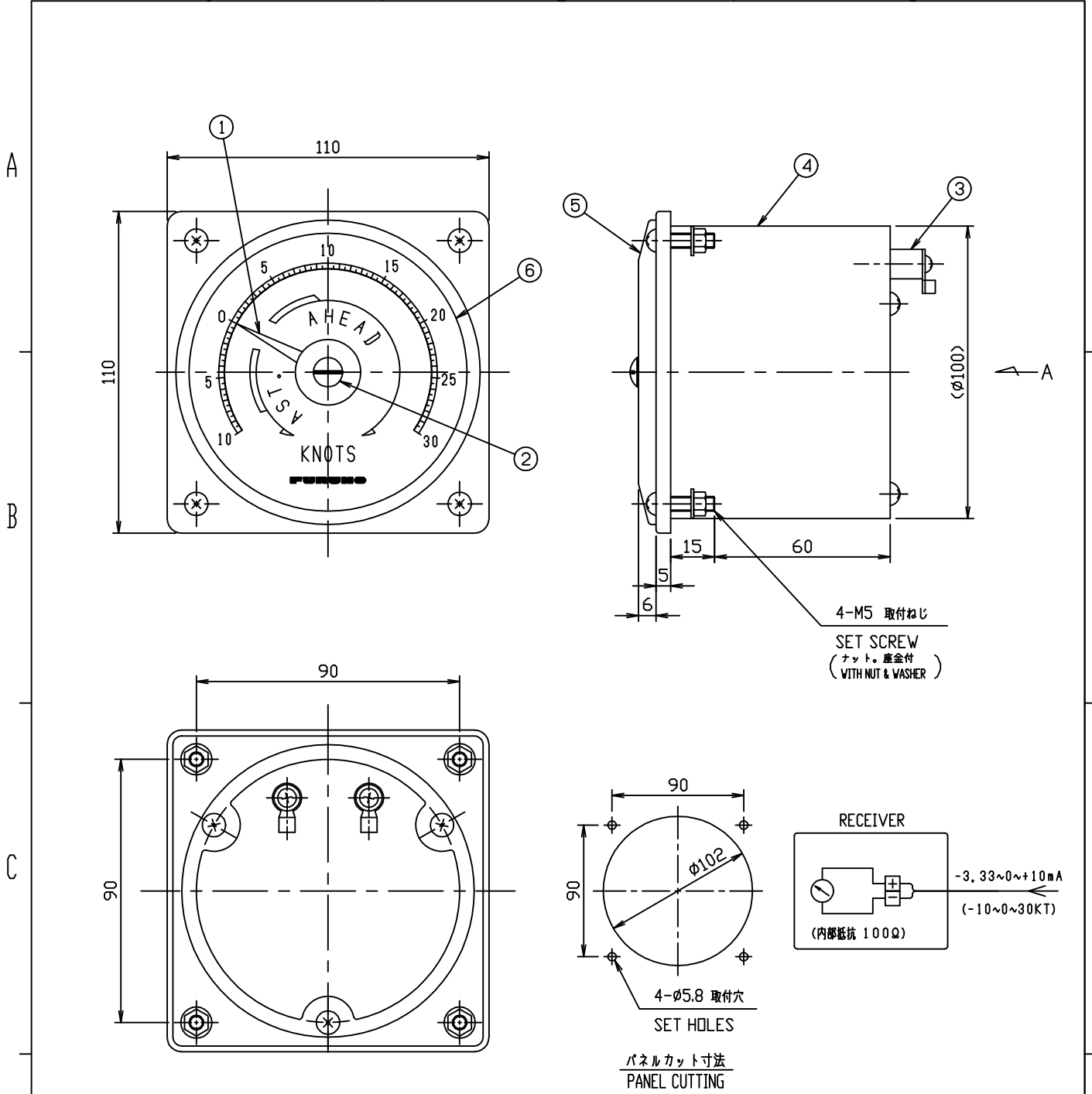
注記

- 1) 指定なき寸法公差は表1による。
- 2) 取付には皿ネジφ5を使用のこと。

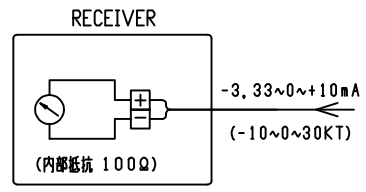
NOTE

1. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS WHICH IS NOT SPECIFIED.
2. USE CONTERSUNK SCREWS $\phi 5$ FOR FIXING THE UNIT.

DRAWN	16/Dec/2016 T.YAMASAKI	TITLE	FL-200S-1W
CHECKED	16/Dec/2016 H.MAKI	名称	アナログ指示器 (埋込装備)
APPROVED	22/Dec/2016 H.MAKI		外寸図
SCALE	1/3	MASS	3.6 $\pm 10\%$ kg
DWG. No.	C7247-G19- A	REF. No.	XG05-10011-01
		NAME	ANALOG INDICATOR (FLUSH MOUNT)
			OUTLINE DRAWING



A 矢视图
A VIEW



パネルカット寸法
PANEL CUTTING

6	目盛り板 DIAL PLATE		1		
5	フタ COVER	PLASTIC	1		
4	ケース本体 CASE		1		
3	端子盤 TERMINAL BOARD		2		
2	0調整 ZERO ADJUSTER		1		
1	指針 POINTER		1		
品番 ITEM	品名 NAME	材質 MATERIAL	数量 QTY	図番 DWG. NO.	摘要 REMARKS

DRAWN Jun. 27' 01 T. YAMASAKI

CHECKED Jun. 27' 01 Y. KIMURA

APPROVED Jun. 27' 01 Y. KIMURA

SCALE 1/2 MASS ±10%
1.2 kg

DWG.No. C7213-G02-C

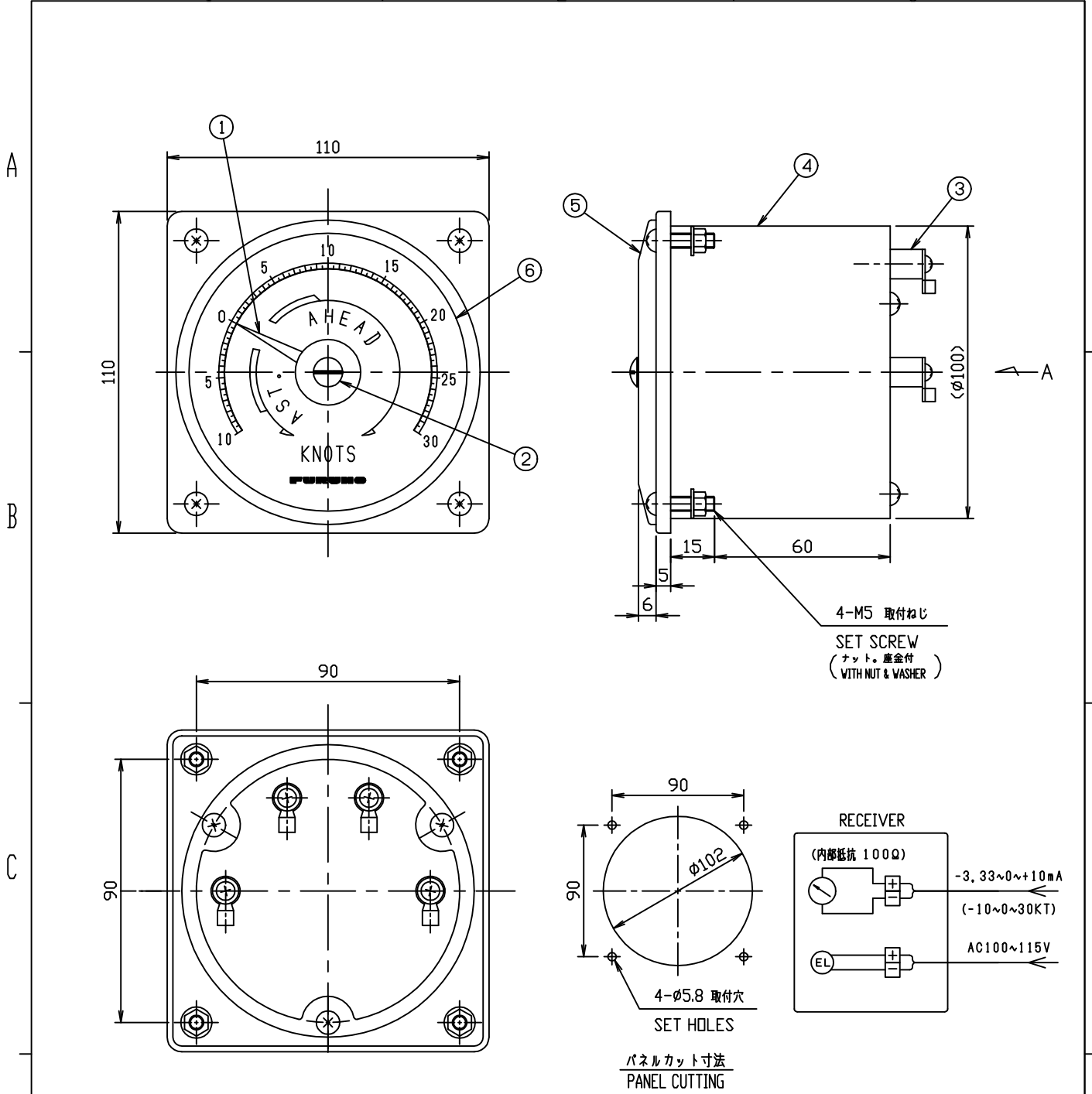
TITLE FE-90

名称 アナログ指示器 (パネル埋込型)

外寸図

NAME ANALOG DISPLAY (FLUSH MOUNT)

OUTLINE DRAWING

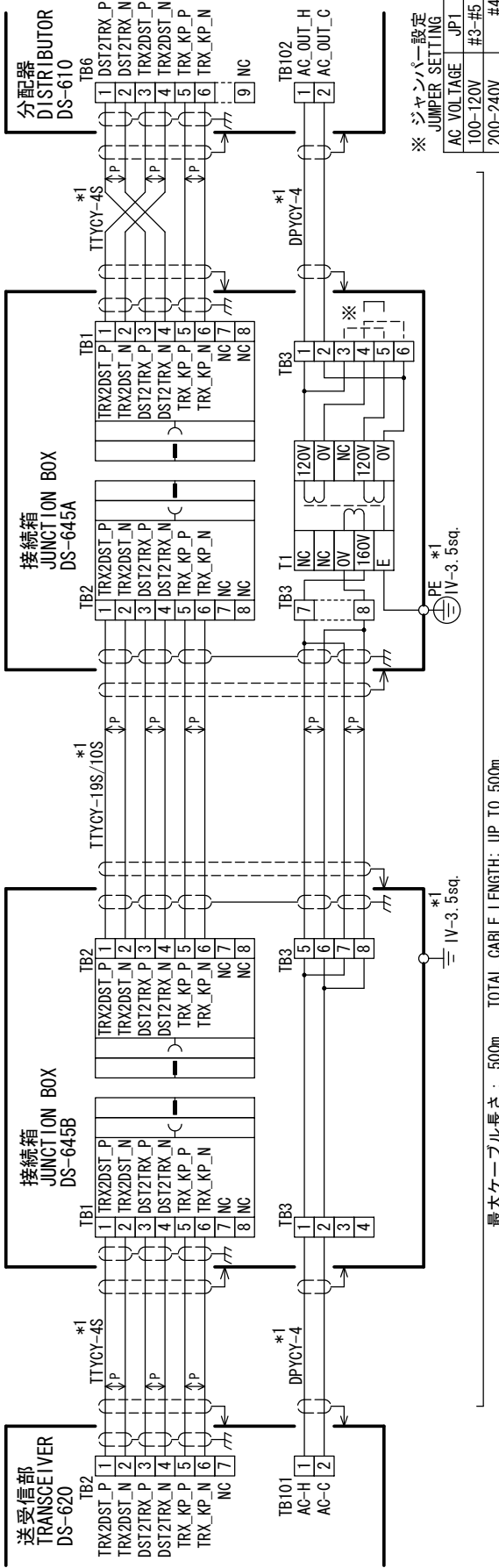


A 矢视图
A VIEW

パネルカット寸法
PANEL CUTTING

品番 ITEM	品名 NAME	材質 MATERIAL	数量 QTY	図番 DWG. NO.	摘要 REMARKS
6	目盛板 DIAL PLATE		1		
5	フタ COVER	PLASTIC	1		
4	ケース本体 CASE		1		
3	端子盤 TERMINAL BOARD		2		
2	0調整 ZERO ADJUSTER		1		
1	指針 POINTER		1		

DRAWN Jun. 27' 01 T. YAMASAKI	TITLE FL-90
CHECKED Jun. 27' 01 Y. KIMURA	名称 アナログ指示器 (パネル埋込型)
APPROVED Jun. 27' 01 Y. KIMURA	外寸図
SCALE 1/2 MASS ±10% 1.4 kg	NAME ANALOG DISPLAY (FLUSH MOUNT)
DWG.No. C7213-G03-B	OUTLINE DRAWING



最大ケーブル長さ : 500m TOTAL CABLE LENGTH: UP TO 500m.

注記

* 1) 造船所手配。

NOTE

*1: SHIPYARD SUPPLY.

DRAWN	19/Apr/2012 T. YAMASAKI	TITLE	DS-645A/B
CHECKED	19/Apr/2012 H. MAKI	名称	接続箱
APPROVED	27/Apr/2012 Y. NISHIYAMA	相互結線図	
SCALE	1/MASS kg	NAME	JUNCTION BOX
DWG. No.	CT264-C02-C	REF. No.	66-031-4501-0
		INTERCONNECTION DIAGRAM	