FURUNO

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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FURUNO ELECTRIC CO., LTD.

www.furuno.co.jp

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

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• FURUNO Authorized Distributor/Dealer

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(TATA) DS-50

000807570 11

⚠ SAFETY INSTRUCTIONS

"NOTIICE", "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 warnig 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:

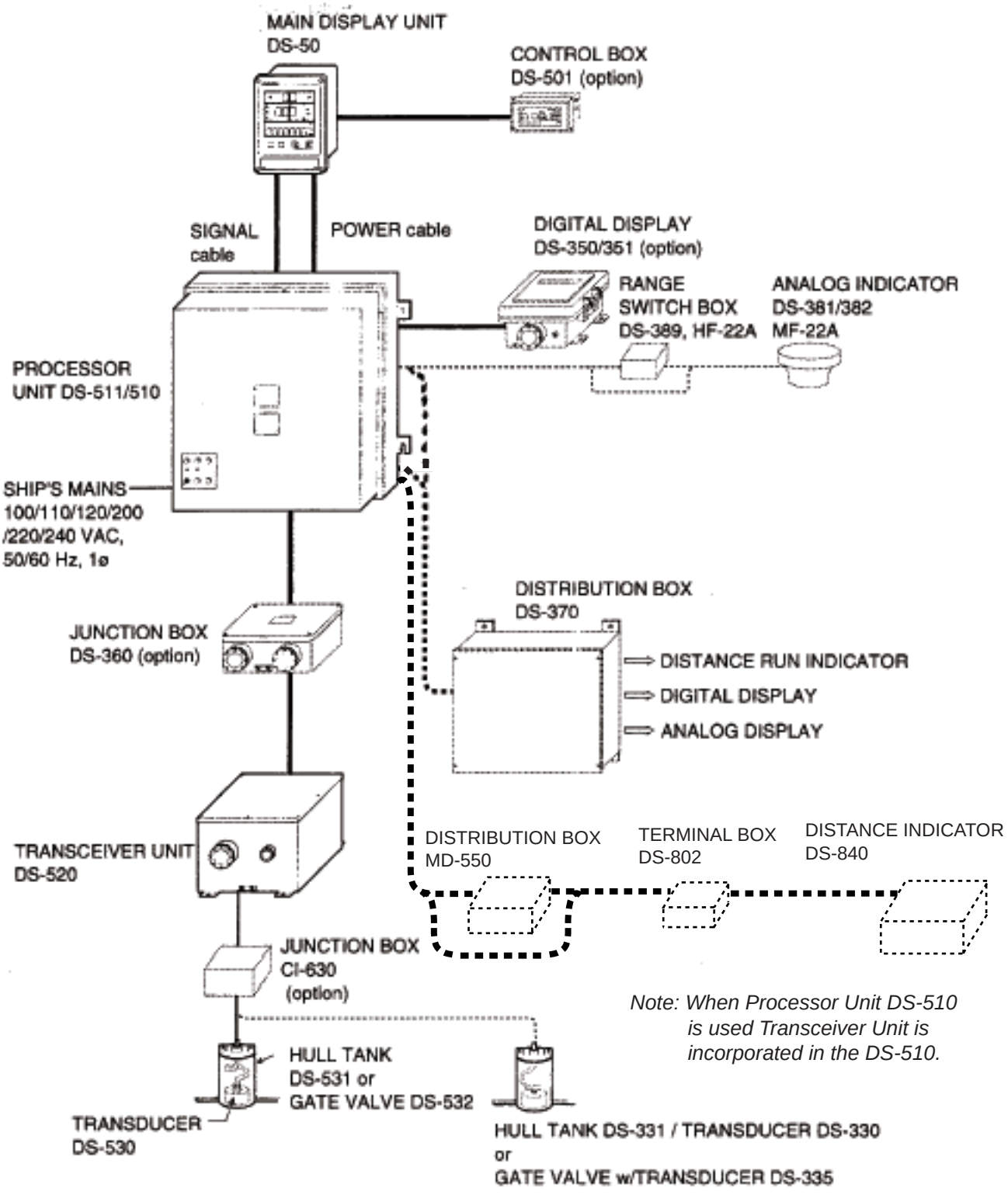
- Away from rain and water splash
- Out of direct sunlight
- Away from air conditionaer vents
- Moderate and stable in temperature and humidity

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

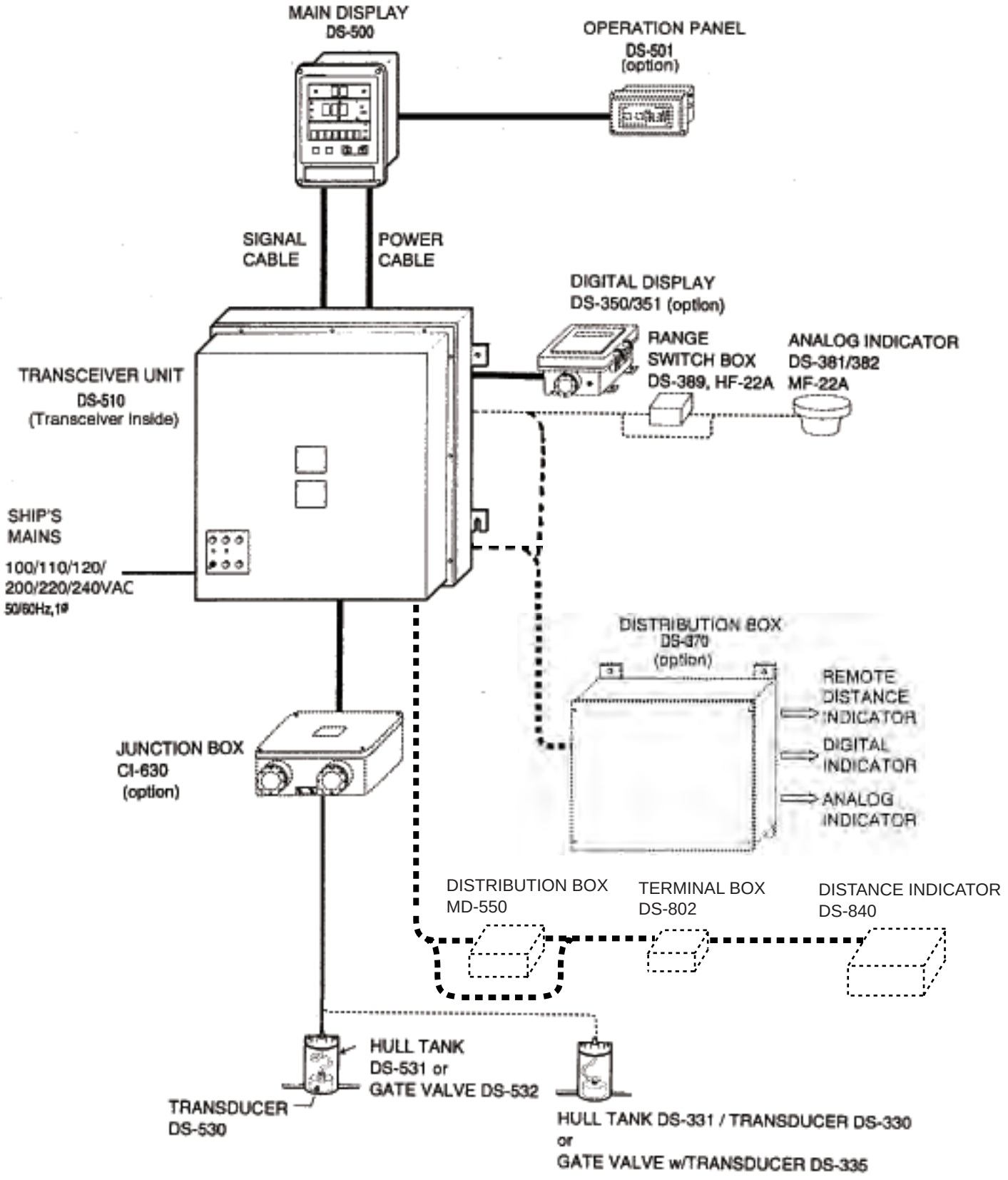
1. SYSTEM CONFIGURATION

Separate processor and transceiver units



Note: When Processor Unit DS-510 is used Transceiver Unit is incorporated in the DS-510.

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	Bulkhead mount/Deck mount, DS-510 incorporates DS-520
3	Transceiver Unit	DS-520	1	Bulkhead 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 Materials	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		Including installation materials CP66-00703: 006-927-330
		DS-360	000-027-994	
6	Distribution Box	DS-370		Bulkhead mount/Deck mount
7	Digital Indicator	DS-350		Waterproof construction
		DS-351		Indoor use
8	Analog Indicator	DS-381		Flush mount
		DS-382		Bulkhead mount
		MF-22A		
		FE-90		Flush mount
		FL-90		Flush mount
9	Range Switch Box	DS-389		
		MF-22R		

Optional Supply

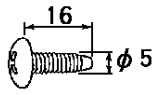
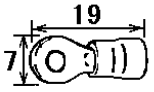
No.	Name	Type	Code No.	Remarks
11	Dimmer	MF-22L		
12	4 Paris Cable	Z-6FVNV-SX-C 3P+1P *20m*	000-146-089	
		Z-6FVNV-SX-C 3P+1P *30m*	000-146-090	
		Z-6FVNV-SX-C 3P+1P *100m*	000-146-091	
13	VAE Board	66P3613	002-886-210	For DS-510/511. Current output
14	VDE Board	66P3614	002-886-220	For DS-510/511. To 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		
17	DISTANCE INDICATOR	DS-840	000-029-062	
18	Alarm Unit	AU-12	-	

FURUNO

CODE NO.	002-885-350-00	65AC-X-9401 -2
TYPE	CP65-00701	1/1

工事材料表

INSTALLATION MATERIALS

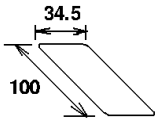
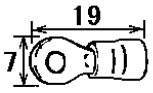
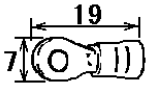
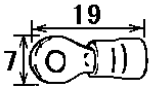
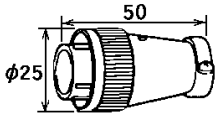
番号 NO.	名称 NAME	略図 OUTLINE	型名／規格 DESCRIPTIONS		数量 Q'TY	用途／備考 REMARKS
1	+ﾄﾗｽﾀｯﾋﾟﾝﾈｼﾞ 1ｼｭ SELF-TAPPING SCREW		5X16 SUS304 5X16 SUS304 1種		4	
			CODE NO.	000-162-607-10 000-805-494-00		
2	圧着端子 CRIMP-ON LUG		FV1.25-M3(LF)		18	
			CODE NO.	000-166-740-10		

FURUNO

CODE NO.	002-885-360-00	65AC-X-9407 -3
TYPE	CP65-00711	1/1

工事材料表

INSTALLATION MATERIALS

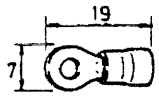
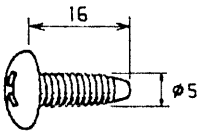
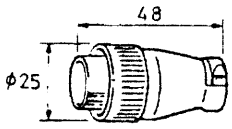
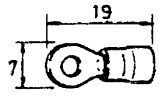
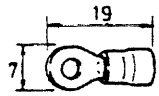
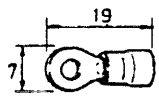
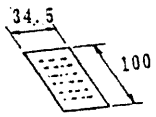
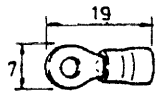
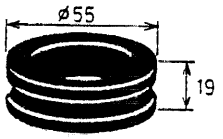
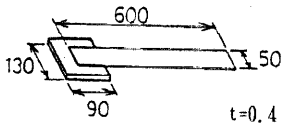
番号 NO.	名称 NAME	略図 OUTLINE	型名／規格 DESCRIPTIONS		数量 Q'TY	用途／備考 REMARKS
1	ﾊﾘﾏｰｸ TB5 STICKER		66-022-2102-1 ROHS 66-022-2102-1		1	
			CODE NO.	100-237-961-10 100-237-961-00		
2	圧着端子 CRIMP-ON LUG		FV1.25-M3(LF)		100	
			CODE NO.	000-166-740-10		
3	圧着端子 CRIMP-ON LUG		FV1.25-M4(LF) FV1.25-M4 ｱｶ		18	
			CODE NO.	000-166-741-10 000-536-715-00		
4	圧着端子 CRIMP-ON LUG		FV2-M4 FV2-M4		3	
			CODE NO.	000-157-229-10 000-536-716-00		
5	ｺﾈｸﾀ(SRCN) CONNECTOR(SRCN)		SRCN6A16-10P		2	
			CODE NO.	000-160-728-10		

FURUNO

CODE NO.	000-028-992	65AC-X-9402-1
TYPE	CP65-00710	

工事材料表 INSTALLATION MATERIALS

DS-50 トランプラストピートログ DOPPLER SPEEDLOG (DS-511用)

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

(略図の寸法は、参考値です。)

図番 DWG. NO. C7241-M02-C (1/1)

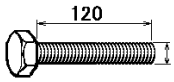
FURUNO ELECTRIC CO., LTD

FURUNO

CODE NO.	002-885-670-00	65AC-X-9405 -4
TYPE	CP65-00702	1/1

工事材料表

INSTALLATION MATERIALS

番号 NO.	名称 NAME	略図 OUTLINE	型名／規格 DESCRIPTIONS		数量 Q'TY	用途／備考 REMARKS
1	平座金 FLAT WASHER		M10 SUS316L		3	
			M10 SUS316L			
			CODE NO.	000-167-416-10		
				000-147-299-00		
2	ﾊﾞﾈ座金 SPRING WASHER		M10 SUS316L		3	
			M10 SUS316L			
			CODE NO.	000-167-389-10		
				000-147-303-00		
3	六角ﾎﾞﾙﾄ 全ﾈｼﾞ HEX.BOLT				3	
			M10X120 SUS316L			
			CODE NO.			
				000-162-962-10		

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

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

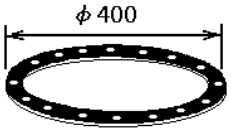
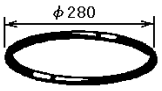
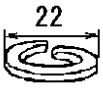
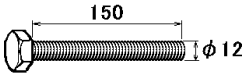
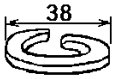
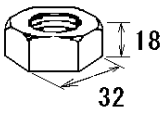
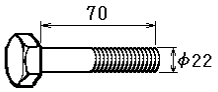
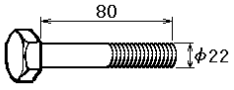
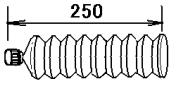
（略図の寸法は、参考値です。 DIMENSIONS IN DRAWING FOR REFERENCE ONLY.）

FURUNO

CODE NO.	000-028-995-00	65AC-X-9403 -11
TYPE	CP65-00720	1/1

工事材料表

INSTALLATION MATERIALS

番 号 NO.	名 称 NAME	略 図 OUTLINE	型名／規格 DESCRIPTIONS	数量 Q'TY	用途／備考 REMARKS
1	ﾊﾟｯｷﾝ.2. PACKING		65-002-1004-0 ROHS CODE NO. 850-210-040-10	1	
2	Oﾘﾝｸﾞ O-RING		JB1AG-280 CODE NO. 000-851-348-00	1	
3	ﾊﾞﾈ座金 SPRING WASHER		M12 SUS316L CODE NO. 000-167-396-10	12	
4	六角ﾎﾞﾙﾄ 全ﾈｼﾞ HEXAGONAL HEAD BOLT		M12X150 SUS316L CODE NO. 000-162-791-10	12	
5	ﾊﾞﾈ座金 SPRING WASHER		M22 SUS316L CODE NO. 000-167-403-10	24	
6	六角ﾅｯﾄ HEX.NUT		M22 SUS316L CODE NO. 000-167-472-10	24	
7	六角ﾎﾞﾙﾄ HEX.BOLT		M22X70LX50S SUS316L CODE NO. 000-162-827-10	12	
8	六角ﾎﾞﾙﾄ HEX.BOLT		M22X80LX50S SUS316L CODE NO. 000-162-857-10	12	
9	ｺｽﾓｸﾞﾘｽﾀﾞｲﾅﾏｯｸｽ GREASE		No.1 400ｼﾞｬﾊﾞﾗﾁｭｰﾌﾞ CODE NO. 000-165-774-10	1	

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

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

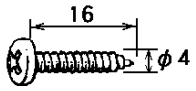
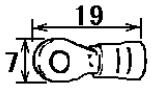
FURUNO

CODE NO.	002-885-370-00	65AC-X-9404 -3
TYPE	CP65-00703	1/1

工事材料表

INSTALLATION MATERIALS

DS-50

番号 NO.	名称 NAME	略図 OUTLINE	型名／規格 DESCRIPTIONS	数量 Q'TY	用途／備考 REMARKS
1	+ﾊﾞｲﾝﾄﾞﾀｯﾋﾟﾝ1ｼｭ +TAPPING SCREW		4X16 SUS304 CODE NO. 000-163-914-10	4	
2	圧着端子 CRIMP-ON LUG		FV1.25-M4(LF) CODE NO. 000-166-741-10	7	

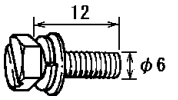
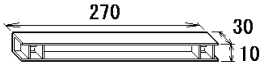
FURUNO

CODE NO.	002-886-970-00	65AC-X-9406 -2
TYPE	CP65-00704	1/1

工事材料表

INSTALLATION MATERIALS

DS-50

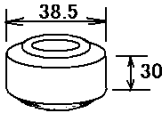
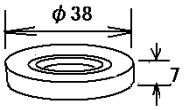
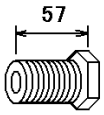
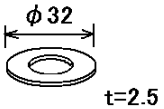
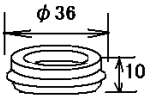
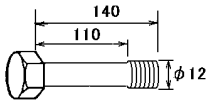
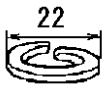
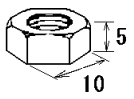
番号 NO.	名称 NAME	略図 OUTLINE	型名／規格 DESCRIPTIONS	数量 Q'TY	用途／備考 REMARKS
1	六角ｽﾘﾜﾘ ｾﾑｽB HEX.HEAD SLOT BOLT-B WASHER		M6X12 SUS304 CODE NO. 000-162-946-10	4	
2	取付足 MOUNTING PLATE		66-019-5571-0 ROHS 66-019-5571-0 CODE NO. 100-178-670-10 100-178-670-00	2	カラー選択有り TO BE SELECTED BY COLOR

FURUNO

CODE NO.	002-876-310-00	66AM-X-9415 -9
TYPE	CP66-00840	1/2

工事材料表

INSTALLATION MATERIALS

番 号 NO.	名 称 NAME	略 図 OUTLINE	型名／規格 DESCRIPTIONS	数量 Q'TY	用途／備考 REMARKS
1	防水ｺﾞﾑ RUBBER PACKING		66-019-1202-0 ROHS CODE NO. 100-178-550-10	1	
2	座金 COUNTERSUNK WASHER		66-019-1203-1 ROHS CODE NO. 100-178-561-10	1	
3	ｹｰﾌﾞﾙｸﾞﾗﾝﾄﾞ CABLE GLAND		66-019-1204-1 ROHS CODE NO. 100-178-571-10	1	
4	平座金 FLAT WASHER		66-019-1205-1 ROHS CODE NO. 100-176-531-10	3	
5	ｷｬｯﾌﾟ LID		66-019-1983-1 CODE NO. 100-176-521-00	3	
6	六角ﾎﾞﾙﾄ HEX.BOLT		66-019-1984-3 ROHS CODE NO. 100-214-533-10	3	
7	ﾊﾞﾈ座金 SPRING WASHER		M12 SUS316L CODE NO. 000-167-396-10	6	
8	平座金 FLAT WASHER		M6 TP340 CODE NO. 000-168-314-10	2	
9	六角ﾅｯﾄ 1ｼｭ HEX.NUT		M6 TW340 CODE NO. 000-168-315-10	2	
10	ｽﾌﾟﾘﾝｸﾞﾜｯｼｬ SPRING WASHER		M6 ﾁﾀﾝ(TB340) CODE NO. 000-168-316-10	2	

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

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

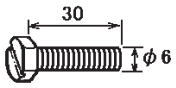
（略図の寸法は、参考値です。 DIMENSIONS IN DRAWING FOR REFERENCE ONLY.）

FURUNO

CODE NO.	002-876-310-00	66AM-X-9415 -9
TYPE	CP66-00840	2/2

工事材料表

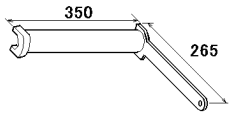
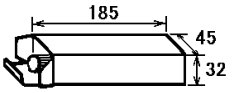
INSTALLATION MATERIALS

番 号 NO.	名 称 NAME	略 図 OUTLINE	型名／規格 DESCRIPTIONS	数量 Q'TY	用途／備考 REMARKS
11	六角ｽﾘﾜﾘ ﾎﾞﾙﾄ HEX.BOLT		M6X30 SUS316L M6X30 SUS316L CODE NO. 000-162-907-10 000-150-024-00	1	

FURUNO

CODE NO.	002-884-990-00	66AM-X-9315 -1 1/1
TYPE	SP66-00512	BOX NO. P

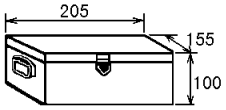
SHIP NO.	SPARE PARTS LIST FOR	U S E	SETS PER VESSEL

ITEM NO.	NAME OF PART	OUTLINE	DWG. NO. OR TYPE NO.	QUANTITY WORKING PER SET	QUANTITY WORKING PER VES	QUANTITY SPARE	REMARKS/CODE NO.
1	締付ﾊﾝﾄﾞﾙ TIGHTENING HANDLE		66-019-1253-1		1		100-176-501-00
2	ｼﾘｺﾝｸﾞﾘｽ SILICONE GREASE		G-30M-100 G30M		1		000-169-306-10 000-824-012-00

FURUNO

CODE NO.	000-028-989-00	65AC-X-9301 -3 1/1
TYPE	SP65-00400	BOX NO. P

SHIP NO.	SPARE PARTS LIST FOR	U S E	SETS PER VESSEL
	DS-50 DOPPLER SPEED LOG		

ITEM NO.	NAME OF PART	OUTLINE	DWG. NO. OR TYPE NO.	QUANTITY WORKING PER SET	QUANTITY WORKING PER VES	QUANTITY SPARE	REMARKS/CODE NO.
1	予備品箱 SPAREPARTS BOX		SP65-00402			1	002-887-500-00
2	予備品 SPARE PARTS		SP65-00401			1	002-885-680-00

MFR'S NAME	FURUNO ELECTRIC CO.,LTD.	DWG NO.	65AC-X-9301	1/1

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

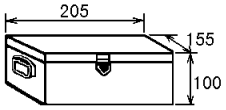
型式/ｺｰﾄﾞ番号が２段の場合、下段より上段に代わる過渡期品であり、どちらかが入っています。 なお、品質は変わりません。

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

FURUNO

CODE NO.	000-028-990-00	65AC-X-9302 -3 1/1
TYPE	SP65-00410	BOX NO. P

SHIP NO.	SPARE PARTS LIST FOR	U S E	SETS PER VESSEL
	DS-50 DOPPLER SPEED LOG		

ITEM NO.	NAME OF PART	OUTLINE	DWG. NO. OR TYPE NO.	QUANTITY WORKING PER SET	QUANTITY WORKING PER VES	QUANTITY SPARE	REMARKS/CODE NO.
1	予備品箱 SPAREPARTS BOX		SP65-00402			1	002-887-500-00
2	予備品 SPARE PARTS		SP66-00503			1	002-876-340-00
3	予備品 SPARE PARTS		SP65-00401			1	002-885-680-00

MFR'S NAME	FURUNO ELECTRIC CO.,LTD.	DWG NO.	65AC-X-9302	1/1

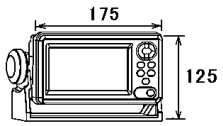
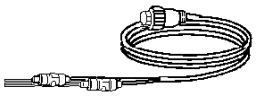
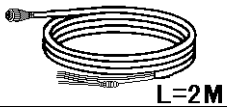
（略図の寸法は、参考値です。 DIMENSIONS IN DRAWING FOR REFERENCE ONLY.）

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

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.

PACKING LIST

DS-840/HK

NAME	OUTLINE	DESCRIPTION/CODE №	Q'TY
ユニット UNIT			
航程計 REMOTE DISTANCE INDICATOR		DS-840/DS-840-HK 000-029-022-00 **	1
付属品 ACCESSORIES			
ﾌﾗｯｼｭﾏｳﾝﾄF FLUSH MOUNTING PANEL		FP65-00401 002-889-360-00	1
付属品 ACCESSORIES			
ﾌﾗｯｼｭﾏｳﾝﾄS FLUSH MOUNTING PANEL		FP65-00402 002-889-370-00	1
付属品 ACCESSORIES			
付属品 ACCESSORIES		FP65-00403 002-889-380-00	1
工事材料 INSTALLATION MATERIALS			
工事材料 INSTALLATION MATERIALS		CP65-00801 002-889-350-00	1
その他工材 OTHER INSTALLATION MATERIALS			
ｹｰﾌﾞﾙ組品MJ CABLE ASSY.		MJ-A7SPF0009-020C 000-159-686-10	1
ｹｰﾌﾞﾙ組品MJ CABLE ASSY.		MJ-A6SPF0013-020C 000-159-701-10	1

注記) 1.ｺｰﾄﾞ番号末尾の[**]は、選択部品の代表ｺｰﾄﾞ番号を表します。
CODE NUMBER ENDED BY "**" INDICATES THE NUMBER OF TYPICAL MATERIAL.

11a 型式/ｺｰﾄﾞ番号が2段の場合、下段より上段に代わる過渡期品であり、どちらかが入っています。 なお、品質は変わりません。
TWO TYPES AND CODES MAY BE LISTED FOR AN ITEM. THE LOWER PRODUCT MAY BE SHIPPED IN PLACE OF THE UPPER PRODUCT. QUALITY IS THE SAME.

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

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.

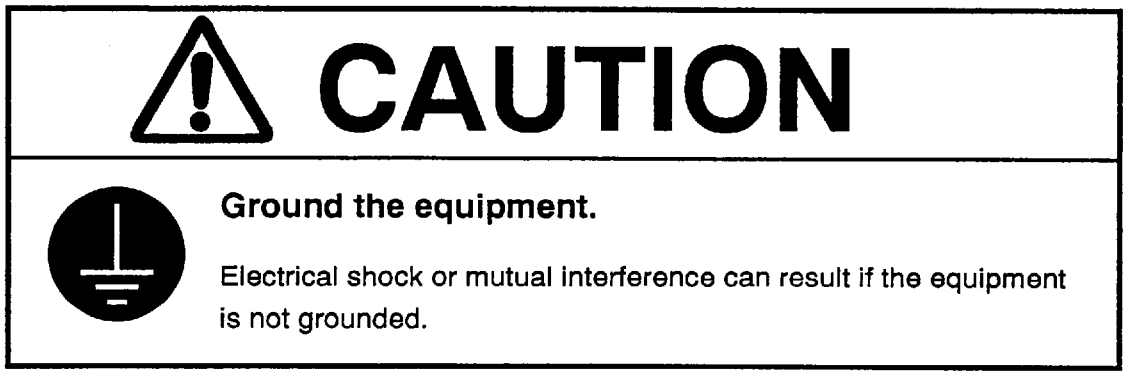
Installation site
The transducer is made of waterproof rubber molding, thus the hull tank, etc. may be installed almost anywhere which meets the requirements noted earlier. However, it is recommended to provide a housing for the transducer inside the ship to keep water out of the transducer.
The transducer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



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

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.

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 4.5kg. 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 Figurer2.1 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 with four tapping screws (5x16).
   Note：Leave sufficient slack in cabling so the unit can 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 step2・

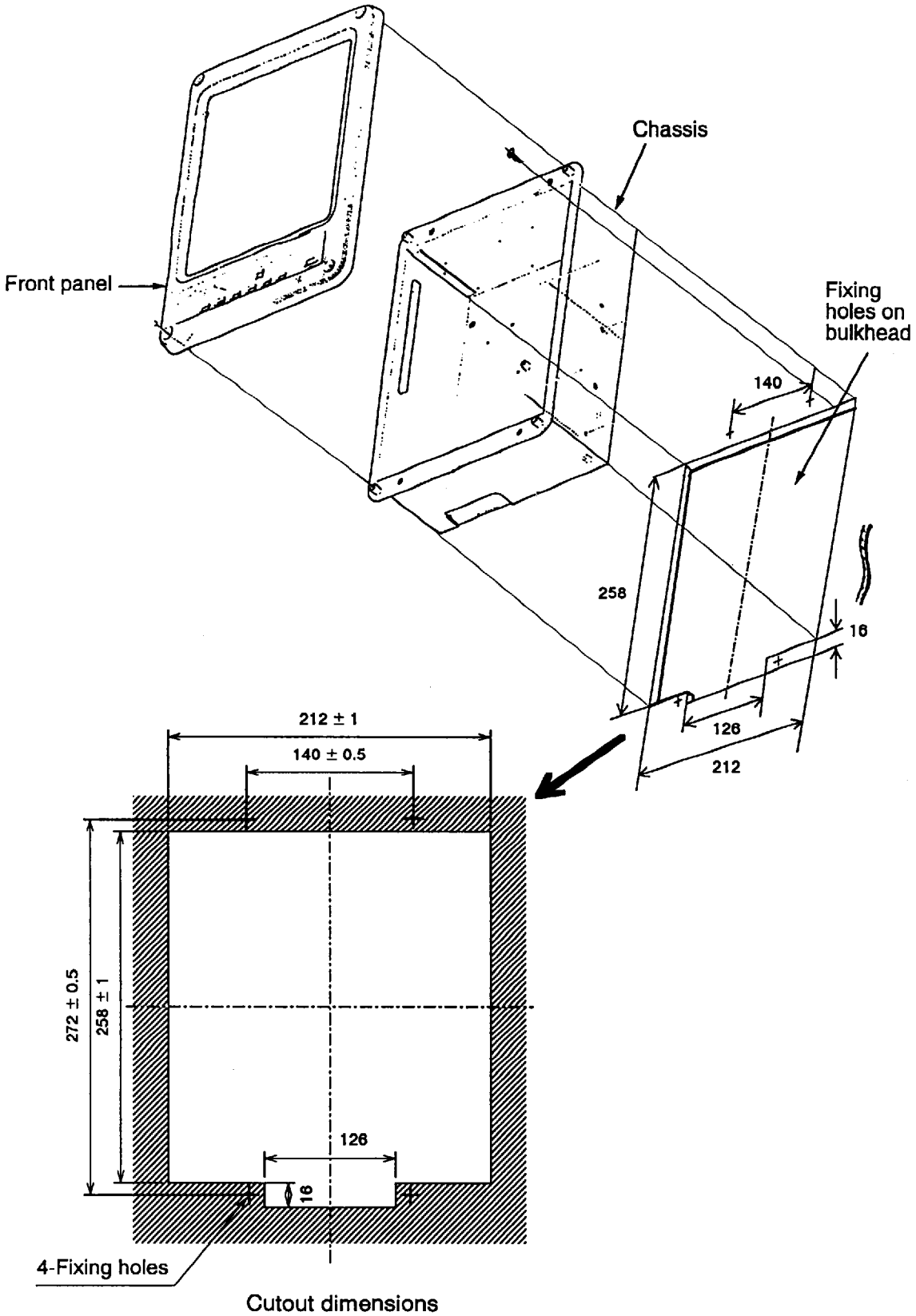


Figure 4-1 Mounting dimensions for flush mounting main display

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.

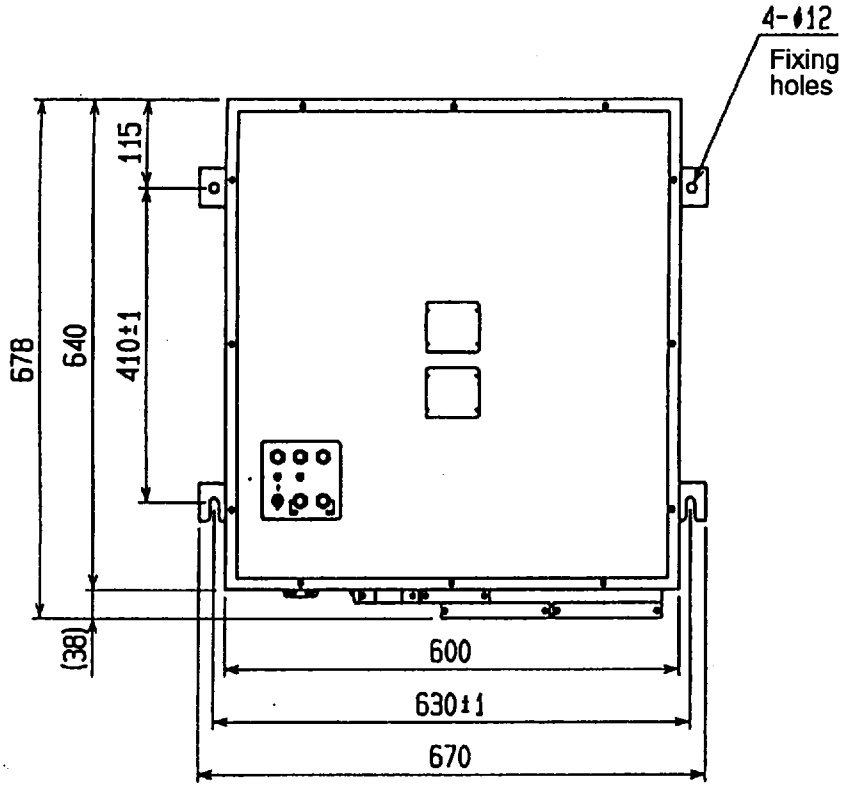


Figure 4-2 Mounting dimensions for processor unit

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.

- 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.

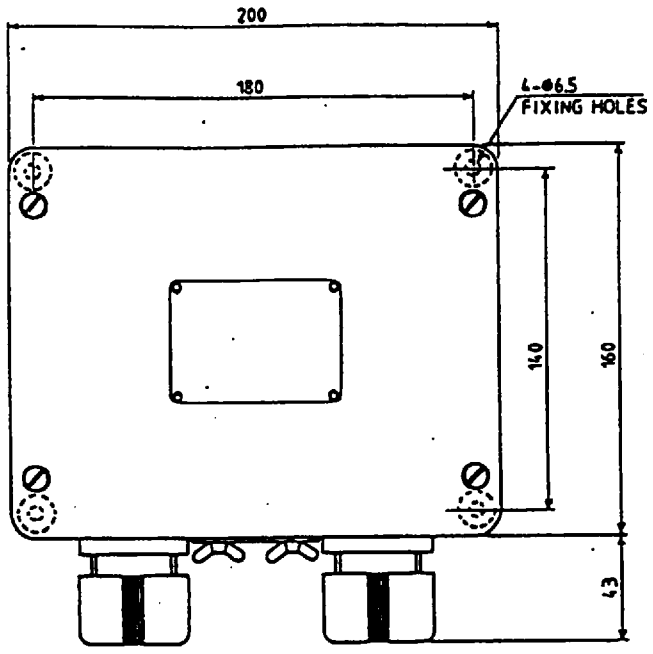


Figure 4-3 Mounting dimensions for junction box CI-630

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.

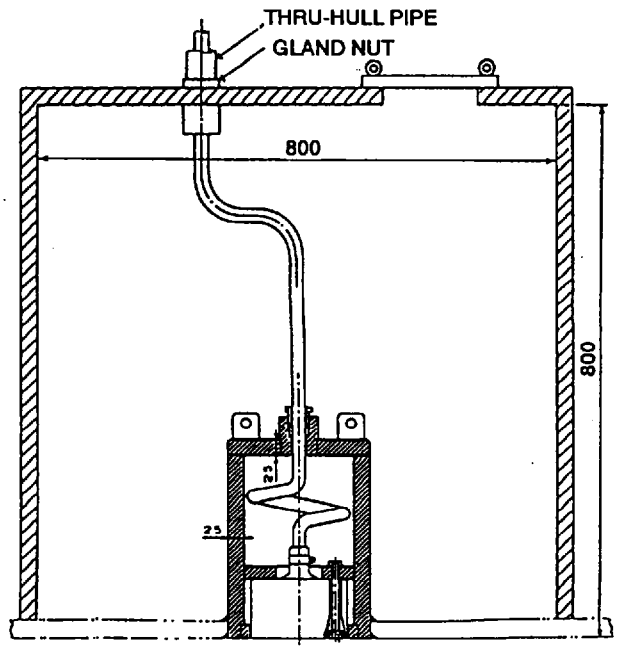


Figure 4-4 Eample of housing for transducer tank

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.

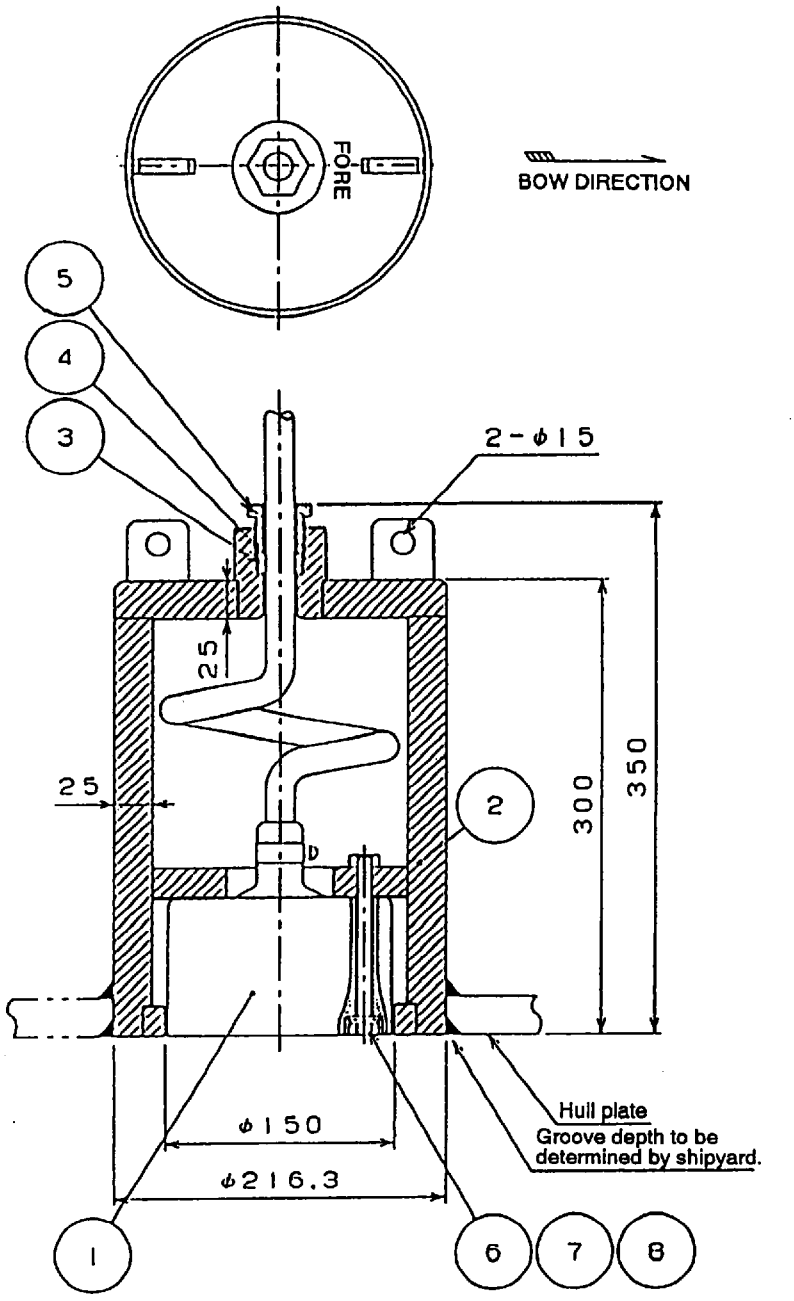
5. Fixing/connecting the transducer cable

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

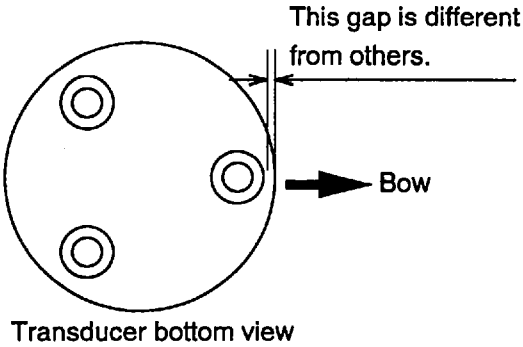
6. Painting

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.



① Transducer
② Tank
③ Gasket
④ Washer
⑤ Cable Gland
⑥ Hex Head Bolt
⑦ Spring Washer
⑧ Flat Washer



Transducer bottom view

Figure 4-5 Tank installation example

Note: Refer to page D-12 for installion 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.

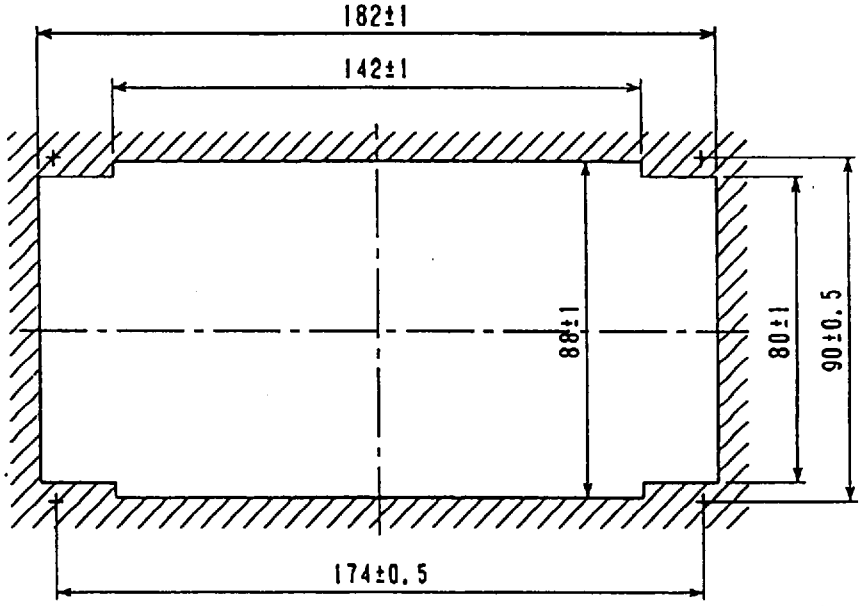


Figure 4-6 Mounting dimensions for control box

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 μV, which are easily interfered by noise. There fore, 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 ± 0.5 mm
Weight	450 kg/km
Outer sheath	Rubber
Armor	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 ± 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 into 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

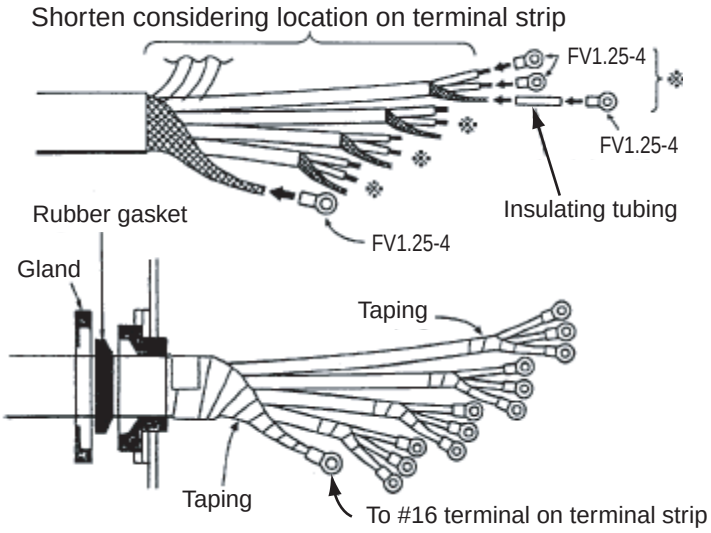


Figure 5-1 Fabrication of transducer cable

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

1) Transceiver unit/ junction box

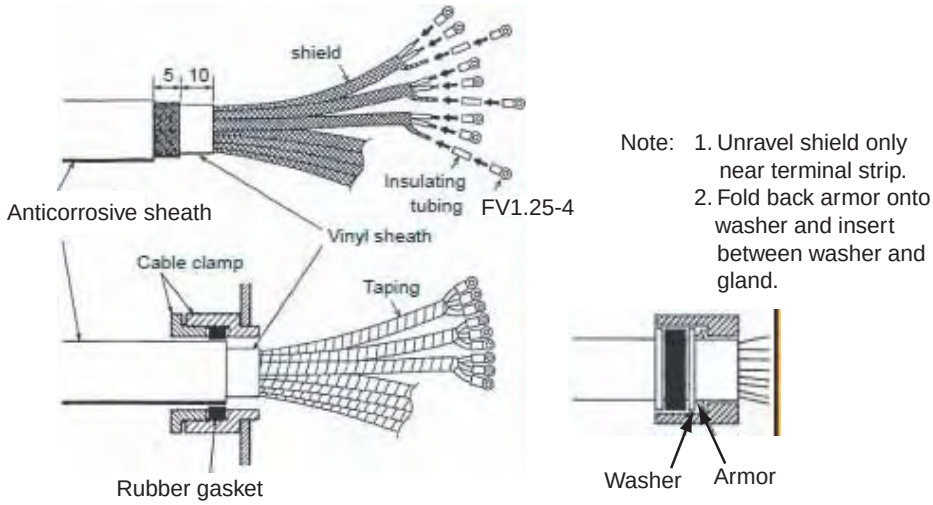


Figure 5-2 Cable fabrication

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.

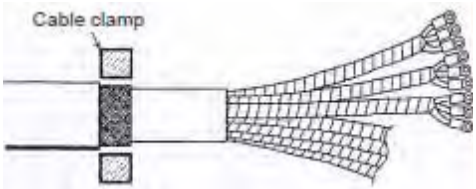


Figure 5-3 Cable fabrication

3. CIF/NMEA Data Signal Cable (CO-SPEVV-SB-C 0.2X5P)

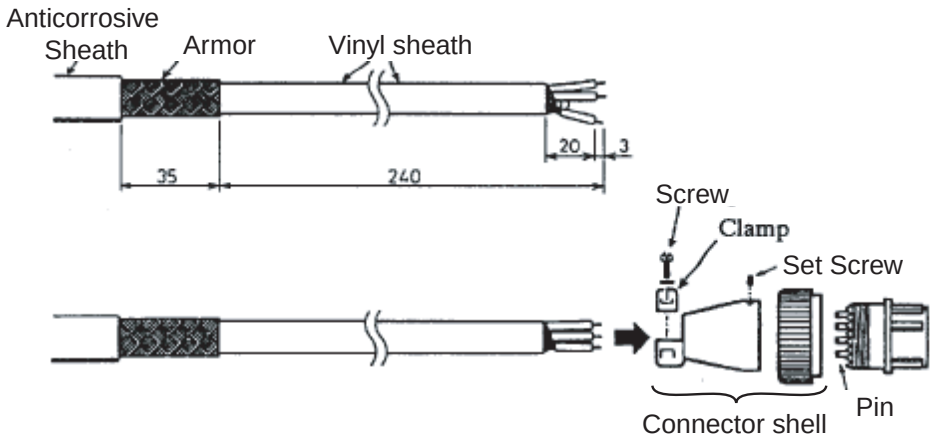


Figure 5-4 Cable fabrication

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.

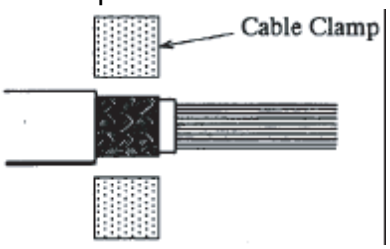


Figure 5-5 Cable *fabrication*

<Cable passed through cable gland>

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

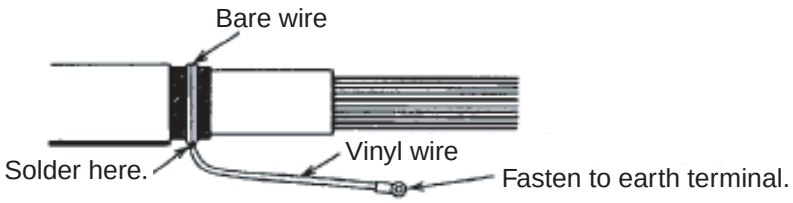


Figure 5-6 *Cable* fabrication

2) Processing the shield

<Individual shields>

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

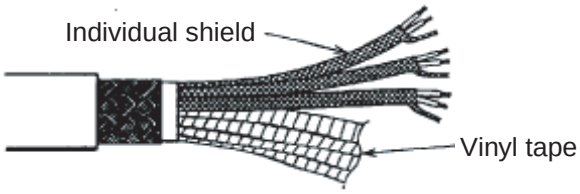


Figure 5-7 Cable fabrication

<Common shield>

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

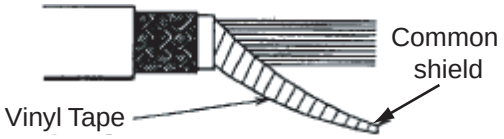


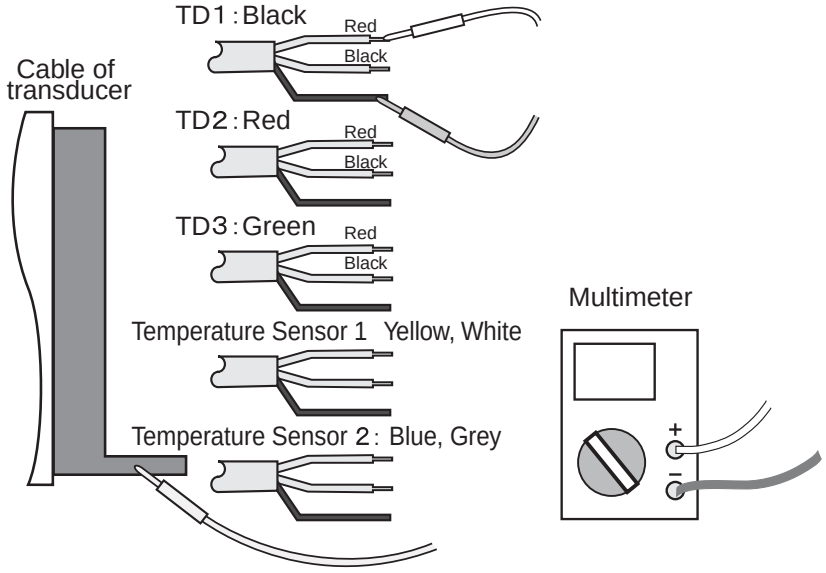
Figure 5-8 Cable fabrication

5. Insulation of cables for transducer

When installing of the Transducer Unit DS-330 (option), check insulation as shown in the procedure below.

Insulation check

1. Remove all cores and shields of the transducer from the terminal board. All wires of the transducer are open.
2. Set the multimeter to the maximum resistance range and measure the resistance between each transducer line (TD1, TD2, TD3) and individual or common shield.



Measurement places		Resistance value for insulation
- polarity lead	- polarity lead	
Red wire of black sheath	Shield in black sheath	Digital multimeter: More than 10MΩ. Analog multimeter: Needle does not swing.
Red wire of black sheath	Common shield	
Red wire of red sheath	Shield in red sheath	
Red wire of red sheath	Common shield	
Red wire of green sheath	Shield in green sheath	
Red wire of green sheath	Common shield	

Note) If rating is not met at a location, suspect faulty insulation. Replace a new one.

5.3 Remarks on Connection of Other Equipment

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

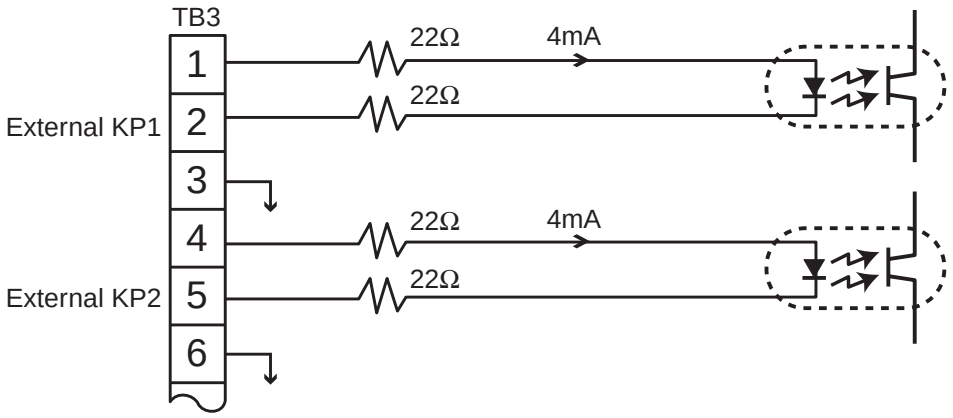


Figure 5-9 KP input circuit

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

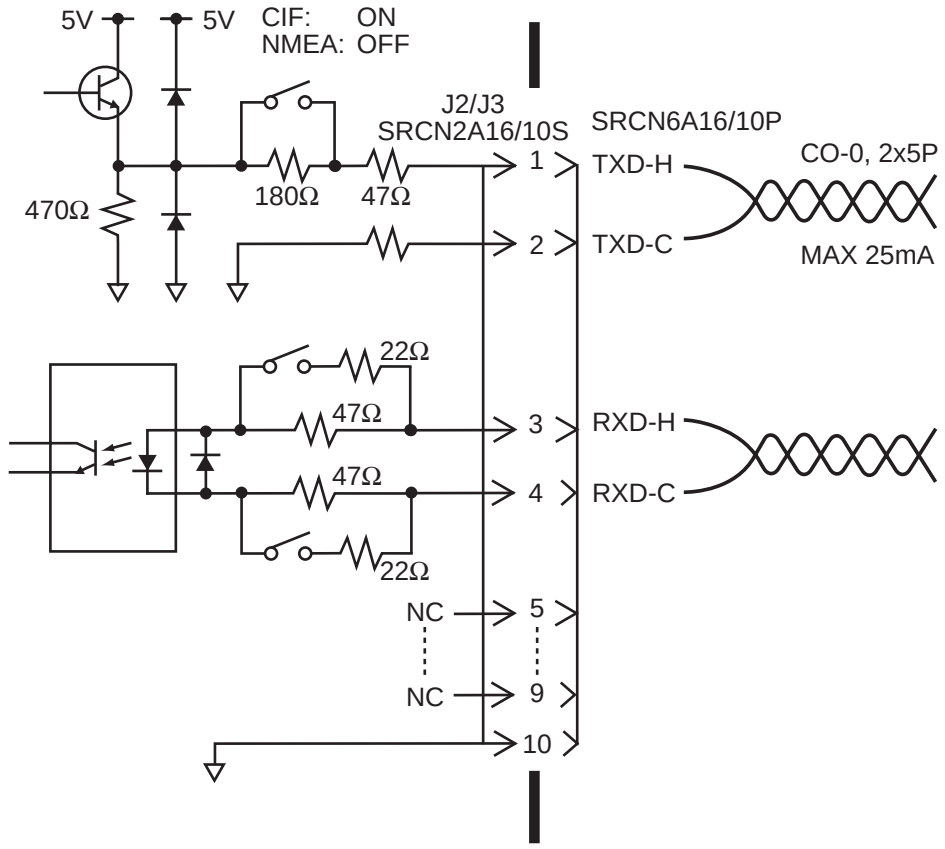


Figure 5-10 NMEA I/O circuit

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 coupler is 2.2 V;
[4.8 – 2.2 (V)] / [10 (mA)] – 227 (Ω) = 33 (Ω)
therefore, insert a 33 ohm resistor in series in the line.

6. INITIAL SETTINGS

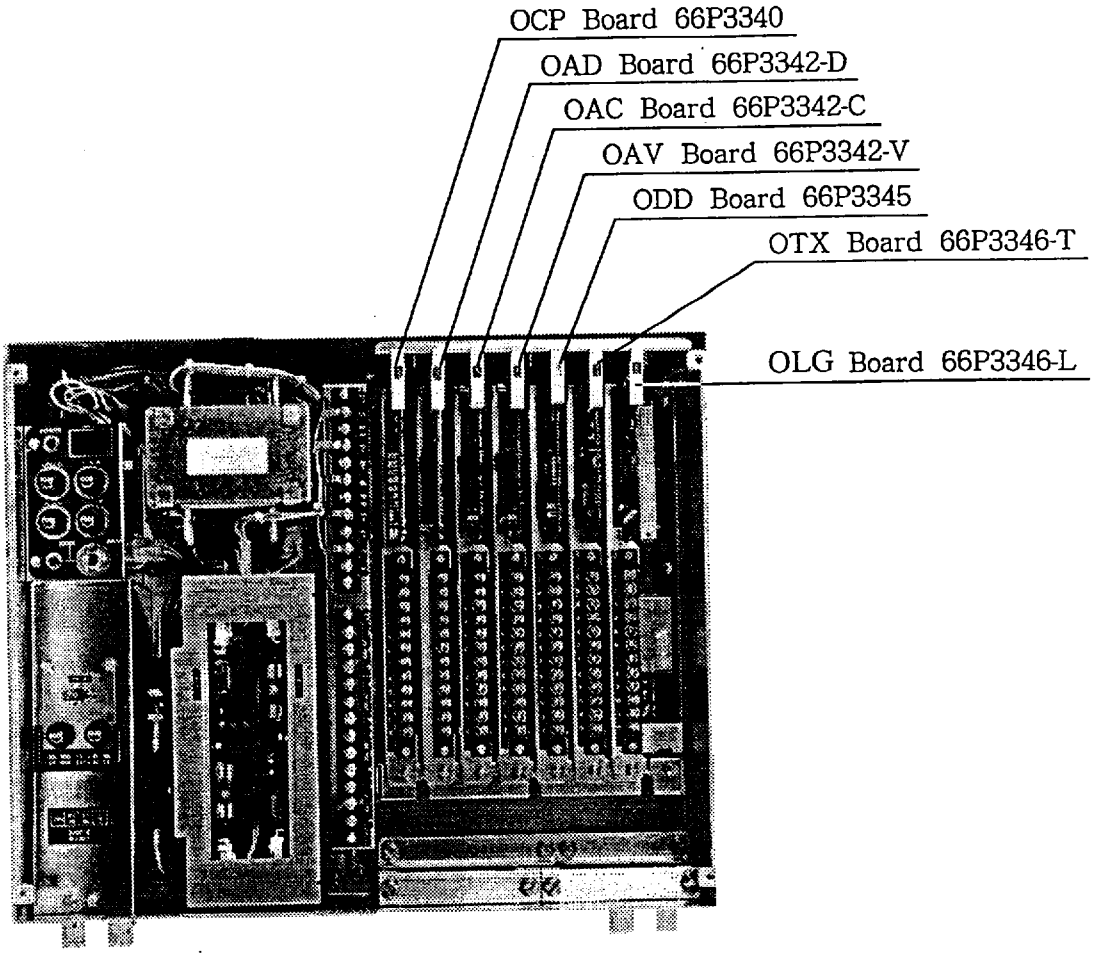
6.1 Processor Unit

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

<table>
<tr><th>Board</th><th colspan="2">DIP switch</th><th>Function</th><th>Setting</th></tr>
<tr><td rowspan="2">MCP Board 66P3310</td><td rowspan="2">S3</td><td>7</td><td>Interference rejector 1</td><td>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</td></tr>
<tr><td>8</td><td>Interference rejector 2</td><td>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</td></tr>
<tr><td rowspan="2">VOC Board 66P3612</td><td>S2</td><td>678</td><td>Speed output dummy</td><td>
<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>
</td></tr>
<tr><td>S3</td><td>1</td><td>Analogmeter Range</td><td>
<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>
</td></tr>
</table>

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 incorprated 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 2 3	Speed dummy output	1 / 2 / 3 / Specification – / – / OFF / Normal 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)

<table>
<tr><th>Board</th><th colspan="2">DIP switch</th><th>Function</th><th>Setting</th></tr>
<tr><td rowspan="2">OAV Board 66P3342 -V</td><td rowspan="2">S1</td><td>1
2</td><td>Ship's speed voltage output selection</td><td>Selct 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></td></tr>
<tr><td>3
4</td><td>Speed output selection</td><td>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></td></tr>
<tr><td rowspan="2">OAC Board 66P3342 -C</td><td rowspan="2">S1</td><td>1
2</td><td>Ship's speed current output selection</td><td>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></td></tr>
<tr><td>3
4</td><td>Speed output selection</td><td>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></td></tr>
</table>

Board	DIP switch		Function	Setting
OAD Board 66P3342 -D	S1	1	Analog indicator selection	Set according to analog indicator connected to the OAD Board. 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.

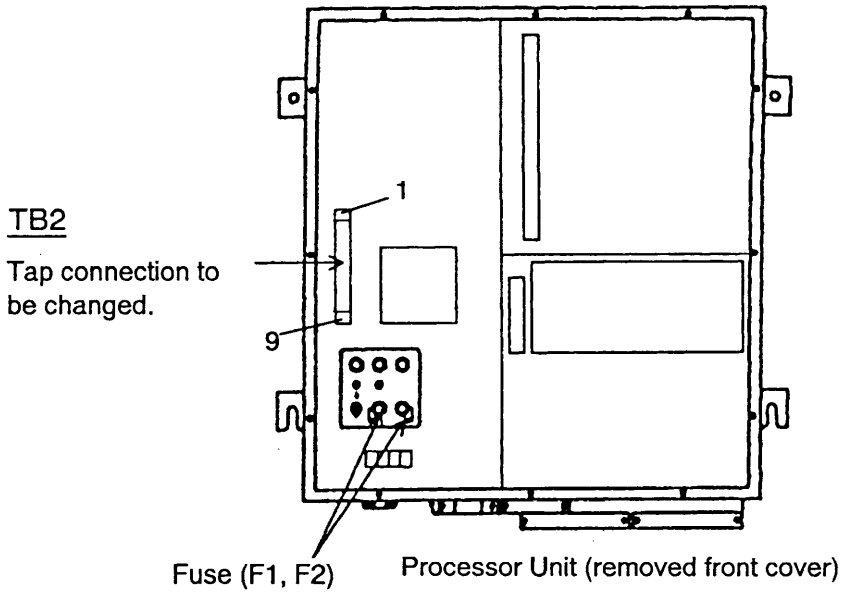
Board	DIP switch		Function	Setting
PCP Board 66P3355	S1	1 2	Depth Unit Selection	Depth Unit: 1: –, 2: OFF m: – / OFF ft: OFF / ON fm: ON / ON DS-350/351 only
		3	Display Mode Selection	OFF: Type A ON: Type B DS-350 only
	※	4	Rate Gyro Connection	OFF: Yes ON: No DS-351 only
	※	5	Gyrocompass Connection	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	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



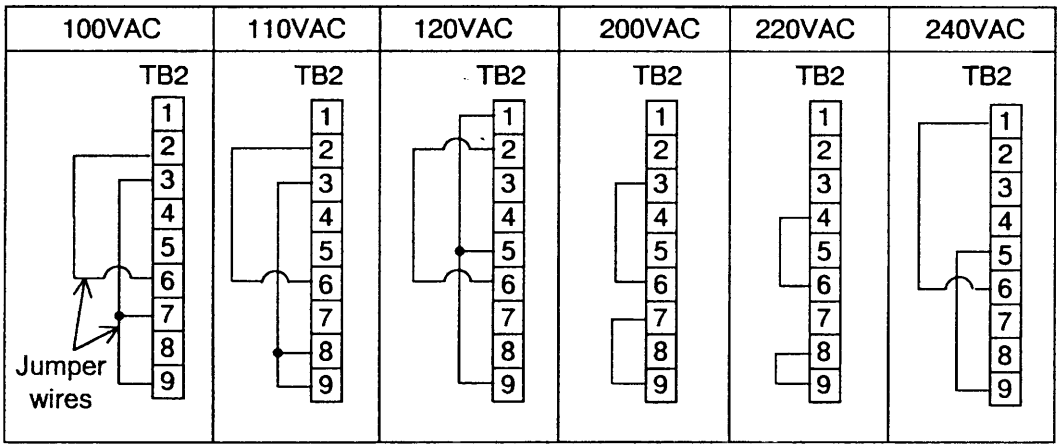


Figure 7-1 Changing tap connection

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)

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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	™
		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)	

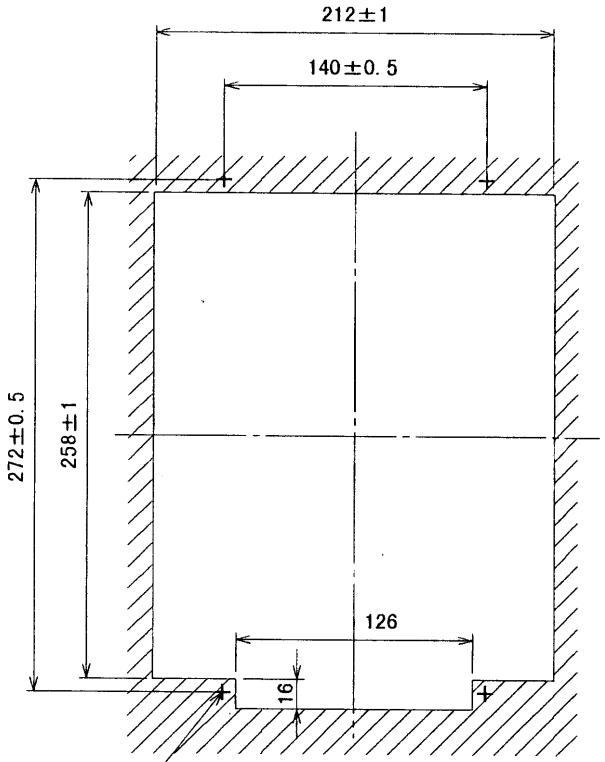
Setting of CIF/NMEA(1) and CIF/NMEA(2) ports

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

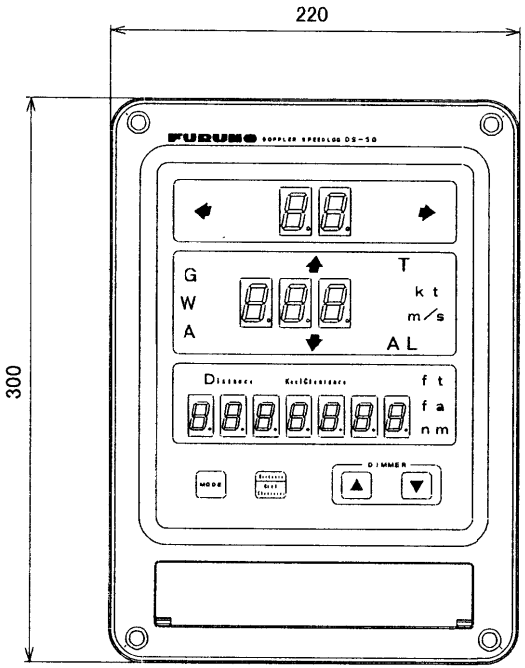
Setting	Port2 Select output format for CIF, IEC or NMEA.			
	CIF/IEC(NMEA)	IEC/NMEA	IEC(NEMA) Ver	IEC(NMEA) Ver
	S1-#5	S3-#8	S4-#8	S1-#7
CIF	ON	-	-	-
IEC61162-1 Ed2	OFF	OFF	ON	-
NMEA Ver 3.0	OFF	ON	ON	-
NMEA Ver 2.0	OFF	ON	OFF	ON
NMEA Ver 1.5	OFF	ON	OFF	OFF

FURUNO



4－取付穴
FIXING HOLES

取付穴寸法（参考図）
CUTTING DIMENSIONS



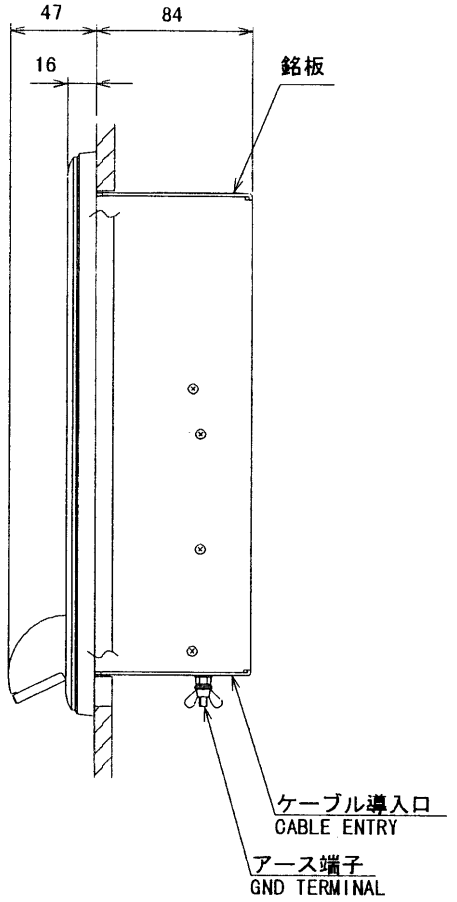


表１　TABLE 1

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

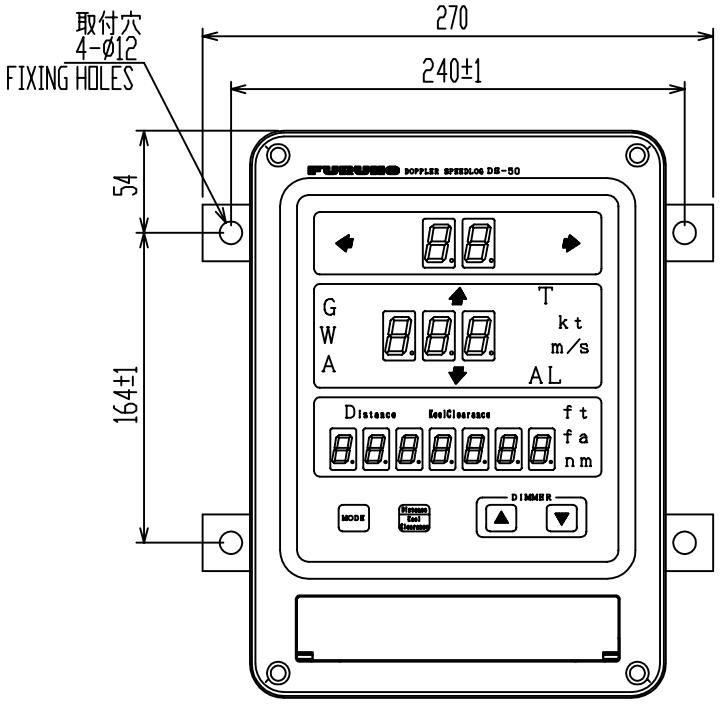
1. KEEP SUFFICIENT CABLE LENGTH BEHIND THE UNIT FOR MAINTENANCE.
2. USE TAPPING SCREWS 5x16 FOR FIXING THE UNIT.
3. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS.

DRAWN June26 '00 T.YAMASAKI			TITLE DS-500
CHECKED June26 '00 Y.Kimura			名称 主指示器（埋込装備）
APPROVED June26 '00 Y.Kimura		DS-50	外寸図
SCALE 1/4	MASS ±10% 4.4 kg		NAME DISPLAY UNIT (FLUSH MOUNT)
DWG. No. C7241-G01- D		66-022-1000-G3	OUTLINE DRAWING

FURUNO ELECTRIC CO., LTD.

D-1

FURUNO



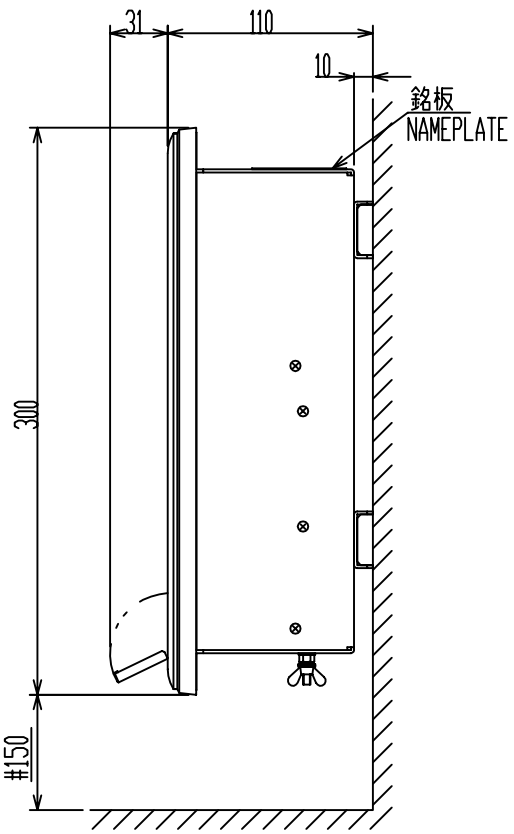
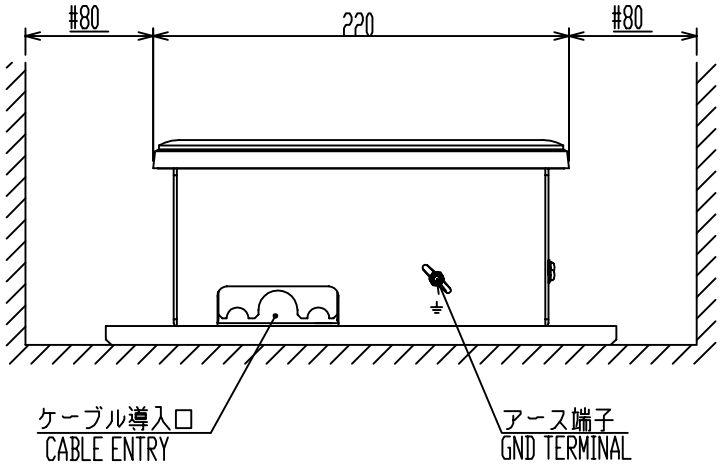


表1 TABLE 1

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



注 記
1）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、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）#：推奨する最小サービス空間寸法。

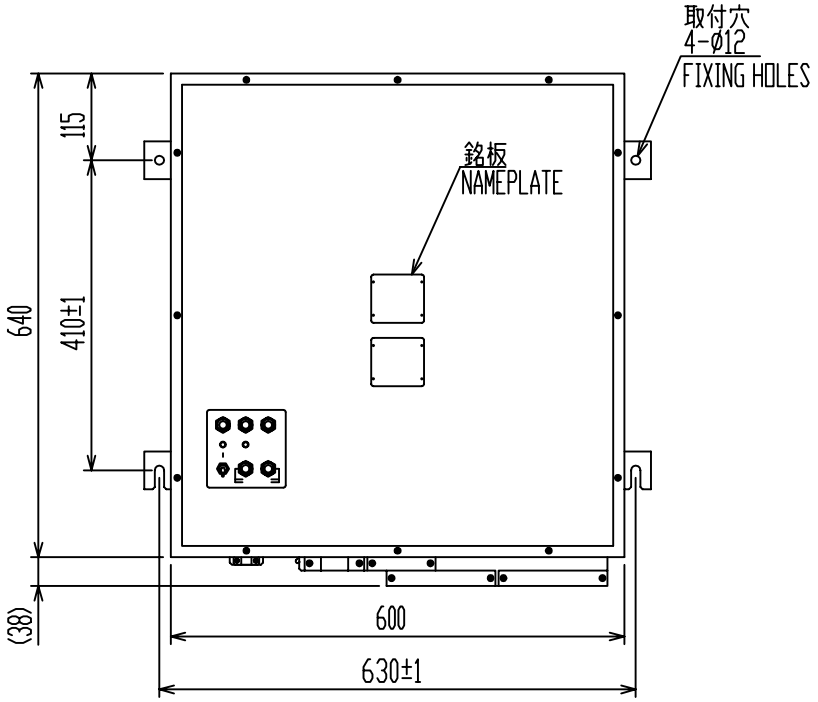
NOTE
1. KEEP SUFFICIENT CABLE LENGTH BEHIND THE UNIT FOR MAINTENANCE.
2. USE M10 BOLTS OR COACH BOLTS ø9 FOR FIXING THE UNIT.
3. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS.
4. #: RECOMMENDED SERVICE CLEARANCE.

DRAWN Mar. 24 '03 T.YAMASAKI		TITLE	DS-500
CHECKED Mar. 24 '03 Y.KIMURA		名称	主指示器（壁掛装備）
APPROVED Mar. 27 '03 Y. Kimura	DS-50		外寸図
SCALE 1/4 MASS 4.7 ±10% kg		NAME	DISPLAY UNIT (BULKHEAD MOUNT)
DWG.No. C7241-G02- E	66-022-1100-G1		OUTLINE DRAWING

FURUNO ELECTRIC CO., LTD.

D-2

FURUNO



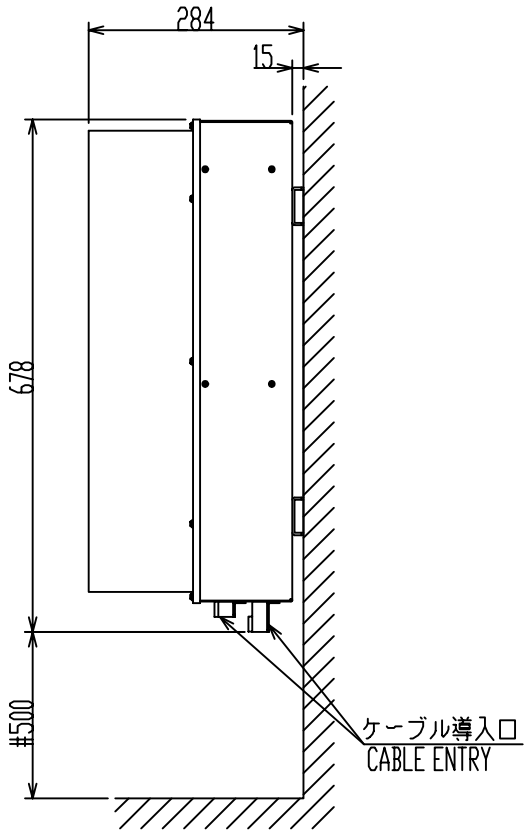
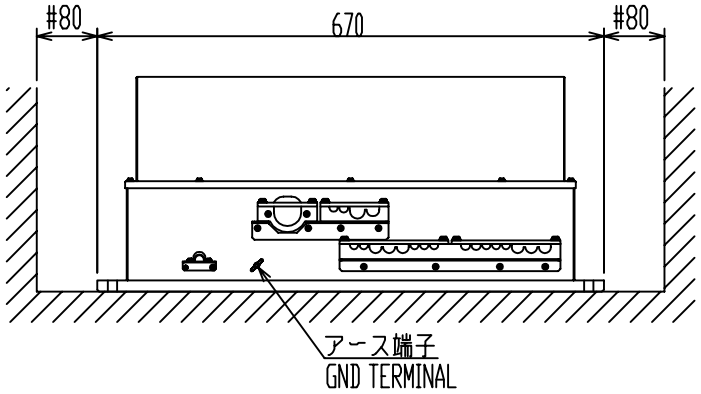


表1 TABLE 1

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

NOTE 1. USE M10 BOLTS OR COACH BOTLS ø9 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.

DRAWN Mar. 24 '03 T.YAMASAKI		TITLE	DS-510/511
CHECKED Mar. 24 '03 Y.KIMURA		名称	演算部
APPROVED Mar. 27 '03 Y. Kimura	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

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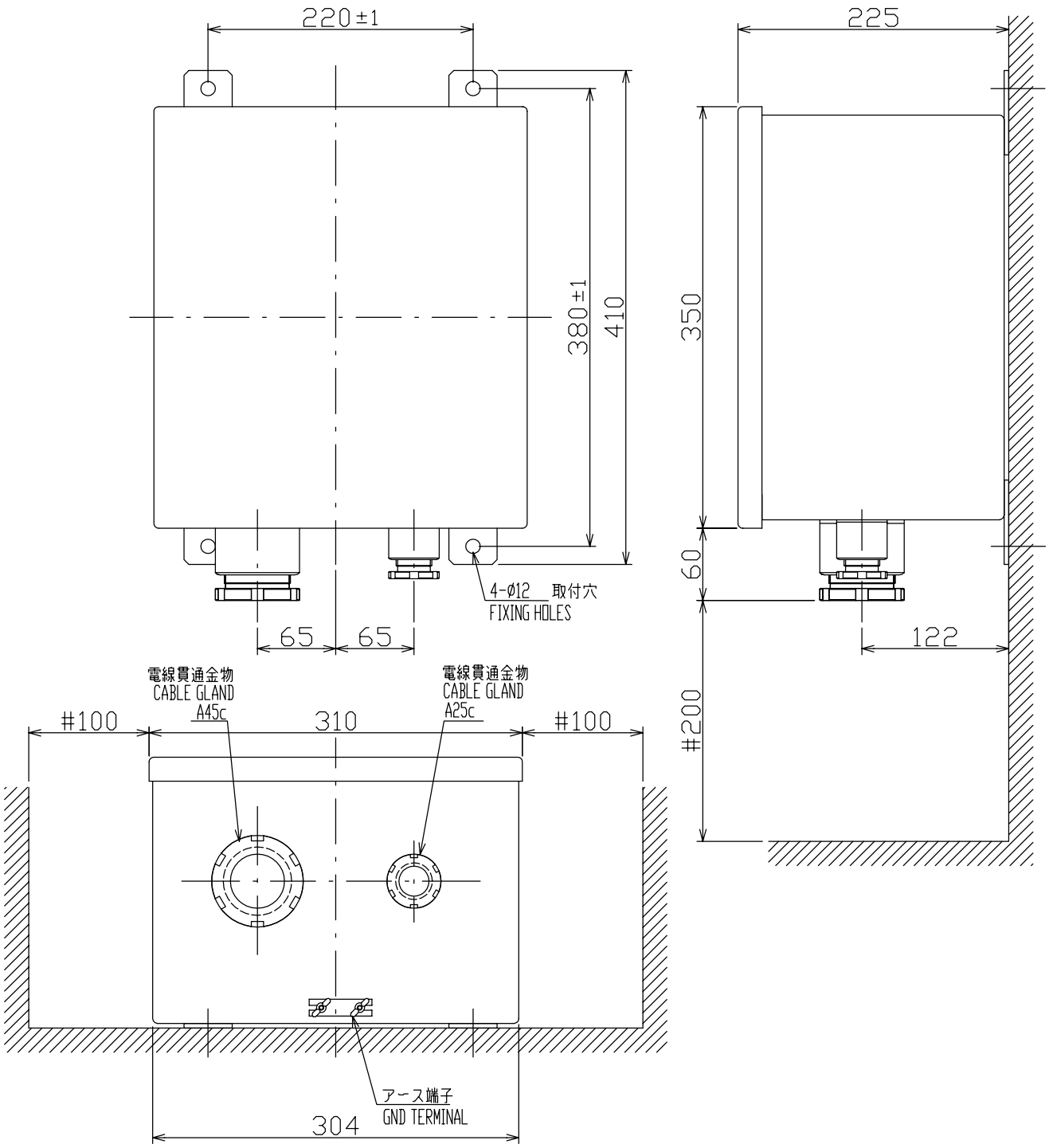


注記
1）指定なき寸法公差は表1による。
2）＃印寸法は最小サービス空間寸法とする。

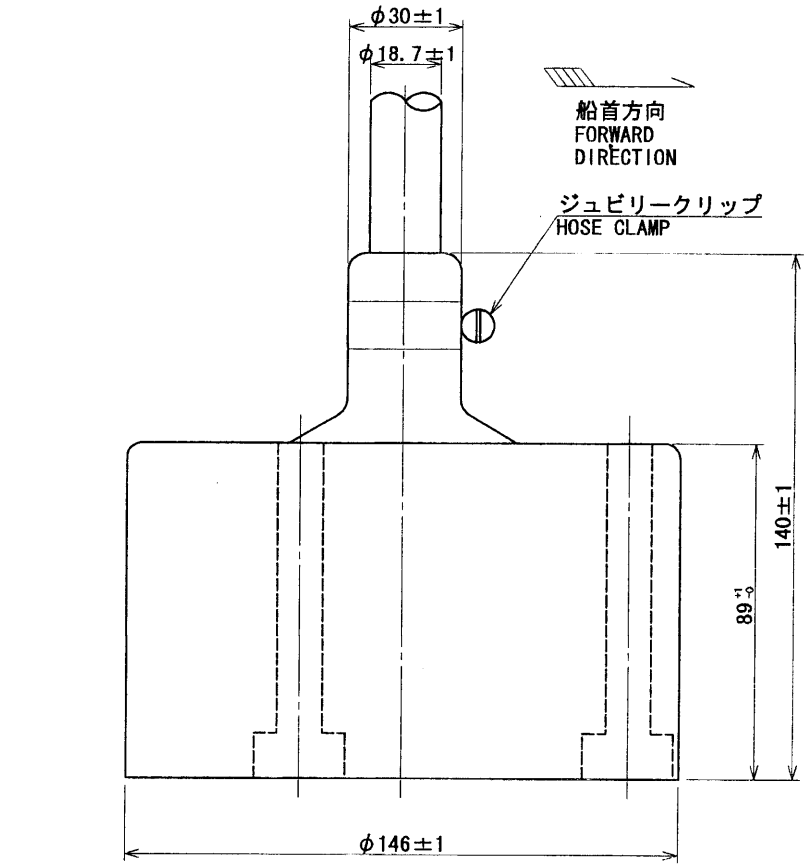
NOTE
1. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS WHICH IS NOT SPECIFIED.
2. #: MINIMUM SERVICE CLEARANCE.

表1 TABLE 1

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

FURUNO



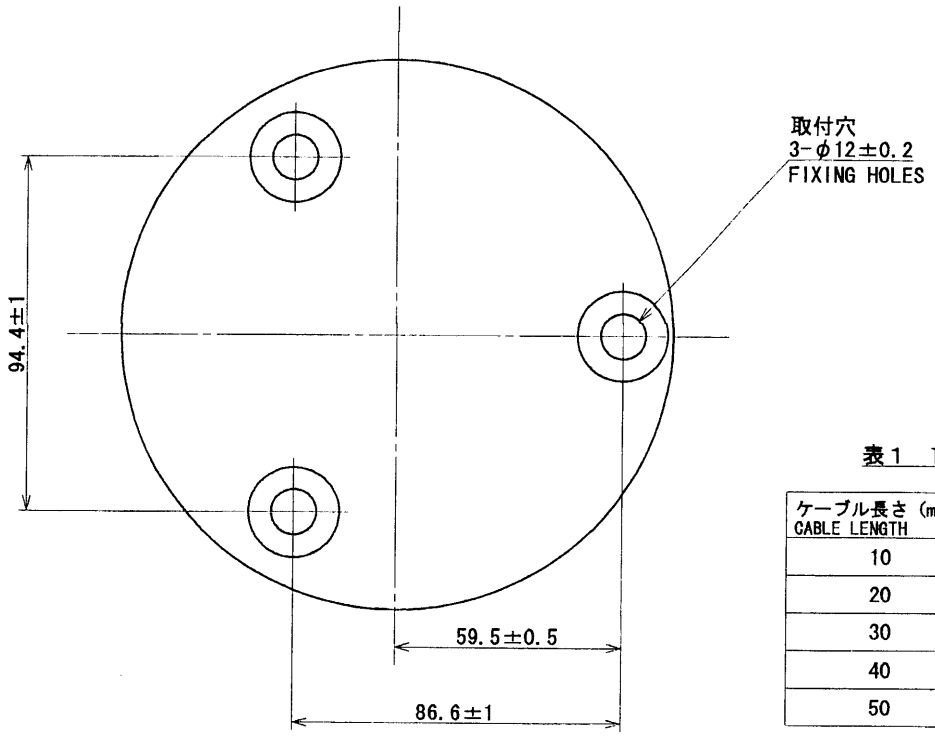


表1　TABLE 1

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		DS-50	外寸図
SCALE 1/2	MASS TABLE 1		NAME TRANSDUCER
DWG. No. C7241-G04- E		66-022-6000-G2	OUTLINE DRAWING

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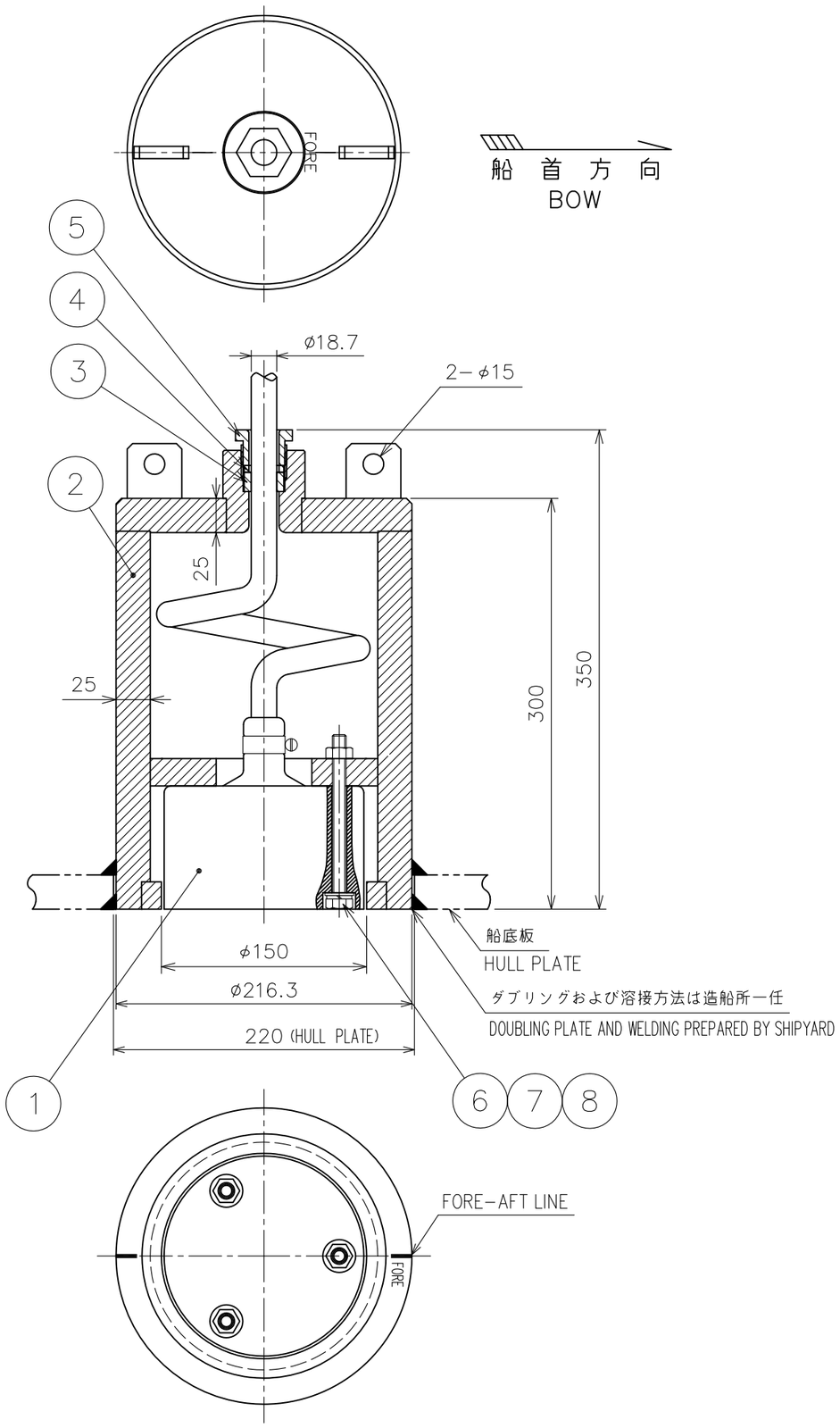

注記

1. タンク本体の板厚は標準２５mmです。
2. タンク本体の材質はＮＫ（日本海事協会）規格のＫＳＴＰＧ３７０です。
3. タンク本体を船底に溶接する祭、船首尾方向の据付誤差は土１°以内とする。
   また水平方向の取付はタンクのフランジが吃水線と土１°以内の誤差で平行
   になるようにしてください。
4. 指定外の寸法公差は表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。

Note

1. Nominal thickness of the casing is 25mm.
2. Material of the casing is KSTPG370 accepted by NK (NIPPON KAIJI KYOKAI).
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 to an accuracy
   of 1 degree or better.
4. Table 1 indicates tolerance of dimensions which is not specified.
5. The transducer face is coated with MARINESTAR20.
   Do not apply other type of paint.

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

ITEM 品番	NAME 品名	MATERIAL 材質	Q'TY 数量	DWG.NO. 図番	REMARKS 摘要
8	平座金 FLAT WASHER	SUS316L	3	M10	質量に含まず NOT INCLUDED IN MASS.
7	ばね座金 SPRING WASHER	SUS316L	3	M10	
6	六角ボルト HEX. BOLT	SUS316L	3	M10×120	
5	締付グランド CABLE GLAND	SUS316L	1	66−017−1404	
4	座金 WASHER	SUS316L	1	66−017−1405	
3	ＶＡパッキン RUBBER GASKET	CR	1	VA−25	
2	タンク本体 CASING EPOXY ZINC RICH PRIMER	KSTPG370	1	66−022−7001	船級認定材 CLASSIFICATION SOCIETY APPROVED MATERIAL
1	送受波器 TRANSDUCER		1	DS−530	質量に含まず NOT INCLUDED IN MASS.

DRAWN Dec. 14 '07 T.YAMASAKI		TITLE	DS−531−B
CHECKED Dec. 17 '07 T.SHISHIDO		名称	送受波器タンク
APPROVED Dec.17'07 R.Esumi	DS−50		外寸図
SCALE 1/4 MASS 45 ±10% kg	質量は送受波器を含まず。 MASS W/O TRANSDUCER	NAME	TRANSDUCER TANK
DWG No. C7241−G05− G	66−022−700G−5		OUTLINE DRAWING

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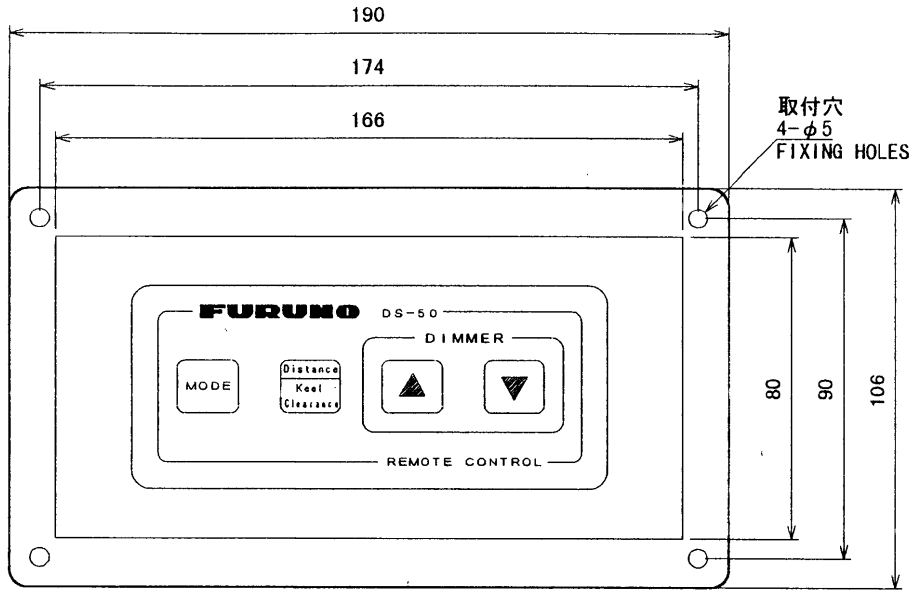


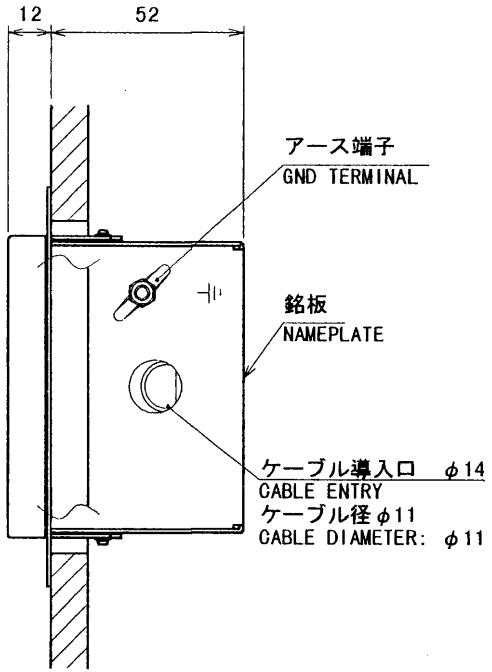
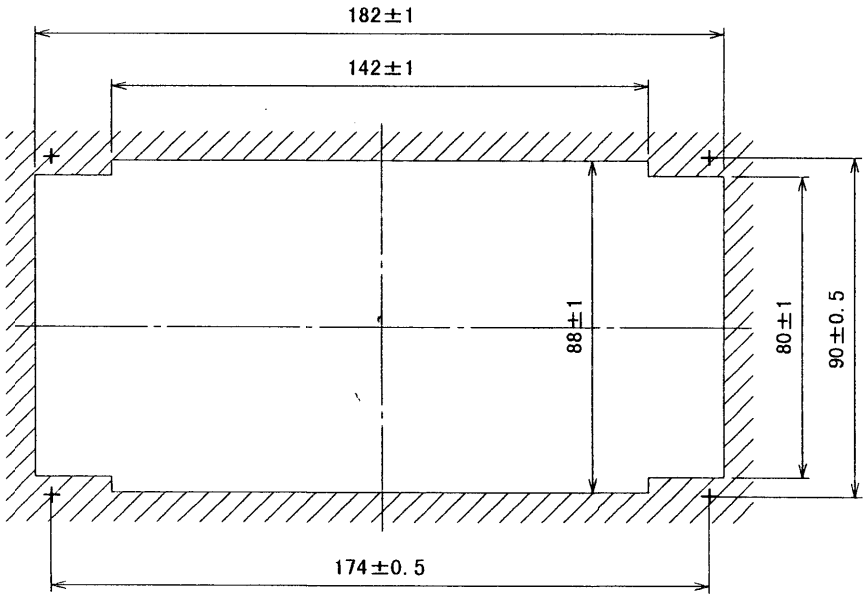


表1 TABLE 1

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



取付穴寸法（参考図）
CUTTING DIMENSIONS

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、トラスタッピンネジ呼び径４×１６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 4x16 FOR FIXING THE UNIT.
3. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS.

DRAWN June 26'00 T.YAMASAKI			TITLE DS-501
CHECKED June 26'00 Y.Kimura			名称 操作箱
APPROVED June 26'00 Y.Kimura	DS-50		外寸図
SCALE 1/2	MASS ±10% 0.6 kg		NAME OPERATION PANEL
DWG. No. C7241-G07- D	66-022-4000-G2		OUTLINE DRAWING

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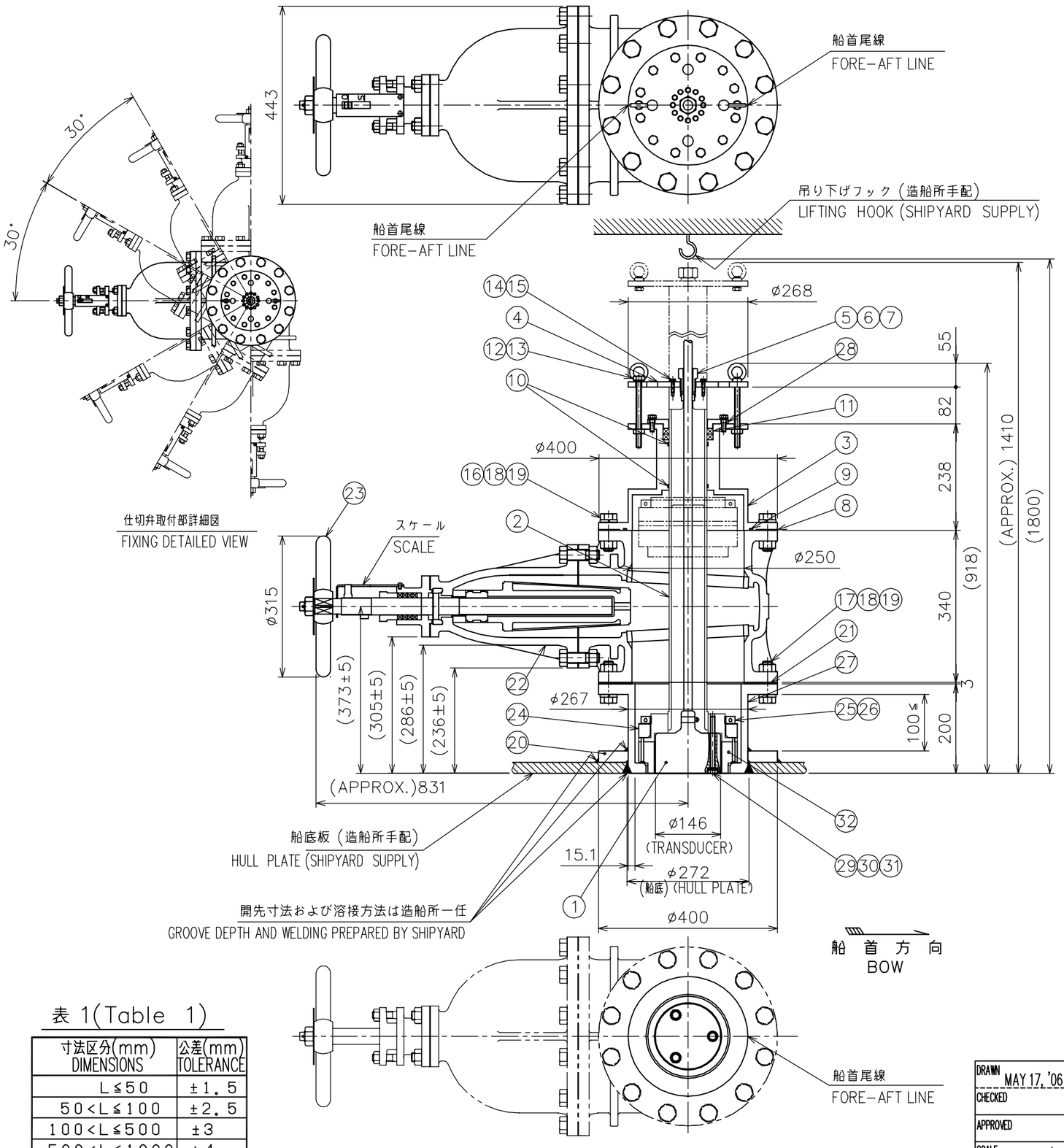


注記

1. 底上げタンク㉗、送受波器①の船首－船尾方向、水平方向の各取付誤差は±1度以内としてください。
2. 仕切り弁㉒を取付ける際はナット⑲の回り止め対策として、ボルト⑯⑰及びナット⑲を脱脂後、#271を塗布して完全に締めること。
3. 仕切り弁部以外の部分は 4.9×10^5 Pa の水圧試験がされています。
4. 仕切り弁㉒は、30°ピッチで任意の方向に取付け可能です。
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。
6. 指定外の寸法公差は表1の通り。

NOTES

1. WELD SPACER ㉗ TO HULL PLATE AND MOUNT TRANSDUCER ① WITHIN ±1 DEGREE OF FORE-AFT LINE AND WITHIN ±1 DEGREE IN HORIZONTAL DIRECTION.
2. BEFORE TIGHTENING NUTS ⑲, CLEAN BOLTS ⑯ ⑰ AND NUTS ⑲ WITH SOLVENT AND COAT PART OF THREADS WHICH CONTACT NUT WITH LOCTITE #271, TO PREVENT NUT FROM LOOSENING.
3. SEACHEST EXCEPT GATE VALVE IS TESTED UNDER 4.9×10^5 Pa WATER PRESSURE.
4. GATE VALVE ㉒ CAN BE ATTACHED IN THE ANY DIRECTION IN 30° PITCH .
5. THE TRANSDUCER FACE IS COATED WITH MARINESTAR20, DO NOT APPLY OTHER TYPE OF PAINT.
6. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS WHICH IS NOT SPECIFIED.

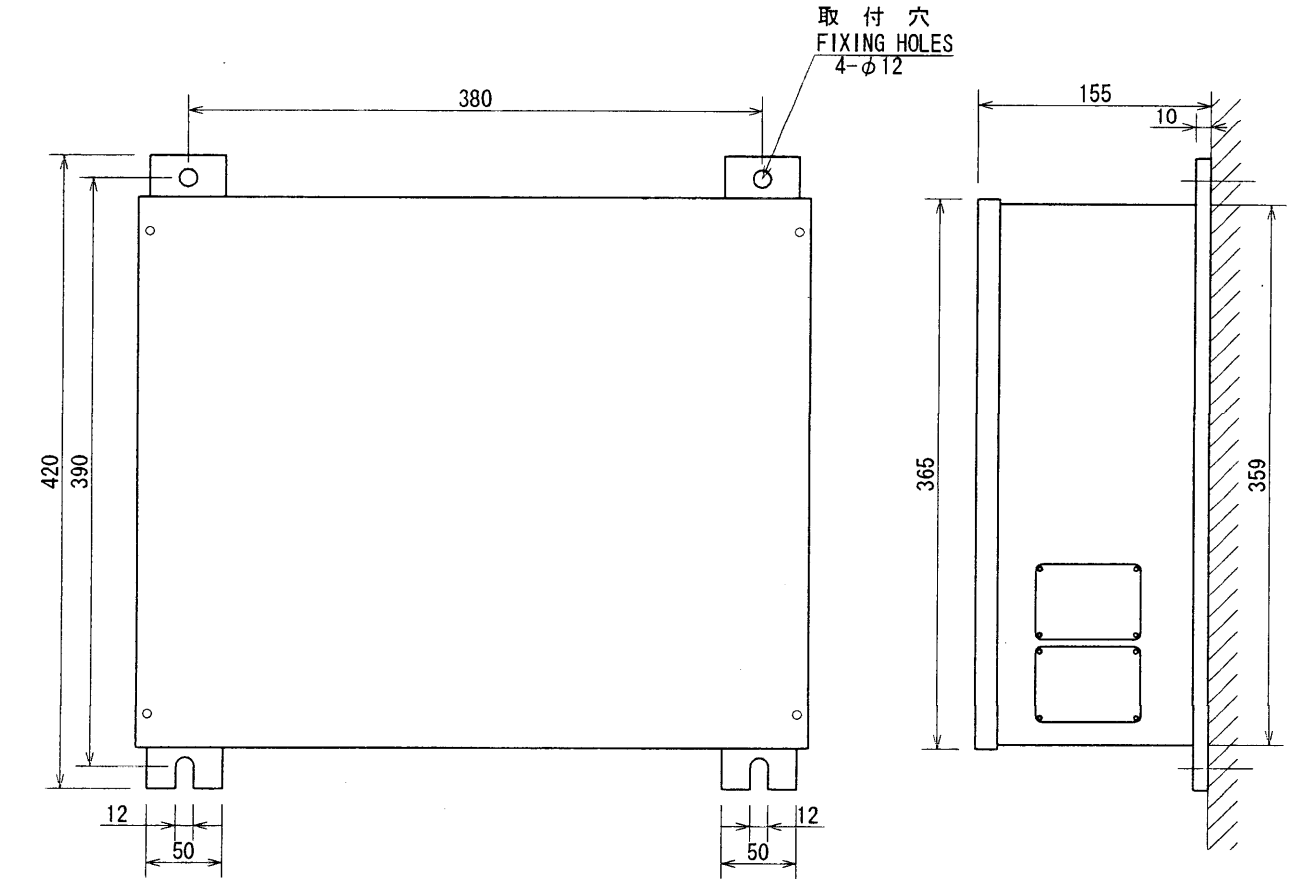
ITEM	NAME	MATERIAL	Q'TY	DWG.NO.	REMARKS
32	HEAD CAP	SUS316L	1	65-005-8104	
31	FLAT WASHER M10	SUS316L	3		
30	SPRING WASHER M10	SUS316L	3		
29	BOLT M10×120	SUS316L	3		
28	COTTON CONTROL	SUS316L	1	65-002-1011	
27	SPACER ZINC RICH PRIMER	KSTPG370	1	65-005-8101	船級認定材 CLASSIFICATION SOCIETY APPROVED MATERIAL
26	CLAMP BAND	SUS316L	2	65-002-1021	
25	CLAMP PIN	SUS316L	2	65-002-1024	
24	ANTI-CORROSIVE ZINC	ZAP	2	65-002-1022/28	
23	HANDLE	FC20	1		
22	GATE VALVE ZINC RICH PRIMER	SC480	1	65-005-8111 (JIS F 7366-250S)	船級認定品 CLASSIFICATION SOCIETY APPROVED
21	GASKET	JOINT SHEET	1	65-002-1003	t=3mm
20	DOUBLING PLATE ZINC RICH PRIMER	KA	1	65-005-8102	船級認定材 CLASSIFICATION SOCIETY APPROVED MATERIAL
19	NUT M22	SUS316L	24		
18	SPRING WASHER M22	SUS316L	24		
17	BOLT M22×80	SUS316L	12		
16	BOLT M22×70	SUS316L	12		
15	SPRING WASHER M6	SUS316L	12		
14	BOLT M6×25	SUS316L	12		
13	SPRING WASHER M12	SUS316L	12		
12	BOLT M12×150	SUS316L	12		
11	GREASE COTTON			12.7 X 12.7	
10	O-RING	NBR	2	JIS B2401 G-85	
9	O-RING	NBR	1	JIS B2401 G-280	
8	GASKET	CR	1	65-002-1004	t=2mm
7	WASHER	SUS316L	1	66-017-1405	
6	PACKING	CR	1	VA-25	
5	FIXING GRAND	SUS316L	1	66-022-8003	
4	UPPER PLATE ZINC RICH PRIMER	SS400	1	65-002-1009	
3	SEACHEST CAP ZINC RICH PRIMER	KSTPG370	1	65-002-1005	船級認定材 CLASSIFICATION SOCIETY APPROVED MATERIAL
2	SHAFT	SUS316L	1	65-005-8105	
1	TRANSDUCER		1		DS-530

表 1(Table 1)

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

DRAWN MAY 17, '06 E. MIYOSHI		TITLE	DS-532
CHECKED TAKAHASHI. T		名称	ゲートバルブ式送受波器タンク（スペーサ付）
APPROVED Y. Hatai	DS-50		船底装備図
SCALE 1/10 MASS 400 ±10% kg	質量（①㉙㉚㉛を除く）(MASS WITHOUT ①㉙㉚㉛)	NAME	SEACHEST WITH GATE VALVE (W/ SPACER)
DWG No. C7241-G10- G	REG No. 65-005-812G-0		HULL UNIT INSTALLATION

FURUNO



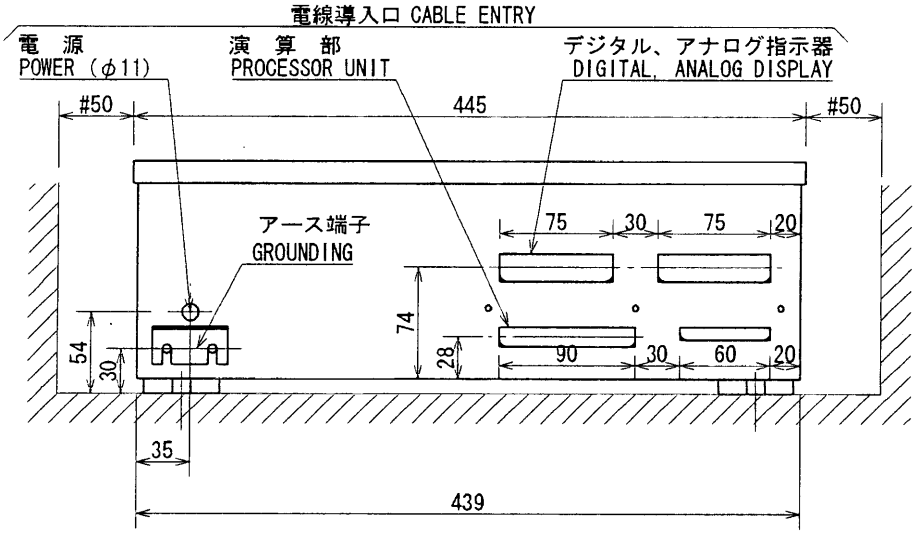


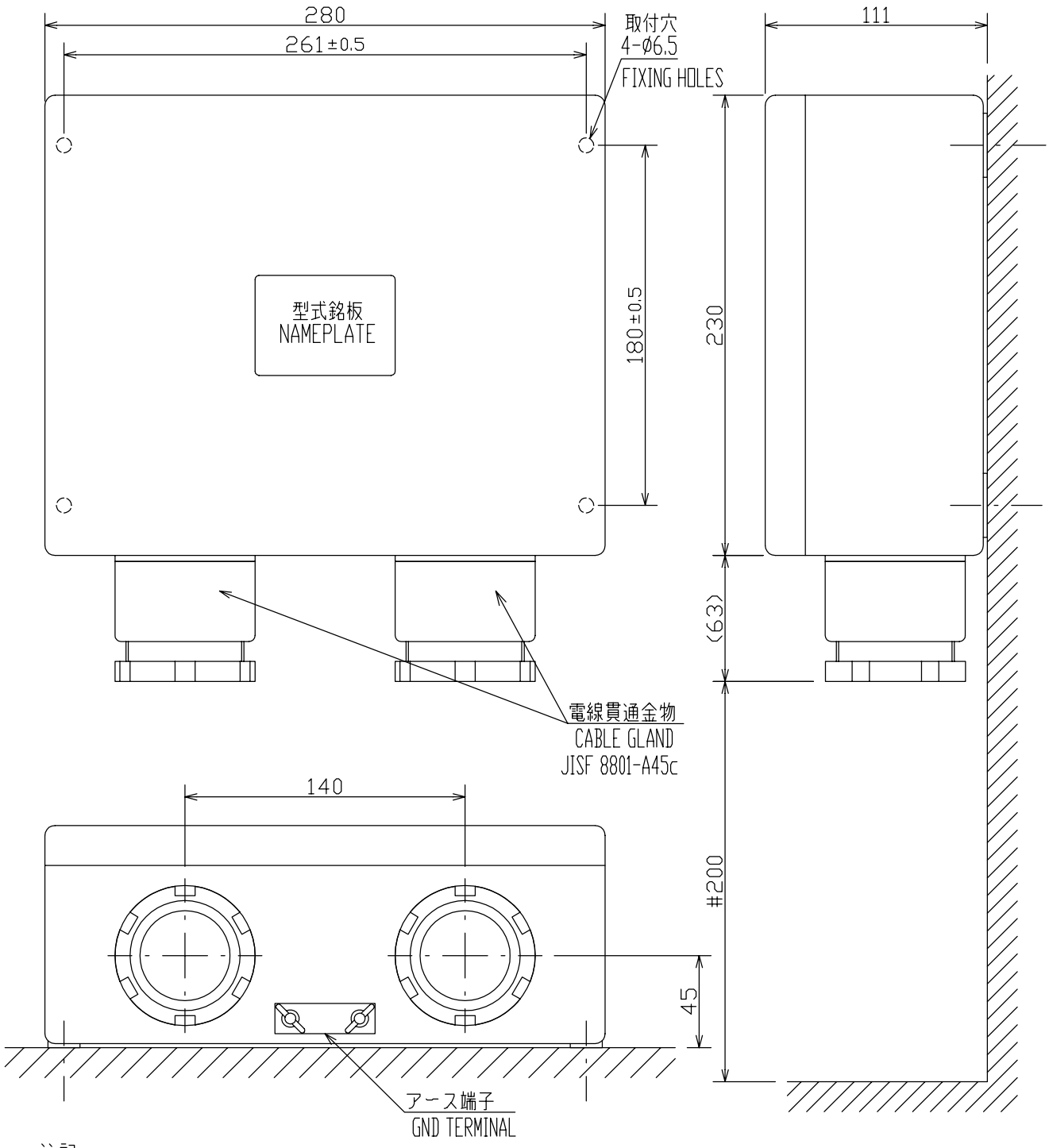
表1 TABLE 1

寸法区分(mm) DIMENSION	公差(mm) TOLERANCE
0 ＜ L ≦ 50	±1.5
50 ＜ L ≦ 100	±2.5
100 ＜ L ≦ 500	±3
500 ＜ L ≦ 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 T.K		名称 分配器
APPROVED July 27 '00 T.K		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 ≦ 50	±1.5
50 < L ≦ 100	±2.5
100 < L ≦ 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 ±10% kg
DWG.No.	C7236-G06- F	NAME	JUNCTION BOX
			OUTLINE DRAWING

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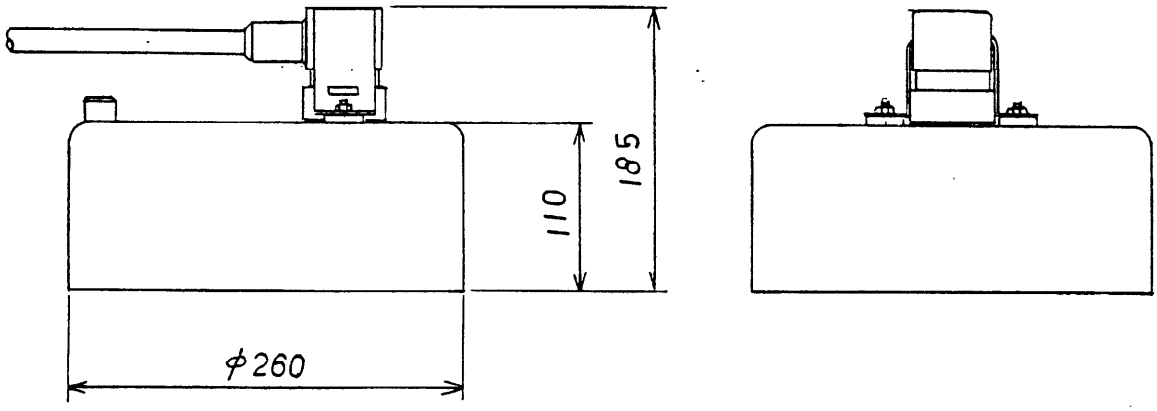

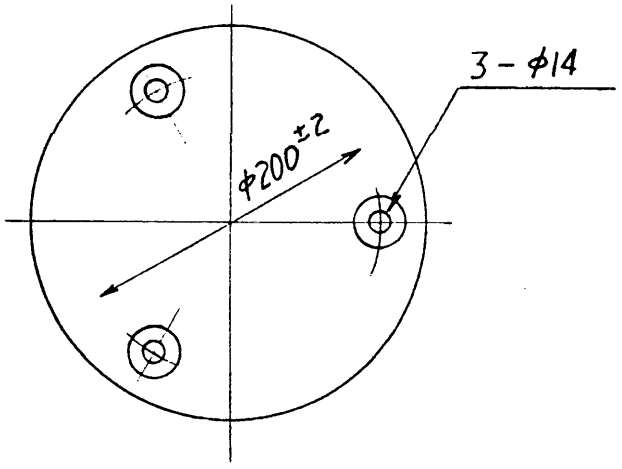

品番 ITEM	品名 NAME	材質 MATERIAL	数量 Q'TY	図番 DWG.NO.	摘要 REMARKS

承認 APPROVED	APR. 8 '92 TAKADO	三角法 THIRD ANGLE PROJECTION		名称 TITLE	DS-330 送受波器 TRANSDUCER
検図 CHECKED	APR. 8 '92 M. USUDA	尺度 SCALE	1/5		
製図 DRAWN	APR. 8 '92 TOMITA	重量 WEIGHT	9 kg (ケーブル含まず)	図番 DWG.NO.	C7236-G14-A

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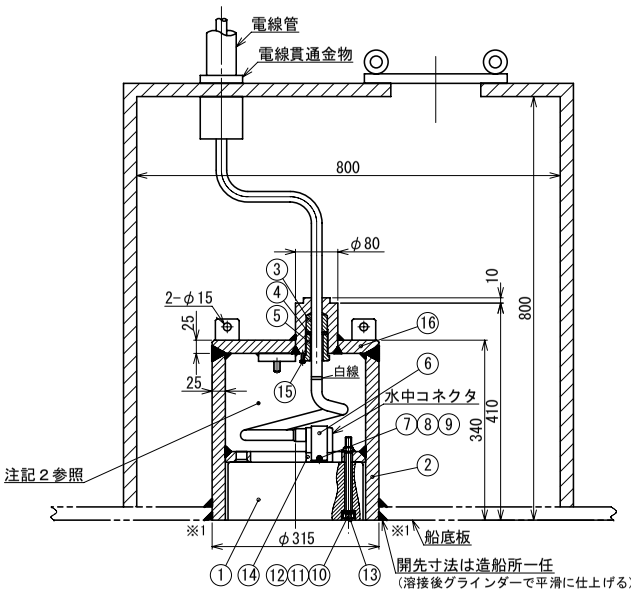
船底部装備要領



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25㎜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、下記の方法で工事してください。

- 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。
- 水平度：標準航行時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平度を水準器で測定してください。

測定機は送受波機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。

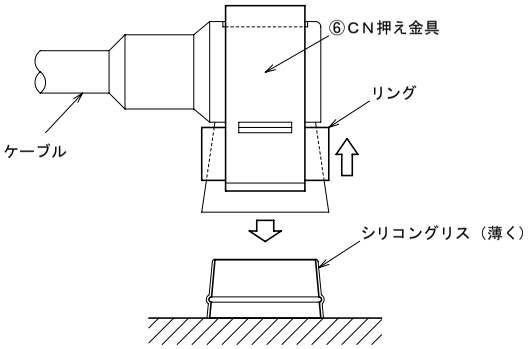
５）送受波器ケーブルの固定／接続

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⑮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上げた状態で当たるまで挿入し、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、ケーブルを捩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で締付け、シリコンシール剤を塗布して、ボルトキャップ⑬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[SGP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。

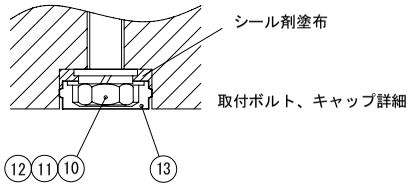
注記１）送受波器面には防汚塗料マリンスター20を塗布しています。これには船体用塗料を塗布しないでください。

９）装備後のチェック

送受波器の各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

注記２）送受波器タンク⑯およびボルト⑩穴の内部には、海水が入ります。これは異常ではありません。



DRAWN Jul. 26 '06 T. YAMASAKI			TITLE DS-330/331
CHECKED Jul. 26 '06 T. TAKENO			名称 船底部
APPROVED Jul. 27 '06 T. Matsuguchi	DS-30		装備要領
SCALE	MASS kg		NAME HULL UNIT
DWG No. J7236-Y10- J			INSTALLATION PROCEDURE

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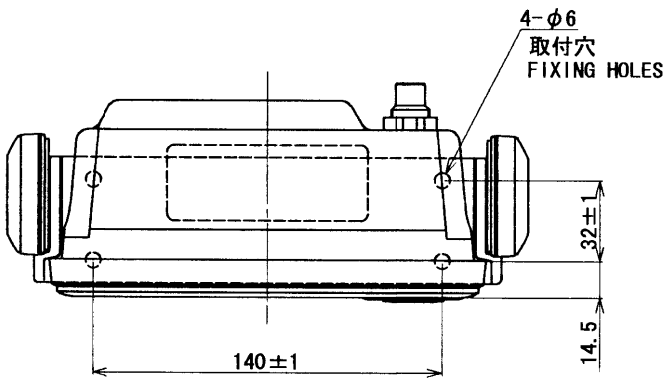
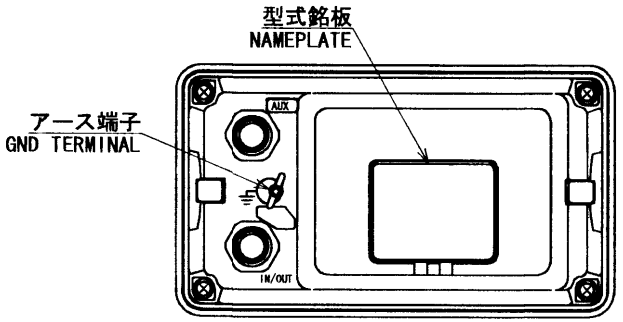
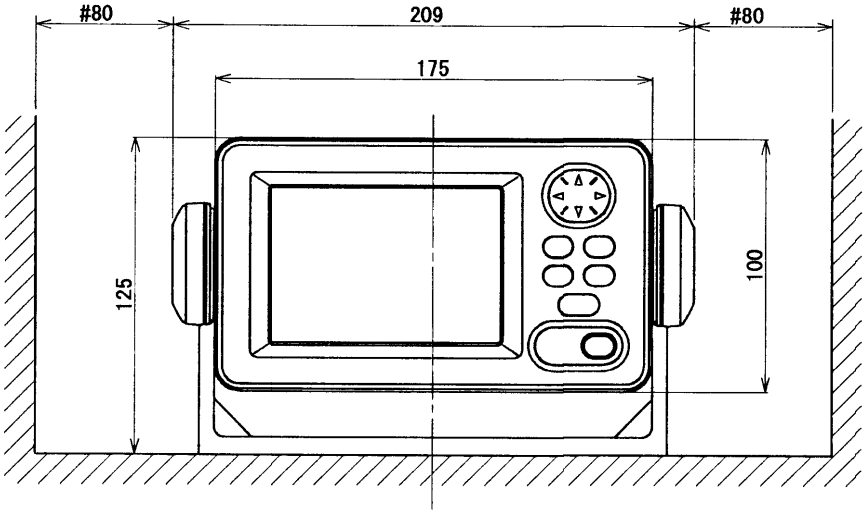


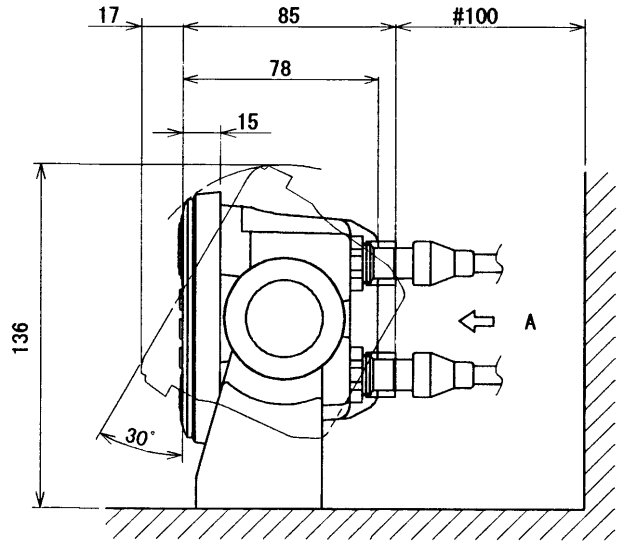


矢視 A
VIEW A

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

表 1
TABLE 1





注 記

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

NOTE

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

DRAWN Mar 17 '00 T.YAMASAKI			TITLE DS-800/830/840
CHECKED Mar 17 '00 T.Kono			名称 主指示器/デジタル指示器/航程計(卓上装備)
APPROVED Mar 17 '00 T.Kono	DS-80		外寸図
SCALE 1/3	MASS ±10% 0.60 kg		NAME DISPLAY UNIT (DESKTOP MOUNT) DIGITAL INDICATOR / DISTANCE INDICATOR
DWG. No. C7247-G01- D	65-007-1000-G2		OUTLINE DRAWING

FURUNO ELECTRIC CO., LTD.

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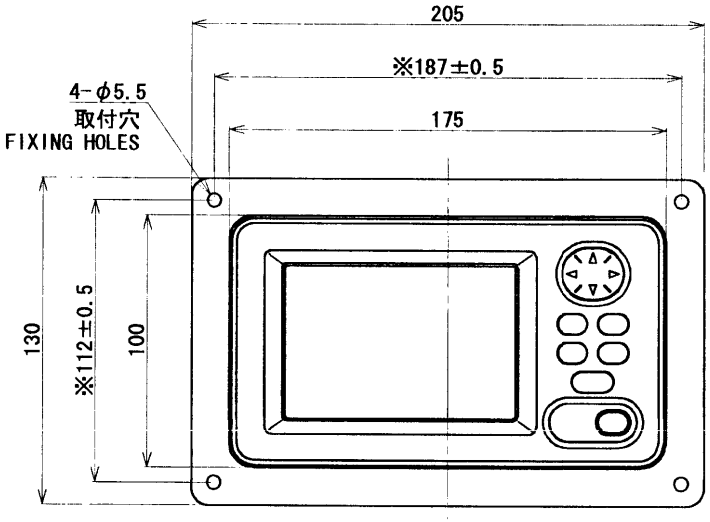
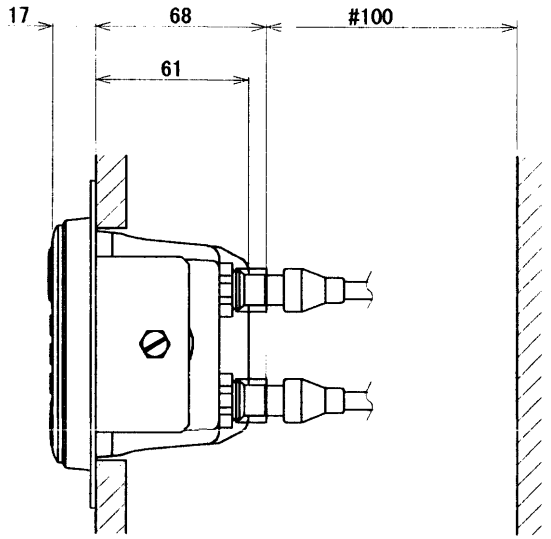
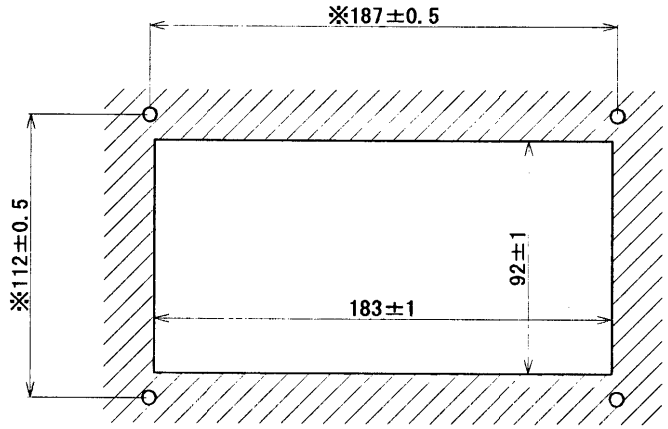




寸法区分 (mm) DIMENSION	公差 (mm) TOLERANCE
0 ＜ L ≦ 50	±1．5
50 ＜ L ≦ 100	±2．5
100 ＜ L ≦ 500	±3

表 1
TABLE 1



取付穴寸法図（参考図）
CUTOUT DIMENSIONS

注 記

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

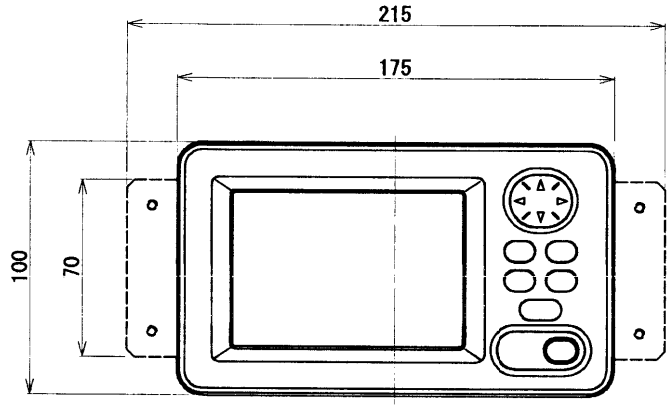
NOTE

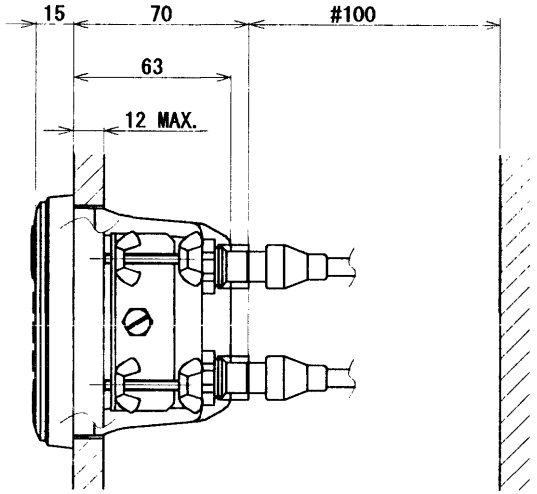
1. #: RECOMMENDED SERVICE CLEARANCE.
2. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS.
3. USE TAPPING SCREWS 5x20 FOR FIXING UNIT.
4. ※: DIMENSION OF FIXING HOLES PITCH.

DRAWN Mar 17 '00 T. YAMASAKI			TITLE DS-800/830/840
CHECKED Mar 17 '00 S. Kuwa			名称 主指示器/デジタル指示器/航程計(埋込装備F)
APPROVED Mar 17 '00 Y. Kuwa	DS-80		外寸図
SCALE 1/3	MASS ±10% 0.60 kg		NAME DISPLAY UNIT (FLASH MOUNT F) DIGITAL INDICATOR / DISTANCE INDICATOR
DWG. No. C7247-G02- D	65-007-1010-G2		OUTLINE DRAWING

FURUNO ELECTRIC CO., LTD.

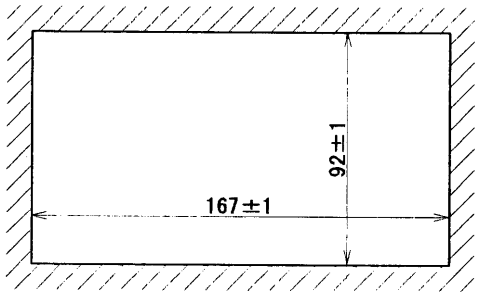
FURUNO





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

表 1
TABLE 1



取付穴寸法図（参考図）
CUTTING DIMENSIONS

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

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

DRAWN Mar.17'00 T.YAMASAKI		TITLE	DS-800/830/840
CHECKED Mar.'00 Y.Kuri		名称	主指示器/デジタル指示器/航程計(埋込装備S)
APPROVED Mar.'00 Y.Kuri	DS-80		外寸図
SCALE 1/3	MASS ±10% 0.58 kg	NAME	DISPLAY UNIT (FLASH MOUNT S) DIGITAL INDICATOR / DISTANCE INDICATOR
DWG. No. C7247-G03- D	65-007-1020-G2		OUTLINE DRAWING

FURUNO ELECTRIC CO., LTD.

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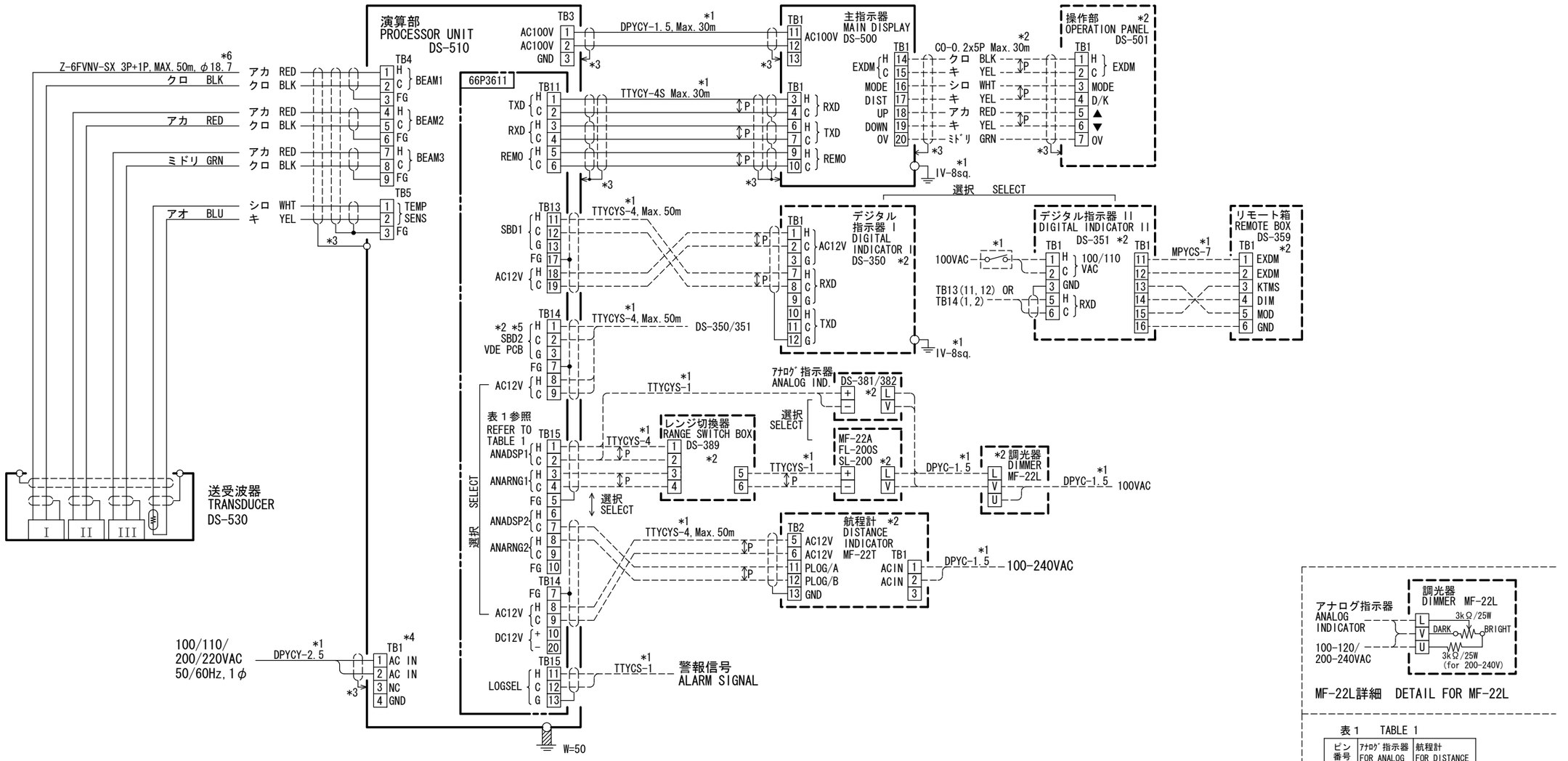


表１ TABLE 1

ピン番号 PIN NO.	ｱﾅﾛｸﾞ指示器 FOR ANALOG INDICATOR (DEFAULT)	航程計 FOR DISTANCE INDICATOR
1	ANADSP1H	DISTH
2	ANADSP1C	DISTC
3	ANARNG1H	BFOV
4	ANARNG1C	LOGARMH
5	FG	LOGARMC
6	ANADSP2H	BFOV
7	ANADSP2C	LOG400H
8	ANARNG2H	LOG400C
9	ANARNG2C	BFOV
10	FG	FG

ジャンパー設定で出力信号を選択。
SELECT OUTPUT SIGNAL BY JUMPER SETTINGS.
66P3611(JP4-JP7)

注記
＊１）造船所手配。
＊２）オプション。
＊３）ケーブルクランプで接地する。
＊４）船内電源に応じて変圧器の接続を変更する。
＊５）速度データ用電流信号出力にはオプションのVAE基板が必要。
＊６）ケーブルを途中で切断する場合は、接続箱CI-630（オプション）を使用する。

NOTE
*1: SHIPYARD SUPPLY.
*2: OPTION.
*3: GROUND THROUGH CABLE CLAMP.
*4: CHANGE CONNECTION ON TRANSFORMER TAP ACCORDING TO SHIP'S MAINS.
*5: CURRENT SIGNAL OF SPEED DATA REQUIRES VAE PCB (OPTION).
*6: USE JUNCTION BOX CI-630 (OPTION) TO CUT THE CABLE.

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

DRAWN 28/Apr/09 T.YAMASAKI			TITLE DS-50 (DS-510)
CHECKED 28/Apr/09 T.TAKENO			名前 ドップラスピードログ
APPROVED 9/Jun/09 R.Esumi			相互結線図
SCALE	MASS kg		NAME DOPPLER SPEED LOG
DWG.No. C7241-C02- P	REF.No. 66-022-0001-0		INTERCONNECTION DIAGRAM

FURUNO ELECTRIC CO., LTD.

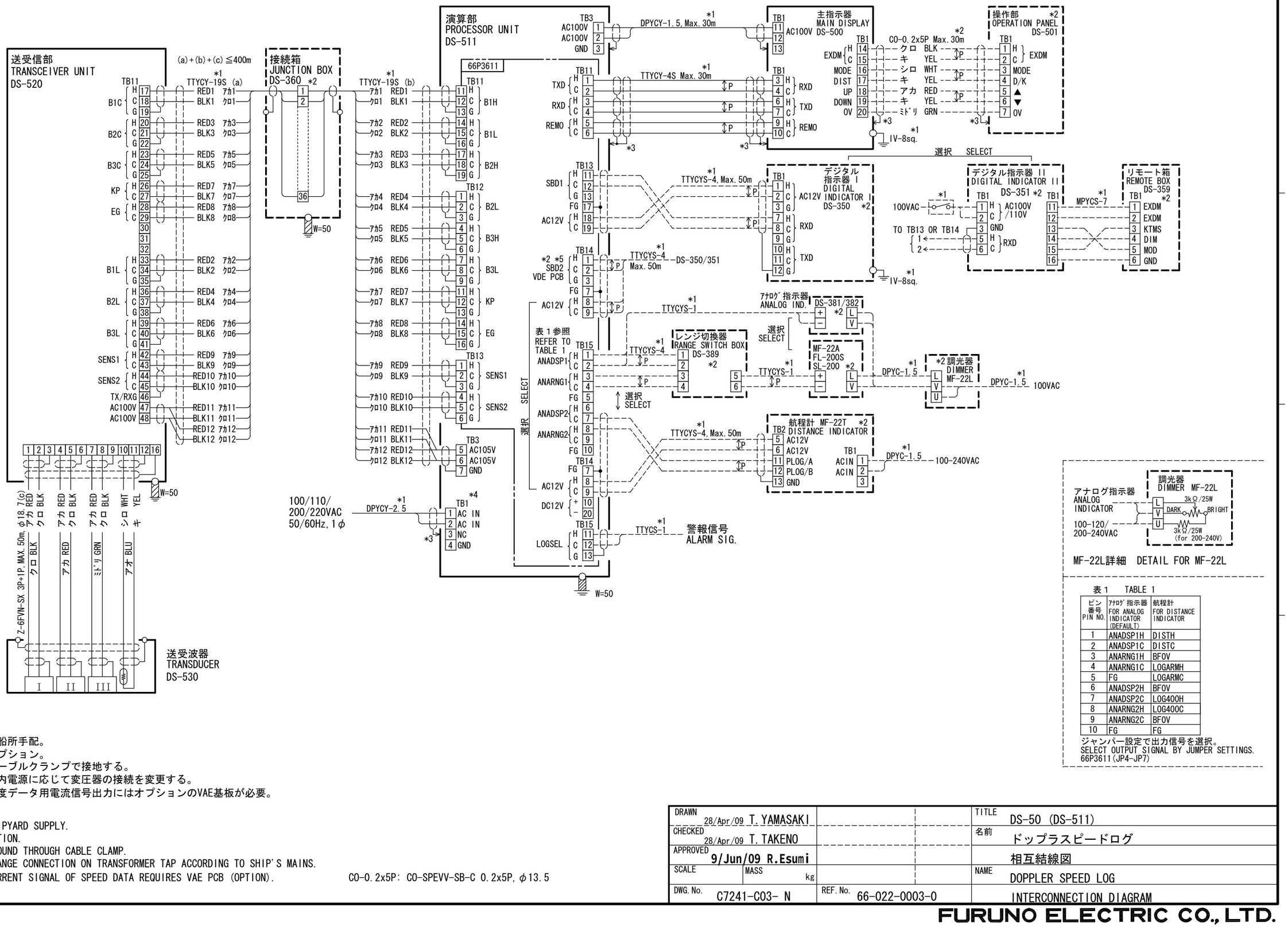


表1 TABLE 1

ピン番号 PIN NO.	アナログ指示器 FOR ANALOG INDICATOR (DEFAULT)	航程計 FOR DISTANCE INDICATOR
1	ANADSP1H	DISTH
2	ANADSP1C	DISTC
3	ANARNG1H	BFOV
4	ANARNG1C	LOGARMH
5	FG	LOGARMC
6	ANADSP2H	BFOV
7	ANADSP2C	LOG400H
8	ANARNG2H	LOG400C
9	ANARNG2C	BFOV
10	FG	FG

ジャンパー設定で出力信号を選択。
SELECT OUTPUT SIGNAL BY JUMPER SETTINGS.
66P3611(JP4-JP7)

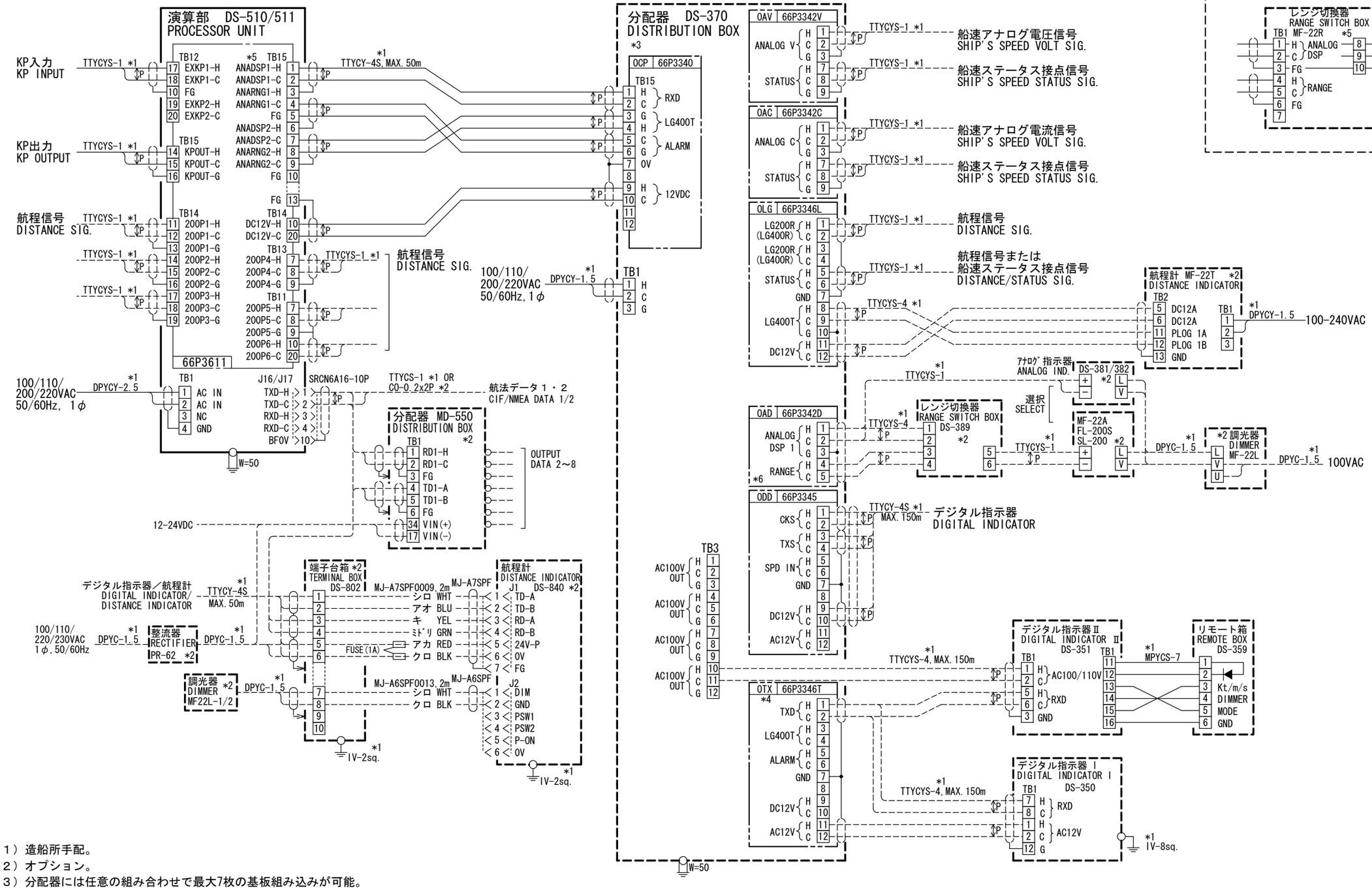
注記
*1) 造船所手配。
*2) オプション。
*3) ケーブルクランプで接地する。
*4) 船内電源に応じて変圧器の接続を変更する。
*5) 速度データ用電流信号出力にはオプションのVAE基板が必要。

NOTE
*1. SHIPYARD SUPPLY.
*2. OPTION.
*3. GROUND THROUGH CABLE CLAMP.
*4. CHANGE CONNECTION ON TRANSFORMER TAP ACCORDING TO SHIP'S MAINS.
*5. CURRENT SIGNAL OF SPEED DATA REQUIRES VAE PCB (OPTION).

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

DRAWN 28/Apr/09 T.YAMASAKI			TITLE DS-50 (DS-511)
CHECKED 28/Apr/09 T.TAKENO			名前 ドップラスピードログ
APPROVED 9/Jun/09 R.Esumi			相互結線図
SCALE	MASS kg		NAME DOPPLER SPEED LOG
DWG.No. C7241-C03- N		REF.No. 66-022-0003-0	INTERCONNECTION DIAGRAM

FURUNO ELECTRIC CO., LTD.



注記 ＊１）造船所手配。
＊２）オプション。
＊３）分配器には任意の組み合わせで最大7枚の基板組み込みが可能。
＊４）分配器を２個使用するときはOTX基板に接続する。
＊５）ジャンパー設定が必要。
＊６）２台目の指示器は#6～#8に接続する。

NOTE *1. SHIPYARD SUPPLY.
*2. OPTION.
*3. DISTRIBUTION BOX CAN INCORPORATE SEVEN BOARDS IN ANY COMBINATION.
*4. WHEN TWO DISTRIBUTION BOXES ARE USED, CONNECT ONE DIST. BOX TO "OTX" BOARD.
*5. JUMPER CONNECTION SETTING REQUIRED.
*6. USE #6 TO #8 FOR No.2 INDICATOR. CO-0.2x2P: CO-SPEVV-SB-C 0.2x2P, φ10.5

DRAWN 28/Apr/09 T.YAMASAKI		TITLE	DS-50 (DS-370)
CHECKED 28/Apr/09 T.TAKENO		名称	ドップラスピードログ
APPROVED 9/Jun/09 R.Esumi			相互結線図
SCALE	MASS kg	NAME	DOPPLER SPEED LOG
DWG.No. C7241-C04- J	REF.No. 66-022-0002- 0		INTERCONNECTION DIAGRAM

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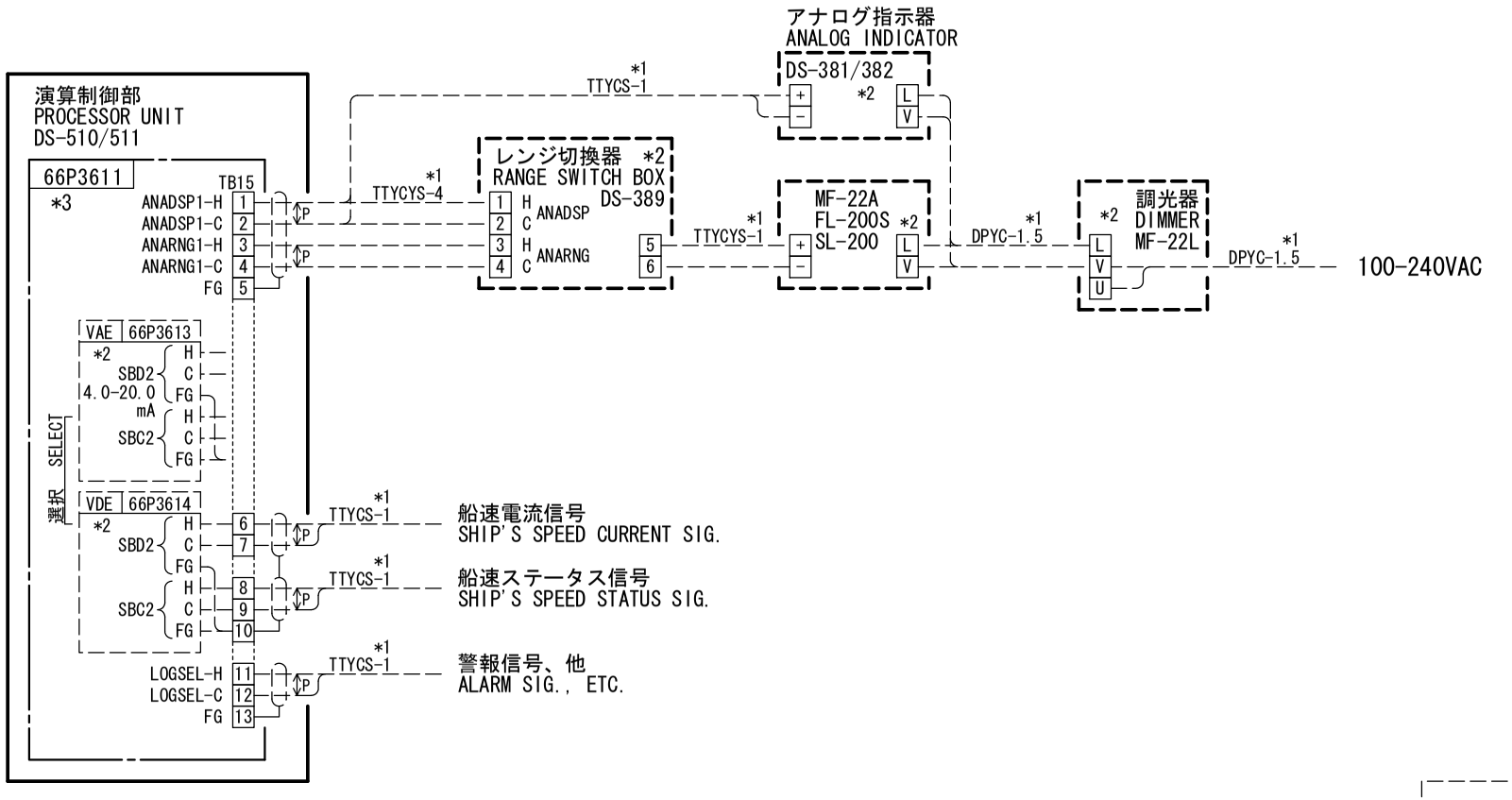

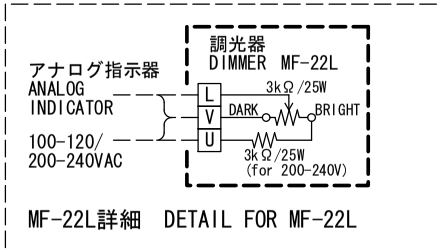

MF-22L詳細 DETAIL FOR MF-22L

注記
＊１）造船所手配。
＊２）オプション。
＊３）信号出力には内部設定変更が必要。

NOTE
*1: SHIPYARD SUPPLY.
*2. OPTION.
*3. SIGNAL OUTPUT REQUIRES MODIFICATION OF PCB SETTING.

DRAWN 28/Apr/09 T.YAMASAKI		TITLE	DS-50 (SPEED I/F)
CHECKED 28/Apr/09 T.TAKENO		名称	ドップラスピードログ（船速信号出力）
APPROVED 18/Jun/09 R.Esumi			相互結線図
SCALE / MASS kg		NAME	DOPPLER SPEED LOG (SPEED SIGNAL I/F)
DWG.No. C7241-C05- E	REF.No. 66-022-0004- 0		INTERCONNECTION DIAGRAM

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