

DOPPLER SPEEDLOG DS-50 INSTALLATION MANUAL

This manual provides the information necessary for the installation of the FURUNO DS-50 Doppler Speedlog. For best performance please follow the recommended procedures.

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(KAMI) DS-50

Your Local Agent/Dealer

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IME72410P10

SAFETY INSTRUCTIONS

"NOTICE", "CAUTION" and "WARNING" notices appear throughout this manual. It is the responsibility of the installer of the equipment to read, understand and follow these notices. If you have any questions regarding these safety instructions, please contact a FURUNO agent or dealer.



WARNING

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



CAUTION

This notice indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury or property damage.

NOTICE

This notice indicates an unsafe practice which, if not avoided, could result in property damage or equipment malfunction.

WARNING



Only qualified personnel should work inside the equipment.

This equipment uses high voltage electricity which can shock, burn, or cause death.

Turn off the power at the ship's mains switchboard before beginning the installation. Post a warning sign near the switchboard to ensure that the power will not be applied while the equipment is being installed.

Serious injury or death can result if the power is not turned off, or is applied while the equipment is being installed.

CAUTION



Ground the equipment.

Ungrounded equipment can give off or receive electromagnetic interference or cause electrical shock

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 equipment damage. The voltage rating appears on the label at the rear of the equipment.

NOTICE

The mounting location must satisfy the following conditions:

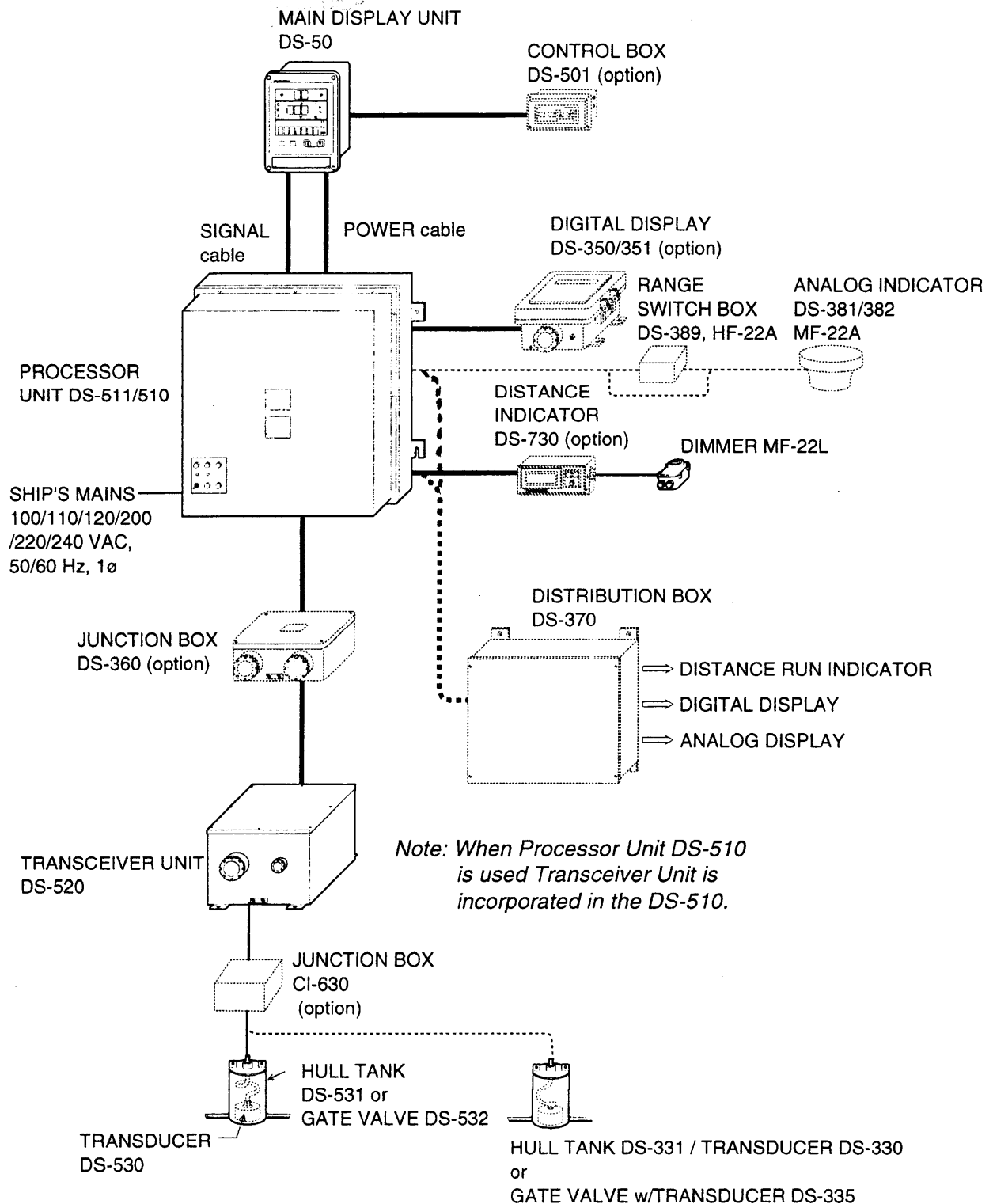
- Away from rain and water splash
- Out of direct sunlight
- Away from air conditioner vents
- Moderate and stable in temperature and humidity

Observe the compass safe distances to prevent deviation of a magnetic compass.

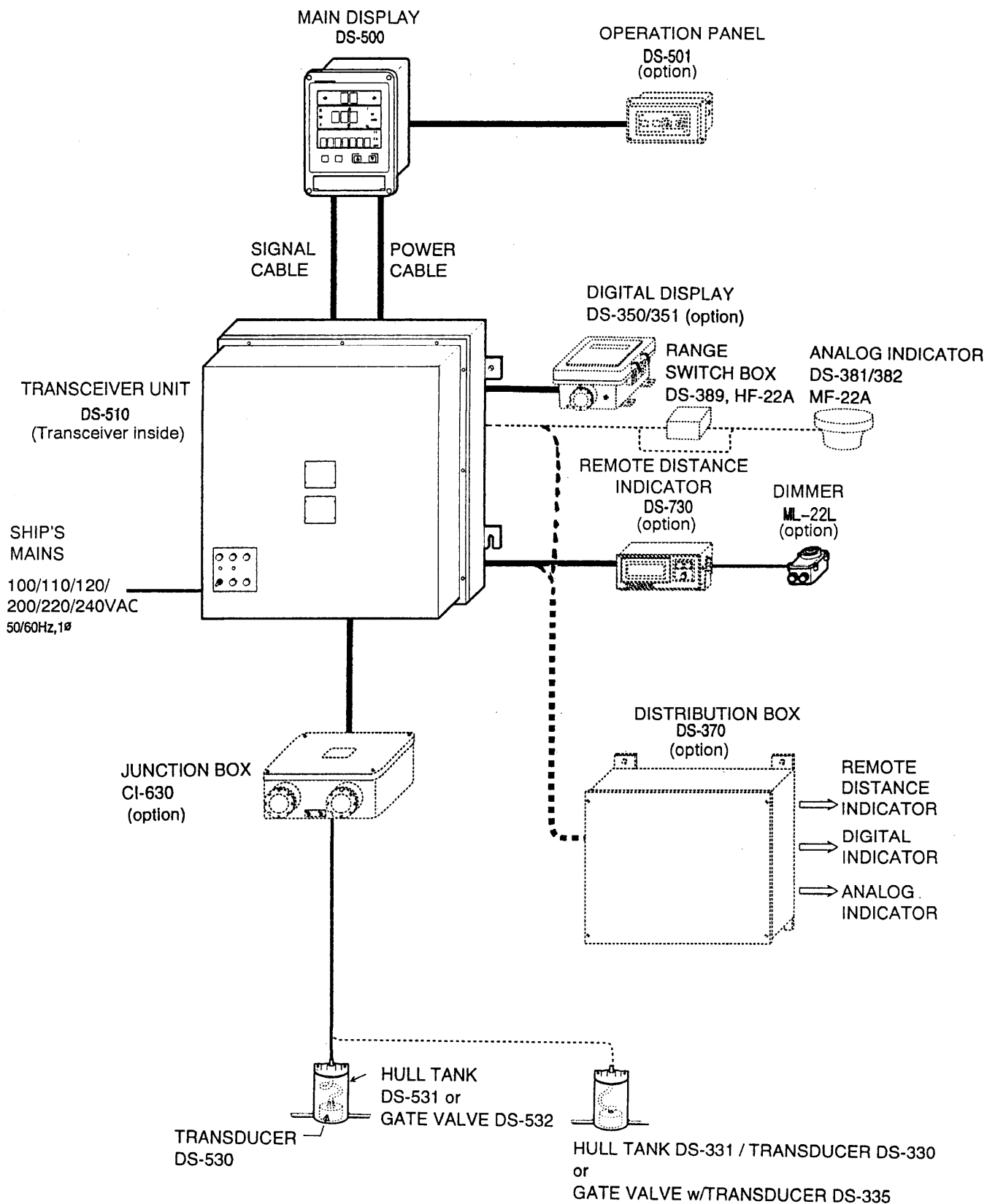
	Standard compass	Steering compass
Main Display	0.8 m	0.6 m
Processor Unit	2.1 m	1.6 m

1. SYSTEM CONFIGURATION

Separate processor and transceiver units



Transceiver unit incorporated in processor unit



2. EQUIPMENT LISTS

Standard Supply

No.	Name	Type	Qty	Remarks
1	Main Display	DS-500	1	Flush mount/Bulkhead mount
2	Processor Unit	DS-510/511	1	Blukhead mount/Deck mount, DS-510 incorporates DS-520
3	Transceiver Unit	DS-520	1	Blukhead mount/Deck mount, required only with DS-511
4	Transducer	DS-530	1	
5	Tank	DS-531	1	
6	Spare Parts	SP65-00400	1 set	For DS-510
		SP65-00410		For DS-511
7	Installation Matetials	CP65-00700	1 set	For DS-510
		CP65-00710		For DS-511

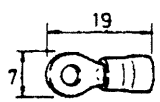
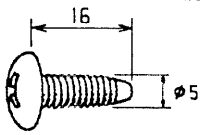
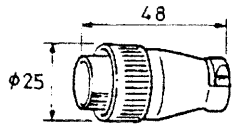
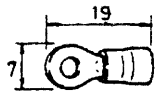
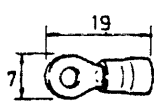
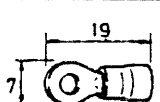
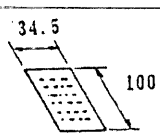
Optional Supply

No.	Name	Type	Code No.	Remarks
1	Installation materials for bulkhead mount	CP65-00704	002-886-970	For main display unit
2	Gate Valve	DS-532	000-028-993	Including installation materials
3	Gate Valve Inst. Materials	MF-220-C-6	000-069-367	For gate valve, option
4	Operation Panel	DS-501		Including installation materials
5	Junction Box	CI-630	000-027-994	Including installation materials
		DS-360		CP66-00703: 006-927-330
6	Distribution Box	DS-370		Bulkhead mount/Deck mount
7	Digital Indicator	DS-350		Waterproof construction
		DS-351		Indoor use
8	Remote Distance Indicator	DS-730		
9	Analog Indicator	DS-381		Flush mount
		DS-382		Bulkhead mount
		MF-22A		
		FE-90		Flush mount
		FL-90		Flush mount
10	Range Switch Box	DS-389		
		MF-22R		

Optional Supply

No.	Name	Type	Code No.	Remarks
11	Dimmer	MF-22L		
12	4 Paris Cable	Z-6FVNV-SX-C 3P+1P *20m*	000-146-089	
		Z-6FVNV-SX-C 3P+1P *30m*	000-146-090	
		Z-6FVNV-SX-C 3P+1P *100m*	000-146-091	
13	VAE Board	66P3613	002-886-210	For DS-510/511. Current output
14	VDE Board	66P3614	002-886-220	For DS-510/511. To connect CI-370/377 or DS-720
15	Spare Parts Box	SP65-00402	002-887-500	
16	Transducer/Tank	DS-330/DS-331		Installation materials page 9b and 9c.
	Gate valve w/ Transducer	DS-335		

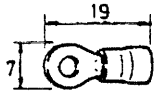
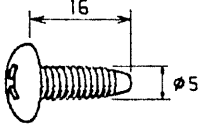
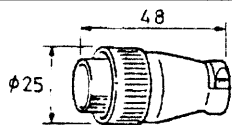
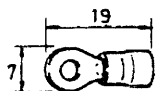
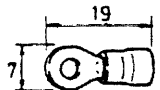
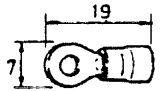
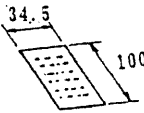
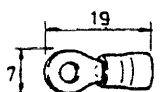
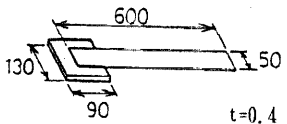
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TYPE	CP65-00700	

工事材料表 INSTALLATION MATERIALS		DS-50 トップラスピートログ DOPPLER SPEEDLOG (DS-510用)			
番号 No.	名称 NAME	略図 OUTLINE	型名 / 規格 DESCRIPTIONS	数量 Q'TY	用途 / 備考 REMARKS
1	圧着端子 CRIMP-ON LUG		FV1.25-M3 アカ RED	18	DS-500用 FOR DS-500
			CODE NO 000-538-110		
2	+トラスタッピングネジ +TAPPING SCREW		5 × 16 SUS304	4	DS-500用 FOR DS-500
			CODE NO 000-805-494		
3	コネクタ CONNECTOR		SRCN6A16-10P	2	DS-510用 FOR DS-510
			CODE NO 000-508-663		
4	圧着端子 CRIMP-ON LUG		FV1.25-M4 アカ RED	18	DS-510用 FOR DS-510
			CODE NO 000-536-715		
5	圧着端子 CRIMP-ON LUG		FV2-M4 ブル BLUE	3	DS-510用 FOR DS-510
			CODE NO 000-536-716		
6	圧着端子 CRIMP-ON LUG		FV1.25-M3 アカ RED	100	DS-510用 FOR DS-510
			CODE NO 000-538-110		
7	ハリマーク TB5 STICKER		66-022-2102-0	1	DS-510用 分配箱使用時 FOR DS-510
			CODE NO 100-237-960		
			CODE NO		
			CODE NO		
			CODE NO		

(略図の寸法は、参考値です。)

図番 (1/1)
DWG. NO. C7241-M01-C

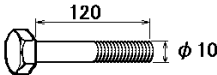
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TYPE	CP65-00710	

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番号 No	名称 NAME	略図 OUTLINE	型名 / 規格 DESCRIPTIONS	数量 Q'TY	用途 / 備考 REMARKS
002 885 350 CP65-00701	1 圧着端子 CRIMP-ON LUG		FV1.25-M3 アカ RED	18	DS-500用 FOR DS-500
			CODE NO 000-538-110		
	2 +トラスタッピングネジ +TAPPING SCREW		5 x 16 SUS304	4	DS-500用 FOR DS-500
			CODE NO 000-805-494		
	3 コネクタ CONNECTOR		SRCN6A16-10P	2	DS-511用 FOR DS-511
			CODE NO 000-508-663		
	4 圧着端子 CRIMP-ON LUG		FV1.25-M4 アカ RED	18	DS-511用 FOR DS-511
			CODE NO 000-536-715		
	5 圧着端子 CRIMP-ON LUG		FV2-M4 アオ BLUE	3	DS-511用 FOR DS-511
			CODE NO 000-536-716		
002 885 360 CP65-00711	6 圧着端子 CRIMP-ON LUG		FV1.25-M3 アカ RED	100	DS-511用 FOR DS-511
			CODE NO 000-538-110		
	7 ハリマーク TB5 STICKER		66-022-2102-0	1	DS-511用 FOR DS-511
			CODE NO 100-237-960		
	8 圧着端子 CRIMP-ON LUG		FV1.25-M4 アカ RED	50	DS-520用 FOR DS-520
			CODE NO 000-536-715		
002 876 350 CP66-00804	9 クラントハッキング CABLE GLAND PACKING		66-019-4201-0 CR	1	DS-520用 FOR DS-520
			CODE NO 100-176-510		
	10 アース銅板 *鉄付* COPPER STRAP W/STEEL PLATE		0.4X50X600MM	1	DS-520用 FOR DS-520
			CODE NO 000-810-253		

(略図の寸法は、参考値です。)

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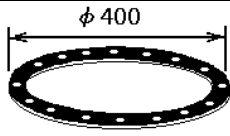
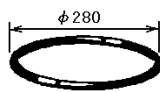
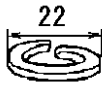
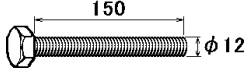
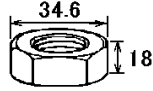
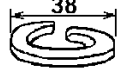
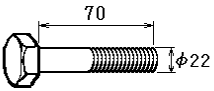
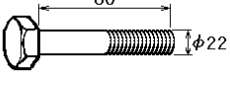
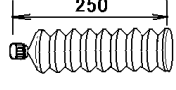
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TYPE	CP65-00702	

工事材料表 INSTALLATION MATERIALS					用途 / 備考 REMARKS
番 号 NO.	名 称 NAME	略 図 OUTLINE	型名 / 規格 DESCRIPTIONS		数量 Q'TY
1	平座金 FLAT WASHER		M10 SUS316L		3
			CODE NO.	000-147-299	
2	ハネ座金 SPRING WASHER		M10 SUS316L		3
			CODE NO.	000-147-303	
3	六角ボルト HEX. BOLT		M10X120LX26S SUS316L		3
			CODE NO.	000-147-315	

65AC-X-9405

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

CODE NO.	000-028-995	65AC-X-9403 -7 1/1
TYPE	CP65-00720	

工事材料表 INSTALLATION MATERIALS					用途 / 備考 REMARKS
番号 NO.	名称 NAME	略図 OUTLINE	型名 / 規格 DESCRIPTIONS	数量 Q'TY	
1	パッキン.2. PACKING		65-002-1004-0	1	
			CODE NO. 850-210-040		
2	Oリング O-RING		J1SB2401-1A-G280	1	
			CODE NO. 000-851-348		
3	ハネ座金 SPRING WASHER		M12 SUS316L	12	
			CODE NO. 000-808-957		
4	六角ボルト HEX. BOLT		M12X150 SUS316L	12	
			CODE NO. 000-147-305		
5	六角ナット HEX. NUT		M22 SUS316L	24	
			CODE NO. 000-808-961		
6	ハネ座金 SPRING WASHER		M22 SUS316L	24	
			CODE NO. 000-808-960		
7	六角ボルト HEX. BOLT		M22X70LX50S SUS316L	12	
			CODE NO. 000-147-317		
8	六角ボルト HEX. BOLT		M22X80LX50S SUS316L	12	
			CODE NO. 000-147-318		
9	コスモグリースダイナミクス COSMO GREASE DYNAMICS		No.1 400G	1	
			CODE NO. 000-149-265		

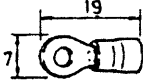
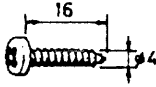
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(略図の寸法は、参考値です。 DIMENSIONS IN DRAWING FOR REFERENCE ONLY.)

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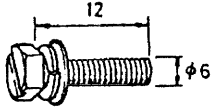
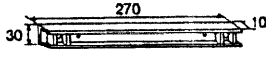
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TYPE	CP65-00703	

工事材料表 INSTALLATION MATERIALS		DS-50 トップラ スピードログ DOPPLER SPEED LOG (DS-501用)			オプション OPTION
番号 No	名称 NAME	略図 OUTLINE	型名 / 規格 DESCRIPTIONS	数量 Q'TY	用途 / 備考 REMARKS
1	圧着端子 CRIMP-ON LUG		FV1.25-M4 アカ RED	7	
			CODE NO 000-536-715		
2	+ハイントタッピネジ +TAPPING SCREW		4X16 SUS3041シ	4	
			CODE NO 000-802-955		

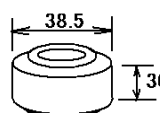
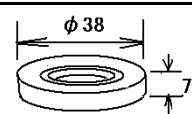
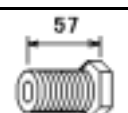
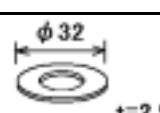
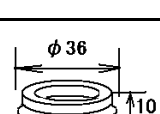
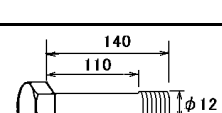
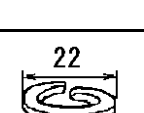
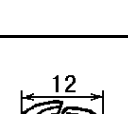
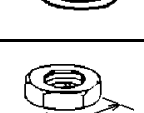
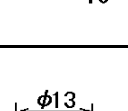
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CODE NO	002-886-970	65AC-X-9406-1
TYPE	CP65-00704	

工事材料表 INSTALLATION MATERIALS		DS-50 トップラ スピードログ DOPPLER SPEED LOG 主指示部壁掛用工材 (オプション)			オプション OPTION
番号 No	名称 NAME	略図 OUTLINE	型名 / 規格 DESCRIPTIONS	数量 Q'TY	用途 / 備考 REMARKS
1	六角セムス入り割付 HEX.BOLT(SLOTTED WASHER HEAD)		M6X12 SUS 304	4	
			CODE NO 000-882-060		
2	取付足 MOUNTING PLATE		66-019-5571-0	2	
			CODE NO 100-178-670		

CODE NO.	002-876-310	66AM-X-9415 -5 1/2
TYPE	CP66-00840	

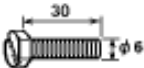
工事材料表						
INSTALLATION MATERIALS						
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1	防水ゴム RUBBER PACKING		66-019-1202-0		1	
			CODE NO.	100-178-550		
2	座金 COUNTERSUNK WASHER		66-019-1203-1		1	
			CODE NO.	100-178-561		
3	ケーブル gland CABLE GLAND		66-019-1204-1		1	
			CODE NO.	100-178-571		
4	平座金 FLAT WASHER		66-019-1205-1		3	
			CODE NO.	100-176-531		
5	キャップ LID		66-019-1983-1		3	
			CODE NO.	100-176-521		
6	六角ボルト HEX. BOLT		66-019-1984-3		3	
			CODE NO.	100-214-533		
7	バネ座金 SPRING WASHER		M12 SUS316L		6	
			CODE NO.	000-808-957		
8	スプリングワッシャ SPRING WASHER		M6 材(TB340)		2	
			CODE NO.	000-808-591		
9	六角ナット 12 HEX. NUT		M6 材(TB340)		2	
			CODE NO.	000-808-590		
10	マルチワッシャ FLAT WASHER		M6 材(TB340)		2	
			CODE NO.	000-808-592		

66AM-X-9415

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

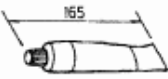
FURUNO

CODE NO.	002-876-310	66AM-X-9415 -5
TYPE	CP66-00840	2/2

工事材料表 INSTALLATION MATERIALS					
番号 NO.	名称 NAME	略図 OUTLINE	型名/規格 DESCRIPTIONS	数量 Q'TY	用途/備考 REMARKS
11	六角ボルト 3171 HEX. BOLT		M5X30 SUS316L CODE NO. 000-150-024	1	

FURUNO

CODE NO.	002-884-990	
TYPE	SP66-00512	

工事材料表 INSTALLATION MATERIALS		DS-30 ドップラソナー DOPPLER SONAR DOCKING SYSTEM (DS-331 船底部 FOR DS-331 HULL UNIT)			
番号 No.	名称 NAME	略図 OUTLINE	型名/規格 DESCRIPTIONS	数量 Q'TY	用途/備考 REMARKS
1	シリコンゴム SILICONE SEALANT		G30M CODE NO. 000-824-012	1	工事用工具 INSTALLATION TOOL
2	緒付ハンドル CABLE GLAND SPANNER		66-019-1253-0 CODE NO. 100-176-500	1	工事用工具 INSTALLATION TOOL

工事使用後、船上備品として保管してください。

TO BE KEPT IN VESSEL AS MAINTENANCE TOOL AFTER INSTALLATION.

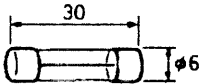
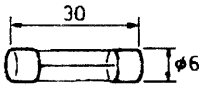
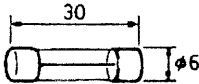
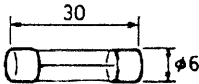
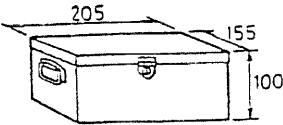
(略図の寸法は、参考値です。)

図番 (1/1)
DWG. NO. C7236-M33-B

FURUNO ELECTRIC CO., LTD

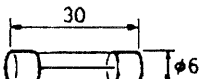
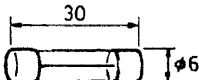
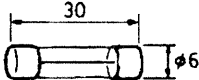
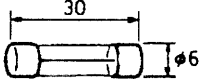
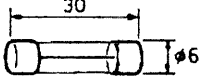
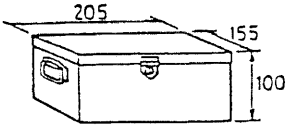
FURUNO

CODE NO.	000-028-989	65AC-X-9301-1
TYPE	SP65-00400	BOX NO. P

SHIP NO.		SPARE PARTS LIST FOR		U S E			SETS PER VESSEL	
		DS-50 トップ・ラースピード・ログ DOPPLER SPEED LOG		D S - 5 1 0 用				
ITEM NO.	NAME OF PART	O U T L I N E	DWG. NO. OR TYPE NO.	Q U A N T I T Y			REMARKS/CODE NO.	
				WORKING		SPARE		
				PER SET	PER VES.			
1	管入りヒューズ GLASS TUBE FUSE		FGBO 3A AC250V	2		2	DS-510用 FOR DS-510 000-549-021	
2	管入りヒューズ GLASS TUBE FUSE		FGBO-A 2A AC125V	1		1	DS-510用 FOR DS-510 000-549-062	
3	管入りヒューズ GLASS TUBE FUSE		FGBO-A 3A AC125V	1		3	DS-510用 FOR DS-510 000-549-063	
4	管入りヒューズ GLASS TUBE FUSE		FGBO-A 5A AC125V	3		3	DS-510用 FOR DS-510 000-549-064	
10	予備品箱 SPARE PARTS BOX		JISF0902-12-10			1	000-831-626	
MFR'S NAME		FURUNO ELECTRIC CO., LTD			DWG. NO.		C7241-P01-C	1/1

FURUNO

CODE NO.	000-028-990	65AC-X-9302-1
TYPE	SP65-00410	BOX NO. P

SHIP NO.	SPARE PARTS LIST FOR		U S E			SETS PER VESSEL
	DS-50 トップ・ラースヒート・ログ DOPPLER SPEED LOG		D S - 5 1 1 用			
ITEM NO.	NAME OF PART	O U T L I N E	DWG. NO. OR TYPE NO.	QUANTITY		REMARKS/CODE NO.
				WORKING	SPARE	
				PER SET	PER VES.	
1	管入りヒューズ GLASS TUBE FUSE		FGBO 3A AC250V	2	2	DS-511用 FOR DS-511 000-549-021
2	管入りヒューズ GLASS TUBE FUSE		FGBO-A 2A AC125V	1	1	DS-511用 FOR DS-511 000-549-062
3	管入りヒューズ GLASS TUBE FUSE		FGBO-A 3A AC125V	1	3	DS-511用 FOR DS-511 000-549-063
4	管入りヒューズ GLASS TUBE FUSE		FGBO-A 5A AC125V	3	3	DS-511用 FOR DS-511 000-549-064
5	管入りヒューズ GLASS TUBE FUSE		FGBO-A 3A AC125V	1	3	DS-520用 FOR DS-520 000-549-063
10	予備品箱 SPARE PARTS BOX		JISF0902-12-10		1	000-831-626
MFR'S NAME		FURUNO ELECTRIC CO., LTD		DWG. NO. C7241-P02-C		1/1

3. OVERVIEW

The FURUNO DS-50 Doppler Speedlog mainly consists of the main display, processor unit, junction box, transceiver unit and transducer.

To obtain full performance from the system, proper installation is very important, especially the transducer. Poor siting or poor cable layout may cause mutual interference or sub par performance. This chapter presents an overview of how to install the system.

3.1. Selection of Mounting Location

Transducer

The performance of the system largely depends on the installation of the transducer and an important consideration is the mounting location. It should meet the requirements mentioned below.

Location from the bow

The location from the bow should be at the distance 1/4 of the ship's length.

Location from the keel

The transducer is installed flush with the ship's hull bottom, therefore it is susceptible to air bubbles which flow below the hull bottom. Select a location where air bubbles will not gather at the mounting location. For the ship having a bulbous bow, air bubbles gather on the hull when the draft line is lower than the bulbous part on the bow.

Generally a location along the keel line provides the best performance.

Projecting distance from hull

The effects of air bubbles are most pronounced near the hull. Therefore, install the transducer along the keel or just below it.

Interference of other ultrasonic equipment

Interference may occur when integer multiple of the transmission frequency of other ultrasonic equipment is within 440 ± 8 kHz. To avoid interference, select a location at least one meter away from the transducer of ultrasonic equipment.

Engine noise

Engine noise resonates through the hull and may interfere with the transducer. Be sure to locate the transducer well away from the engine.

Installation site

The transducer is made of waterproof rubber molding, thus the hull tank, etc. may be installed almost anywhere which meets the requirements noted earlier. However, it is recommended to provide a housing for the transducer inside the ship to keep water out of the transducer.

The transducer cable should be laid in steel conduit tubing, lined with vibration-absorbing materials such as sand to prevent cable vibration.

The material of the transducer tank must meet the requirements of relevant ship classification society. The material of the tank supplied standard by FURUNO is type KSTPG370, approved by the Ship Classification Society of Japan. Consult with relevant classification society to determine suitable material.

Mounting considerations for indoor units

All equipment in the DS-50 system is designed and constructed to withstand the humidity and corrosive atmosphere found in the marine environment. However, certain guidelines must be observed to ensure continued operation. When selecting a mounting location for indoor units, keep the following points in mind.

- Locate the units out of direct sunlight because of heat which can build up inside the cabinet.
- Locate the units away from heaters and air conditioners.
- Avoid places subject to water splash.
- The mounting location should be well ventilated.
- The mounting location should be clean.
- Select a place where vibration is minimal.

3.2 Grounding

	CAUTION
	Ground the equipment. Electrical shock or mutual interference can result if the equipment is not grounded.

The DS-50 system use pulse signals. Thus, insufficient grounding of the equipment may cause mutual interference, especially to radio equipment. To minimize unwanted radiation, considering the following.

- Do not run cables near radio equipment.
- Do not bind cables with cables of radio equipment.
- Cables should be as short as possible, laid along the shortest route.
- Ground all units of the system with a copper strap.
- Lay cables on top of copper plate and fix them every 30 cm with a brass band.
- To connect a copper strap to a copper plate, use silver solder or solder cream to ensure solid connection.

4. MOUNTING

4.1 Mounting the Main Display

The main display can be mounted in a panel (flush mount) or on a bulkhead. Consider the following points when selecting a mounting.

- Select a location where the display can be easily viewed and operated.
- Select a location out of direct sunlight and free of water splash.
- The unit weighs 4.5 kg. Be sure the mounting location is strong enough to support the weight of the unit.

Flush mounting

Refer to the outline drawing on page D-1 for mounting dimensions.

1. Prepare a cutout in the mounting location referring to Figure 2-1 on the next page.
2. Unfasten four bolts on the front panel to separate the front panel from the chassis. Save the bolts for later use.
3. Set the chassis to the mounting location and fasten it with four tapping screws (5 x 16).

Note: Leave sufficient slack in cabling so the unit can be drawn out for maintenance and servicing.

4. Connect wires to the terminal strip referring to the next chapter.
5. Fasten the front panel to the chassis with four bolts removed at step 2.

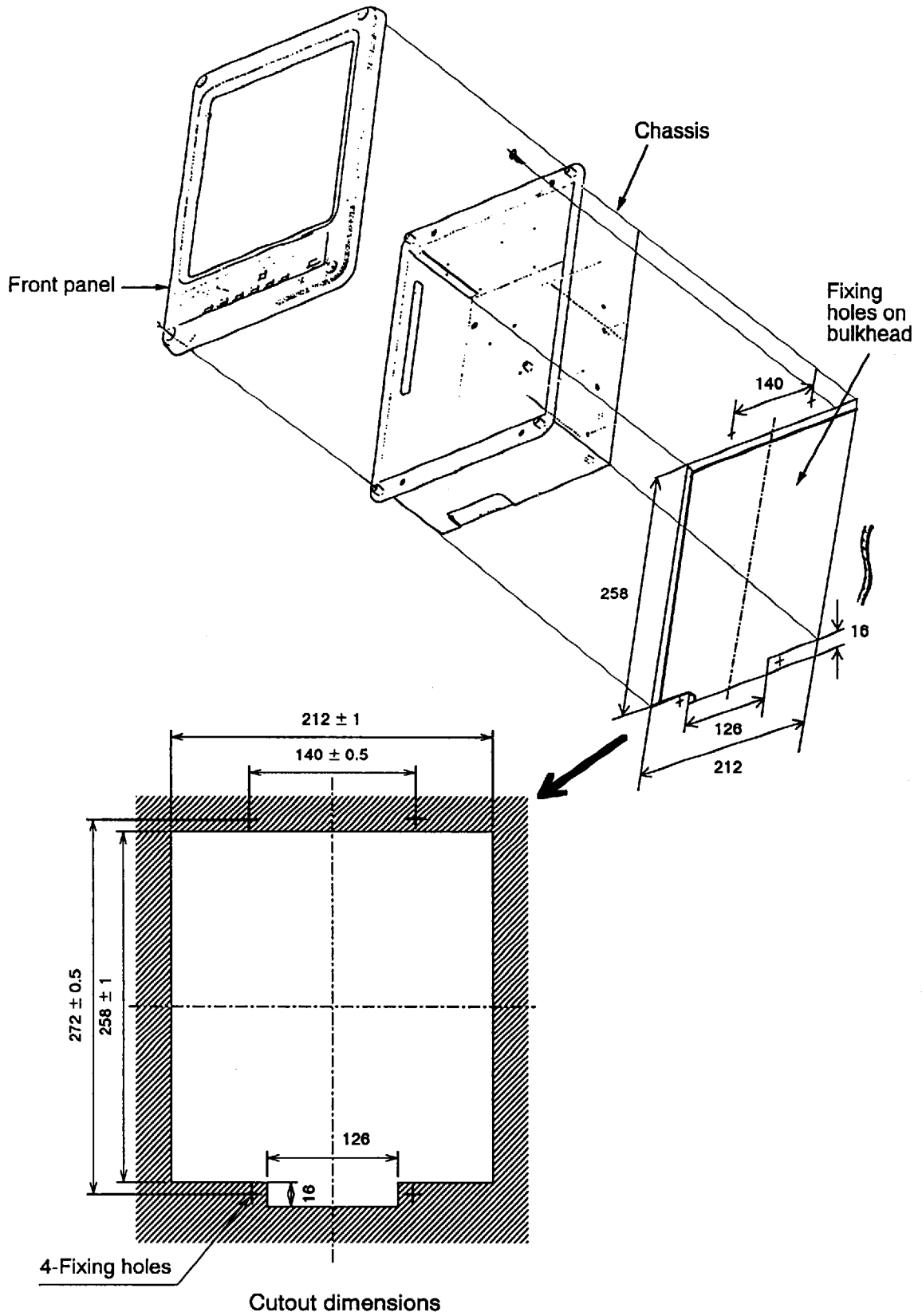


Figure 4-1 Mounting dimensions for flush mounting main display

Bulkhead mounting

Fix the unit to the mounting location with M10 bolts or coach screws. Refer to the outline drawing on page D-2.

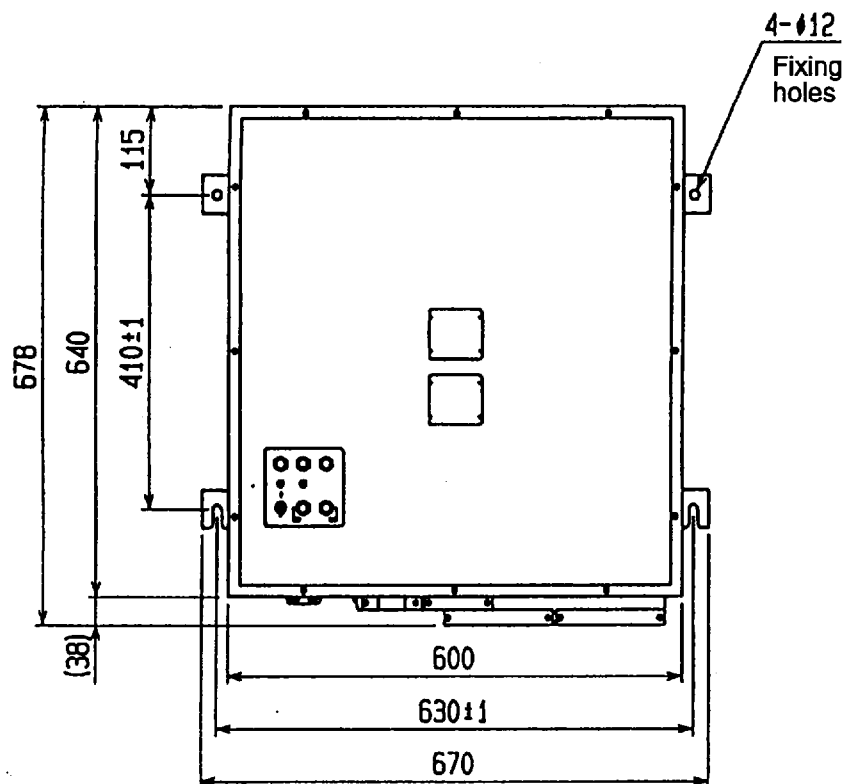
4.2 Mounting the Processor Unit

The processor 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.
- The unit weighs 40 kg. For bulkhead mounting, be sure the mounting location is strong enough to support the weight of the unit under continued vibration normally encountered on the vessel.

Refer to the outline drawing on page D-3 for mounting dimensions.

1. Set four stud bolts to the mounting location at the intervals shown in the outline drawing on page D-3. The bolts should protrude from the mounting location by about 20 mm.
2. Set the unit to the stud bolts and fasten it with four M10 nuts.



4.3 Mounting the Transceiver Unit

The transceiver 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.
- The unit weighs 14 kg. For bulkhead mounting, be sure the mounting location is strong enough to support the weight of the unit under continued vibration normally encountered on the vessel.

Refer to the outline drawing on page D-4 for mounting dimensions.

1. Set four stud bolts to the mounting location at the intervals shown in the outline drawing on page D-4. The bolts should protrude from the mounting location by about 20 mm.
2. Set the unit to the stud bolts and fasten it with four M10 nuts.

4.4 Mounting the Junction Boxes (option)

Junction box DS-360 (between processor and transceiver units)

The DS-360 can be mounted on the deck or on a bulkhead. For bulkhead mounting be sure the mounting location is strong enough to support the weight of the unit (6 kg). Refer to page D-10 for mounting dimensions.

1. Determine mounting location.
2. Remove cover of junction box.
3. From inside the junction box, fasten it to the mounting location with tapping screws (5 mm dia.) or bolts, nuts and washers (5 mm dia.)
4. Replace the cover.

Junction box CI-630 (between transceiver and transducer)

The mounting procedure is the same as that for the DS-360. Refer to the outline drawing on page D-11 for mounting dimensions.

Consider the following points when selecting a mounting location.

4.4 Mounting the Junction Boxes (option)

- The CI-630 handles pulse signals. Locate it well away from generators, radio equipment, televisions and other noise-emitting equipment.
- The unit is waterproof; however, select a location which is low in humidity.
- Locate the unit away from heaters and air conditioners. The temperature should be moderate and stable to prevent moisture build up inside the unit.
- The CI-630 is usually installed above the draft line and the transducer cable is run through steel conduit tubing. This permits replacement of the transducer without having to dry dock the vessel.

If the junction box is installed below the draft line, pass the transducer cable through steel conduit tubing laid between the cable gland on the transducer and the junction box, to prevent noise interference. If steel conduit tubing is not used, shorten the transducer cable as much as possible and install the junction box close to the hull.

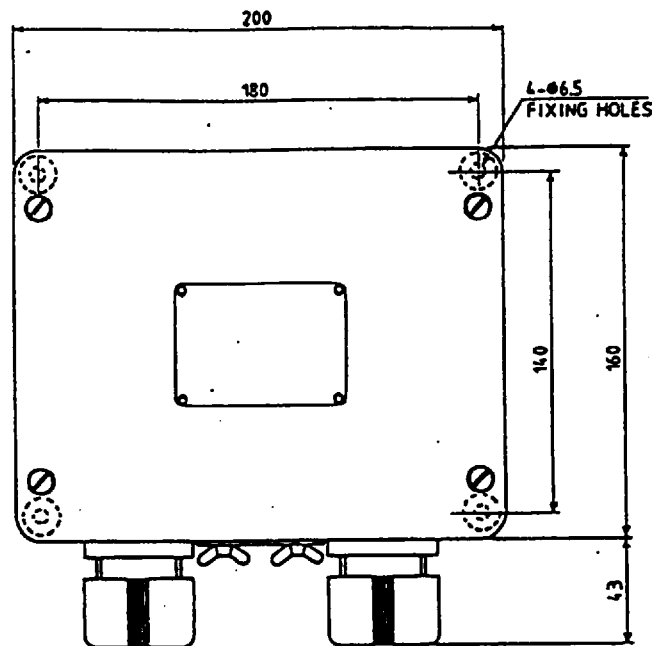


Figure 4-3 Mounting dimensions for junction box CI-630

4.5 Mounting the Hull Unit

For steel hull vessels

1. Confirming transducer tank material, hull plate thickness

Before installing the hull unit, check that the transducer tank is of material approved by relevant ship classification society and is with a thickness not thinner than the hull plate. The type of material used for the casing of the hull tank supplied standard by FURUNO is type KSTPG370 (formerly KSTPG38, KST138), approved by the Ship Classification Society of Japan, with a thickness of 25 mm.

2. Determining installation site

Select the installation site referring to page 11. For ships which are prone to collect air bubbles at the hull bottom, consult local FURUNO agent or dealer for advice.

3. Constructing housing for transducer tank

Housing for the transducer is not required by classification societies since the transducer tank is waterproof. However it is recommended to do so for safety. Dimensions shown in the hull unit outline drawing are for reference; shipyard may change as required. No maintenance space is required inside the housing since the transducer is detachable/replaceable in the water from outside the ship.

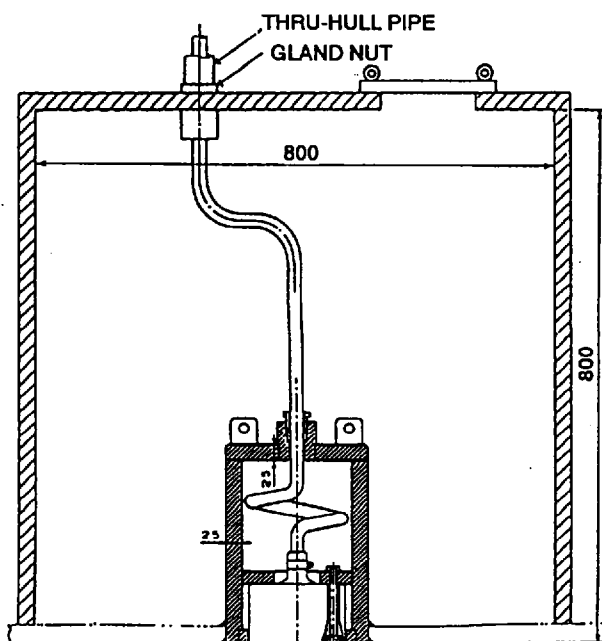


Figure 4-4 Example of housing for transducer tank

4. Welding tank

a) Fore/aft direction

“Fore” mark is engraved on the tank. Align them with the ship’s fore-aft line within accuracy of 1° . After the tank has been welded, measure both ship’s fore-aft direction and tank fore-aft direction with a magnetic compass. Calculate the difference between the readings and enter it on the system settings menu after completion of installation as follows:

- 1) Turn off the main display.
 - 2) While pressing and holding down the [Kt/ m/s] key, turn on the power.
 - 3) Press the DOWN arrow key to select system setting no. 3, transducer installation error.
 - 4) Press RIGHT or LEFT arrow key to set offset.
 - 5) Turn off the power.
- b) Leveling: Install the tank so that its top face is horizontal while the ship is running. Measure leveling accuracy with a level meter, after the ship is launched.
- c) Detach transducer, transducer cable, cable gland and gasket before welding the tank.
- d) Welding method for tank and hull should be determined by the shipyard. Weld reinforcement ribs to the tank if the shipyard considers them necessary.
- e) Remove welding build up between the tank and the ship’s hull with a grinder, for a flat finish.

5. Fixing/connecting the transducer cable

The transducer cable should be laid in steel conduit tubing, lined with vibration absorbing material to prevent cable vibration.

6. Painting

After welding the tank, paint both inner and outer surfaces of the tank with paint used for top coating of hull bottom.

Note: The bottom face of the transducer has been coated with Marine Star 20 Antifouling Paint. Do not coat it with paint for the hull.

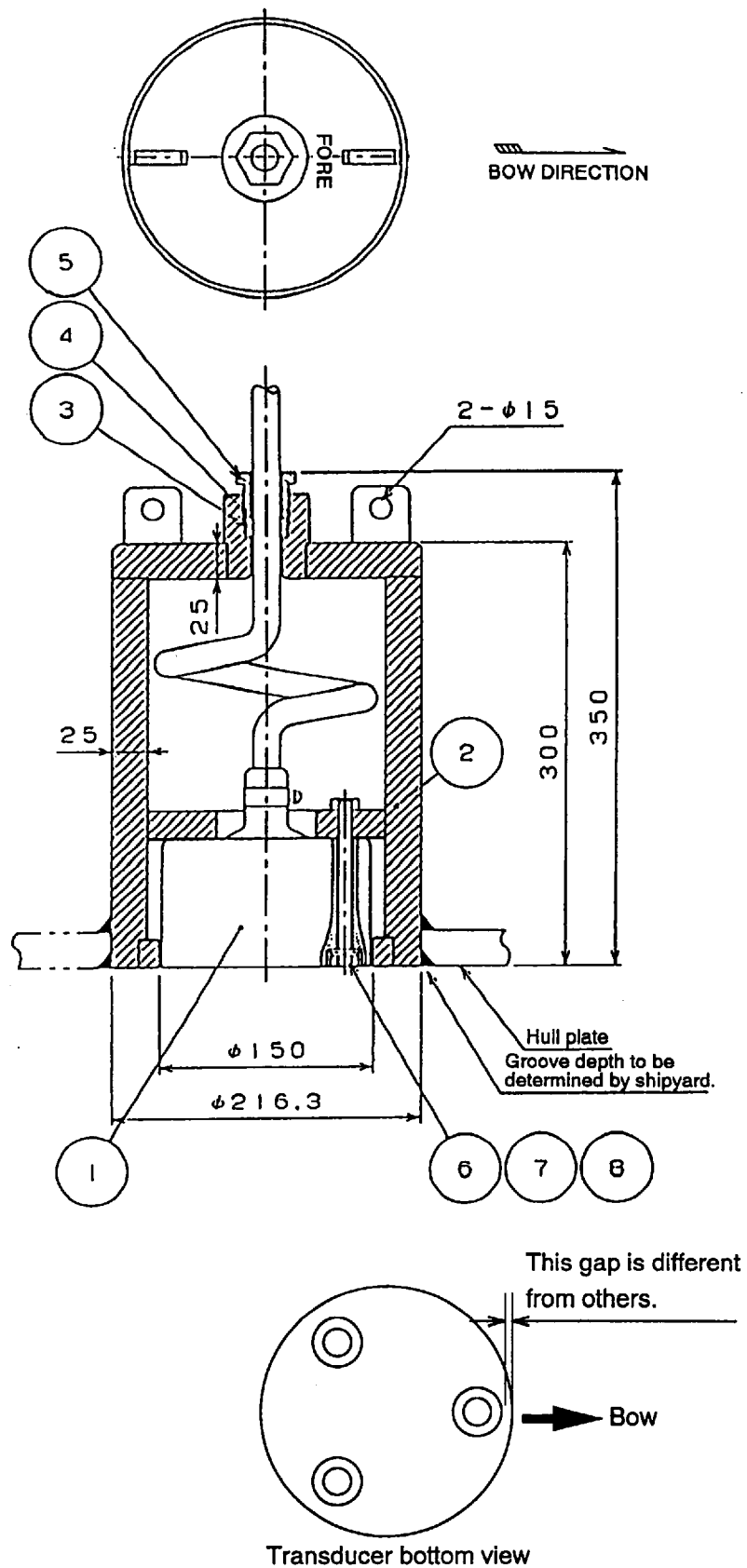


Figure 4-5 Tank installation example

Note: Refer to page D-12 for installation of DS-330 (option).

4.6 Mounting the Operation Panel (option)

The operation panel is designed for flush mounting. Consider the following points when selecting a mounting location.

- Locate the unit where it can be easily operated.
- The mounting location should be free of water splash.

Procedure

Refer to the outline drawing on page D-7 for mounting instructions.

1. Prepare a cutout in the mounting location.

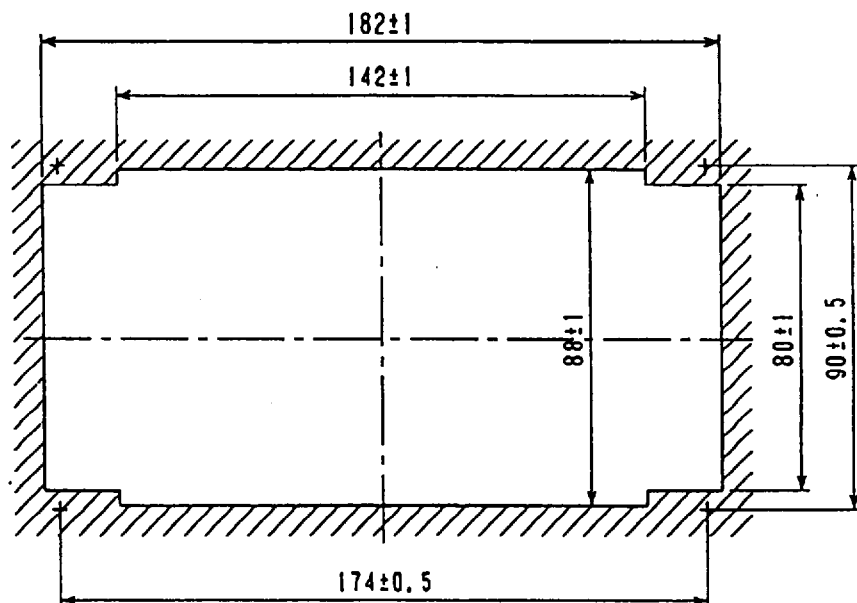


Figure 4-6 Mounting dimensions for control box

2. Open the lid of the control box. Connect the unit referring to the next chapter.
3. Set the control box to the mounting location and fix it with four tapping screws.

Note: Leave sufficient extra cabling so the unit can be drawn out for maintenance and servicing.

5. WIRING

5.1 Remarks on Cabling

1. Cable between transducer and transceiver unit

This cable carries very weak signals having amplitude of less than 0.1 μ V, which are easily interfered by noise. Therefore, dedicate steel conduit tubing exclusively for this cable. For the conduit which runs vertically, line it with vibration absorbing material prevent cable vibration.

Cable to use

Cable Name	Z-6FVN-SX 3P+1P
Outer diameter	18.7 $\pm$ 0.5 mm
Weight	450 kg/km
Outer sheath	Rubber
Aarmor	None

2. Cables between transceiver unit and processor unit (via junction box DS-360)

These cable carries echoes signal having amplitude of greater than 0.1 mV, which can be interfered by noise from high power electrical power cables. Therefore, do not run these cables through steel conduit tubing with the following cables:

- Cable carrying more than a few kilowatts of power to fluctuating loads.
- Cable carrying switching waves generated by thyristor, etc.
- Transmission antenna cable of radio equipment.

Observe also the guidelines given for “3. Other cables.”

Cable to use

Cable Name	TTYCY-19S
Outer diameter	38.8 $\pm$ 1.6 mm
Weight	2050 kg/km

3. Other cables

Observe the guidelines which follow to prevent noise and interference.

- When cables run parallel with power cables, separate them 40 cm minimum.
- For cables run in non-metallic conduit tubing or duct behind a bulkhead, use cable with armor and no protective covering and ground it every 50 cm.

5.2 Cable Fabrication

1. Transducer cable

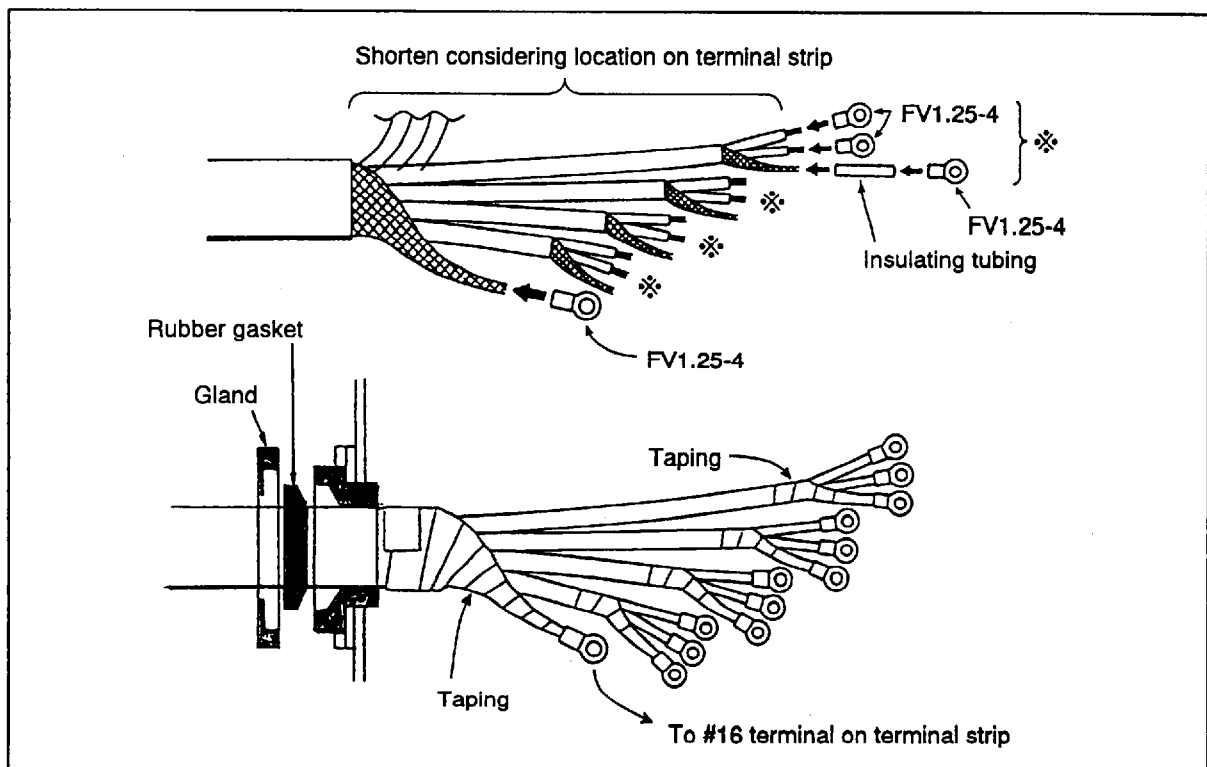


Figure 5-1 Fabrication of transducer cable

2. Cable between transceiver unit, junction box and processor unit (TTYCY-19S)

1) Transceiver unit/junction box

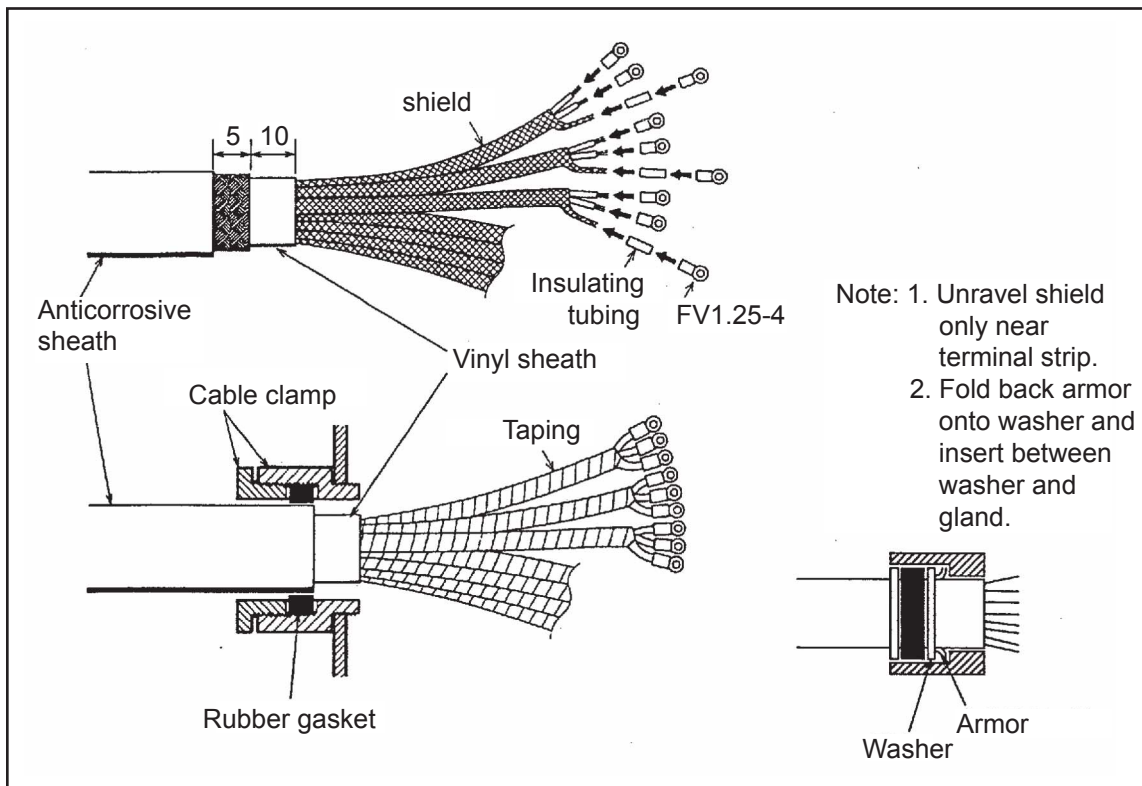


Figure 5-2 Cable fabrication

2) Processor unit

Cores and shields are fabricated the same as on transceiver unit/junction box side. To ground the cable, remove paint from the armor and set the armor in the cable clamp.

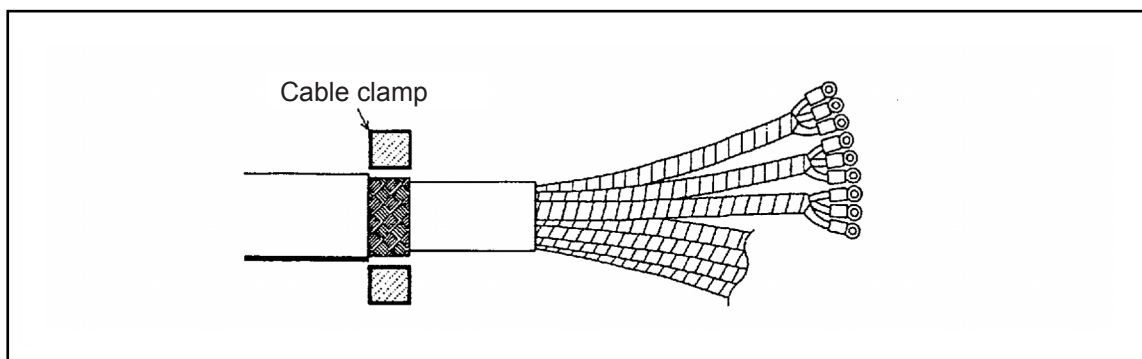


Figure 5-3 Cable fabrication

3. CIF/NMEA data signal cable (CO-SPEVV-SB-C 0.2 x 5P)

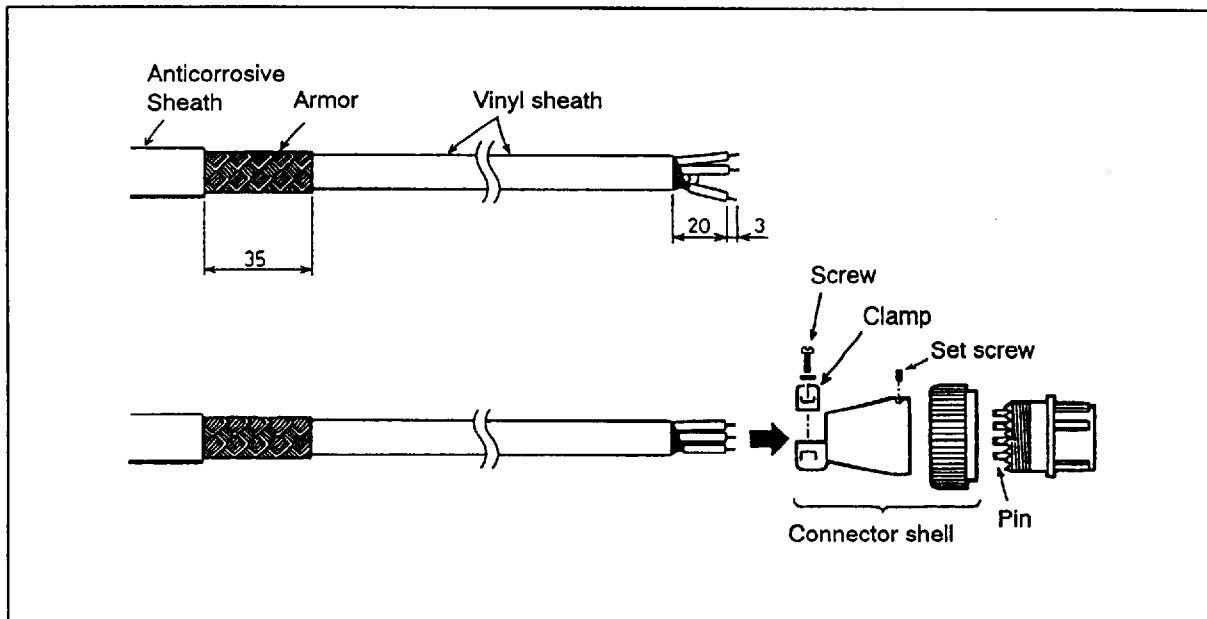


Figure 5-4 Cable fabrication

4. Other cables

All other cables are terminated at a terminal strip.

1) Processing the armor

- **Cable passed through cable clamp**
Locate the armor in the cable clamp.

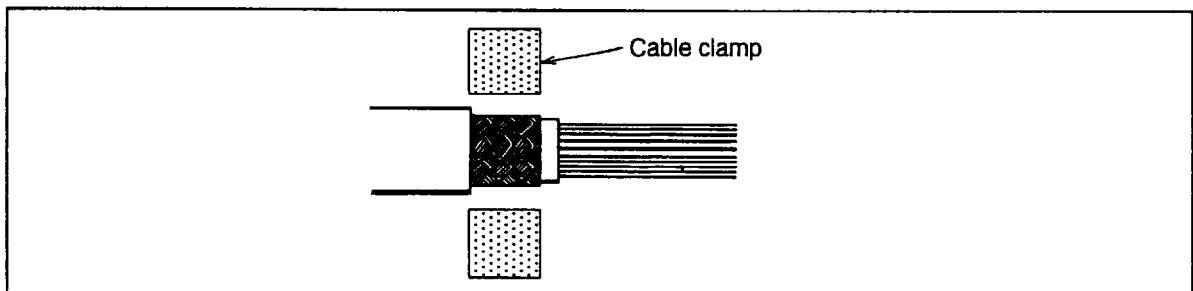


Figure 5-5 Cable fabrication

- **Cable passed through cable gland**

Solder a vinyl wire w/crimp-on lug to the armor and fasten it to the earth terminal.

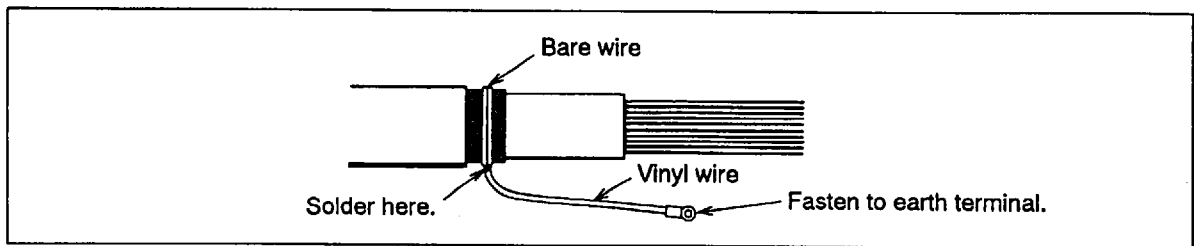


Figure 5-6 Cable fabrication

2) Processing the shield

- **Individual shields**

Undo individual shields only near the terminal strip to which its wire is connected. Tape shields for insulation.

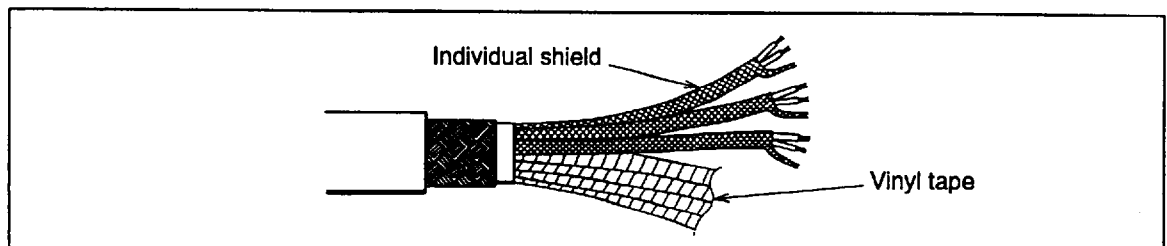


Figure 5-7 Cable fabrication

- **Common shield**

Undo common shield at the cable gland of equipment and tape it for insulation.

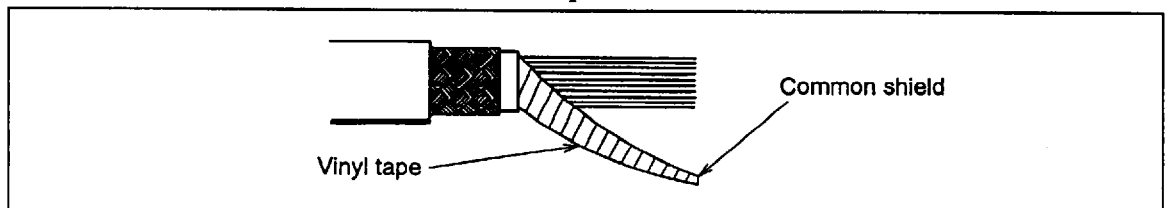


Figure 5-8 Cable fabrication

5.3 Remarks on Connection of Other Equipment

1. KP input signal to reject interference

When a Tx trigger pulse (KP) input to the system is giving off interference, note the following:

1) Interference rejection signal input circuit

Two input ports are provided in the processor unit for connection of KP for interference rejection. Use either port.

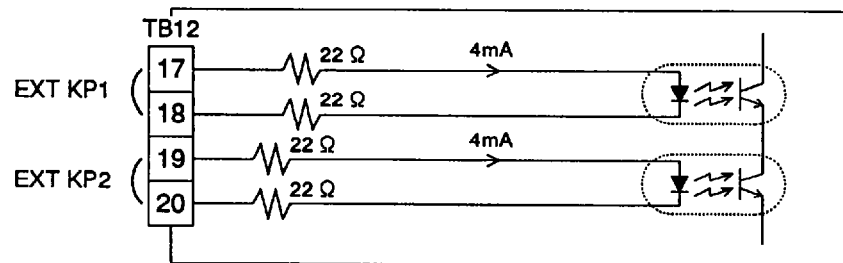


Figure 5-9 KP inout circuit

2) Current requirement

Recommended current is 4 mA while the circuit operates normally at 2 mA to 20 mA. Adjust resistance of output circuit in equipment connected to obtain recommended current.

3) Signal logic

Use signal logic equivalent to electric current flow when the system is transmitting.

2. NMEA I/O circuit

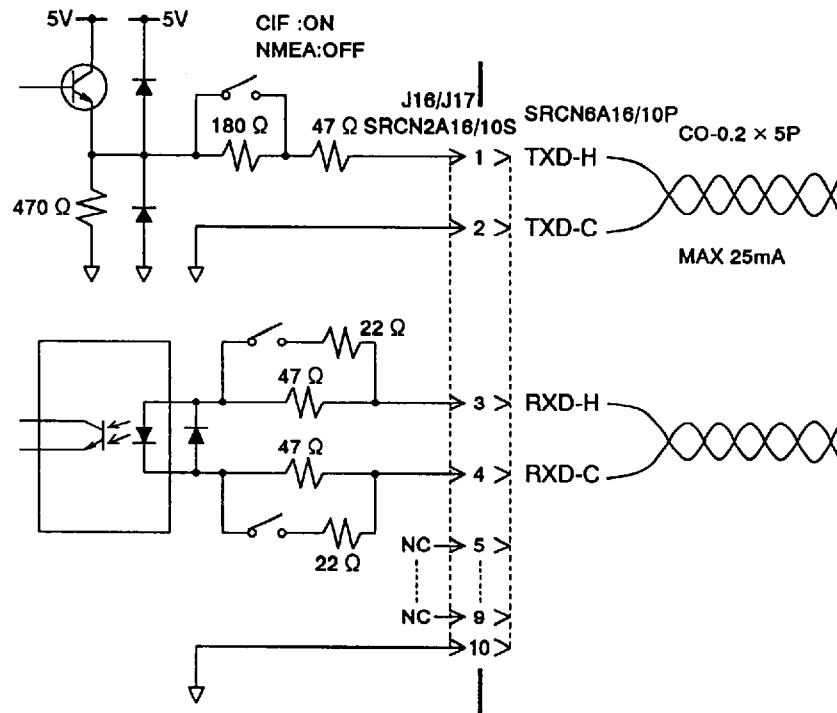


Figure 5-10 NMEA I/O circuit

The maximum allowable current in the NMEA output line is 25 mA and recommended current is 10 mA. When terminating the line by a photo coupler for current loop configuration, take suitable means at the signal receive side to limit the current. If, for example, forward voltage drop in the photo coupler is 2.2 V;
 $[4.8 - 2.2 \text{ (V)}] / [10 \text{ (mA)}] - 227 \text{ (}\Omega\text{)} = 33 \text{ (}\Omega\text{)}$
 therefore, insert a 33 ohm resistor in series in the line.

6. INITIAL SETTINGS

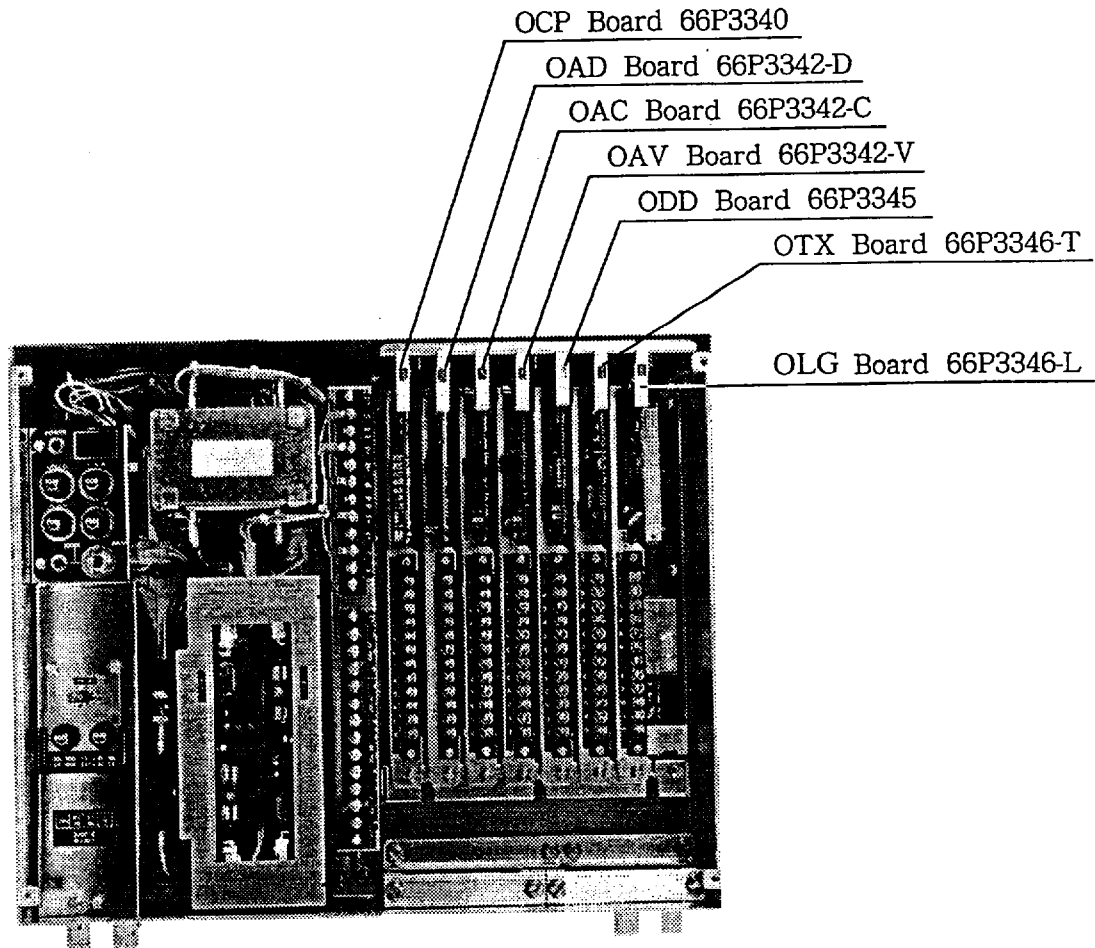
6.1 Processor Unit

When a KP is input to the system, turn on appropriate DIP switch as follows.

Board	DIP switch		Function	Setting																											
MCP Board 66P3310	S3	7	Interference rejector 1	Turn ON when a KP signal is conneted to TB12-#17 and #18 in the Processor unit to reject interference from other ultrasonic equipment. OFF: Int. Rej.1 OFF(Default setting) ON : Int. Rej.1 ON																											
		8	Interference rejector 2	Turn ON when a KP signal is connected to TB12-#19 and #20 to reject interference from other ultrasonic equipment. OFF: Int. Rej.2 OFF(Default setting) ON : Int. Rej.2 ON																											
VOC Board 66P3612	S2	678	Speed output dummy	<table><tr><th colspan="3">S2 dip switch No.</th><th rowspan="2">Output format</th></tr><tr><th>6</th><th>7</th><th>8</th></tr><tr><td>OFF</td><td>—</td><td>—</td><td>Normal Condition (Not output dummy sig.)</td></tr><tr><td>ON</td><td>ON</td><td>OFF</td><td>Min. value (-10kt for almost case)</td></tr><tr><td>ON</td><td>ON</td><td>ON</td><td>Changable between -10 to 30/40kt</td></tr><tr><td>ON</td><td>OFF</td><td>OFF</td><td>Output 0 kt</td></tr><tr><td>ON</td><td>OFF</td><td>ON</td><td>Max. speed 30kt or 40kt</td></tr></table>	S2 dip switch No.			Output format	6	7	8	OFF	—	—	Normal Condition (Not output dummy sig.)	ON	ON	OFF	Min. value (-10kt for almost case)	ON	ON	ON	Changable between -10 to 30/40kt	ON	OFF	OFF	Output 0 kt	ON	OFF	ON	Max. speed 30kt or 40kt
	S2 dip switch No.			Output format																											
6	7	8																													
OFF	—	—	Normal Condition (Not output dummy sig.)																												
ON	ON	OFF	Min. value (-10kt for almost case)																												
ON	ON	ON	Changable between -10 to 30/40kt																												
ON	OFF	OFF	Output 0 kt																												
ON	OFF	ON	Max. speed 30kt or 40kt																												
	S3	1	Analogmeter Range	<table><tr><th>1</th><th>Range</th></tr><tr><td>OFF</td><td>30 kt</td></tr><tr><td>ON</td><td>40 kt</td></tr></table>	1	Range	OFF	30 kt	ON	40 kt																					
1	Range																														
OFF	30 kt																														
ON	40 kt																														

Board	Jumper	Function	Setting	
VMT Board 66P3611	JP4 JP5 JP6 JP7 JP8	Analog indicator selection	JP4:1,3 JP7:1,3 JP5:1,3 JP8:1 JP6:1,3	Remove VOC Board(66P3612) and MCNA Board(66P3616) to access the Jumpers under the MCNA board.
		Distributor selection	JP4:2,4 JP7:2,4 JP5:2,4 JP8:2 JP6:2,4	

6.2 Distributor



Quantity and type of boards to be incorporated change with equipment specifications.

Figure 6-1 Distributor

Set DIP switches on circuit boards incorporated in accordance with specifications of equipment connected.

Board	DIP switch		Function	Setting			
OCP Board 66P3340	S1	1	Speed dummy output	1	2	3	Specification
		2		—	—	OFF	Normal
		3		OFF	OFF	ON	0 knot output
				ON	OFF	ON	Max. (30 or 40 knot)
				ON	ON	ON	Variable(-10 to 30/40 knot)
				OFF	ON	ON	Min. (almost case: -10 knot)

Board	DIP switch		Function	Setting															
OAV Board 66P3342 -V	S1	1 2	Ship's speed voltage output selection	Select ship's speed versus voltage characteristics according to specifications of equipment connected to the OAV Board. <table><tr><th>Specification</th><th>1</th><th>2</th></tr><tr><td>-10~40 knot = -2.50~10.0V</td><td>OFF</td><td>OFF</td></tr><tr><td>-10~30 knot = -3.33~10.0V</td><td>ON</td><td>OFF</td></tr><tr><td>-10~25 knot = -4.00~10.0V</td><td>OFF</td><td>ON</td></tr><tr><td>-10~20 knot = -5.00~10.0V</td><td>ON</td><td>ON</td></tr></table>	Specification	1	2	-10~40 knot = -2.50~10.0V	OFF	OFF	-10~30 knot = -3.33~10.0V	ON	OFF	-10~25 knot = -4.00~10.0V	OFF	ON	-10~20 knot = -5.00~10.0V	ON	ON
		Specification	1	2															
-10~40 knot = -2.50~10.0V	OFF	OFF																	
-10~30 knot = -3.33~10.0V	ON	OFF																	
-10~25 knot = -4.00~10.0V	OFF	ON																	
-10~20 knot = -5.00~10.0V	ON	ON																	
		3 4	Speed output selection	Select type of ship's speed to output from OAV Board. <table><tr><th>Output speed</th><th>3</th><th>4</th></tr><tr><td>Fore-aft speed</td><td>OFF</td><td>OFF</td></tr><tr><td>Port-stbd speed</td><td>ON</td><td>OFF</td></tr><tr><td>Vector Speed</td><td>OFF</td><td>ON</td></tr></table>	Output speed	3	4	Fore-aft speed	OFF	OFF	Port-stbd speed	ON	OFF	Vector Speed	OFF	ON			
Output speed	3	4																	
Fore-aft speed	OFF	OFF																	
Port-stbd speed	ON	OFF																	
Vector Speed	OFF	ON																	
OAC Board 66P3342 -C	S1	1 2	Ship's speed current output selection	Select ship's speed versus current output characteristics according to specifications of equipment connected to the OAC Board. <table><tr><th>Specification</th><th>1</th><th>2</th></tr><tr><td>-10~40 knot = 4.0~20.0mA 0 knot = 7.2mA</td><td>OFF</td><td>OFF</td></tr><tr><td>-10~30 knot = 4.0~20.0mA 0 knot = 8.0mA</td><td>ON</td><td>OFF</td></tr><tr><td>-10~25 knot = 4.0~20.0mA 0 knot = 8.57mA</td><td>OFF</td><td>ON</td></tr><tr><td>-10~20 knot = 4.0~20.0mA 0 knot = 9.33mA</td><td>ON</td><td>ON</td></tr></table>	Specification	1	2	-10~40 knot = 4.0~20.0mA 0 knot = 7.2mA	OFF	OFF	-10~30 knot = 4.0~20.0mA 0 knot = 8.0mA	ON	OFF	-10~25 knot = 4.0~20.0mA 0 knot = 8.57mA	OFF	ON	-10~20 knot = 4.0~20.0mA 0 knot = 9.33mA	ON	ON
		Specification	1	2															
-10~40 knot = 4.0~20.0mA 0 knot = 7.2mA	OFF	OFF																	
-10~30 knot = 4.0~20.0mA 0 knot = 8.0mA	ON	OFF																	
-10~25 knot = 4.0~20.0mA 0 knot = 8.57mA	OFF	ON																	
-10~20 knot = 4.0~20.0mA 0 knot = 9.33mA	ON	ON																	
		3 4	Speed output selection	Select type of ship's speed to output from the OAC Board. <table><tr><th>Output speed</th><th>3</th><th>4</th></tr><tr><td>Fore-aft speed</td><td>OFF</td><td>OFF</td></tr><tr><td>Port-stbd speed</td><td>ON</td><td>OFF</td></tr><tr><td>Vector speed</td><td>OFF</td><td>ON</td></tr></table>	Output speed	3	4	Fore-aft speed	OFF	OFF	Port-stbd speed	ON	OFF	Vector speed	OFF	ON			
Output speed	3	4																	
Fore-aft speed	OFF	OFF																	
Port-stbd speed	ON	OFF																	
Vector speed	OFF	ON																	

Board	DIP switch		Function	Setting						
OAD Board 66P3342 -D	S1	1	Analog indicator selection	Set according to analog indicator connected to the OAD Board.						
				<table><tr><td>Analog indicator</td><td>1</td></tr><tr><td>MF-22A</td><td>OFF</td></tr><tr><td>DS-381/382</td><td>ON</td></tr></table>	Analog indicator	1	MF-22A	OFF	DS-381/382	ON
				Analog indicator	1					
				MF-22A	OFF					
DS-381/382	ON									
Note: Speed current output to analog indicator:										
ON: -10~40 kont = -2.50~10.0 mA OFF : -10~30 knot = -3.33~10.0 mA										

6.3 Digital Indicator

Set the DIP switch S1 on PCP board at installation.

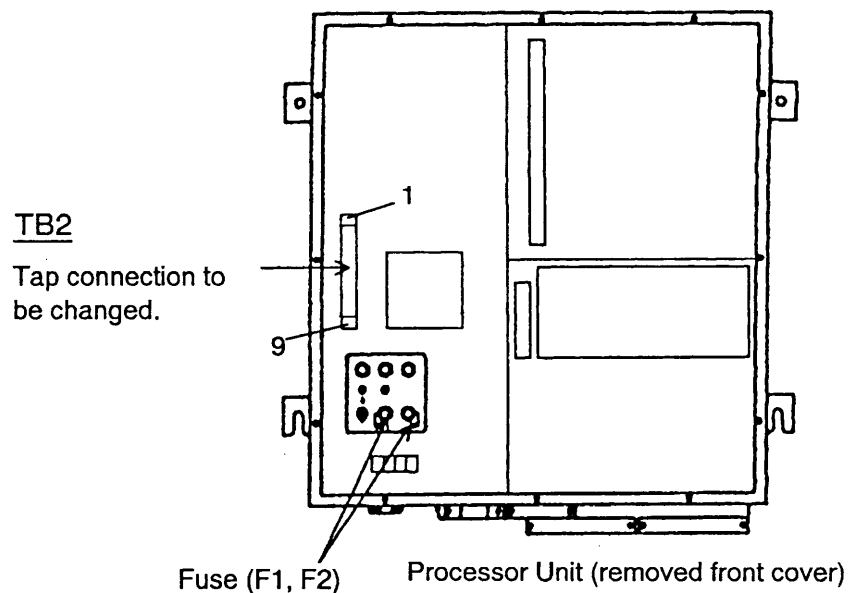
Board	DIP switch		Function	Setting																	
PCP Board 66P3355	S1	1	Depth Unit Selection	<table><tr><td>Depth Unit</td><td>1</td><td>2</td></tr><tr><td>m</td><td>—</td><td>OFF</td></tr><tr><td>ft</td><td>OFF</td><td>ON</td></tr><tr><td>fm</td><td>ON</td><td>ON</td></tr></table>			Depth Unit	1	2	m	—	OFF	ft	OFF	ON	fm	ON	ON			
		Depth Unit		1	2																
		m		—	OFF																
		ft		OFF	ON																
		fm		ON	ON																
		2		DS-350/351 only																	
	3	Display Mode Selection	OFF: Type A ON: Type B DS-350 only																		
4	Rate Gyro Connection	OFF: Yes ON: No DS-351 only																			
5	Gyrocompass Connection	OFF: Yes ON: No DS-350/351 only																			
※		6	Depth Selection	OFF: Internal Depth ON: External Depth DS-350/351 only																	
		7 8	Model Selection	<table><tr><td>Model</td><td>7</td><td>8</td></tr><tr><td>DS-350</td><td>OFF</td><td>OFF</td></tr><tr><td>DS-351</td><td>OFF</td><td>ON</td></tr><tr><td>No use</td><td>ON</td><td>OFF</td></tr><tr><td>No use</td><td>ON</td><td>ON</td></tr></table>			Model	7	8	DS-350	OFF	OFF	DS-351	OFF	ON	No use	ON	OFF	No use	ON	ON
Model	7	8																			
DS-350	OFF	OFF																			
DS-351	OFF	ON																			
No use	ON	OFF																			
No use	ON	ON																			

Note: ※ When DS-350/351 is connected to DS-50, dip switches S1 #4 and #5 on PCP board (60P3355) should be set to ON.

7. CHANGING POWER SUPPLY SPECIFICATIONS

This equipment can be powered by 100, 110, 200 or 220 VAC, and its power specification is set at the factory in accordance with customers order. If the specification is different from ship's power supply, change jumper wires and fuses in the processor unit as follows.

Changing tap connection



100VAC	110VAC	120VAC	200VAC	220VAC	240VAC
TB2 Jumper wires	TB2	TB2	TB2	TB2	TB2

Figure 7-1 Changing tap connection

Changing fuses

Change fuse F1 and F2 by according to ship's mains.

SHIP'S MAINS	FUSE(F1, F2)
100/110/120VAC	5A(125V)
200/220/240VAC	3A(125V)

8. LIST OF DIP SWITCH SETTINGS

DIP Switch Location

The DIP switches are located on the boards shown in the table below.

Unit	Board	DIP Switch
Display Unit DS-500	VCP Board	S1 (all off)
Processor Unit DS-510/511	MCP Board	S1, S2, S3, S4
	MFT Board	S1
	MIF Board	S1, S3, S4, (S2, S5 and S6: no use)

Setting and Function of DIP Switch

- : Do not change setting.
- : Change setting as required.

1) Processor Unit

Board	Switch Setting			Function	Factory Setting
MCP Board	S1	0		Monitor signal: Fore beam GEL	○
		1		Ditto: Fore beam EL	
		2		Ditto: Starboard beam GEL	
		3		Ditto: Starboard beam EL	
		4		Ditto: Port beam GEL	
		5		Ditto: Port beam EL	
		6		Ditto: TVG + external KP	
		7		Ditto: External KP	
		8 to F		Unused	
		GEL: Echo signal with TVG effected EL: Echo signal without TVG effected			
	S2	#1	#2	Bottom tracking beam selection	
		OFF	OFF	Fore beam	○
		ON	OFF	Starboard beam	
		ON	OFF	Port beam	
		ON	ON	All beams	
		#3	OFF	TX pulselength in water tracking mode: Standard	●
			ON	Ditto: Long	
		#4	OFF	Automatic sound speed correction: On	●
			ON	Ditto: Off	
		#5	OFF	Angular speed latitude error correction: On	●
			ON	Ditto: Off	
		#6	OFF	Exponential smoothing: On	●
			ON	Ditto : Off	
		#7		Unused	
		#8	OFF	Ship's speed smoothing: Yes (without MKL pcb)	
			ON	Ditto: No (without MKL pcb)	●

Board	Switch Setting			Function	Factory Setting
MCP Board	S3	#7	OFF	Interference rejector 1: Off	o
			ON	Ditto: On	
		#8	OFF	Interference rejector 2: Off	o
			ON	Ditto: On	
		#1 to #6			Unused
	S4	0		TVG curve selection: Auto (TVG curve is automatically adjusted based on water temperature measured by DS-30 transducer.)	•
		1		Ditto: Water temp 20°C or less	
		2		Ditto: Water temp 20°C to 25C	
		3		Ditto: Water temp 25°C to 30°C	
		4 to F		Ditto: Water temp 30°C or above	
MFT Board	S1	#8	OFF	Continuous self-test (for factory use): Off	o
			ON	Ditto: On	
		#1 to #7			Unused

Board	Switch Setting			Function		
MIF Board	S1	#1	OFF	IEC/NMEA Format, Baud rate: 4800bps (Related switch: S1-#8, S4-#7 and S1-#3)	For Port1 J16	
			ON	CIF Format, Baud rate: 4800bps		
		#2	OFF	-		
			ON	-		
		#3	OFF	NMEA ver1.5		
			ON	NMEA ver2.0		
		#4	OFF	Logpulse out at forward and backward		
			ON	Logpulse out at forward only	●	
		#5	Same as #1 (Related switch: S3-#8, S4-#8 and S1-#7)			For Port2 J17
		#6	-			
		#7	Same as #3			
		#8	OFF	Port 1 IEC: Effective when S1-#1 is OFF (Related switch: S4-#7)		●
			ON	Port 1 NMEA: Effective when S1-#1 is OFF (Related switch: S4-#7)		

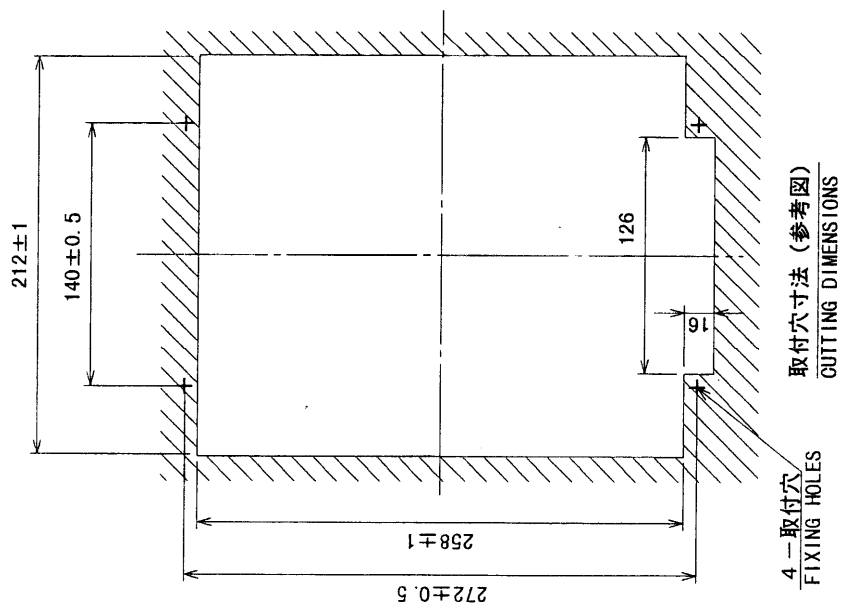
Board	Switch Setting			Function	Factory Setting
MIF Board	S4	#1	#2	Ship's speed for distance run pulse selection	
		OFF	OFF	Speed over-the-ground & speed through-water & speed fed from nav sensor	TM
		OFF	ON	Speed over-the-ground & speed through-water	
		ON	-	Speed over-the-ground	
		#3 to #6		Unused	
		#7	OFF	Port 1: NMEA Ver 1.5 or 2.0 (Related switch: S1-#3.)	
			ON	Port 1: NMEA Ver. 3.0 (S1-#8: ON) Port 1: IEC 61162-1 Ed2 (S1-#8: OFF)	●
		#8	OFF	Port 2: NMEA Ver 1.5 or 2.0 (Related switch: S1-#7.)	
			ON	Port 2: NMEA Ver. 3.0 (S3-#8: ON) Port 2: IEC 61162-1 Ed2 (S3-#8: OFF)	●
	S3	#8	OFF	Port 2 IEC: Effective when S1-#5 is OFF (Related switch: S4-#8)	●
			ON	Port 2 NMEA: Effective when S1-#5 is OFF (Related switch: S4-#8)	

Setting of CIF/NMEA(1) and CIF/NMEA(2) ports

You can choose output data format among IEC, NMEA and CIF.

Setting	Port1 Select output format for CIF, IEC or NMEA.			
	CIF/IEC(NMEA)	IEC/NMEA	IEC(NEMA) Ver	IEC(NMEA) Ver
	S1-#1	S1-#8	S4-#7	S1-#3
CIF	ON	-	-	-
IEC61162-1 Ed2	OFF	OFF	ON	-
NMEA Ver 3.0	OFF	ON	ON	-
NMEA Ver 2.0	OFF	ON	OFF	ON
NMEA Ver 1.5	OFF	ON	OFF	OFF

Setting	Port2 Select output format for CIF, IEC or NMEA.			
	CIF/IEC(NMEA)	IEC/NMEA	IEC(NEMA) Ver	IEC(NMEA) Ver
	S1-#5	S3-#8	S4-#8	S1-#7
CIF	ON	-	-	-
IEC61162-1 Ed2	OFF	OFF	ON	-
NMEA Ver 3.0	OFF	ON	ON	-
NMEA Ver 2.0	OFF	ON	OFF	ON
NMEA Ver 1.5	OFF	ON	OFF	OFF



4—取付穴 FIXING HOLES

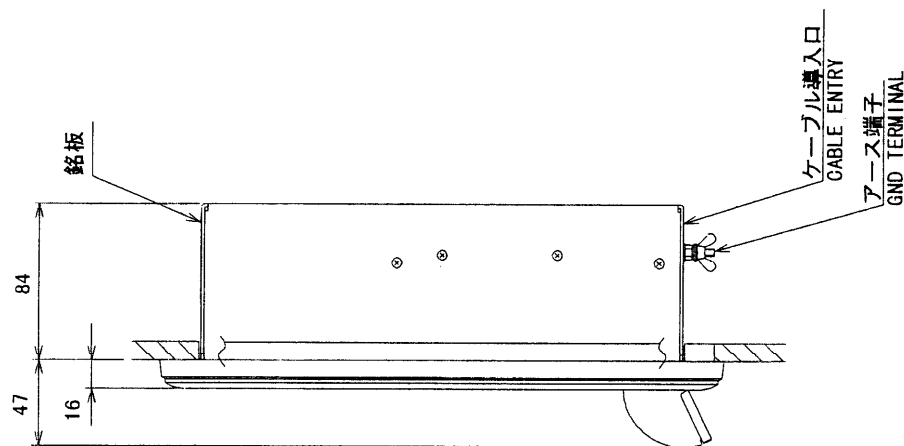


表 1 TABLE 1

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

記
注

- 1) 装備ケーブルはサービス時、本体を十分に引き出せるよう余裕を持たせること。
- 2) 取付用ネジは、トラスタッピングネジ 呼び径 5×16 を使用のこと。
- 3) 指定外の寸法公差は表 1 による。

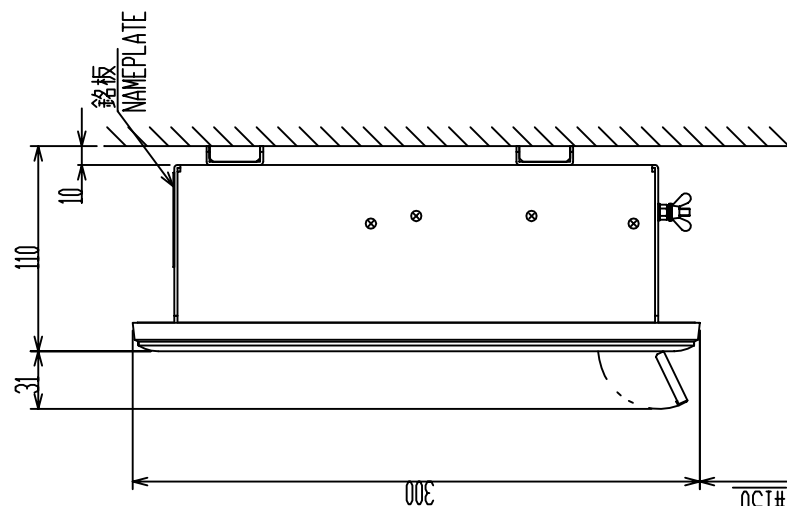
NOTE

1. KEEP SUFFICIENT CABLE LENGTH BEHIND THE UNIT FOR MAINTENANCE.
2. USE TAPPING SCREWS 5x16 FOR FIXING THE UNIT.
3. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS.

DRAWN June 26 '60 T. KAWASAKI		TITLE	DS-500
CHECKED June 26 '60 Y. Kawanishi		名称	主指示器（埋込装備）
APPROVED June 26 '60 Y. Kawanishi	DS-50		外寸図
SCALE 1/4	MASS ±10% 4.4 kg	NAME	DISPLAY UNIT (FLUSH MOUNT)
DWG. No.	G7241-G01-D		OUTLINE DRAWING
			66-0322-1000-G3

FURLUNO ELECTRIC CO., LTD.

公差(mm)	公差(mm)
±1.5	±1.5
±2.5	±2.5
±3	±3



注記

- 1) 装備ケージはサービス時、本体を十分に引き出せるよう余裕を持たせること。
- 2) 取付用ネジは、M10ボルトまたはコーチボルト呼び径9を使用のこと。
- 3) 指定外の寸法公差は表 1 による。
- 4) 井：推奨する最小サービス空間寸法。

NOTE

1. KEEP SUFFICIENT CABLE LENGTH BEHIND THE UNIT FOR MAINTENANCE.
2. USE M10 BOLTS OR COACH BOLTS Ø9 FOR FIXING THE UNIT.
3. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS.
4. #. RECOMMENDED SERVICE CLEARANCE.

DRAWN	Mar. 24 '03	T. YAMASAKI			TITLE	DS-500
CHECKED	Mar. 24 '03	Y. KIMURA			仕様	主指示器（壁掛装備）
APPROVED	Mar. 27 '03	Y. Kimura				外寸図
SCALE	1/4	MASS $\pm 10\%$	4.7	kg	NAME	DISPLAY UNIT (BULKHEAD MOUNT)
DWG No.	C7241-G02-E		66-022-1100-G1		OUTLINE DRAWING	

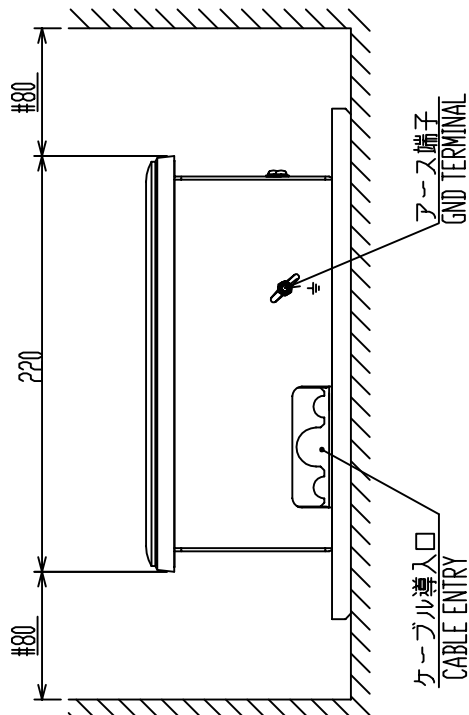
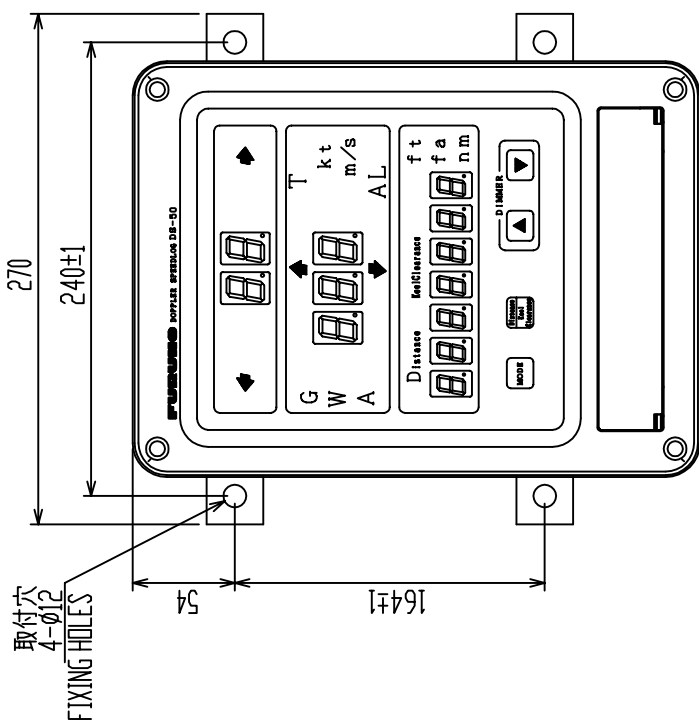
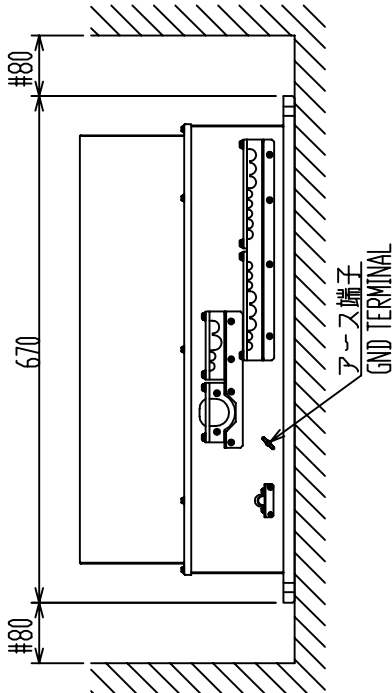
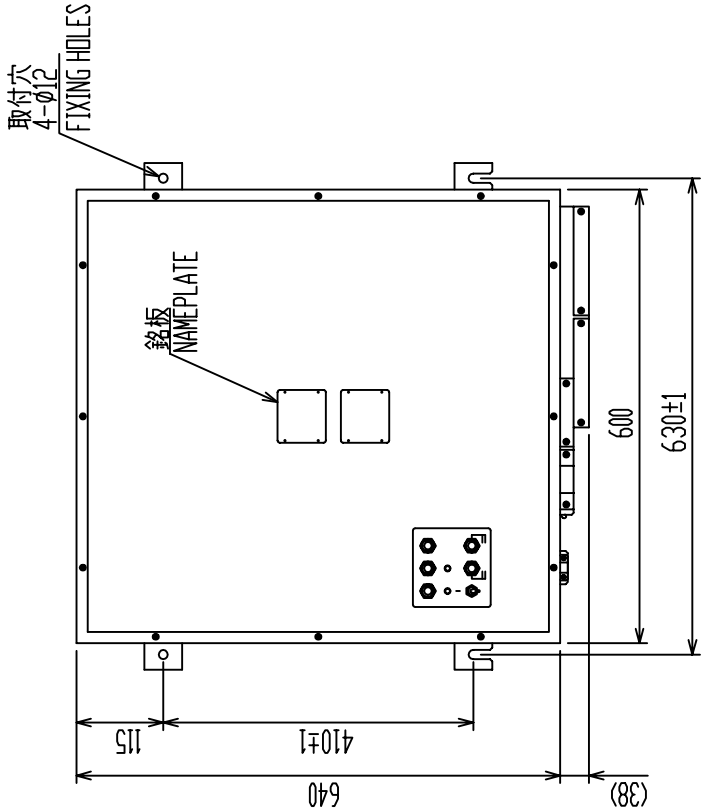
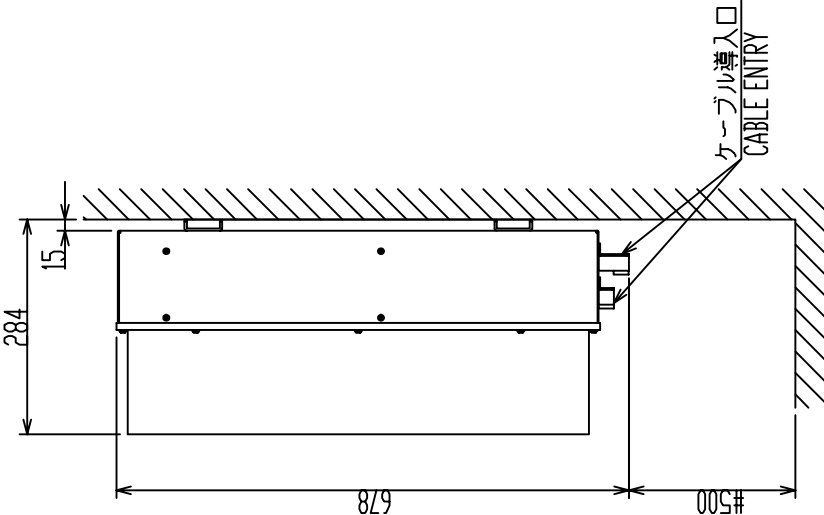


表 1 TABLE 1

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

表 2 TABLE 2

型式 TYPE	質量(kg±10%) MASS
DS-510	38.5
DS-511	36.7



注 記 1) 取付用ネジはM10ボルトまたはコーチボルト呼び径9を使用のこと。

2) 印寸法は最小サービス空間寸法とする。

3) 指定なき寸法公差は表 1 による。

4) 装備ケーブルの端末処理は装備要領書参照のこと。

1. USE M10 BOLTS OR COACH BOLTS 9 FOR FIXING THE UNIT.

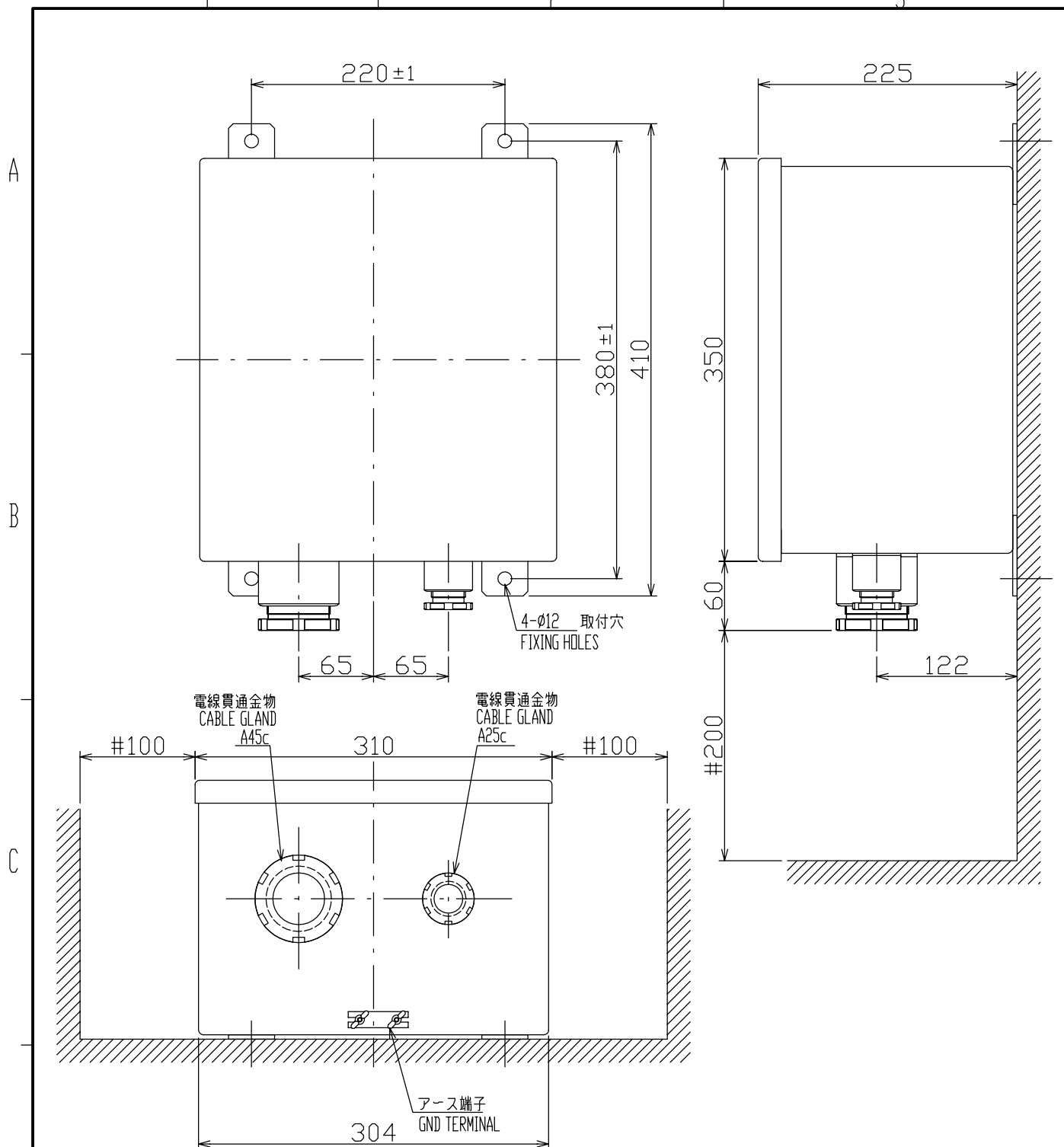
2. # RECOMMENDED SERVICE CLEARANCE.

3. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS.

4. REFER TO INSTALLATION MANUAL FOR FABRICATION OF CABLE ENDS.

NOTE

DRAWN	Mar. 24 '03	T. YAMASAKI	TITLE	DS-510/511
CHECKED	Mar. 24 '03	Y. KITAJIMA	名 称	演算部
APPROVED	Mar. 27 '03	Y. KITAJIMA	DS-50	外寸図
SCALE	1/10	MASS 表 2 参照 SEE TABLE 2	NAME	PROCESSOR UNIT
DWG. NO.	C7241-G03-E	66-022-2000-G2		OUTLINE DRAWING



注記

- 1) 指定なき寸法公差は表 1 による。
2) #印寸法は最小サービス空間寸法とする。

NOTE

- NOTE
1. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS WHICH IS NOT SPECIFIED.
2. #: MINIMUM SERVICE CLEARANCE.

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 Feb. 10 '04 T.YAMASAKI			TITLE DS-520
CHECKED Feb. 10 '04 T.TAKENO			名称 送受信器
APPROVED Feb. 12' 04 H.HAYASHI	DS-50		外寸図
SCALE 1/5	MASS 14.5 ±10% kg		NAME TRANSCEIVER
DWG.No. C7241-G08-F	66-022-3000-G0		OUTLINE DRAWING

A

B

C

D

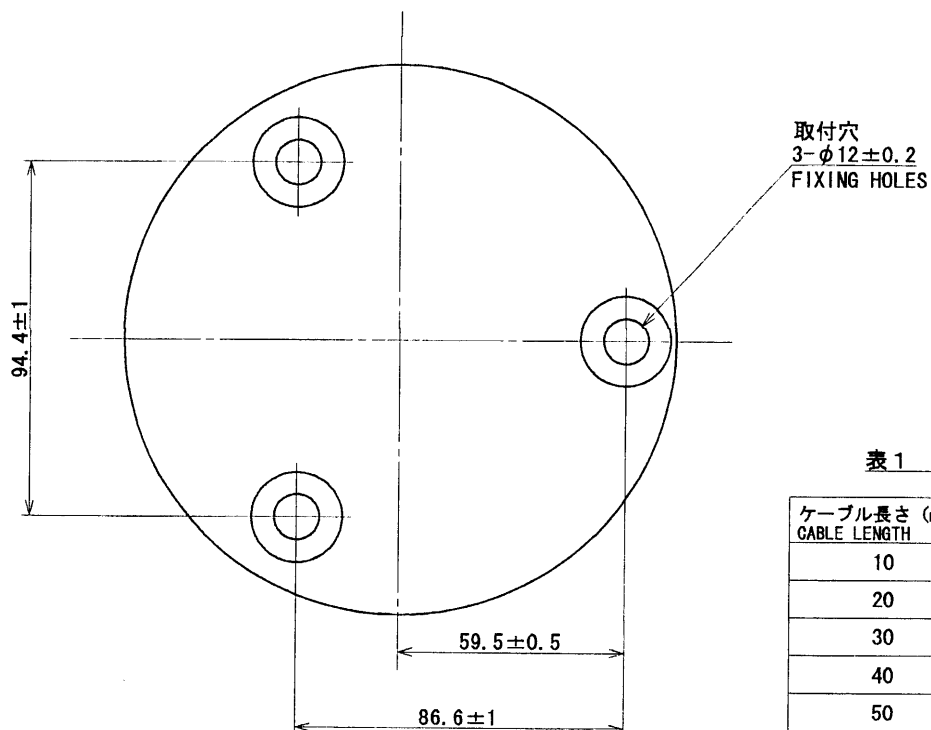
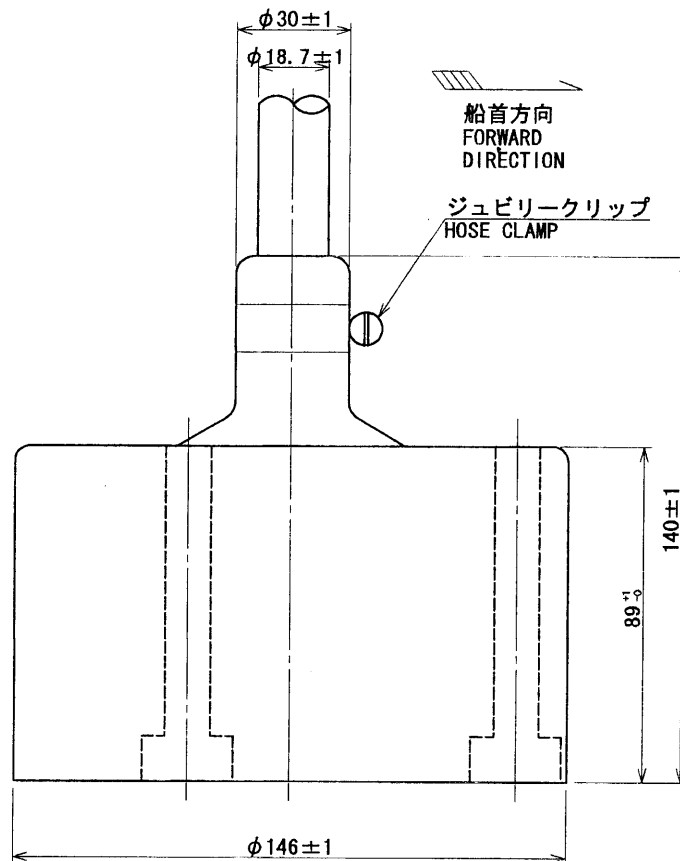


表 1 TABLE 1

ケーブル長さ (m) CABLE LENGTH	質量 (kg) MASS
10	7.6 ± 1
20	12.6 ± 2
30	17.6 ± 2
40	22.6 ± 3
50	27.6 ± 3

DRAWN Nov. 26 '99 T. YAMASAKI		TITLE DS-530	
CHECKED Nov. 26 '99 K. Kusunoki		名称 送受波器	
APPROVED Nov. 26 '99 K. Kusunoki		外寸図	
SCALE 1/2	MASS TABLE 1	NAME TRANSDUCER	
DWG. No. C7241-G04- E		OUTLINE DRAWING	
66-022-6000-G2			

注記

1. 船底タンク板厚は標準25mmです。
2. 船底タンク材質はKSTPG370です。その化学成分は表2の通りです。
3. 船底タンクを船底に溶接する際、船首船尾の方向の据付の誤差は $\pm 1^{\circ}$ 以内。としてください。また水平方向の取付はタンクのフランジが吃水線と ± 1 以内の誤差で平行になるようにしてください。
4. 寸法公差は表1の通りです。
5. 送受波器面にはマリンスター20を塗布しています。その他の船底塗料を塗布しないでください。

NOTES

1. NOMINAL THICKNESS OF THE CASING IS 25 mm.
2. CHEMICAL COMPOSITION OF THE CASING MATERIAL KSTPG370 IS AS IN TABLE 2.
3. ORIENT FORE MARK OF THE CASING IN PARALLEL WITH SHIP'S FORE-AFT LINE AND THE TOP OF THE CASING IN PARALLEL WITH WATER-LINE WITHIN AN ACCURACY OF 1 DEGREE OR BETTER.
4. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS.
5. THE TRANSDUCER FACE IS COATED WITH MARINESTAR20, DO NOT APPLY OTHER TYPE OF PAINT.

表2 TABLE 2

化学成分 CHEMICAL COMPOSITION	C	Si	Mn	P	S	Cr	Mo
含有量 (%) CONTENT	0.25以下 OR LESS	0.35以下 OR LESS	0.30-0.90	0.040以下 OR LESS	0.040以下 OR LESS	なし NIL	なし NIL

8	平座金 FLAT WASHER	SUS316L	3	M10			
7	ばね座金 SPRING WASHER	SUS316L	3	M10			
6	六角ボルト HEX. BOLT	SUS316L	3	M10×120			
5	縛付グラウンド CABLE GLAND	SUS316L	1	66-017-1404			
4	座金 WASHER	SUS316L	1	66-017-1405			
3	V/Aパッキン RUBBER GASKET	CR77A	1	VA-25			
2	タンク本体 CASTING DACROTIZING TREATMENT	KSTPG370	1	66-022-7001			船級認定材 CLASSIFICATION SOCIETY APPROVED MATERIAL
1	送波器 TRANSDUCER		1	DS-530			

表1 TABLE 1

寸法範囲 (mm) DIMENSIONS	公差 (mm) TOLERANCE
0 < L ≤ 50	±1
50 < L ≤ 100	±2
100 < L ≤ 500	±3

DRAWN	Apr. 15 '04	E. MIYOSI	TITLE	DS-531-B
CHECKED		TAKAHASHI, T	名称	送受波器タンク
APPROVED		Y. Hatai	外寸図	
SCALE	1/5	質量 45 ±10% ①⑥⑦⑧を除く MASS WITHOUT ①⑥⑦⑧	NAME	HULL BOTTOM UNIT
DWG No.	C7241-G05-F	66-022-700G-03		OUTLINE DRAWING

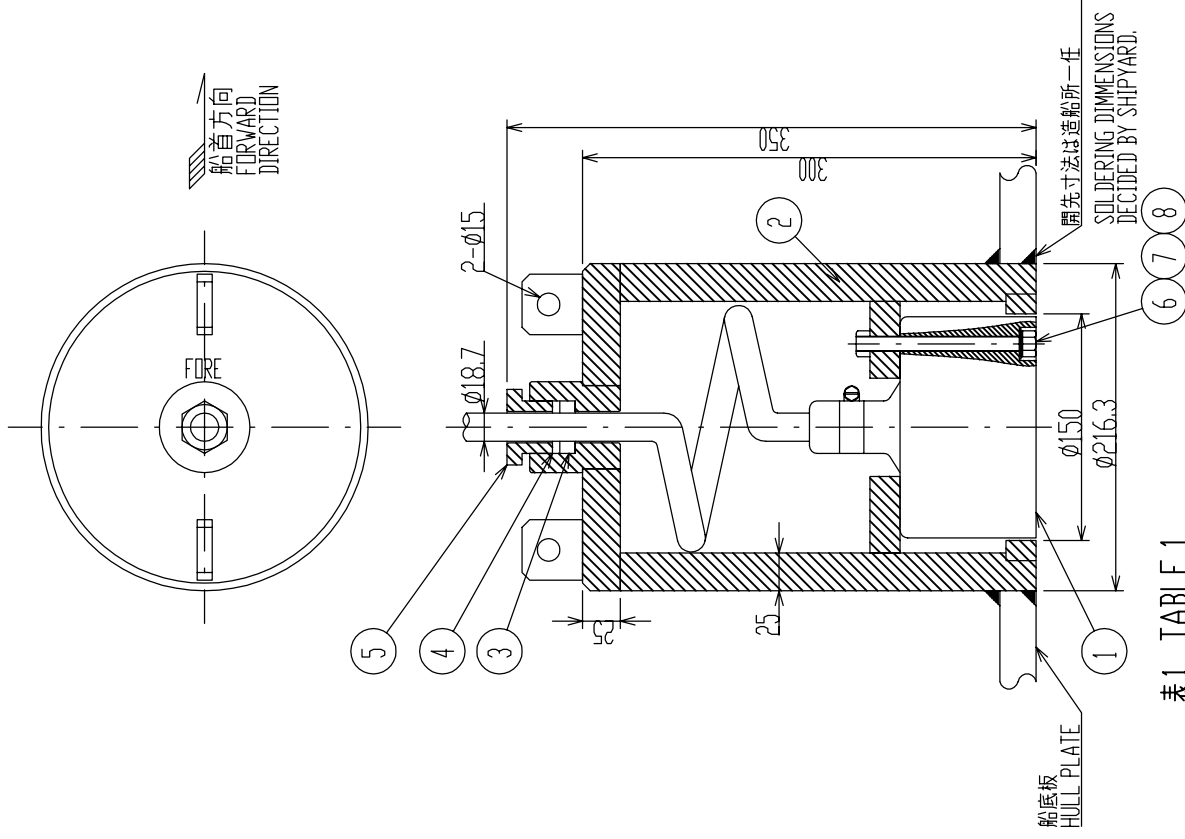
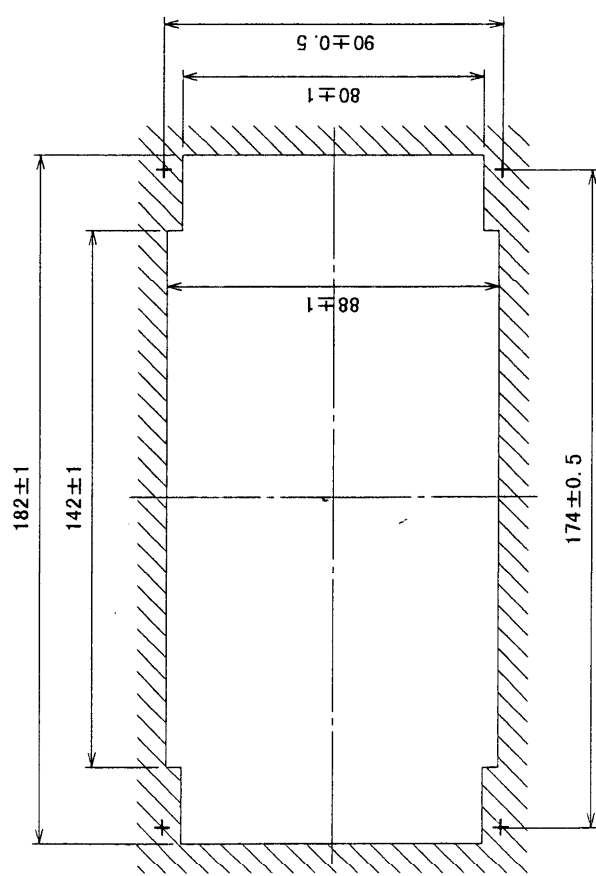
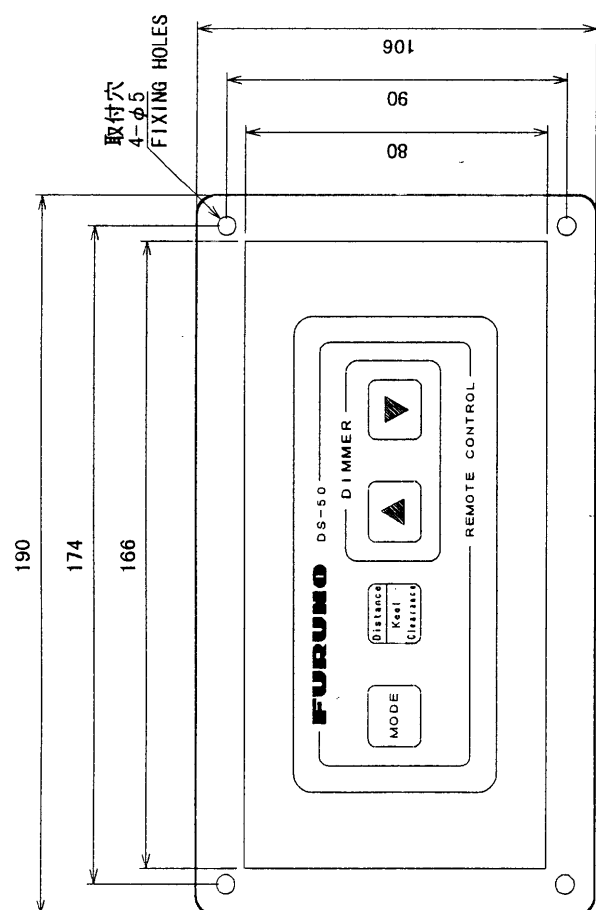
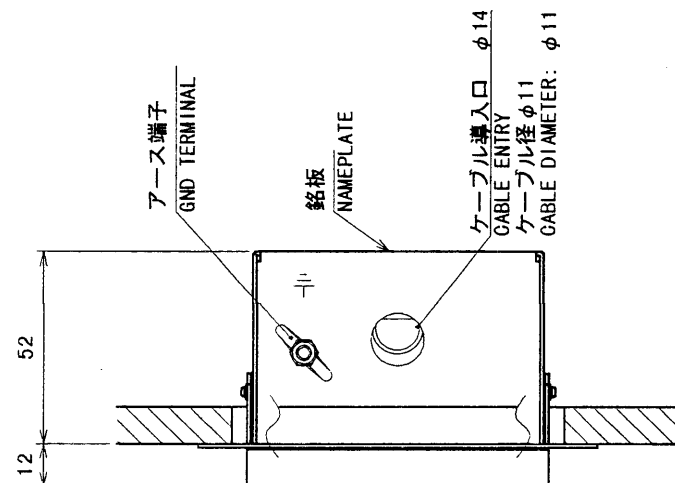


表 1 TABLE 1

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) 装備ケーブルはサービス時、本体を十分に引き出せるよう余裕を持たせること。
 - 2) 取付用ネジは、トラスタップピンネジ呼び径 4 × 1.6 を使用のこと。
 - 3) 指定外の寸法公差は表 1 による。

- NOTE
1. KEEP SUFFICIENT CABLE LENGTH BEHIND THE UNIT FOR MAINTENANCE.
 2. USE TAPPING SCREWS 4x1.6 FOR FIXING THE UNIT.
 3. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS.

DRAWN	June 26 '00 T. TAKAHASHI	TITLE	DS-501
CHECKED	June 26 '00 Y. K. K.	名称	操作箱
APPROVED	June 26 '00 Y. K. K.	外寸図	
SCALE	1/2	NAME	OPERATION PANEL
MASS	±10% 0.6 kg		
DWG. No.	G7241-G07- D		OUTLINE DRAWING
	66-022-4000-G2		

取付寸法 (参考図)
MOUNTING DIMENSIONS



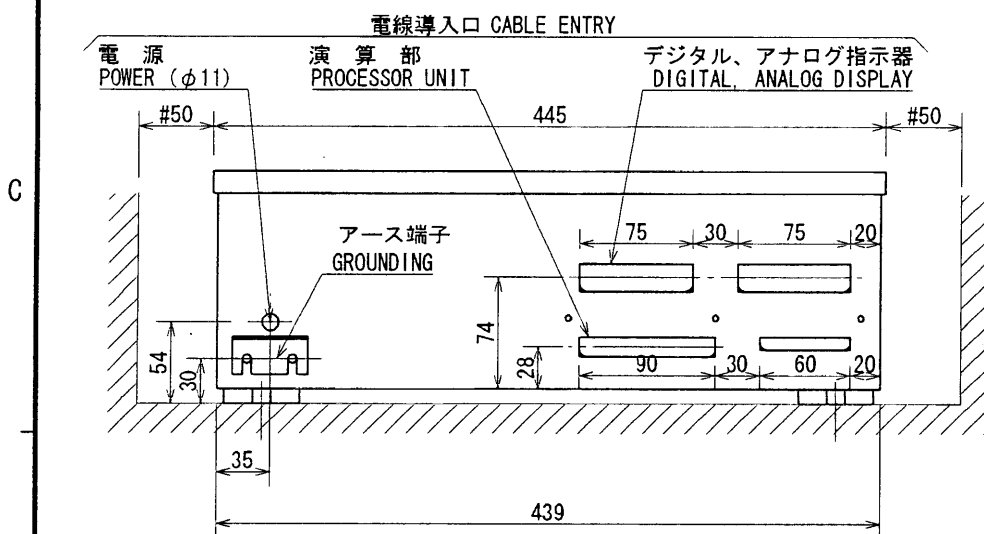
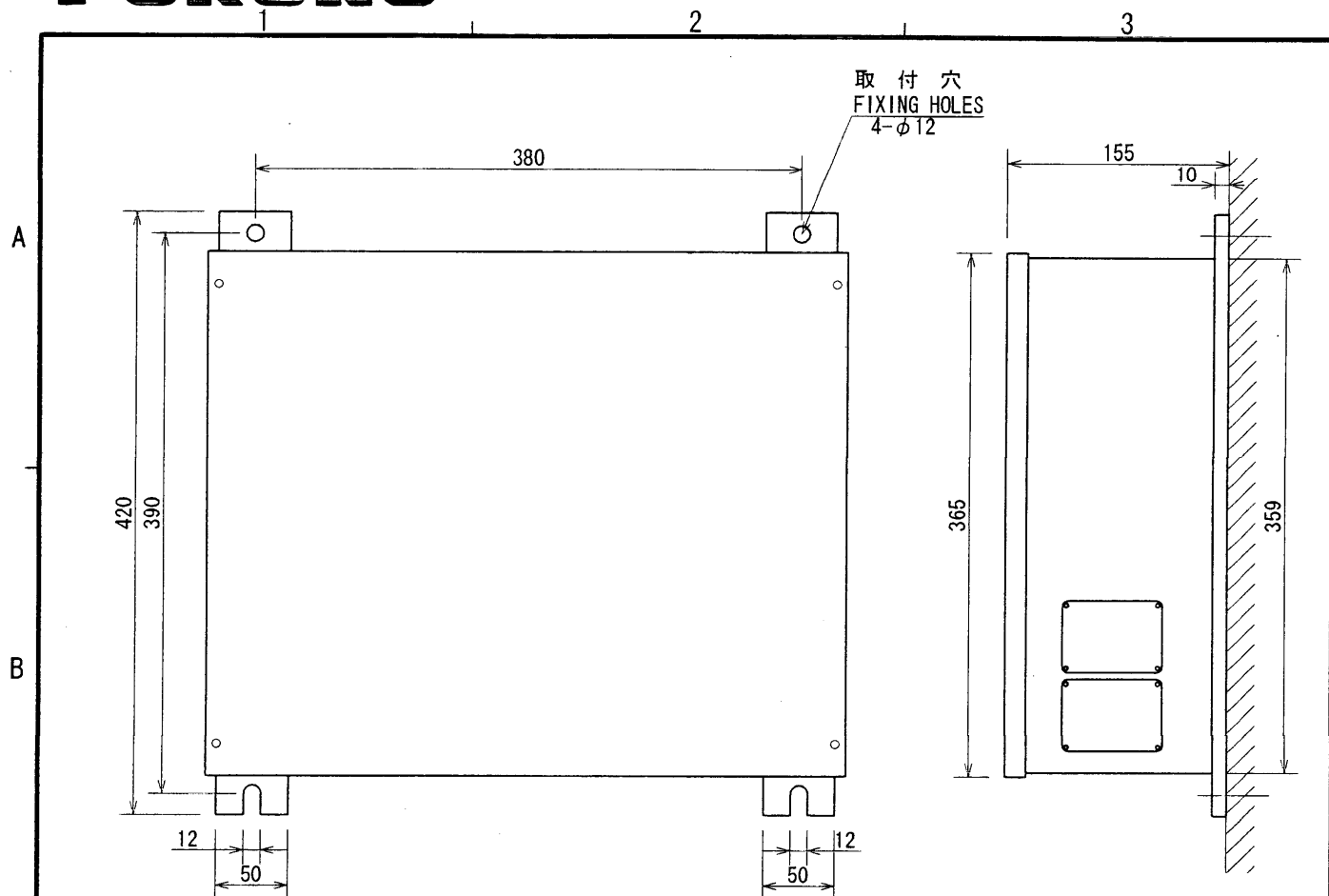


表 1 TABLE 1

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
$500 < L \leq 1000$	± 4

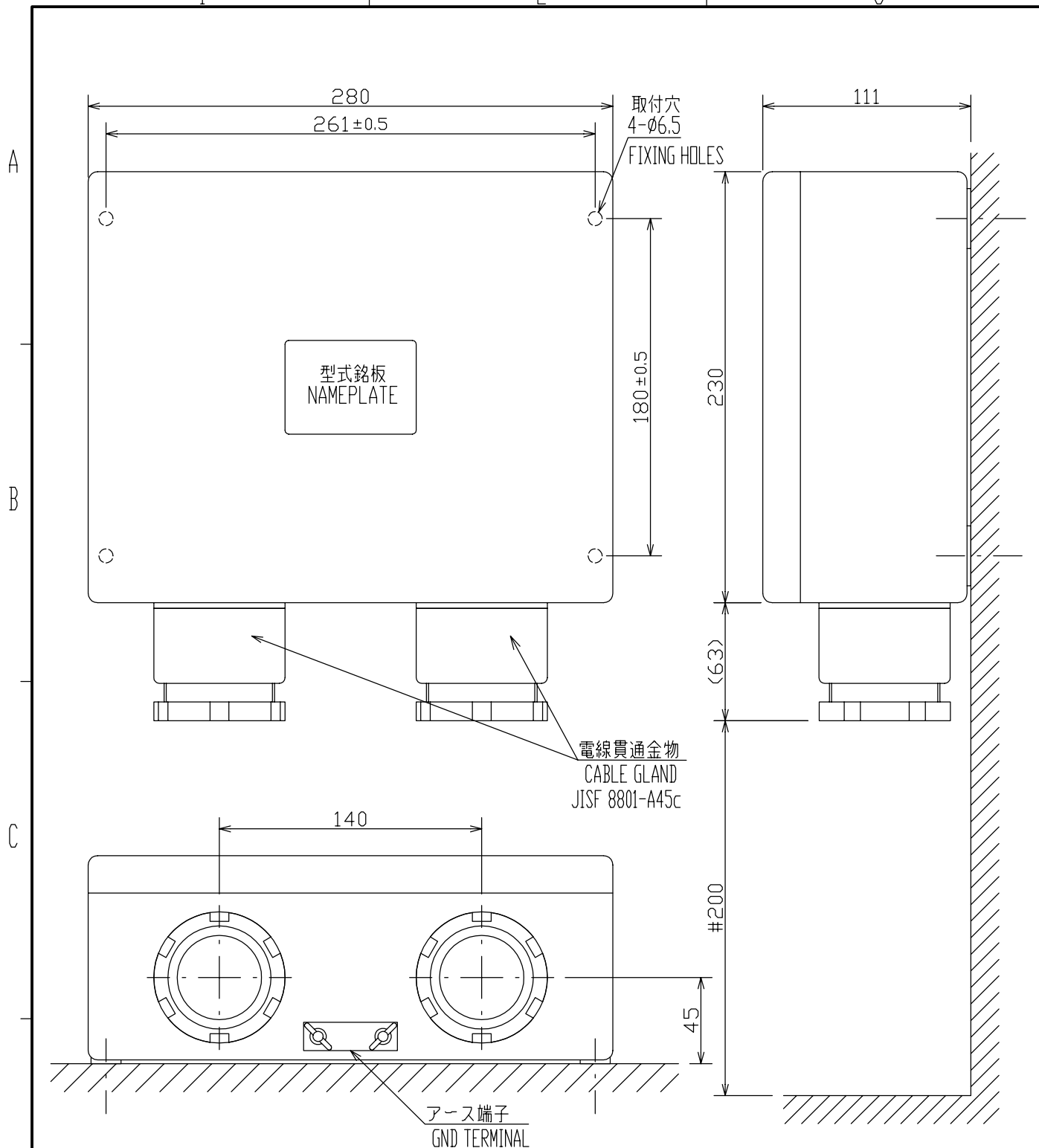
注記

- 1) 指定なき寸法公差は表 1 による。
- 2) #: 推奨する最小サービス空間寸法。

NOTE

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

DRAWN July 26 '00 T. YAMASAKI	TITLE DS-370
CHECKED July 27 '00 Y. Kuni	名称 分配器
APPROVED July 27 '00 Y. Kuni	外 寸 図
SCALE 1/5 MASS 19 kg	NAME DISTRIBUTION UNIT
DWG. No. C7236-G10-G	OUTLINE DRAWING



注記

- 1) 指定なき寸法公差は表 1 による。
- 2) #印寸法は最小サービス空間寸法とする。

NOTE

1. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS WHICH IS NOT SPECIFIED.
2. #: MINIMUM SERVICE CLEARANCE.

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

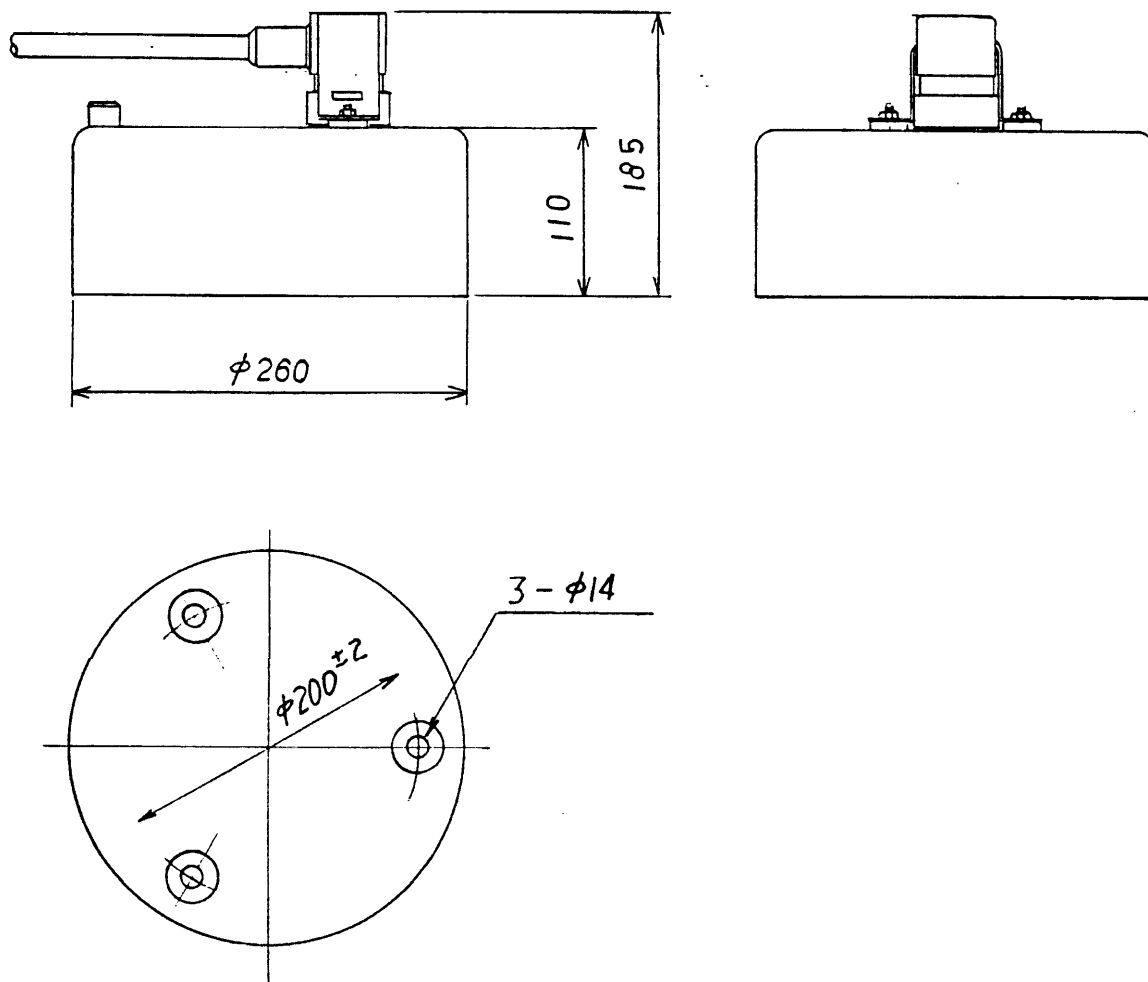
DRAWN Feb. 9 '04 T.YAMASAKI		TITLE DS-360
CHECKED Feb. 9 '04 T.TAKENO		名称 接続箱
APPROVED Feb.12'04 H.HAYASHI		外寸図
SCALE 1/3	MASS 5.9 $\pm 10\%$ kg	NAME JUNCTION BOX
DWG.No. C7236-G06-F		OUTLINE DRAWING

A

B

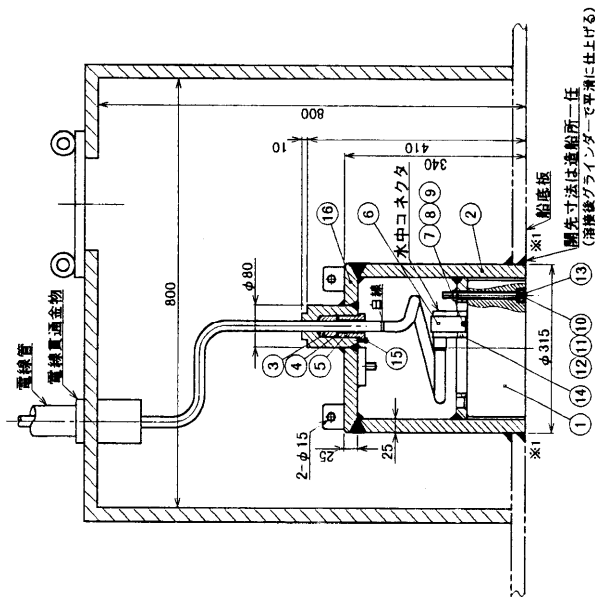
C

D



品番 ITEM	品名 NAME	材質 MATERIAL	数量 Q'TY	図番 DWG.NO.	摘要 REMARKS
承認 APPROVED	三角法 THIRD ANGLE PROJECTION	名称 TITLE DS-330 送受波器 TRANSDUCER			
検 CHECKED	尺 SCALE				
製 DRAWN	重量 WEIGHT	図番 DWG.NO. C 7 2 3 6 - G 1 4 - A			

船底部装備要領



1) タンクの材質・板厚の確認

工事の前に、該当する船級協会指定の材料で製作されているか、また船底板と同等以上の厚みがあるか確認してください。弊社船底タンク標準品の材質は、日本船級協会承認のKSTPG370（旧規格名KSTPG38, KST138）、板厚は25mmです。

2) 装備場所の選定

装備場所は装備要領書記載の注意事項を参照し決定してください。特に気泡が船底に回り込みやすい船は、あらかじめ弊社営業員に相談してください。

3) 水密のタンク収納室の設置

送受波器は水密ゴムモールド品のため特に船級協会規則では規定されていませんが、水密のタンク収納室の設置を推奨します。上図に参考寸法を示します。実際寸法は造船所に一任します。

送受波器は船外から水中でも取り外しできる構造になっていますから、保守スペースが十分確保できないときは、それでもかまいません。

4) 船底タンクの溶接方法

a) 船首方向

タンクに船首／船尾の刻印がありますので、船首方向を合わせてください。

b) 取付精度

演算装置で角度補正する方式ですので、下記の方法で工事でください。
● 船首・船尾方向：船と船底タンクの船首方向を1°以内の誤差で合わせてください。

● 水深度：標準航行時でできるだけ水平になるようにしてください。
● 下架後タンク上面の水深度を水準器で測定してください。

測定機は送受波器の貼りマークに注意してください。

c) 船底タンク②溶接時は、送受波器①、ケーブル、ケーブルグランド⑤、防水ゴム③を必ず取り外してから溶接してください。

d) タンクと船底の溶接方法は造船所一任とします。またタンク補強リブが必要な場合は造船所にて溶接してください。

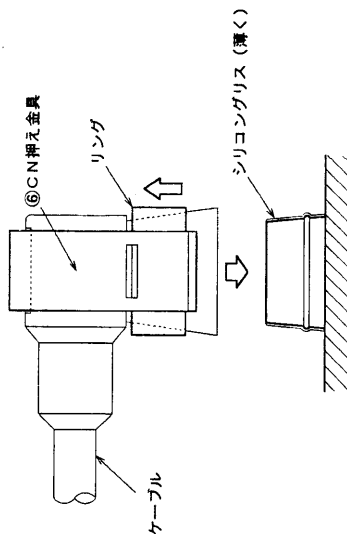
e) タンクと船底の溶接部（図中※1）の肉盛はグラインダーで取り去り、平面に仕上げてください。

5) 送受波器ケーブルの固定／接続

a) 送受波器ケーブルはケーブル上の白線マークまで船底タンク内に取出し、ケーブルグランド⑤を支給の締付ハンドルで締め付けてください。

b) ケーブルグランド締付け後、緩み止め用六角ボルト⑩を取付けてください。
c) 水中コネクタ接続の際はゴミ等が付着していないことを確認してください。また送受波器側コネクタ（レセプタクル側）のテーパー部（図示）に、シリコングリスを薄く塗布してください。

d) 水中コネクタの接続はリングを上にした状態で当てるまで挿入し、CN押え金具⑥を六角ナット⑦で取付けてください。



6) 送受波器の固定

送受波器を船底タンク②に取付ける際には、ケーブルを振りながら送受波器を回転させる（約一回転）。送受波器の船首、船尾方向を確認して、六角ボルト⑩で取付け、ボルトキャップ⑨を被せてください。

7) ケーブルの敷設

タンクから送受信装置までのケーブルは電線管を使用し、内部に砂等を入れて振動しないようにしてください。
電線管は[SOP呼びB-2]を使用してください。

8) 塗装

タンクにはジンクリッチプライマー（中国塗料社製）を塗布しています。溶接後内外共に船体と同じ上塗り塗料を塗布してください。

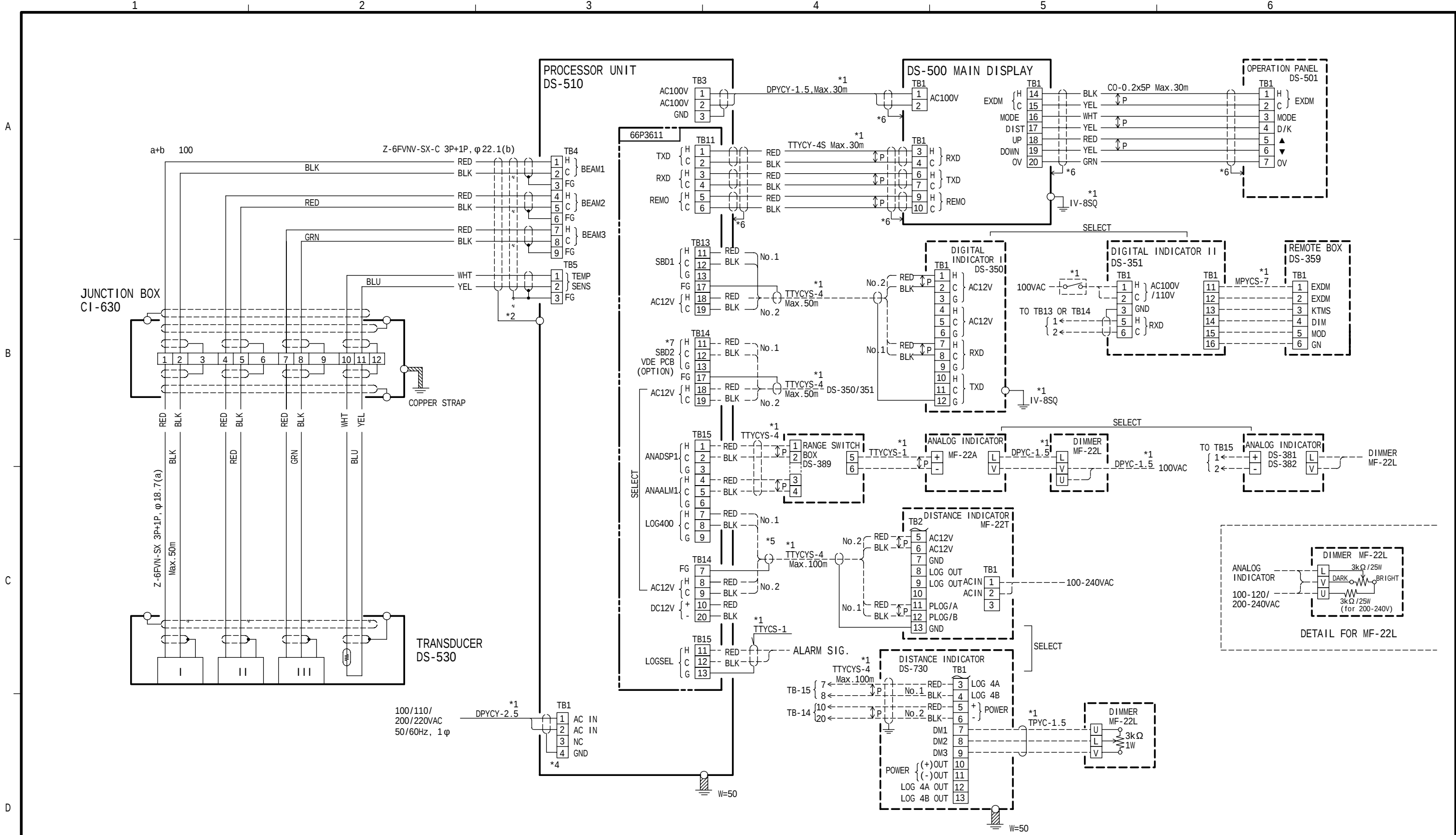
注記）送受波器面には防汚塗料マリンスター20を塗布してあります。これには船体用塗料を塗布しないでください。

9) 装備後のチェック

送受波器の端子の片端をはずして抵抗値を測定してください。測定にはデジタルテスターを推奨します。（メガー使用不可）

信号の種類	測定点	規格 (Ω)
ビーム1 (黒)	TB #1 (赤) - #2 (黒)	0.5~3.0
ビーム2 (赤)	TB #4 (赤) - #5 (黒)	0.5~3.0
ビーム3 (緑)	TB #7 (赤) - #8 (黒)	0.5~3.0
温度センサ1	TB #10 (黄) - #11 (白)	450~550
温度センサ2	TB #13 (青) - #14 (灰)	450~550

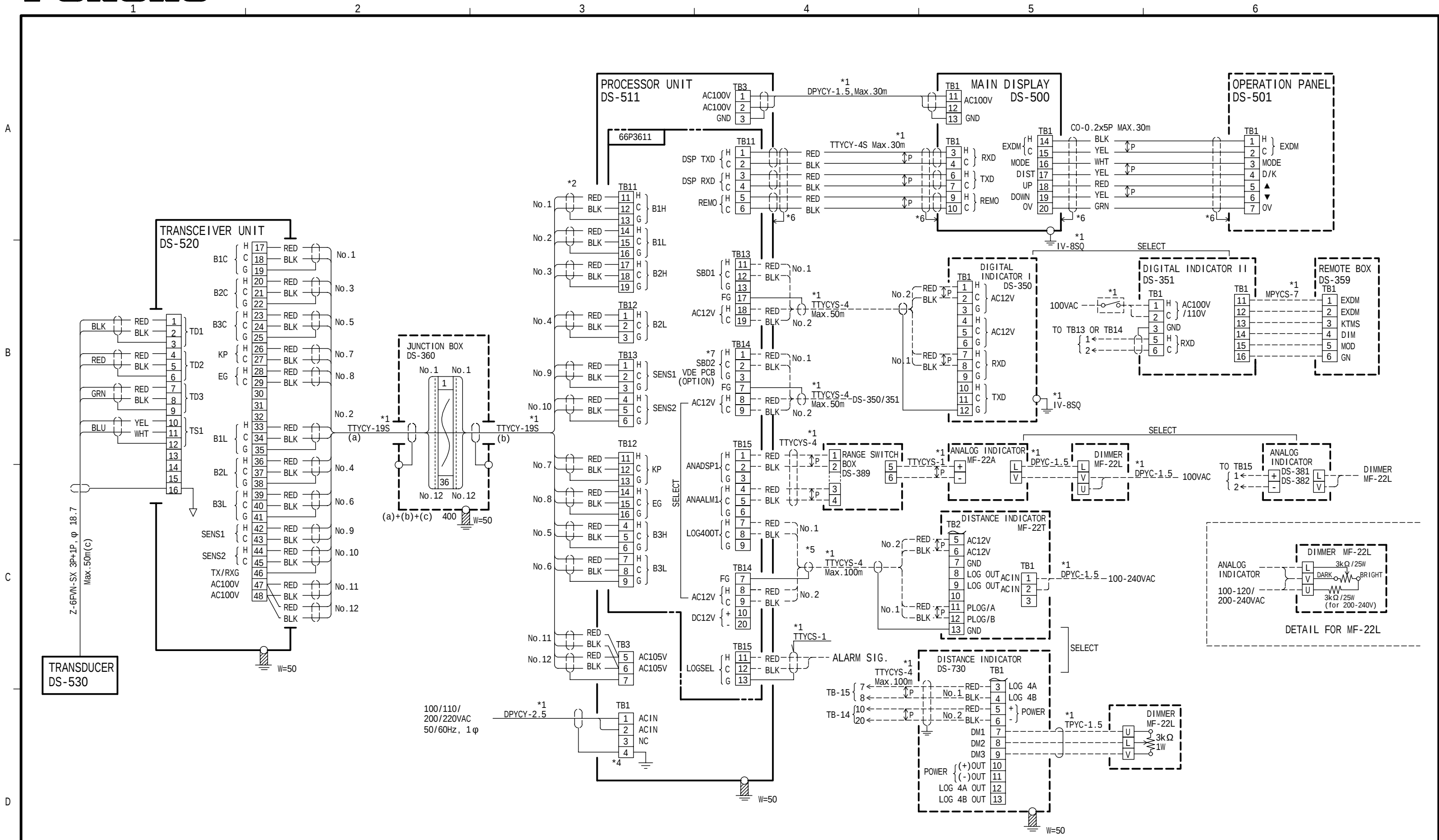
DRAWN	APR 13 2000	TAKASAKI	TITLE	DS-330/331
CHECKED	APR 13 2000	Y. K.	名称	船底部
APPROVED	APR 13 2000	S. K.	装備要領	
SCALE	1/100	kg	NAME	HULL UNIT
DWG No.	J7236-Y10-F		INSTALLATION PROCEDURE	



- NOTE
- *1. *: SHIPYARD SUPPLY
 - *2. CABLE ARMOR SHOULD BE CLAMPED TIGHTLY AFTER REMOVING PAINT FOR COMPLETE GROUNDING.
 - *3. ALL UNITS SHOULD BE GROUNDED TO SHIP'S BODY.
 - *4. CHANGE CONNECTION ON TRANSFORMER TAP ACCORDING TO SHIP'S MAINS.
 - *5. ONE OF MF-22T OR DS-730 CAN BE CONNECTED.
 - *6. GROUND THROUGH CABLE CLAMP.
 - *7. CURRENT SIGNAL OF SPEED DATA REQUIRES VAE PCB (OPTION).

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

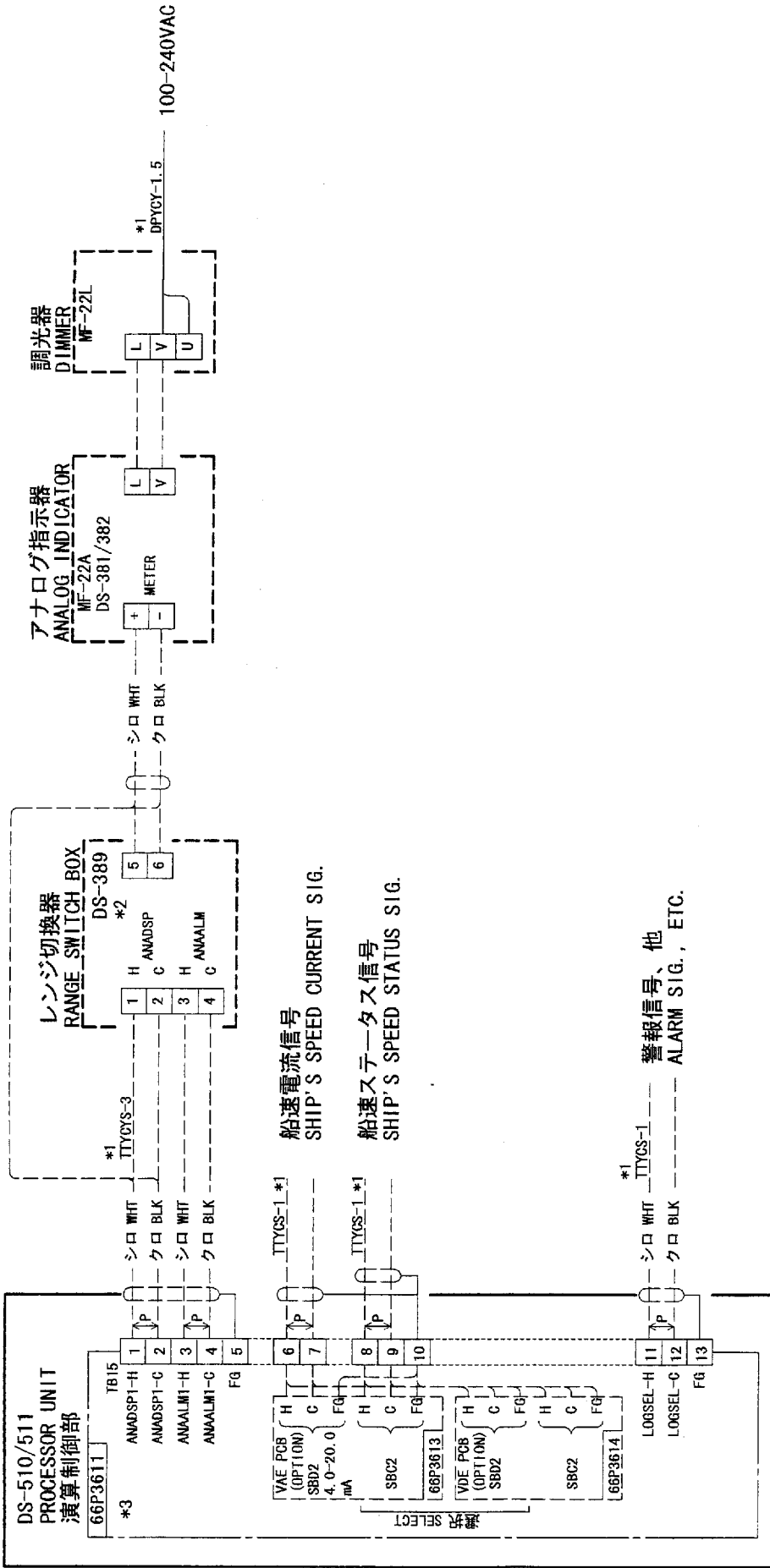
DRAWN	Mar. 17 '04 T.Shishido	TITLE	DS-50
CHECKED	Mar. 17 '04 T.Yamasaki	NAME	DOPPLER SPEED LOG (1/4)
APPROVED	Mar. 24 '04 H.Hayashi	REMARKS	INTERCONNECTION DIAGRAM
SCALE	MASS kg	APPLICABLE TO; (MODEL)	BLOCK NO.
DWG NO.	E7241-C02- H		66-022-0001-0



- NOTE
- *1. SHIPYARD SUPPLY
 - *2. CABLE ARMOR SHOULD BE CLAMPED TIGHTLY AFTER REMOVING PAINT FOR COMPLETE GROUNDING.
 - *3. ALL UNITS SHOULD BE GROUNDED TO SHIP'S BODY.
 - *4. CHANGE CONNECTION ON TRANSFORMER TAP ACCORDING TO SHIP'S MAINS.
 - *5. ONE OF MF-22T OR DS-730 CAN BE CONNECTED.
 - *6. GROUND THROUGH CABLE CLAMP.
 - *7. CURRENT SIGNAL OF SPEED DATA REQUIRES VAE PCB (OPTION).

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

DRAWN	Mar. 18 '04 T. Shishido	TITLE	DS-50
CHECKED	Mar. 18 '04 T. Yamasaki	NAME	DOPPLER SPEED LOG (2/4)
APPROVED	Mar. 24 '04 H. Hayashi		INTERCONNECTION DIAGRAM
SCALE	MASS kg	APPLICABLE TO; (MODEL)	BLOCK NO. REMARKS
DWG NO.	E7241-C03- H	66-022-0003-0	



注記

- *1) 造船所支給
- *2) レンジ切換器はMF-22Aの場合のみ必要。
- *3) 信号出力には内部設定変更が必要。

NOTE

- *1: SHIPYARD SUPPLY.
- *2. RANGE SWITCH BOX IS ONLY REQUIRED FOR MF-22A.
- *3. SIGNAL OUTPUT REQUIRES MODIFICATION OF PCB SETTING.

DRAWN	Oct. 19 '01	I. YAMASAKI	TITLE	DS-50
CHECKED	08/22/01	Y. K.	名称	ドップラスピードログ (4/4)
APPROVED	08/22/01	Y. K.	相互結線図	
SCALE	MASS	kg	NAME	DOPPLER SPEED LOG (4/4)
DWG. No.	C7241-C05- C		INTERCONNECTION DIAGRAM	
	66-022-0004- 0			