

# *Installation Manual*

## **RADAR SENSOR**

### **DRS2D/DRS4D/ DRS4A/DRS6A/DRS12A/DRS25A**

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# ⚠ SAFETY INSTRUCTIONS

## ⚠ WARNING



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

Only qualified personnel should work inside the equipment.



**Wear a safety belt and hard hat when working on the antenna unit.**

Serious injury or death can result if someone falls from the radar mast.



**Construct a suitable service platform from which to install the antenna unit.**

Serious injury or death can result if the power is left on or is applied while the equipment is being installed.



**Turn off the power at the mains switch-board before beginning the installation.**

Fire, electrical shock or serious injury can result if the power is left on or is applied while the equipment is being installed.

## ⚠ CAUTION



**Ground the equipment to prevent electrical shock and mutual interference.**

**Observe the following compass safe distance to prevent deviation of a magnetic compass.**

Model	Standard	Steering
DRS4A	0.80 m	0.50 m
DRS6A	0.85 m	0.55 m
DRS12A	1.15 m	0.70 m
DRS25A	1.00 m	0.60 m
DRS2D	1.35 m	0.80 m
DRS4D	1.40 m	0.85 m
PSU-012	0.30 m	0.30 m
PSU-013	0.30 m	0.30 m

## ⚠ WARNING

### Radio Frequency Radiation Hazard



The radar antenna emits electromagnetic radio frequency (RF) energy which can be harmful, particularly to your eyes. Never look directly into the antenna aperture from a close distance while the radar is in operation or expose yourself to the transmitting antenna at a close distance.

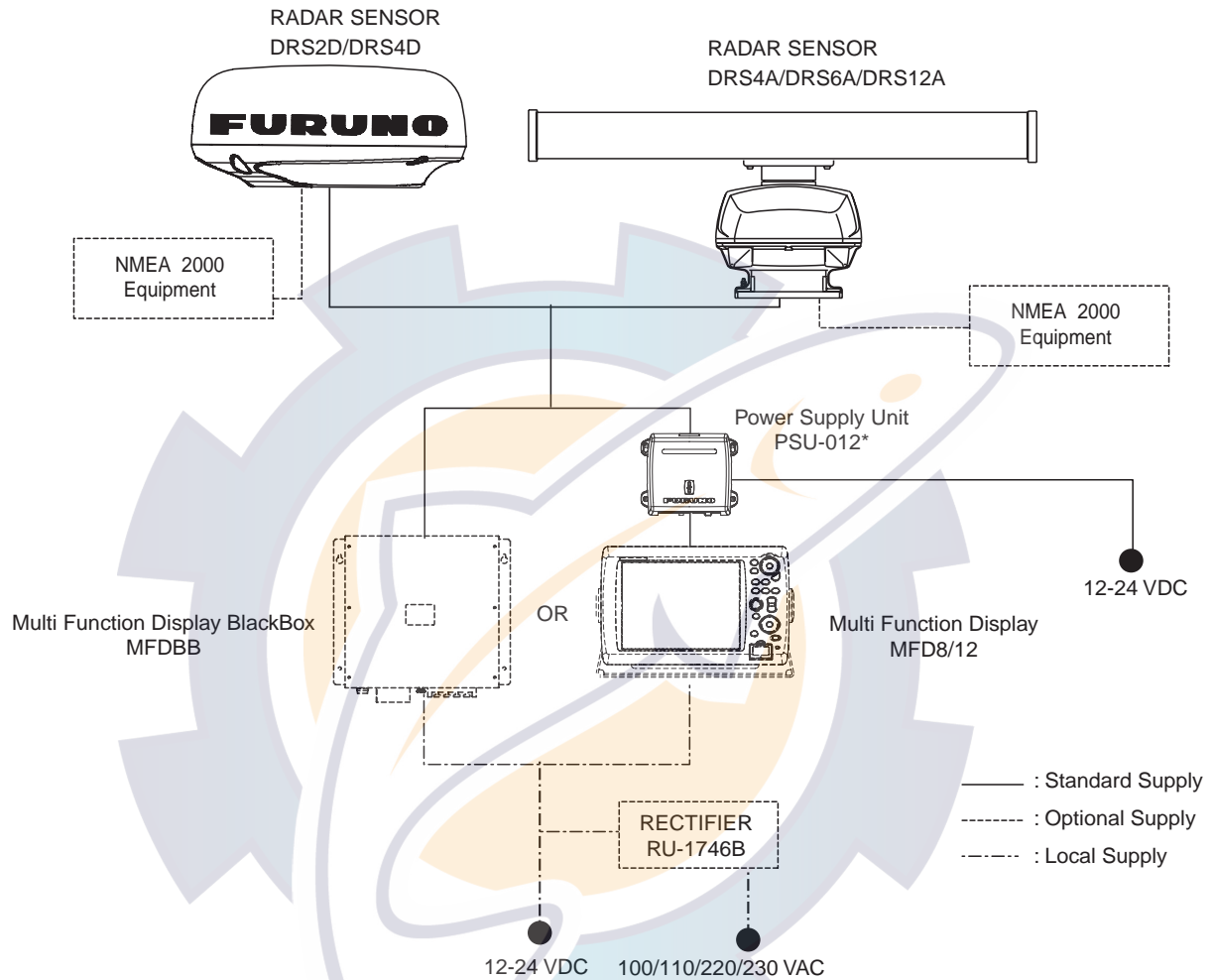
Distances at which RF radiation levels of 100 and 10 W/m<sup>2</sup> exist are given in the table below.

**Note:** If the antenna unit is installed at a close distance in front of the wheel house, your administration may require halt of transmission within a certain sector of antenna revolution. This is possible - Ask your FURUNO representative or dealer to provide this feature.

Model	Distance to 100 W/m <sup>2</sup> point	Distance to 10 W/m <sup>2</sup> point
DRS4A	Nil	1.20 m
DRS6A	Nil	1.20 m
DRS12A (XN12A)	0.20 m	2.40 m
DRS12A (XN13A)	0.20 m	1.90 m
DRS25A (XN12A)	0.50 m	5.30 m
DRS25A (XN13A)	0.40 m	4.40 m
DRS2D	Nil	0.40 m
DRS4D	0.10 m	1.40 m

# SYSTEM CONFIGURATION

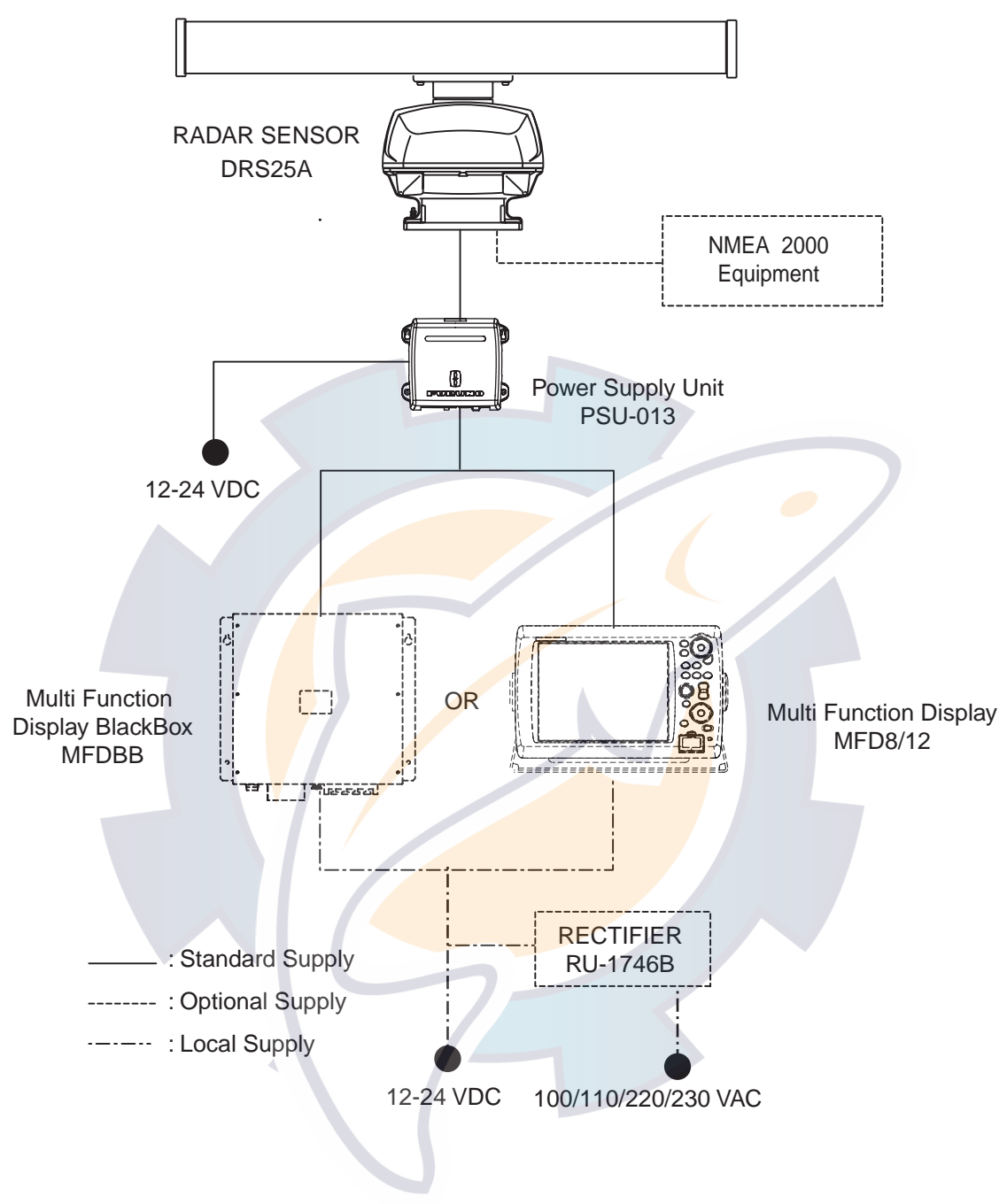
## DRS2D/4D/4A/6A/12A



\*The power supply unit PSU-012 is necessary in the combination of radar sensor and MFD.

	DRS2D/4D	DRS4A	DRS6A	DRS12A (future development)
MFD8	NO	YES	YES	YES
MFD12	NO	NO	NO	YES
MFDBB	NO	NO	NO	NO

**DRS25A**



# EQUIPMENT LISTS

## Standard supply

Name	Type	Code No.	Qty	Remarks
Radar Sensor	XN10A-RSB-118-092	-	1	For DRS4A, w/CP03-32601
	XN12A-RSB-118-093		1	For DRS6A, w/CP03-32601
	XN12A-RSB-118-094	-	1	For DRS12A, 1255 mm, w/CP03-32601
	XN13A-RSB-118-094		1	For DRS12A, 1795 mm, w/CP03-32601
	XN12A-RSB-118-095	-	1	For DRS25A, 1255 mm, w/CP03-32601
	XN13A-RSB-118-095	-	1	For DRS25A, 1795 mm, w/CP03-32601
	DRS2D	-	1	Radome, 2 kW, w/CP03-32101
	DRS4D	-	1	Radome, 4 kW, w/CP03-32101
Power Supply Unit	PSU-013	-	1	For DRS25A, w/SP03-16101 and CP03-32700
Installation Materials	CP03-32101	001-025-270	1 set	For DRS2D/4D
	CP03-32601	001-025-780	1 set	For DRS4A/6A/12A/25A
	CP03-32200	000-011-720	1	Two-way cable, MOD-ASW0001-100+, 10 m, for DRS2D/4D/4A/6A/12A
	CP03-32300	000-011-721		Two-way cable, MOD-ASW0001-150+, 15 m, for DRS2D/4D/4A/6A/12A
	CP03-32400	000-011-722		Two-way cable, MOD-ASW0001-200+, 20 m, for DRS2D/4D/4A/6A/12A
	CP03-32500	000-011-723		Two-way cable, MOD-ASW0001-300+, 30 m, for DRS2D/4D/4A/6A/12A
	CP03-32800	000-011-990		Two-way cable, MOD-ASW0002-100+, 10 m, for DRS25A
	CP03-32810	000-011-991		Two-way cable, MOD-ASW0002-150+, 15 m, for DRS25A
	CP03-32820	000-011-992		Two-way cable, MOD-ASW0002-200+, 20 m, for DRS25A
	CP03-32830	000-011-993		Two-way cable, MOD-ASW0002-300+, 30 m, for DRS25A

**Optional supply**

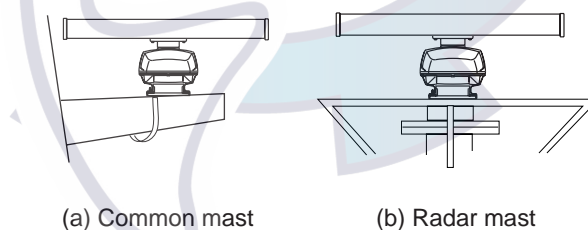
Name	Type	Code No.	Qty	Remarks
Power Supply Unit	PSU-012	-	1 set	
Gasket	OP03-203	001-025-290	1	For DRS2D/4D, 10 NMEA2000 cable
	OP03-205	001-025-790		For DRS4A/6A, 10 NMEA2000 cable
	OP03-206	001-035-290		For DRS25A, 10 NMEA2000 cable
Resister Assy	OP03-204	001-025-300	1	For NMEA2000 connection with a unit
Joint Box	TL-CAT-012	000-167-140-10	1	For LAN cable extension
LAN Cable	MOD-Z072-020+	000-167-175-10	1	2 m
	MOD-Z072-050+	000-167-176-10	1	5 m
	MOD-Z072-100+	000-167-177-10	1	10 m
Cable Assy	M12-05BFFM-010	000-167-965-10	1	NMEA2000, 6, w/connector, 1 m
	M12-05BFFM-020	000-167-966-10	1	NMEA2000, 6, w/connector, 2 m
	M12-05BFFM-060	000-167-967-10	1	NMEA2000, 6, w/connector, 6 m
	CB-05BFFM-010	000-167-971-10	1	NMEA2000, 10, w/connector, 1 m
	CB-05BFFM-020	000-167-972-10	1	NMEA2000, 10, w/connector, 2 m
	CB-05BFFM-060	000-167-973-10	1	NMEA2000, 10, w/connector, 6 m

# 1. MOUNTING

## 1.1 Mounting Considerations

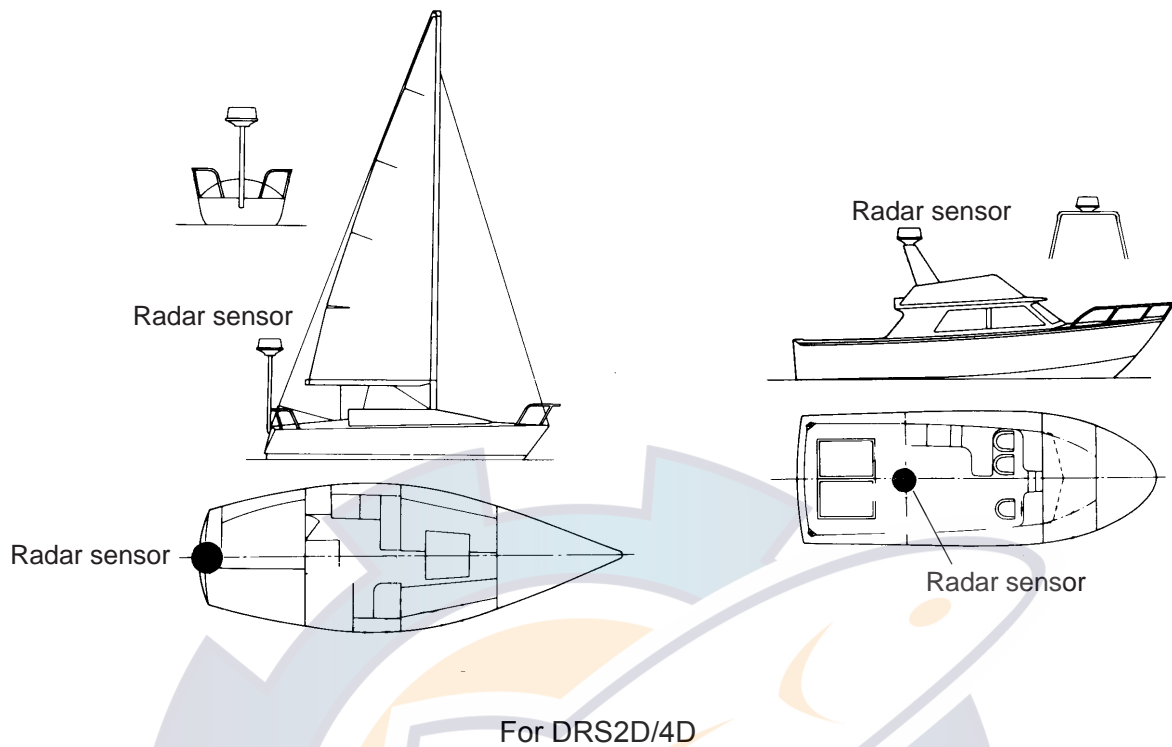
- The radar sensor is generally installed either on top of the wheelhouse or on the radar mast on a suitable platform. Locate the radar sensor where there is a good all-round view. Any obstruction will cause shadow and blind sectors. A mast for instance, with a diameter considerably less than the horizontal beamwidth of the radiator, will cause only a small blind sector, but a horizontal spreader or crosstrees in the same horizontal plane as the radar sensor would be a much more serious obstruction; you would need to place the radar sensor well above or below it.
- It is rarely possible to place the radar sensor where a completely clear view in all directions is available. Thus, you should determine the angular width and relative bearing of any shadow sectors for their influence on the radar at the first opportunity after fitting.
- A magnetic compass will be affected if the radar sensor is placed too close to it. Observe the compass safe distances mentioned in the SAFETY INSTRUCTIONS to prevent interference to a magnetic compass.
- Do not paint the radiator aperture and radome to ensure proper emission of the radar waves.
- When this radar sensor is to be installed on large vessels, consider the following points:
  - The two-way cable run between the radar sensor and MFDBB, MFD8, MFD12 or PSU-012 comes in lengths of 10 m, 15 m, 20 m or 30 m.
  - Deposits and fumes from a funnel or other exhaust vent can adversely affect the aerial performance and hot gases may distort the radiator portion. The radar sensor must not be mounted where the temperature is more than 55 degrees centigrade.

As shown in the figure below, the radar sensor may be installed on a common mast or on the radar mast.



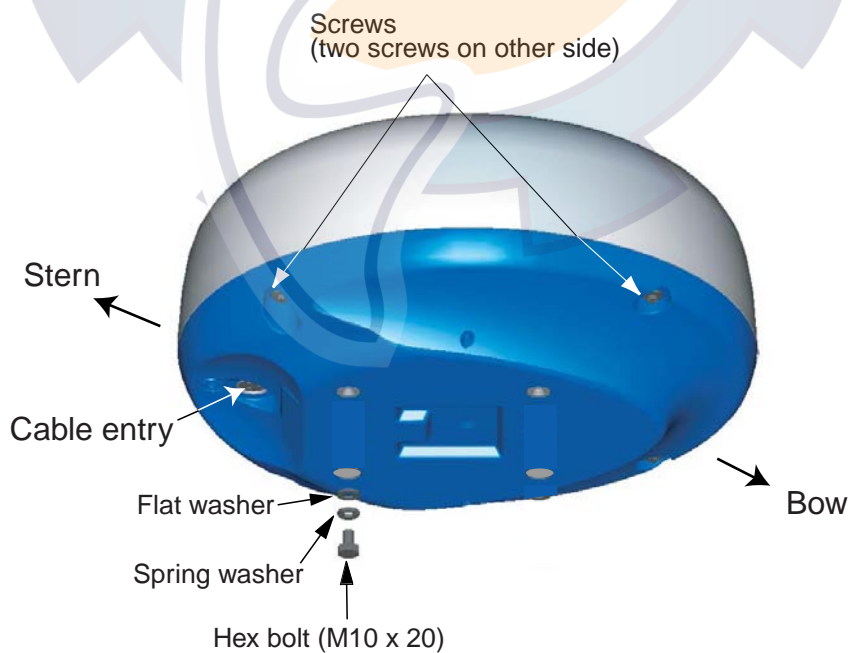
For DRS4A/6A/12A





## 1.2 Mounting Procedure for DRS2D/4D

1. Remove mounting hardware at the bottom of the radar sensor, four each of hex bolts (M10x20), spring washers and flat washers. Save the spring washers and flat washers to use them to fix the radome base to the platform, at step 3. If the thickness of the mounting platform is 5 mm or less, also save the bolts.

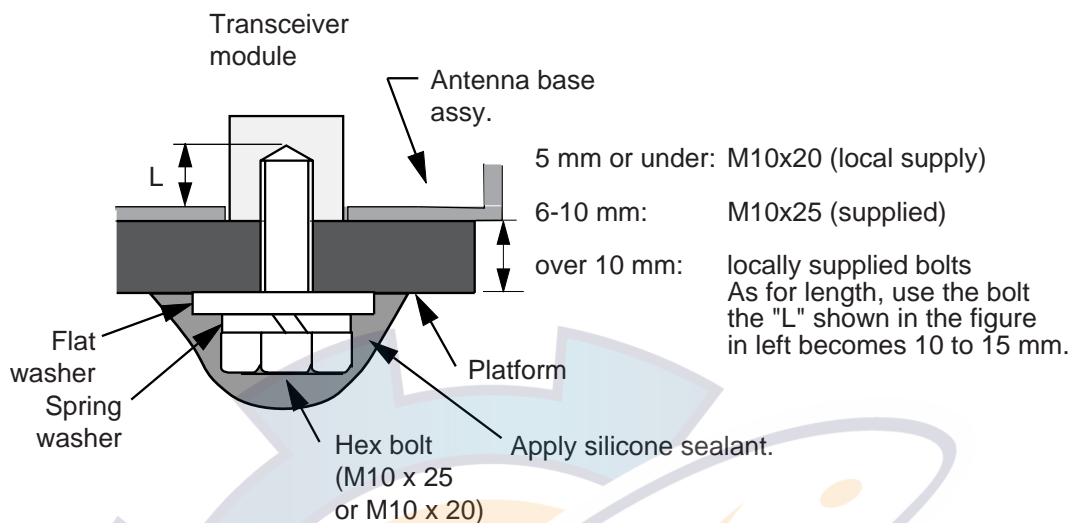


2. Construct a platform (steel or aluminum) 6-10 mm in thickness referring to the outline drawing at the back of this manual. Fasten the platform to the mounting location. Next, position the base so the cable entrance is facing the stern.

**Note:** When drilling holes in the platform, be sure they are parallel with the fore and aft line.

3. Use the hex bolts\*, flat washers and spring washers removed at step 1, and fasten the radome base to the platform. The torque should be between 19.6-24.5N•m.

\*If the thickness of the platform is 6-10 mm, use M10x25 bolts (supplied). For thicker platform, use locally supplied bolts.



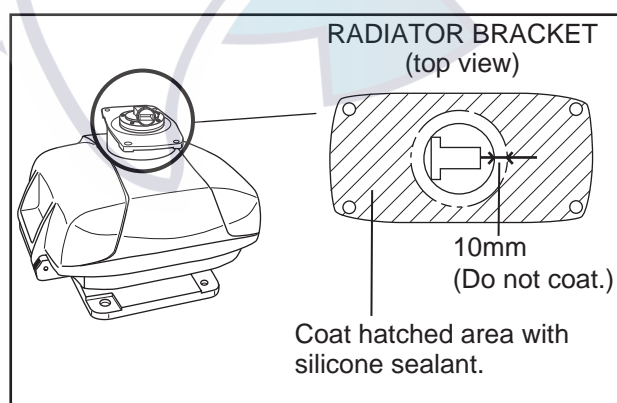
4. Mount the cover tentatively. The cover is opened for wiring at Chapter 2.

## 1.3 Mounting Procedure for DRS4A/6A/12A/25A

Refer to the outline drawing at the back of this manual, and drill five holes in the mounting platform: four holes of 15 mm in diameter for fixing the radar sensor and one hole of 25-30 mm in diameter for the signal cable. The outline drawing shows two cable entrance holes, one on the radar sensor and one on the rubber mat. Use only the one on the rubber mat.

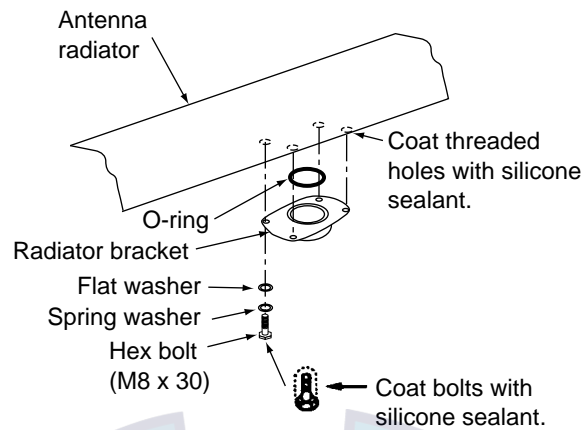
### 1.3.1 Fastening the radiator to the radiator bracket

1. Remove the radiator cap from the radiator bracket.
2. Coat the surface of the radiator bracket with silicone sealant as shown in the figure below.



3. Coat threaded holes on the antenna radiator with silicone sealant.
4. Grease the O-ring and set it to the radiator bracket.

5. Coat the hex bolts (4 pcs.) with silicone sealant. Fasten the antenna radiator to the radiator bracket with the hex bolts, flat washers and spring washers supplied with the radiator.



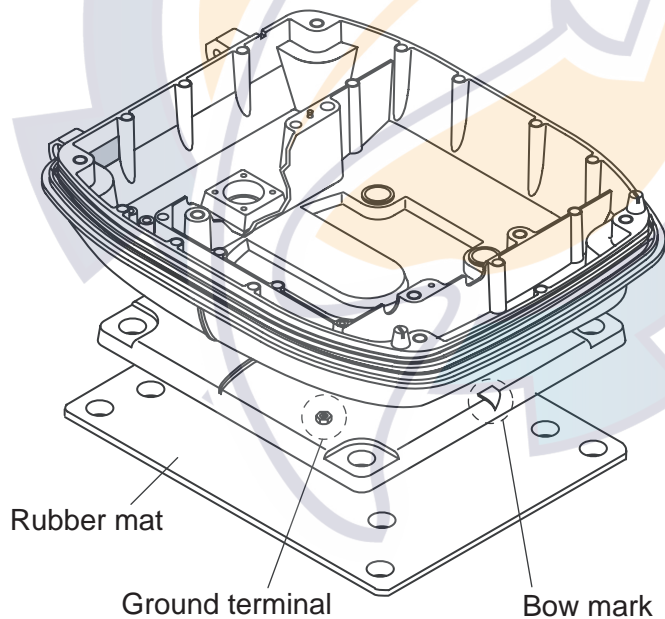
### 1.3.2 Mounting the radar sensor

The radar sensor can be mounted using the fixing holes on the outside (200 x 200 mm) or inside (140 x 150 mm) the radar sensor.

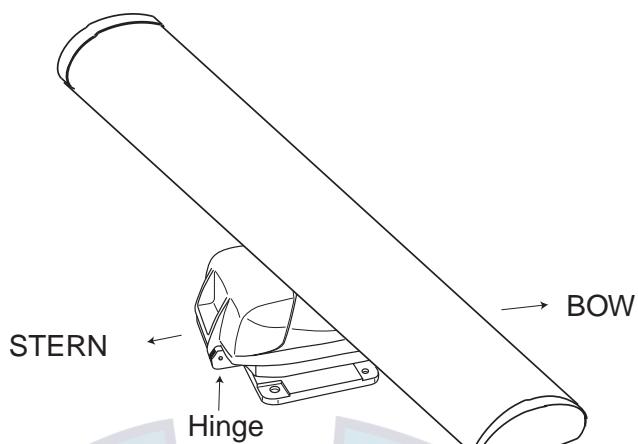
#### Using outside fixing holes of radar sensor

Use the hex bolts (supplied) to mount the radar sensor as below.

1. Lay the corrosion-proof rubber mat (supplied) on the mounting platform.



2. Lay the radar sensor on the mounting platform, orienting it as shown below. (The hinges must face toward the stern.)

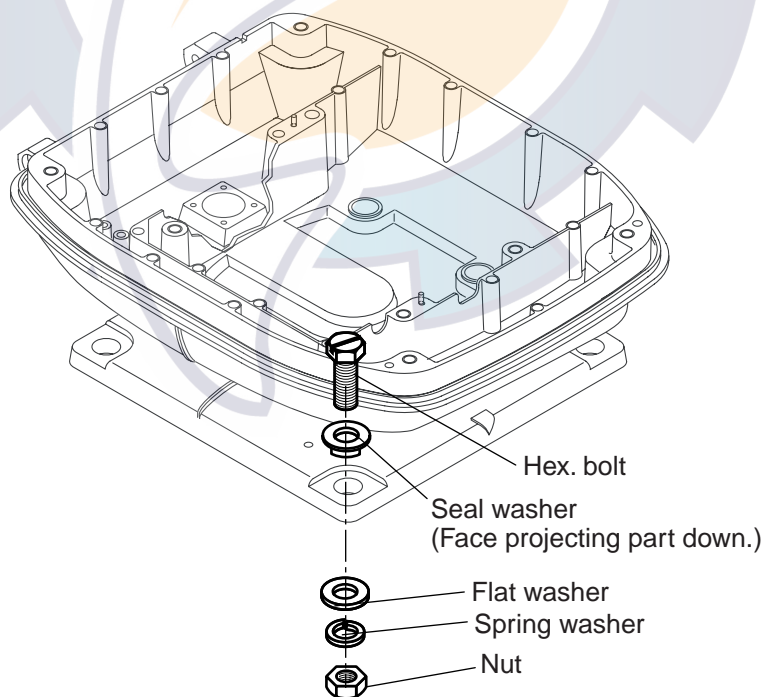


**⚠ CAUTION**

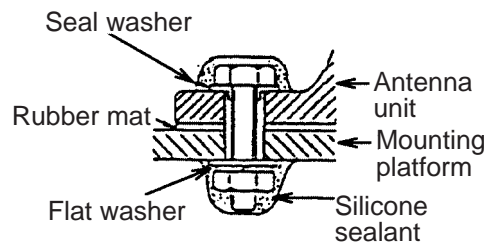
**Do not lift the radar sensor by the radiator; lift it by the housing.**

The radiator may be damaged.

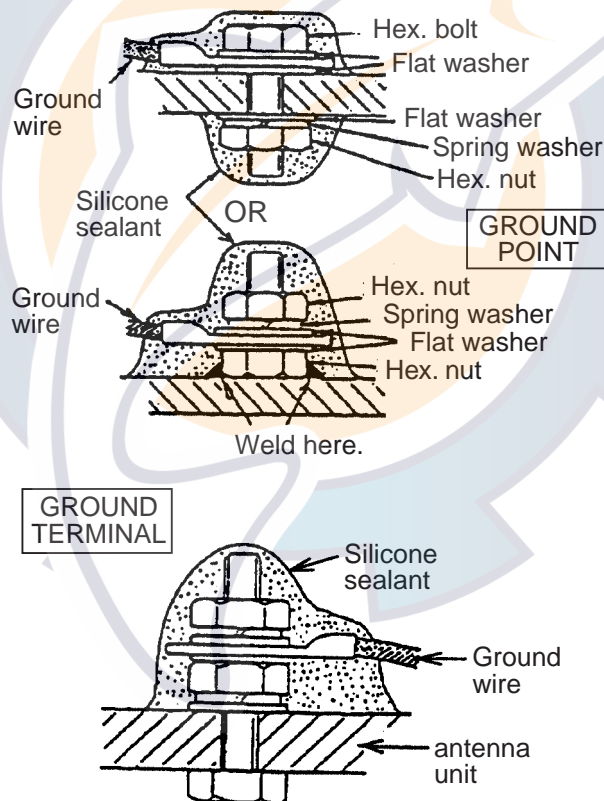
3. Insert four hex bolts (M12 x 60, supplied) and seal washers (φ30, supplied) from the top of the housing, as shown below.



4. Pass flat washers (M12, supplied), spring washers (M12, supplied) and nuts (M12, supplied) onto hex. bolts. Fasten by tightening nuts. Do not fasten by tightening the hex. bolts; seal washers may be damaged.



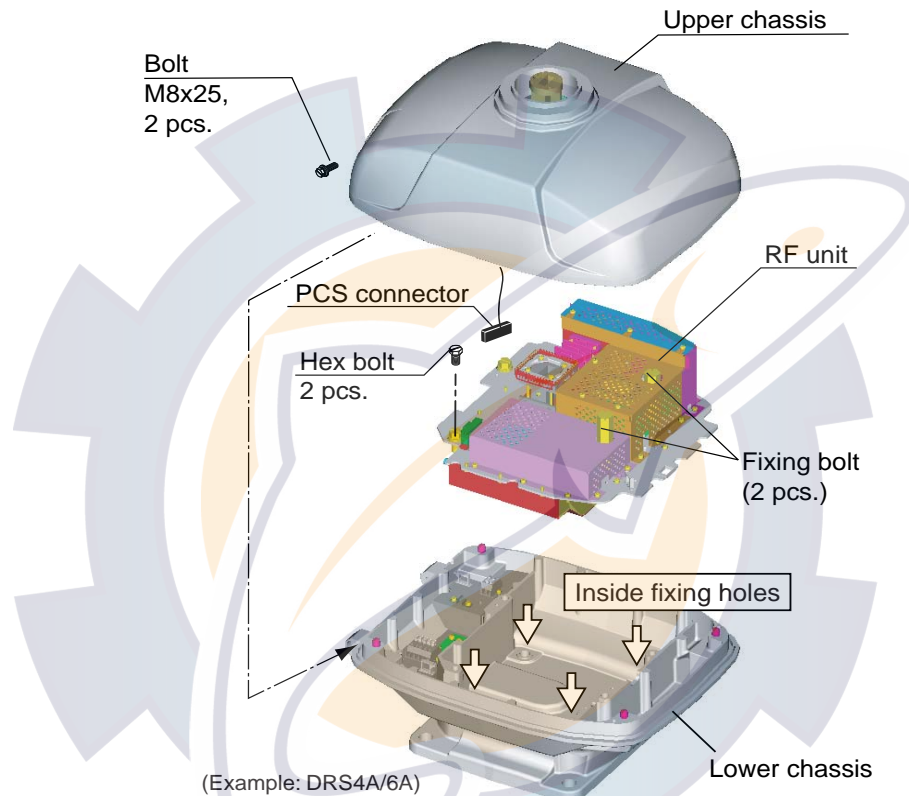
5. Coat flat washers, spring washers, nuts and exposed parts of bolts with anticorrosive sealant.
6. Prepare ground point in mounting platform (within 300 mm of ground terminal on radar sensor) using M6 x 25 bolt, nut and flat washer (supplied).
7. Run the ground wire (RW-4747, 340 mm, supplied) between the ground terminal and ground point.
8. Coat ground terminal and ground point with silicone sealant as shown below.



### Using inside fixing holes of the sensor housing

If this radar is replacing a FURUNO radar whose mounting dimensions are the same as this one (140 x 150 mm), it may be possible to use its mounting platform. This method requires removal of the RF unit from the radar sensor to access inside fixing holes. Use hex bolts, flat washers, spring washers and nuts (local supply) to mount the radar sensor.

1. Unfasten four bolts from the cover to open the radar sensor.
2. Unplug the PCS connector from RF unit.
3. Separate upper chassis from lower chassis by removing two bolts (M8x25).
4. Remove RF unit by unfastening two hex bolts and two fixing bolt.



For DRS12A/25A, unfasten four hex bolts, not two fixing bolts, to remove the RF unit.

5. Lay the corrosion-proof rubber mat (supplied) on the mounting platform.
6. Fasten the lower chassis to the mounting platform with hex bolts, spring washers, flat washers and nuts (local supply), and then coat flat washers, nuts and exposed parts of bolts with silicone sealant. Cut a slit in the rubber bushing and insert bolt into the bushing. Do not use seal washers.
7. Remount RF unit.
8. Coat outside fixing holes with silicone sealant and then attach caps (supplied) to holes.
9. Do steps 6-8 on page 6.

## 1.4 Mounting of Power Supply Unit PSU-013 (for DRS25A)/PSU-012 (Option)

For combinations shown below, the optional power supply unit PSU-012 (Code No.: 000-011-756) is necessary. The PSU-013 is required for any DRS25A installation.

	DRS2D/4D	DRS4A	DRS6A	DRS12A
MFD8	NO	YES	YES	YES
MFD12	NO	NO	NO	YES
MFDBB	NO	NO	NO	NO

### Contents of PSU-0012/013

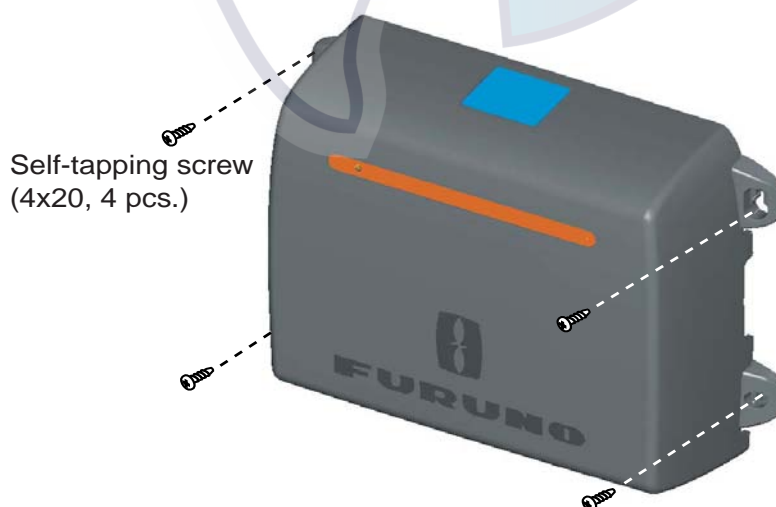
Name	Type	Code No.	Qty	Remarks
Power supply unit	PSU-012	-	1	
	PSU-013	-		for DRS25A
Cable assy	VL3P-VV-S2X2C-AA050	000-152-217-10	1	5 m
LAN cable	MOD-Z072-050+	000-167-176-10	1	5 m, standard
Self-tapping screw	4x20, SUS304	000-158-850-10	4	
Fuse*	FGB0 250V 10A	000-155-839-10	2	For 24 VDC
	FGB0 250V 15A	000-157-874-10	2	For 12 VDC

**\*Note:** The power supply unit is shipped with 15A fuse. Replace fuse with 10A when using the unit with 24V ship's battery.

The power supply unit can be installed almost anywhere provided the following conditions are met:

- Location is dry, well ventilated.
- Sufficient maintenance space is available.
- Installed within 2, 5 or 10 m (2 and 10 m: optional supply) from the multi function display.

Do not install the power supply unit on the overhead; install it on the deck or bulkhead. Use four tapping screws (4x20, supplied) to fasten the power supply unit.



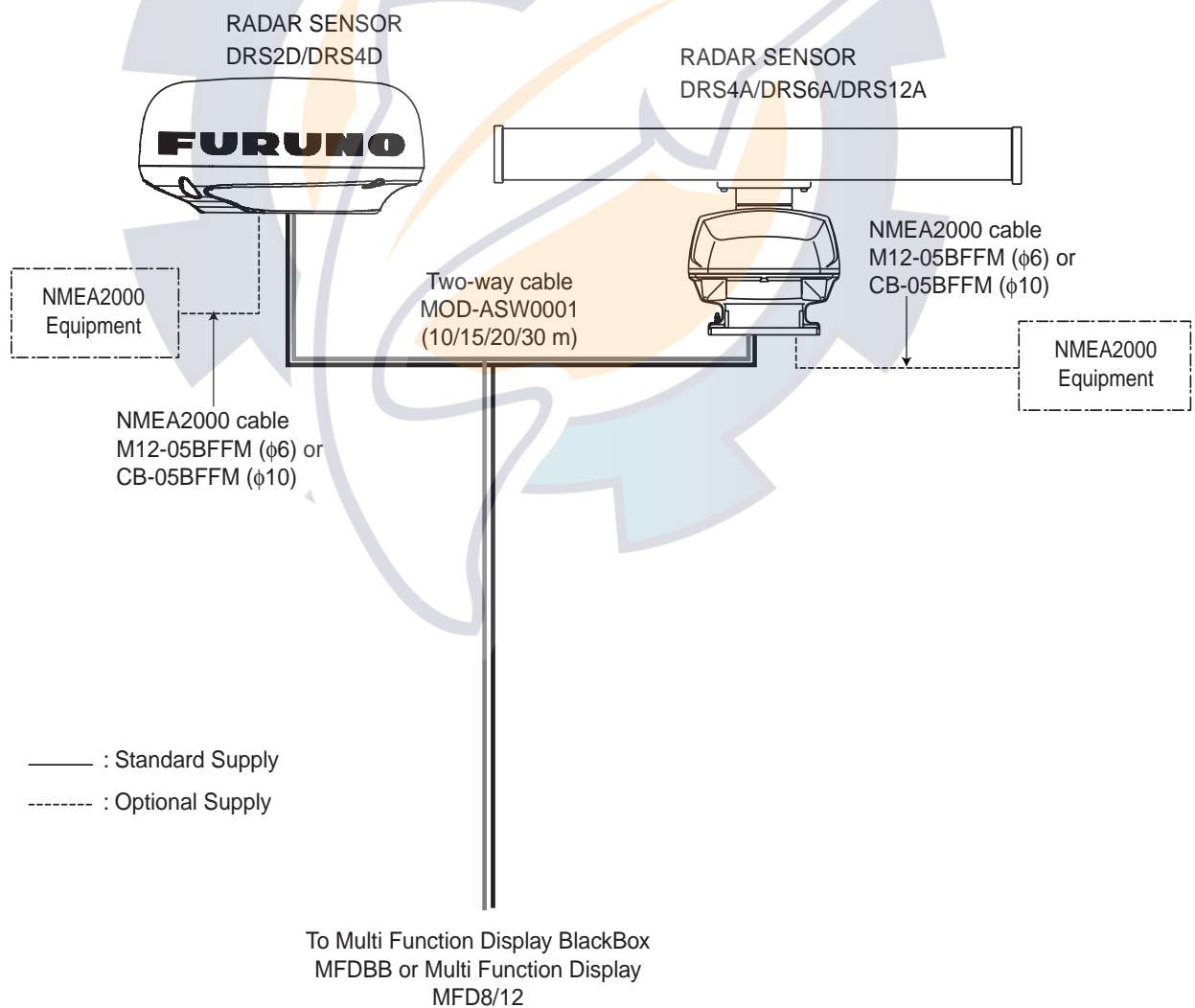
Power supply unit PSU-012/013

## 2. WIRING

The MFDBB, MFD8, MFD12 or PSU-012 connects to the radar sensor with the two-way cable MOD-ASW0001 (MOD-ASW0002 for DRS25A). In order to minimize the chance of picking up electrical interference, avoid where possible routing the two-way cable near other onboard electrical equipment. After passing the cable through the hole in the radar sensor, apply sealing compound around the hole for waterproofing. When connecting to other NMEA2000 equipment, use the optional cable M12-05BFFM ( $\phi 6$ ) or CB-05BFFM ( $\phi 10$ ).

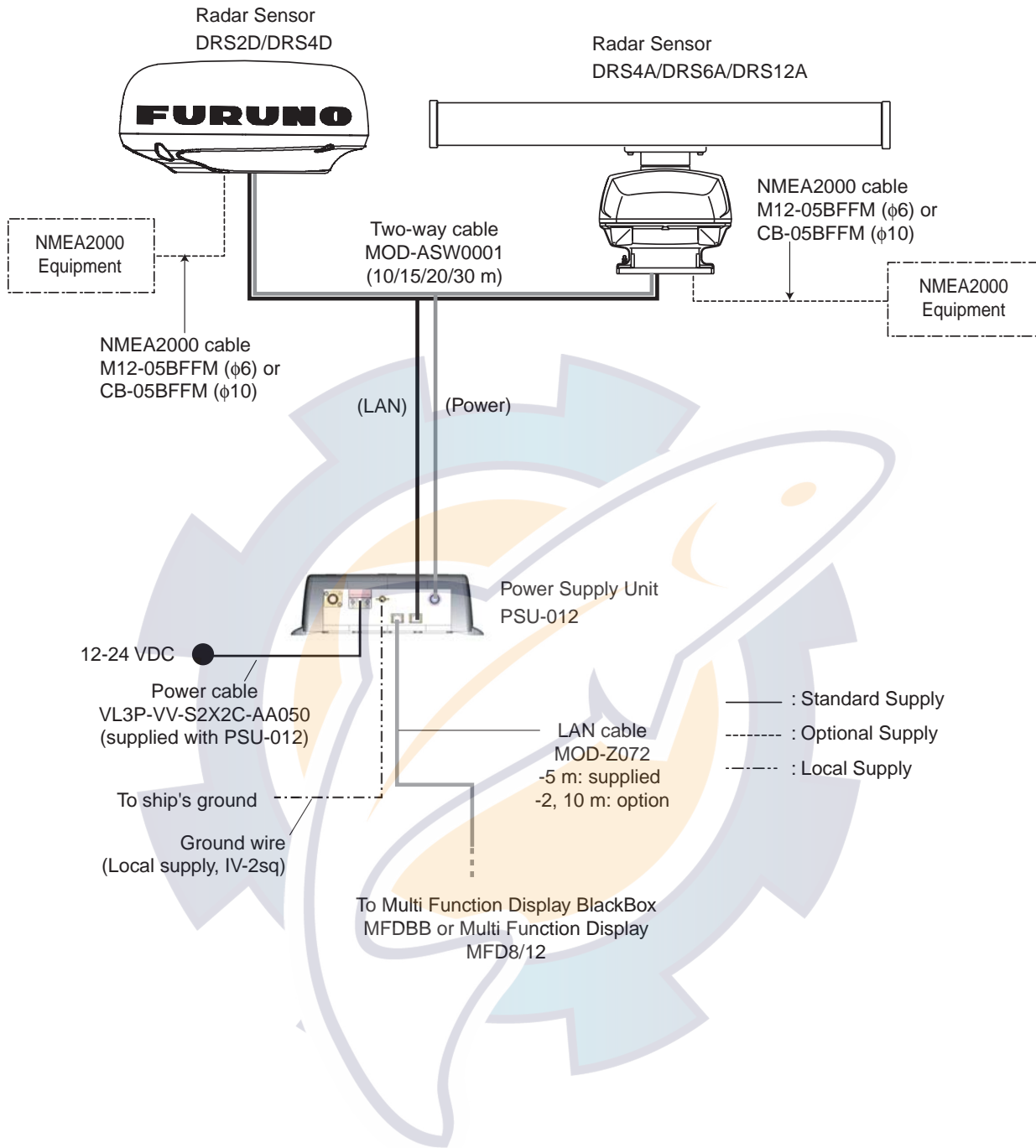
<b>NOTICE</b>
<b>Before connecting or disconnecting the NMEA2000 cable, turn off the radar sensor.</b>
The sensor may become damaged if the power is not turned off.

### Wiring for DRS2D/4D/4A/6A/12A without PSU-012

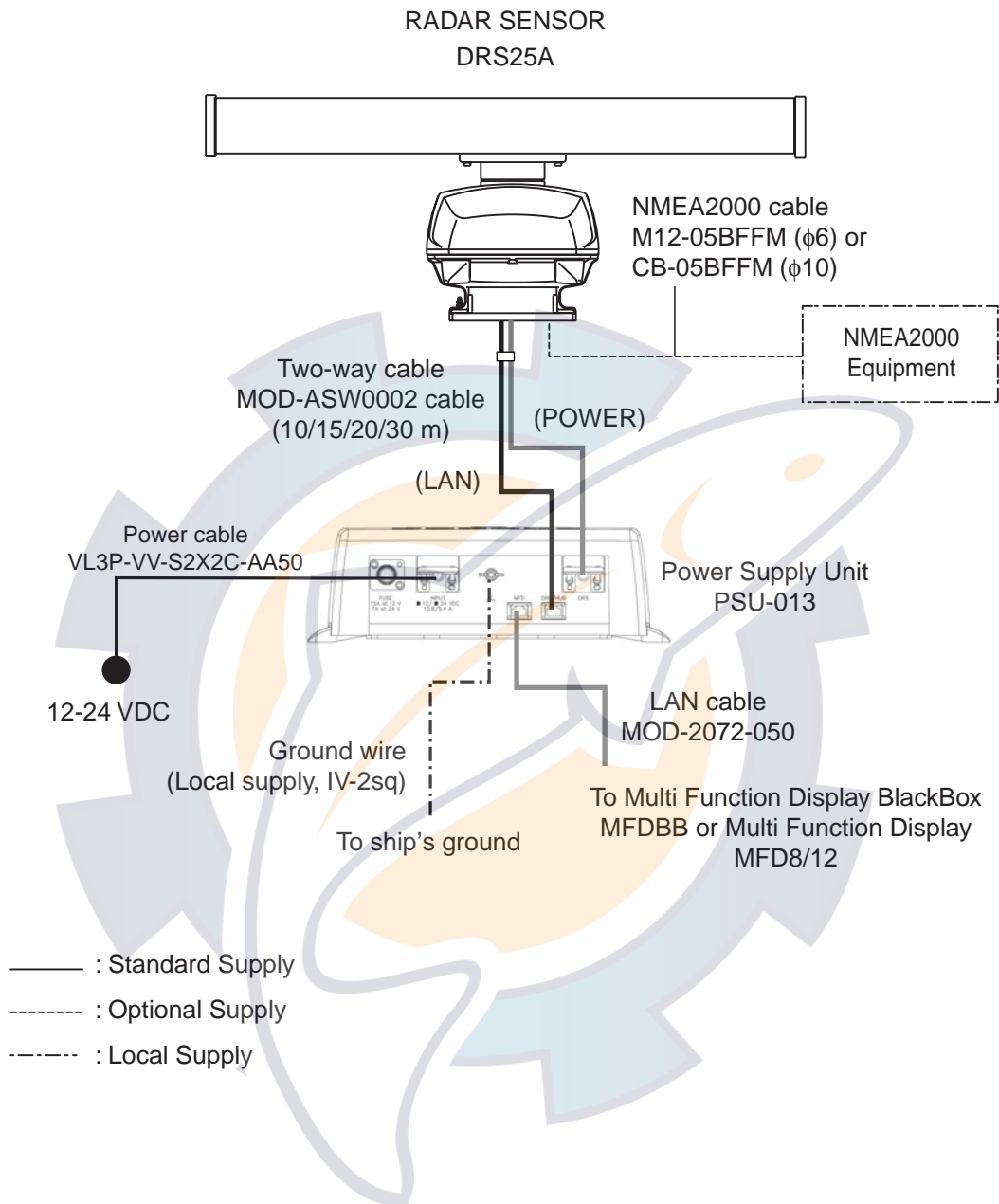




**Wiring for DRS2D/4D/4A/6A/12A with PSU-012**



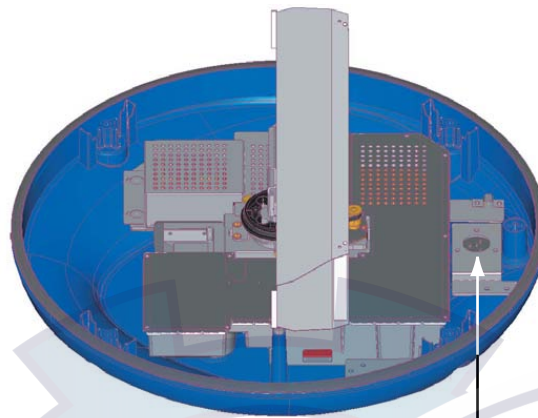
**Wiring for DRS25A**



## 2.1 Wiring inside DRS2D/4D

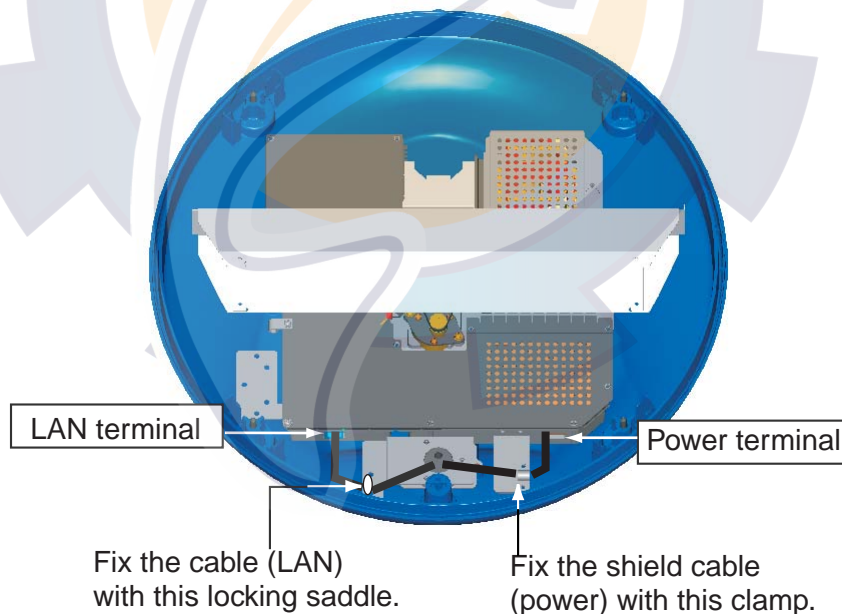
### Two-way cable connection

1. Unfasten three screws at the bottom of the mounting base to remove the fixing plate for the gasket.



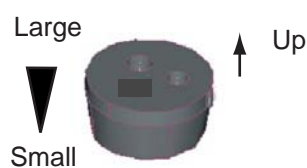
Fixing plate  
(for gasket)

2. Remove the gasket, and pass the two-way cable MOD-ASW0001.
3. Fasten the shield of the cable (power) with the cable clamp in the radar sensor, and connect the connector of cable (power) to the power terminal.
4. Connect the RJ-45 connector of the cable (LAN) to the LAN terminal in the radar sensor.

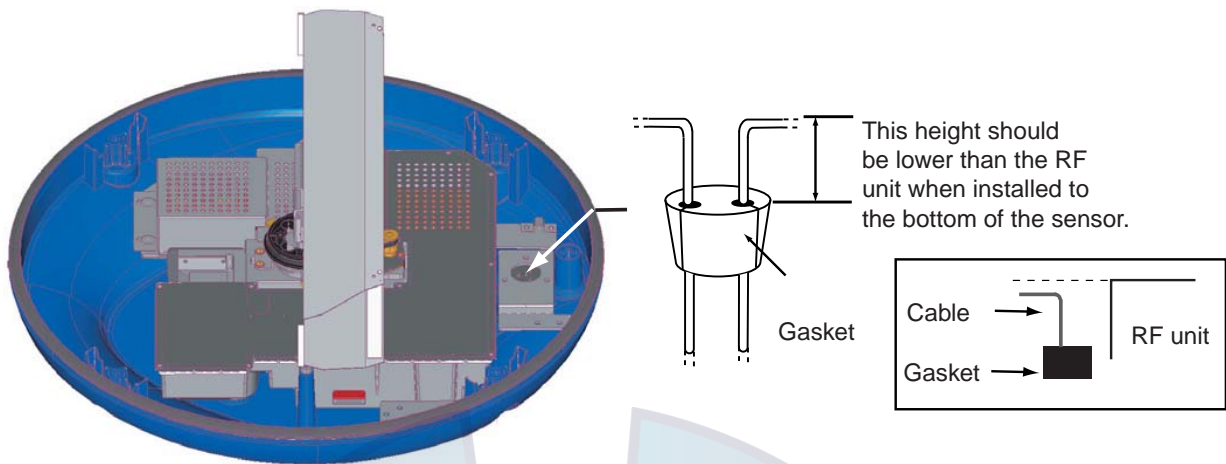


5. Push cables of the two-way cable into the slits of the gasket inside the radar sensor.

**Note:** The ends of the gasket are different. Larger end should be up.

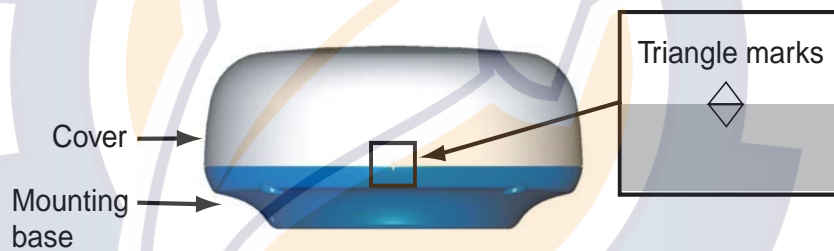


- Slide the gasket on cables so that the amount of cable above the gasket is lower than the RF chassis.



**Note:** If the two-way cable touches the platform near the mounting base, wind vinyl tape around the cable at the point where it is bent.

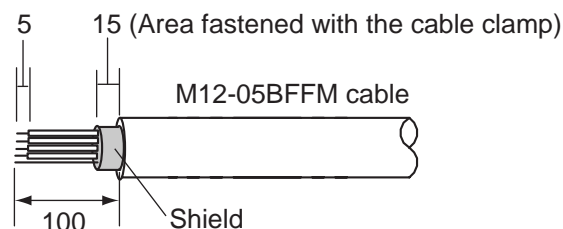
- Confirm that the rubber gasket is properly positioned and that the triangle mark on the cover is aligned with the triangle mark on the mounting base, then tighten the fixing screws for the cover.



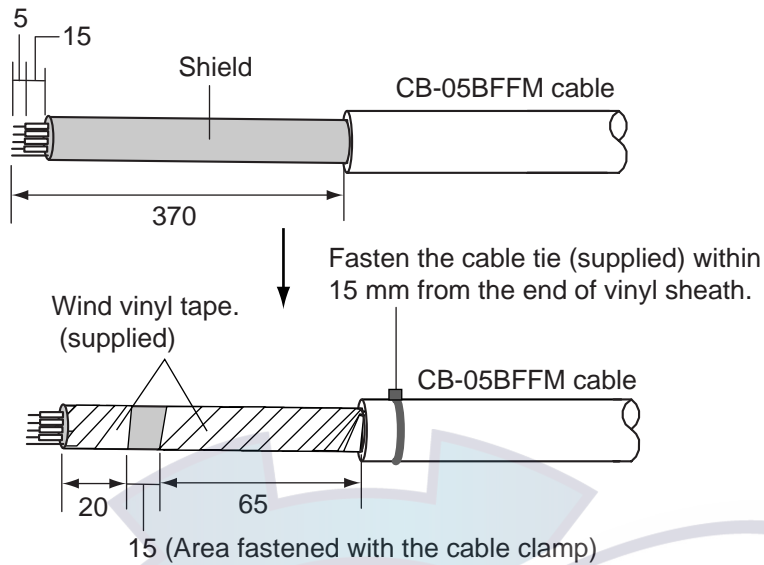
### **Connecting to NMEA2000 equipment**

To connect NMEA2000 equipment to the sensor, wire an optional NMEA2000 cable, M12-05BFFM ( $\phi 6$ ) or CB-05BFFM ( $\phi 10$ ), as shown below. Also, the gasket at the bottom of mounting base must be replaced.

- Do steps 1 to 4 on page 12.
- Refer to the figure below, and fabricate the cable M12-05BFFM ( $\phi 6$ ) or CB-05BFFM ( $\phi 10$ ).



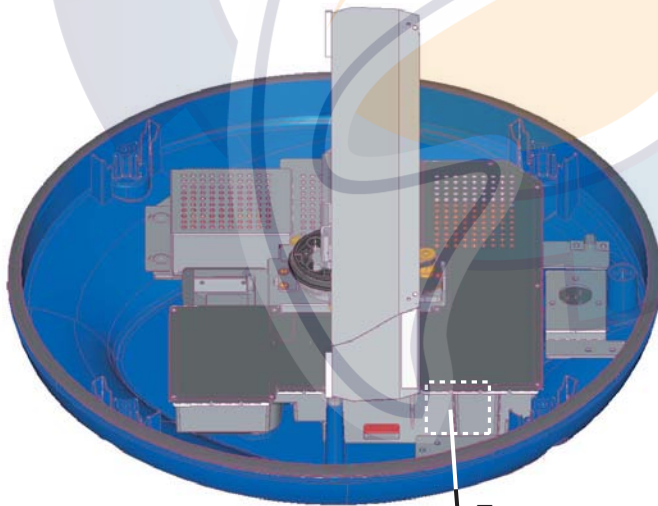
Fabrication of cable M12-05BFFM ( $\phi 6$ )



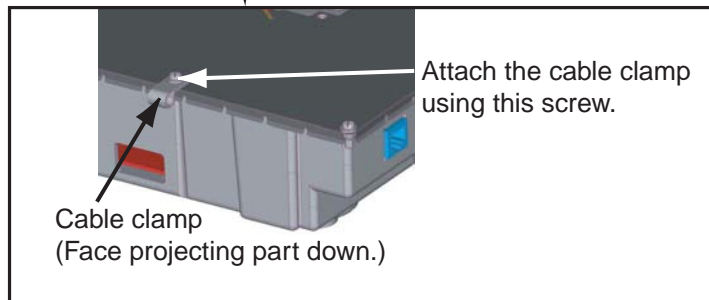
Fabrication of CB-05BFFM cable

3. Insert wires of cable M12-05BFFM ( $\phi 6$ ) or CB-05BFFM ( $\phi 10$ ) to the NMEA connector inside the radar sensor, consulting the label on the connector for location. As for shield, use the cable clamp shown below to fasten it to the RF chassis.

Cable	M12-05BFFM ( $\phi 6$ )	CB-05BFFM ( $\phi 10$ )
Clamp	Use the clamp in the plastic bag supplied inside the radar sensor.	Use the clamp supplied with the optional gasket (Type: OP03-203, Code No.: 001-025-290)



Zoom up



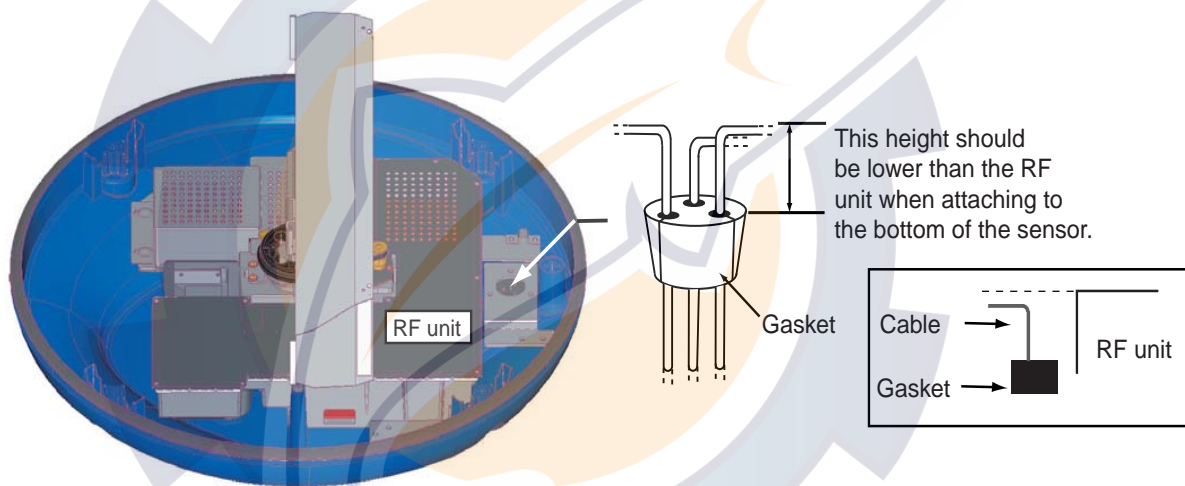
- Push LAN and POWER cables of the two-way cable and cable M12-05BFFM ( $\phi 6$ ) or CB-05BFFM ( $\phi 10$ ) into the slits of the gasket inside the mounting base. Depending on the NMEA2000 cable used, replace the gasket as shown below.

Cable type	M12-05BFFM ( $\phi 6$ )	CB-05BFFM ( $\phi 10$ )
Gasket	Use the gasket supplied in the plastic bag inside the radar sensor.	Use the optional gasket. (Type: OP03-203, Code No.: 001-025-290)

**Note:** The ends of the gasket are different. Larger end should be up)



- Slide the gasket on cables so that the amount of cable above the gasket is lower than the RF chassis.



**Note:** If the two-way cable touches the platform near the radar sensor base, wind vinyl tape around the cable at the point where is bent.

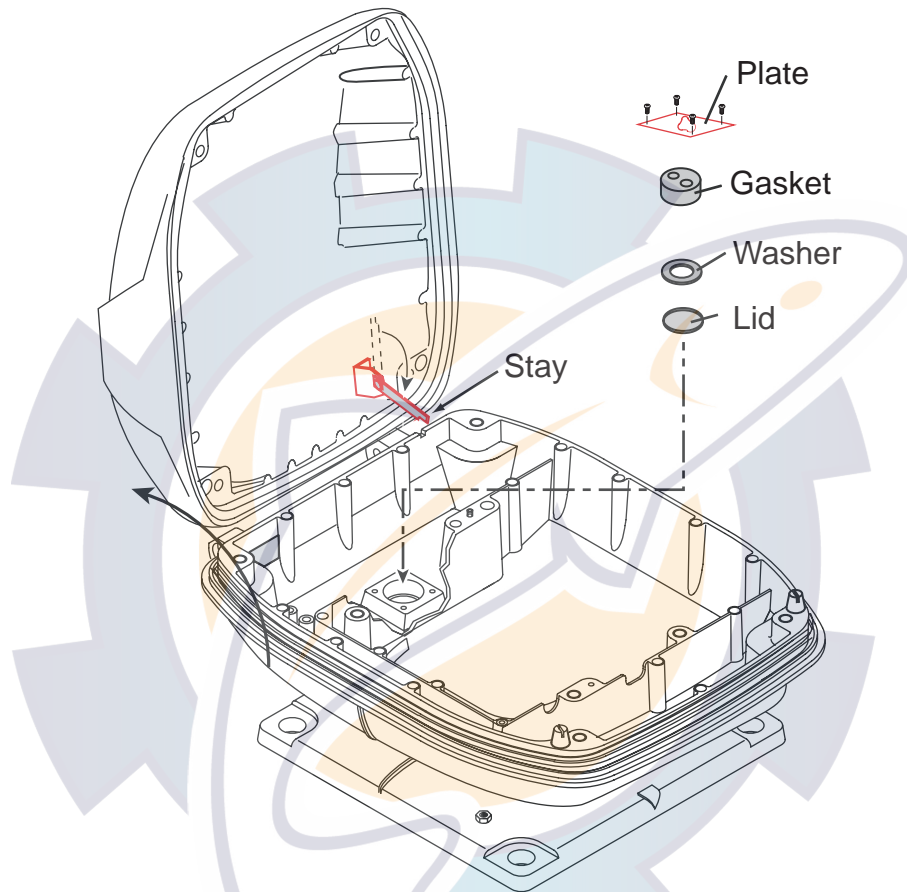
- Confirm that the rubber gasket is properly positioned and that the triangle mark on the cover is aligned with the triangle mark on the mounting base, then tighten the fixing screws for the cover.

## 2.2 Wiring inside DRS4A/6A/12A/25A

### Two-way cable connection

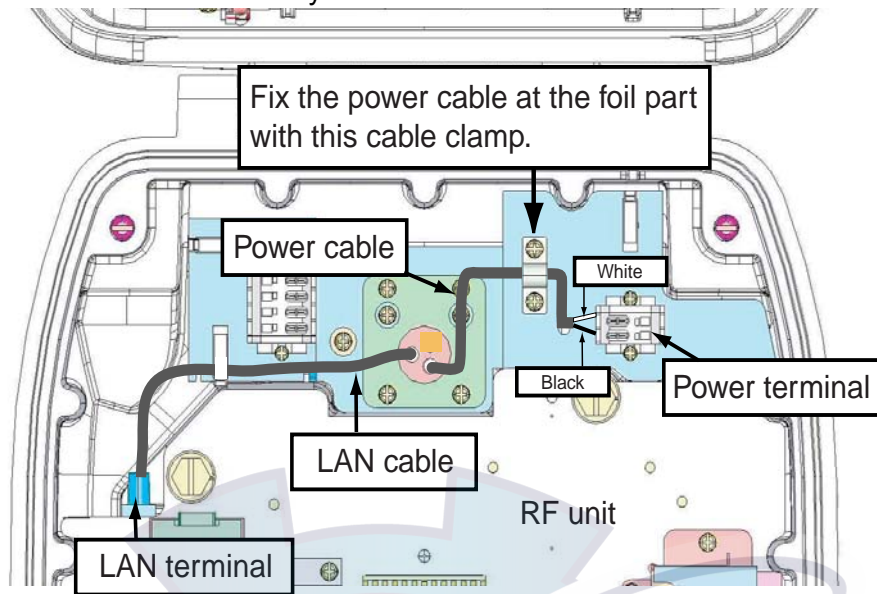
If you have no NMEA2000 equipment to connect, use the MOD-ASW0001 cable (standard supply).

1. Open the radar sensor cover by loosening four bolts, and fix the stay for safety purpose.
2. Unfasten four bolts to detach the plate, gasket, washer and lid. Discard the lid at the bottom of the hole for the gasket.

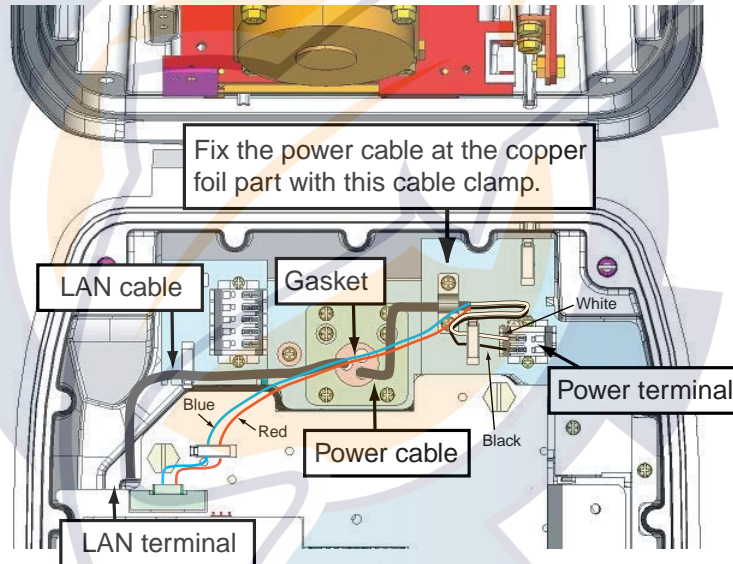


3. Pass the two-way cable MOD-ASW0001 (MOD-ASW0002 for DRS25A) through the bottom of the chassis and washer.
4. Fasten the shield of the power cable of the two-way cable (part of the foil) with the cable clamp in the radar sensor, and then connect the power cable to the power terminal as shown on next page.

5. Attach the LAN cable of the two-way cable to the LAN terminal in the radar sensor.



*DRS4A/6A/12A*

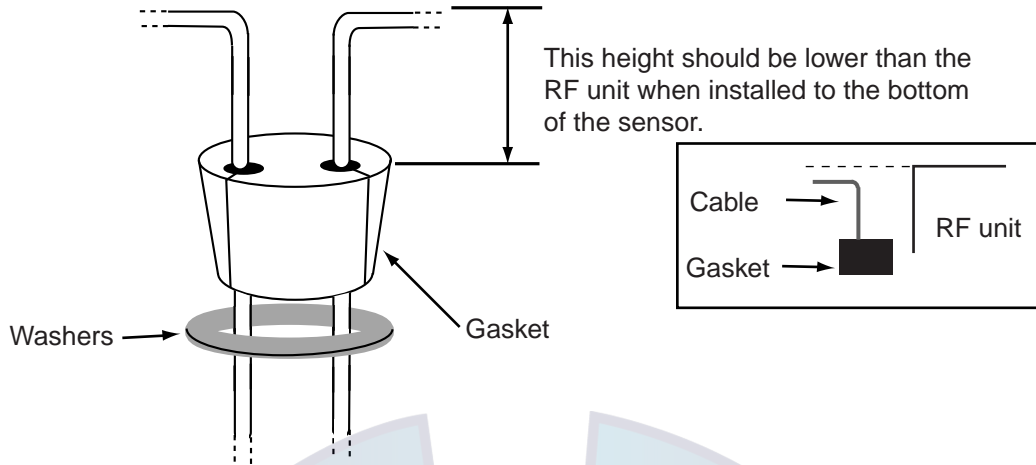


*DRS25A*

6. Refer to the illustration shown below, and attach the gasket to the two-way cable, inserting the cable into the slits on the gasket.

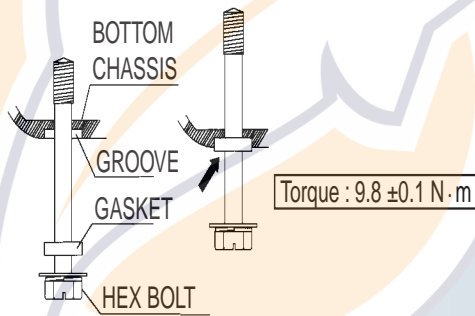
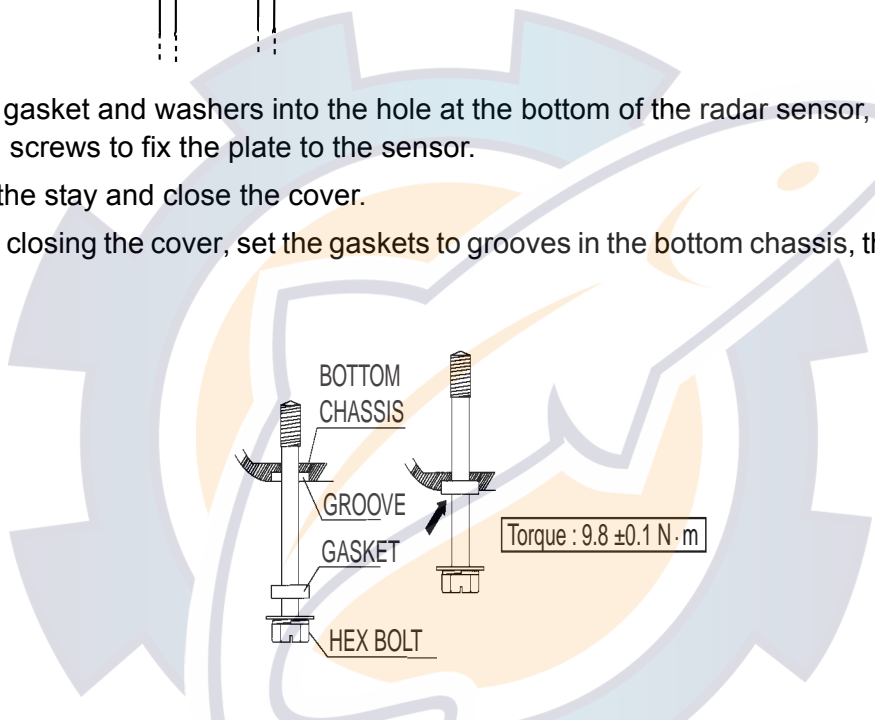


- Slide the gasket on cables so that the amount of cable above the gasket is lower than the RF chassis.



- Push the gasket and washers into the hole at the bottom of the radar sensor, then fasten four pan head screws to fix the plate to the sensor.
- Release the stay and close the cover.

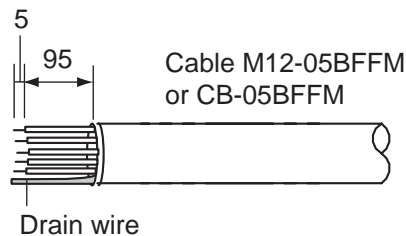
**Note:** When closing the cover, set the gaskets to grooves in the bottom chassis, then tighten bolts.



### Connecting to NMEA2000 equipment

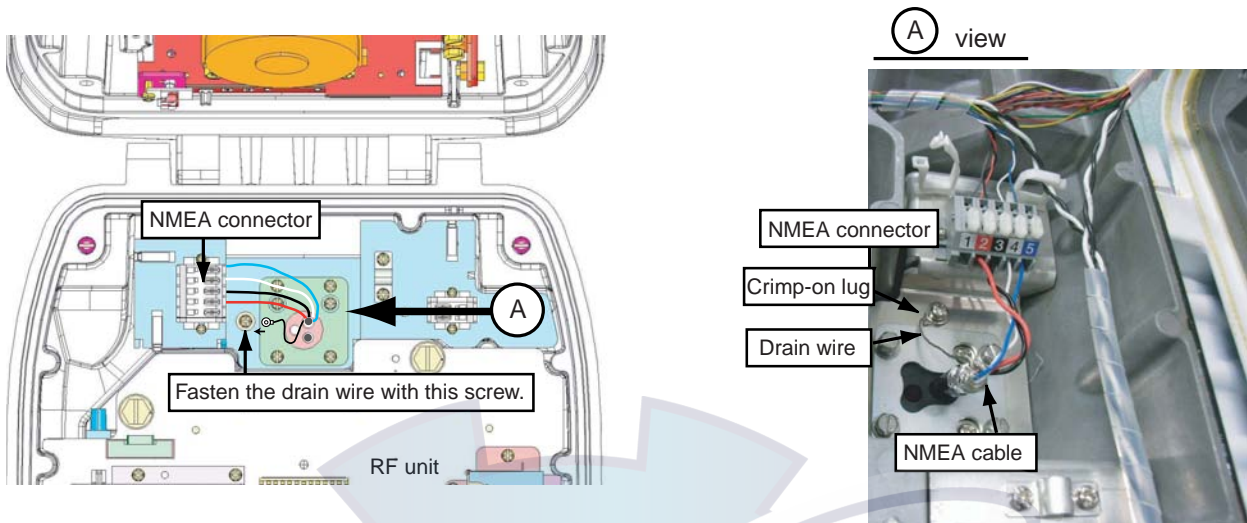
To connect NMEA2000 equipment to the sensor, use an optional NMEA2000 cable, M12-05BFFM ( $\phi 6$ ) or CB-05BFFM ( $\phi 10$ ). Also, the gasket at the bottom of the antenna sensor must be replaced.

- Do steps 1 to 5 on pages 16 and 17.
- Fabricate the cable M12-05BFFM ( $\phi 6$ ) or CB-05BFFM ( $\phi 10$ ) as shown below.



- Pass the cable through the bottom of the chassis.
- Insert wires of the cable M12-05BFFM ( $\phi 6$ ) or CB-05BFFM ( $\phi 10$ ) to the NMEA connector inside the radar sensor, consulting the label on the connector for location. As for drain wire, attach

the crimp-on lug (pre-attached at the bottom of the chassis) to the drain wire, and fasten it with the screw shown below.



5. Depending on the NMEA2000 used, replace the gasket as shown below.

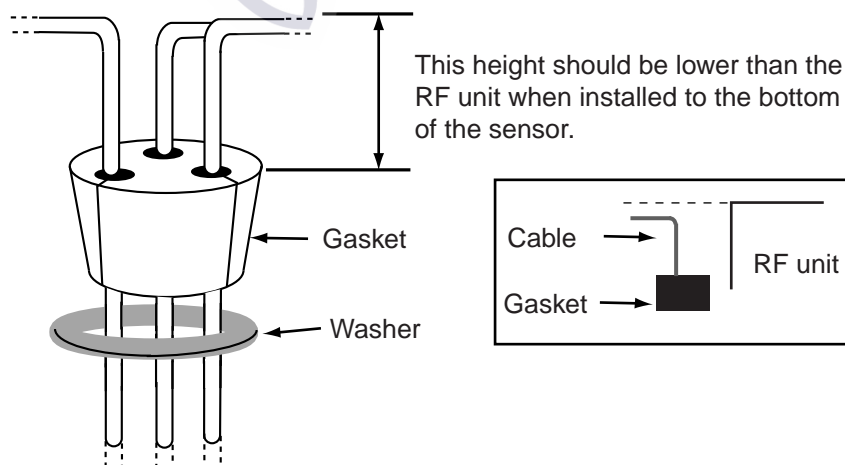
**DRS4A/6A/12A**

Cable type	M12-05BFFM ( $\phi 6$ )	CB-05BFFM ( $\phi 10$ )
Gasket	Use the gasket supplied in the plastic bag inside the radar sensor.	Use the optional gasket. (Type: OP03-205, Code No.: 001-025-790)

**DRS25A**

Cable type	M12-05BFFM ( $\phi 6$ )	CB-05BFFM ( $\phi 10$ )
Gasket	Use the gasket supplied in the plastic bag inside the radar sensor.	Use the optional gasket. (Type: OP03-206, Code No.: 001-035-290)

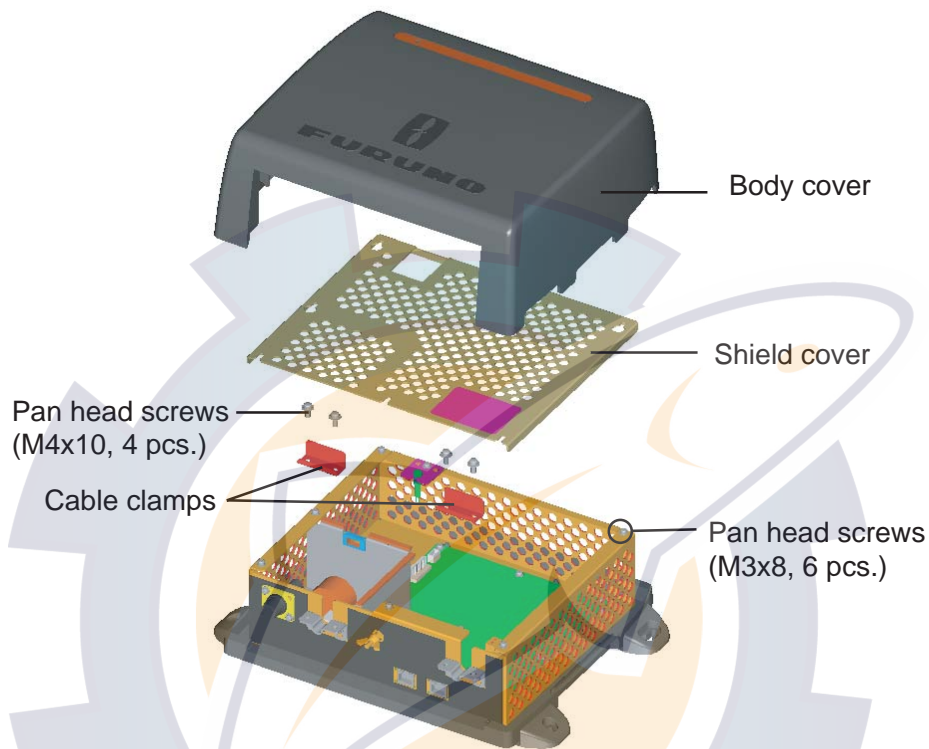
- Refer to the illustration shown on next page, and attach the gasket to the two-way cable inserting the cable into the slits on the gasket.
- Slide the gasket on cables so that the amount of cable above the gasket is lower than the RF chassis.



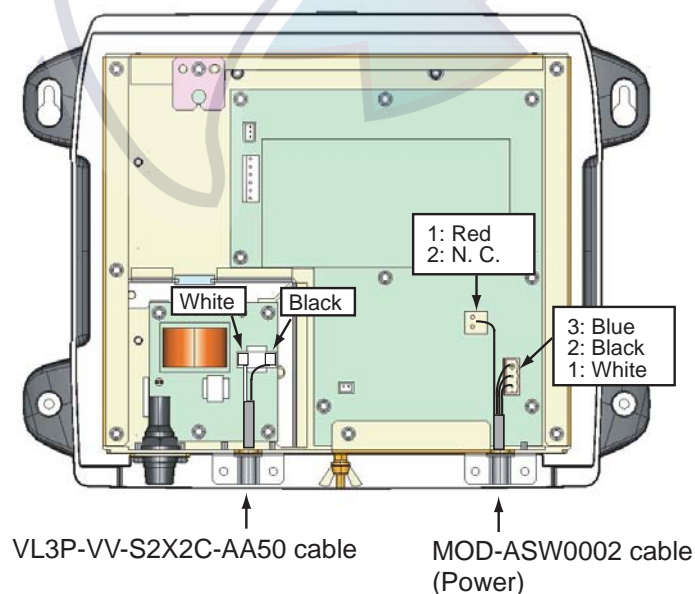
8. Do steps 8 and 9 on page 18.

## 2.3 Wiring of Power Supply Unit PSU-013 (for DRS25A)

1. Detach the body cover by hand.
2. Loosen six pan head screws (M3x8) and slide the shield cover upward to remove it.
3. Unfasten four pan head screws (M4x10) to remove two cable clamps.



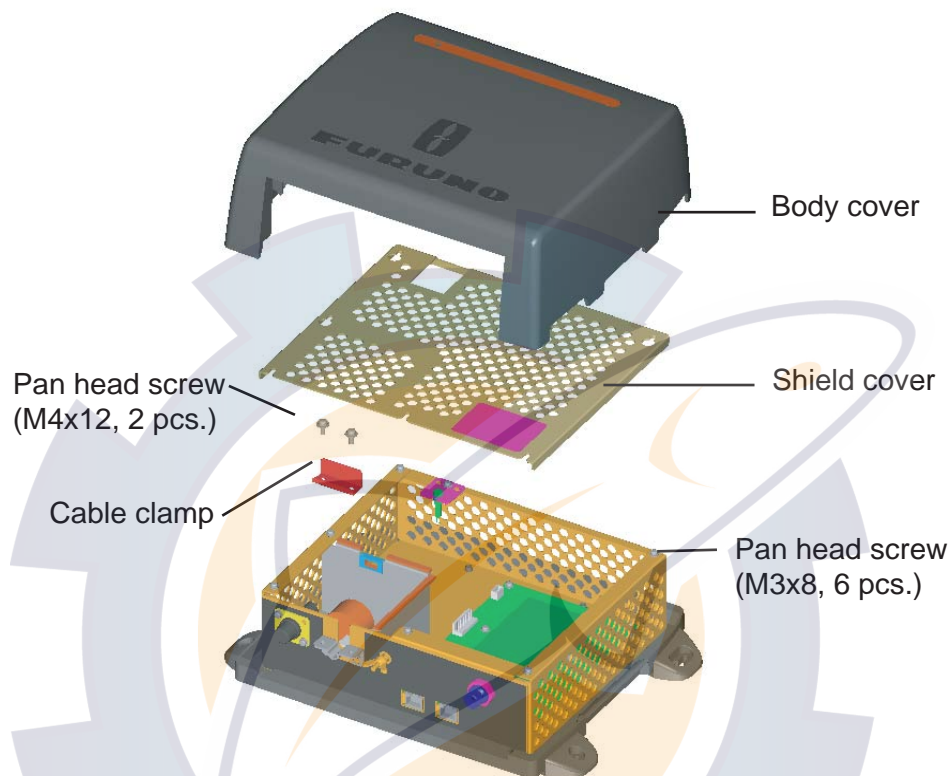
4. Connect the cable VL3P-VV-S2X2C-AA50 and MOD-ASW0002 cables (supplied) to appropriate connectors in the power supply unit as shown below.



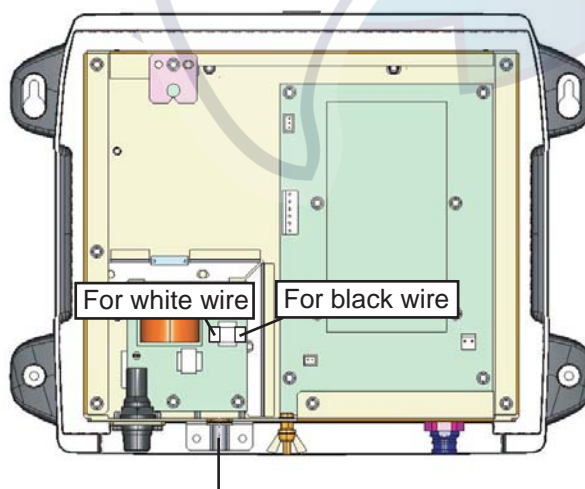
5. Remove two cable clamps, shield cover and body cover in that order.
6. Connect other cables.

## 2.4 Wiring inside Power Supply Unit PSU-012 (Option)

1. Detach the body cover by hand.
2. Loosen six pan head screws (M3x8) and slide the shield cover upward to remove it.
3. Unfasten two pan head screws (M4x12) to remove the cable clamp.



4. Connect the cable VL3P-VV-S2X2C-AA050 (supplied) to the power connector in the PSU-012.

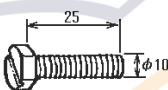


Put the cable VL3P-VV-S2X2C-AA050 here at the shield part.

5. Remount the cable clamp, shield cover and body cover in that order.
6. Connect other cables.

# FURUNO

CODE NO.	001-025-270-00	03HA-X-9401 -0
TYPE	CP03-32101	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	テロの組品 RESISTOR ASSEMBLY		120 OHM-1007#24-L50 CODE NO. 000-167-746-10	1	
2	ミガキ平座金 FLAT WASHER		M10 SUS304 CODE NO. 000-167-232-10 000-864-131-00	4	
3	バネ座金 SPRING WASHER		M10 SUS304 CODE NO. 000-167-233-10 000-864-261-00	4	
4	六角スリッパボルト HEX. BOLT (SLOTTED HEAD)		M10X25 SUS304 CODE NO. 000-162-883-10	4	


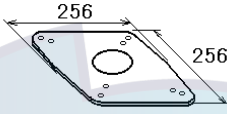
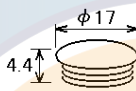
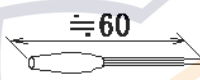



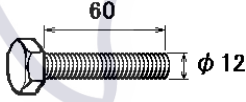


型式/コード番号が2段の場合、下段より上段に代わる過渡期品であり、どちらかが入っています。なお、品質は変わりません。

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

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

**FURUNO**

CODE NO.	001-025-780-00	03GY-X-9401 -2 1/2
TYPE	CP03-32601	

工事材料表 INSTALLATION MATERIALS		RSB-118-092/093/094			
番号 NO.	名称 NAME	略図 OUTLINE	型名/規格 DESCRIPTIONS	数量 Q' TY	用途/備考 REMARKS
1	シールワッシャ SEAL WASHER		03-001-3002-0 ROHS 03-001-3002-0 CODE NO. 300-130-020-10 300-130-020-00	4	
2	防蝕ゴム CORROSION-PROOF RUBBER MAT		03-142-3001-0 ROHS CODE NO. 100-275-580-10	1	
3	キャップ CAP		040-4010 CODE NO. 000-164-929-10	4	
4	テコの組品 RESISTOR ASSEMBLY		120 OHM-1007#24-L50 CODE NO. 000-167-746-10	1	
5	バネ座金 SPRING WASHER		M12 SUS304 CODE NO. 000-167-397-10	4	
6	ミガキ平座金 FLAT WASHER		M12 SUS304 CODE NO. 000-167-446-10	4	
7	六角ナット 1シュ HEX. NUT		M12 SUS304 CODE NO. 000-167-491-10	4	
8	六角ボルト (全ネジ) HEX. BOLT		M12X60 SUS304 CODE NO. 000-162-813-10	4	
9	ミガキ平座金 FLAT WASHER		M6 SUS304 CODE NO. 000-158-854-10	3	
10	バネ座金 SPRING WASHER		M6 SUS304 CODE NO. 000-158-855-10	1	

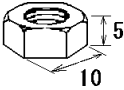
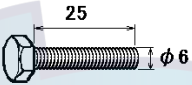
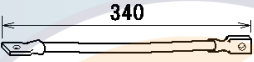
型式/コード番号が2段の場合、下段より上段に代わる過渡期品であり、どちらかが入っています。なお、品質は変わりません。

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

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

# FURUNO

CODE NO.	001-025-780-00	03GY-X-9401 -2
TYPE	CP03-32601	2/2

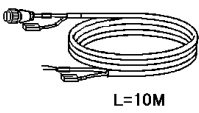
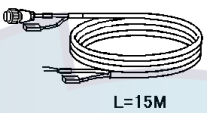
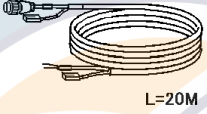

工事材料表 INSTALLATION MATERIALS		RSB-118-092/093/094			
番号 NO.	名称 NAME	略図 OUTLINE	型名/規格 DESCRIPTIONS	数量 Q'TY	用途/備考 REMARKS
11	六角ナット 1ｼ HEX. NUT		M6 SUS304 CODE NO. 000-158-856-10	1	
12	六角ボルト HEX. BOLT		M6X25 SUS304 CODE NO. 000-162-871-10	1	
13	7-ｽ線 GROUND WIRE		RW-4747-1 CODE NO. 000-566-000-01	1	

型式/コード番号が2段の場合、下段より上段に代わる過渡期品であり、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**

工事材料表		RADAR SENSOR		CODE NO.	03HA-X-9402 -0
INSTALLATION MATERIALS		DRS2D/4D		TYPE	1/1
番号 NO.	名称 NAME	略図 OUTLINE	型名/規格 DESCRIPTIONS	数量 Q'TY	用途/備考 REMARKS
1	ケーブル組品 CABLE ASSY.	 L=10M	MOD-ASW0001-100+ CODE NO. 000-167-635-00	1	選択 TO BE SELECTED
2	ケーブル組品 CABLE ASSY.	 L=15M	MOD-ASW0001-150+ CODE NO. 000-167-636-00	1	選択 TO BE SELECTED
3	ケーブル組品 CABLE ASSY.	 L=20M	MOD-ASW0001-200+ CODE NO. 000-167-637-00	1	選択 TO BE SELECTED
4	ケーブル組品 CABLE ASSY.	 L=30M	MOD-ASW0001-300+ CODE NO. 000-167-638-00	1	選択 TO BE SELECTED

標準は15mであるが必要により選択可  
STANDARD LENGTH IS 15M. OTHER LENGTHS ARE ALSO AVAILABLE.

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

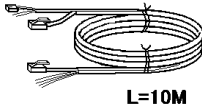
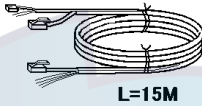
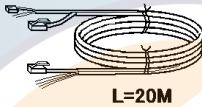
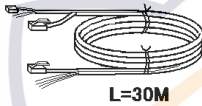
TWO TYPES AND CODES MAY BE LISTED FOR AN ITEM. THE LOWER PRODUCT MAY BE SHIPPED IN PLACE OF THE UPPER PRODUCT. QUALITY IS THE SAME.

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



# FURUNO

CODE NO.		03HC-X-9402 -0
TYPE		1/1

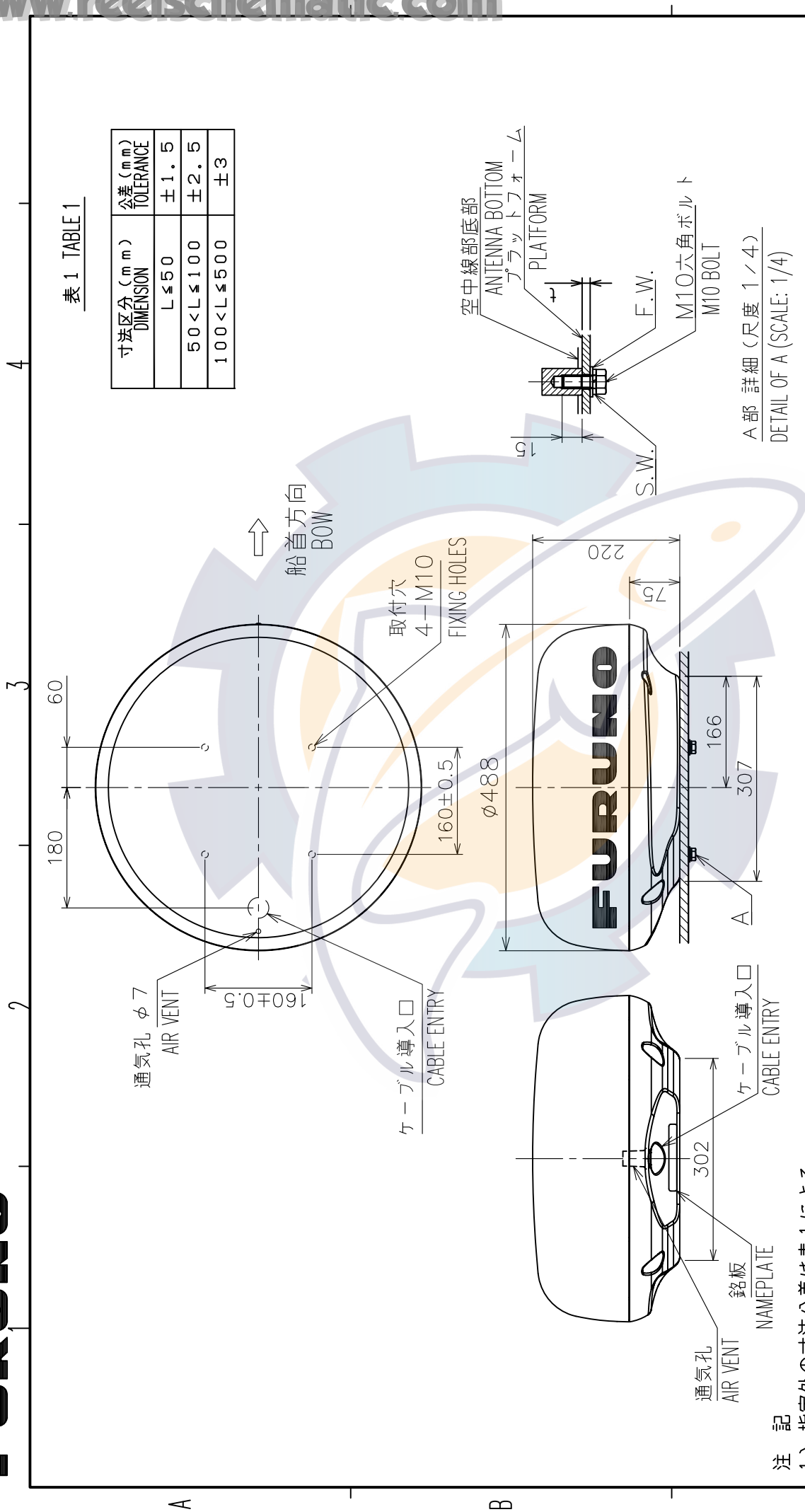
工事材料表 INSTALLATION MATERIALS		RADAR SENSOR DRS25A			
番号 NO.	名称 NAME	略図 OUTLINE	型名/規格 DESCRIPTIONS	数量 Q'TY	用途/備考 REMARKS
1	ケーブル組品 CABLE ASSY.	 L=10M	MOD-ASW0002-100+ CODE NO. 000-167-639-00	1	*選択 TO BE SELECT
2	ケーブル組品 CABLE ASSY.	 L=15M	MOD-ASW0002-150+ CODE NO. 000-167-640-00	1	*選択 TO BE SELECT
3	ケーブル組品 CABLE ASSY.	 L=20M	MOD-ASW0002-200+ CODE NO. 000-167-641-00	1	*選択 TO BE SELECT
4	ケーブル組品 CABLE ASSY.	 L=30M	MOD-ASW0002-300+ CODE NO. 000-167-642-00	1	*選択 TO BE SELECT

型式/コード番号が2段の場合、下段より上段に代わる過渡期品であり、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**



**注記**

- 1) 指定外の寸法公差は表 1 による。
- 2) 取付用ネジは M10 ボルトを使用のこと。ネジ長さは板厚 t に応じて、 $20 (t \leq 5)$  または  $25 (5 < t \leq 10)$  とする。

**NOTE**

1. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS WHICH IS NOT SPECIFIED.
2. USE M10 BOLTS FOR FIXING THE UNIT. SCREW LENGTH SHOULD BE  $20 (t \leq 5)$  OR  $25 (5 < t \leq 10)$ . t: THICKNESS OF PLATFORM

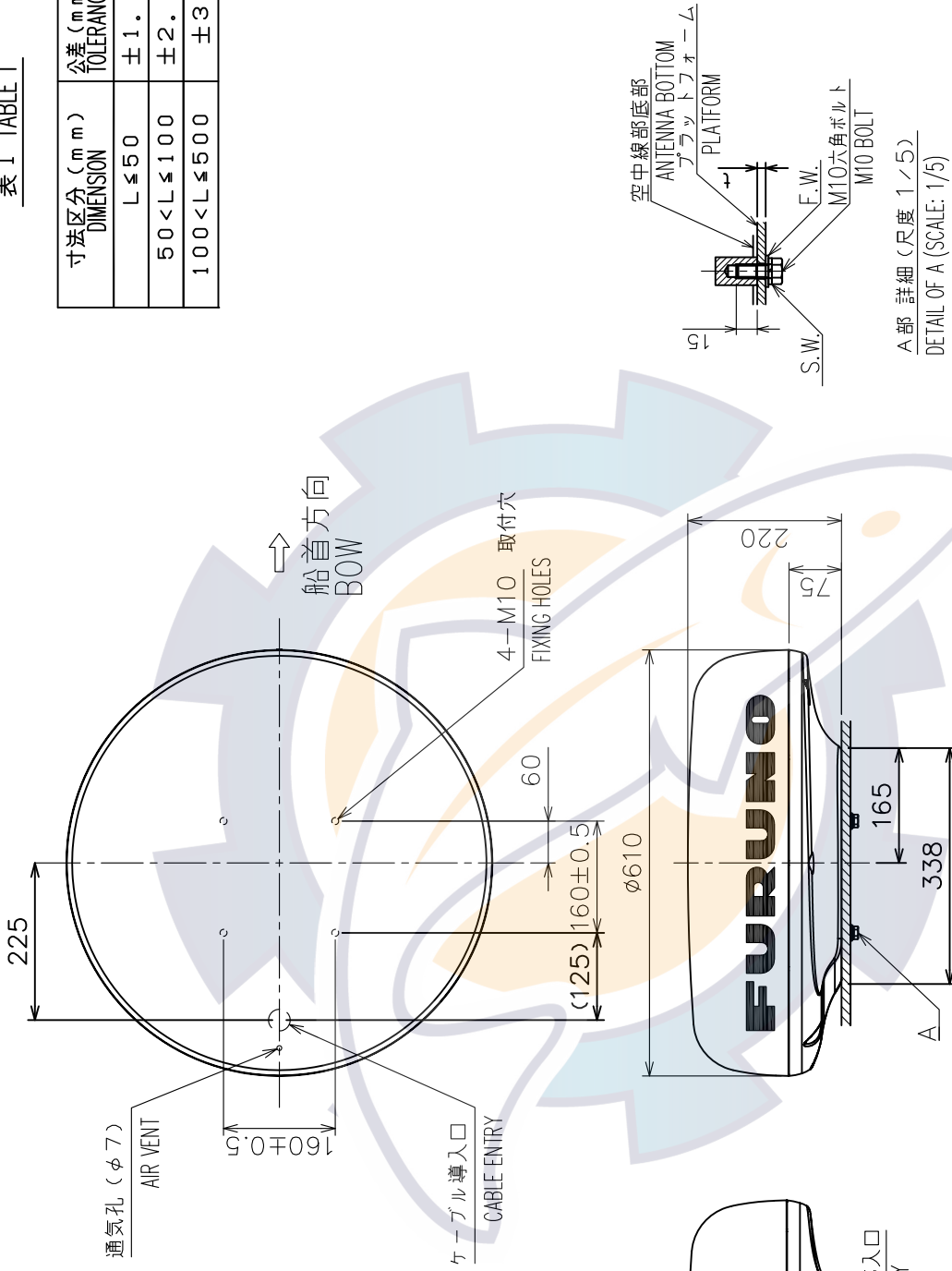
DRAWN	Oct. 10 '07 I. YAMASAKI	TITLE	DRS2D
CHECKED	Oct. 10 '07 I. TAKENO	名#	レーダーセンサー
APPROVED	Oct. 15 '07 R. Esumi	外寸図	
SCALE	1/8	NAME	RADAR SENSOR
DWG.No.	C3567-G01-A	REF.No.	03-174-300G-0
			OUTLINE DRAWING

**FURUNO ELECTRIC CO., LTD.**

**FURUNO**

表 1 TABLE 1

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



A部 詳細 (尺度 1/5)  
DETAIL OF A (SCALE: 1/5)

注 記

- 1) 指定外の寸法公差は表 1 による。
- 2) 取付用ネジは M10 ボルトを使用のこと。ネジ長さは板厚 t に応じて、20 (t ≤ 5) または 25 (5 < t ≤ 10) とする。

NOTE

1. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS WHICH IS NOT SPECIFIED.
2. USE M10 BOLTS FOR FIXING THE UNIT. SCREW LENGTH SHOULD BE 20 (t ≤ 5) OR 25 (5 < t ≤ 10). t: THICKNESS OF PLATFORM

DRAWN	10/Mar/08 I.YAMASAKI	TITLE	DRS4D
CHECKED	10/Mar/08 I.TAKENO	名 称	レーダーセンサー
APPROVED	22/Mar/08 R. Esumi	外 寸 図	
SCALE	1/10 MASS 7.5 t/10	NAME	RADAR SENSOR
DWG.No.	C3568-G01-B	REF.No.	03-174-310G-1
			OUTLINE DRAWING

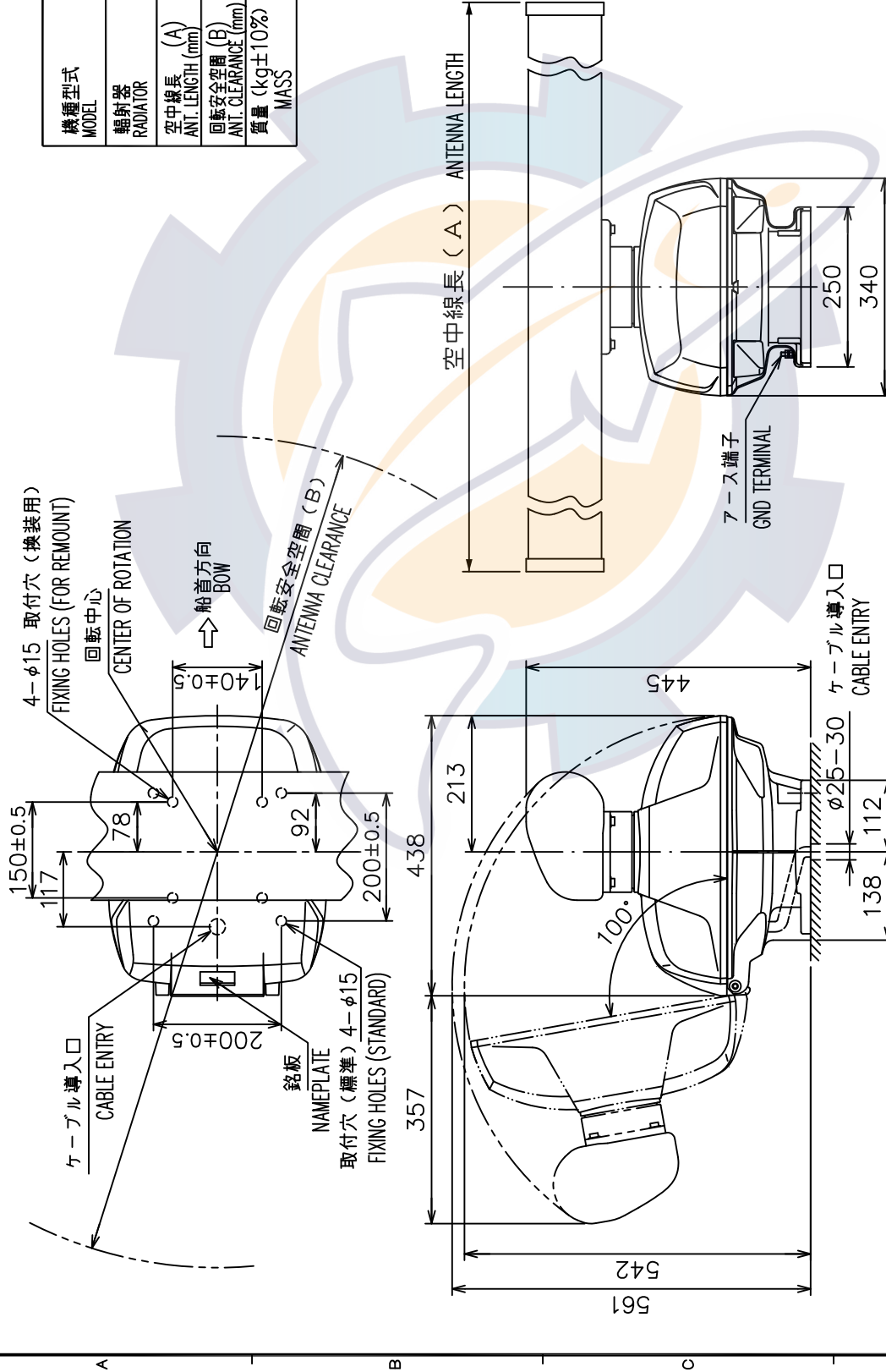
**FURUNO ELECTRIC CO., LTD.**

表 1 TABLE 1

機種型式 MODEL	DRS4A	DRS6A	DRS12A DRS25A	DRS12A DRS25A
輻射器 RADIATOR	XN10A	XN12A	XN12A	XN13A
空中線長 (A) ANT. LENGTH (mm)	1036±10	1255±10	1255±10	1795±10
回転安全空間 (B) ANT. CLEARANCE (mm)	1200	1400	1400	1940
質量 (kg±10%) MASS	25	25	26	28

表 2 TABLE 2

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



注 記

- 1) 指定寸法公差は表 2 による。
- 2) 取付は M12 ボルトを使用のこと。

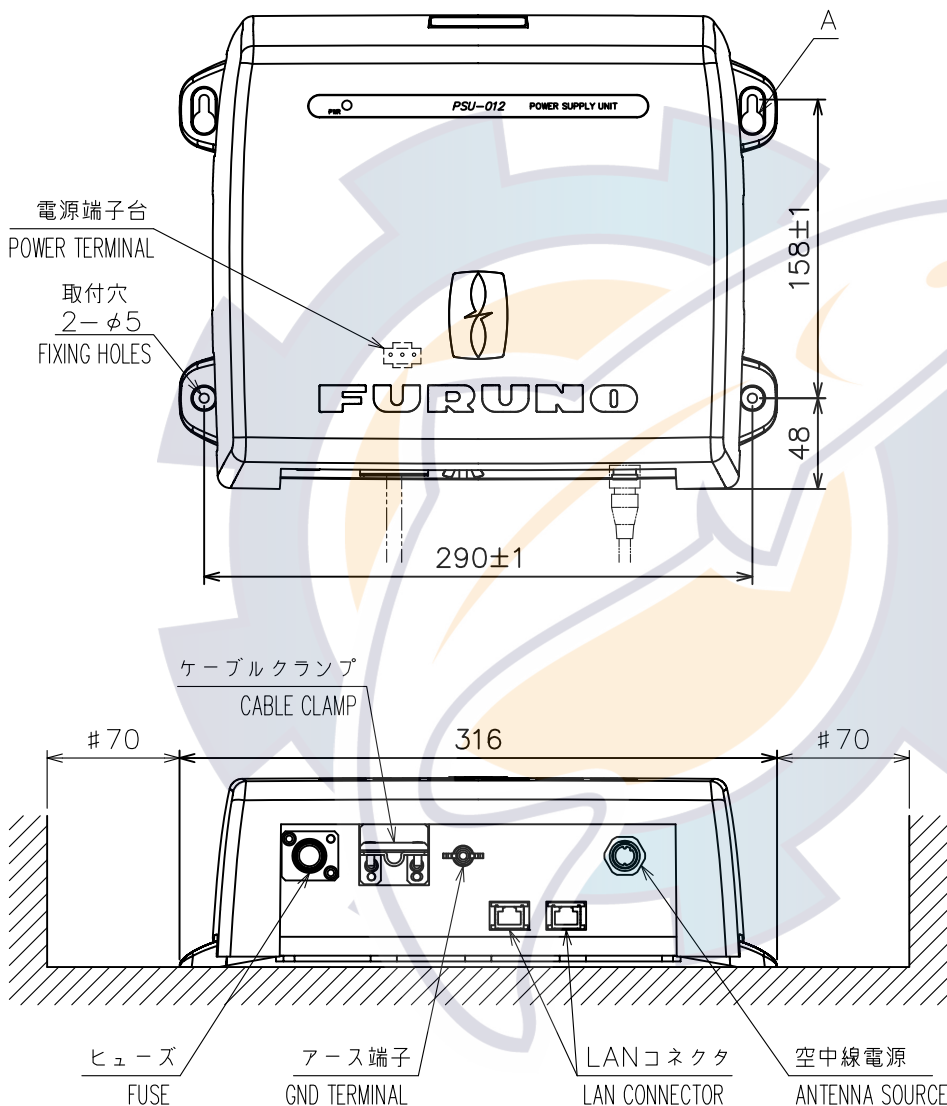
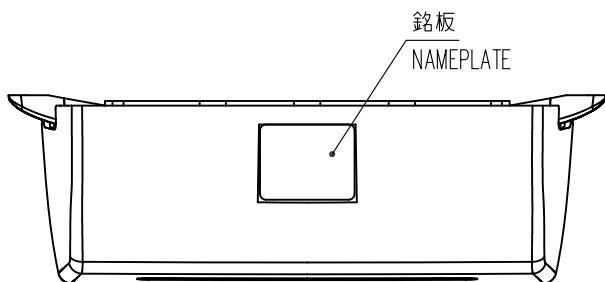
NOTE

1. TABLE 2 INDICATES TOLERANCE OF DIMENSIONS WHICH IS NOT SPECIFIED.
2. USE M12 BOLTS FOR FIXING THE UNIT.

DRAWN	Jan. 17 '08	I. YAMASAKI	TITLE	RSB-118
CHECKED	Jan. 17 '08	I. TAKENO	名称	空中線部
APPROVED	Jan. 18 '08	R. ESUMI	外寸図	
SCALE	1/10	質量 表 1 参照 SEE TABLE 1	NAME	ANTENNA UNIT
DWG. No.	C3569-G01-B	REF. No.	03-174-504G-2	OUTLINE DRAWING

表 1 TABLE 1

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



A部詳細 (縮尺: 1/2)  
 DETAIL OF A (SCALE: 1/2)

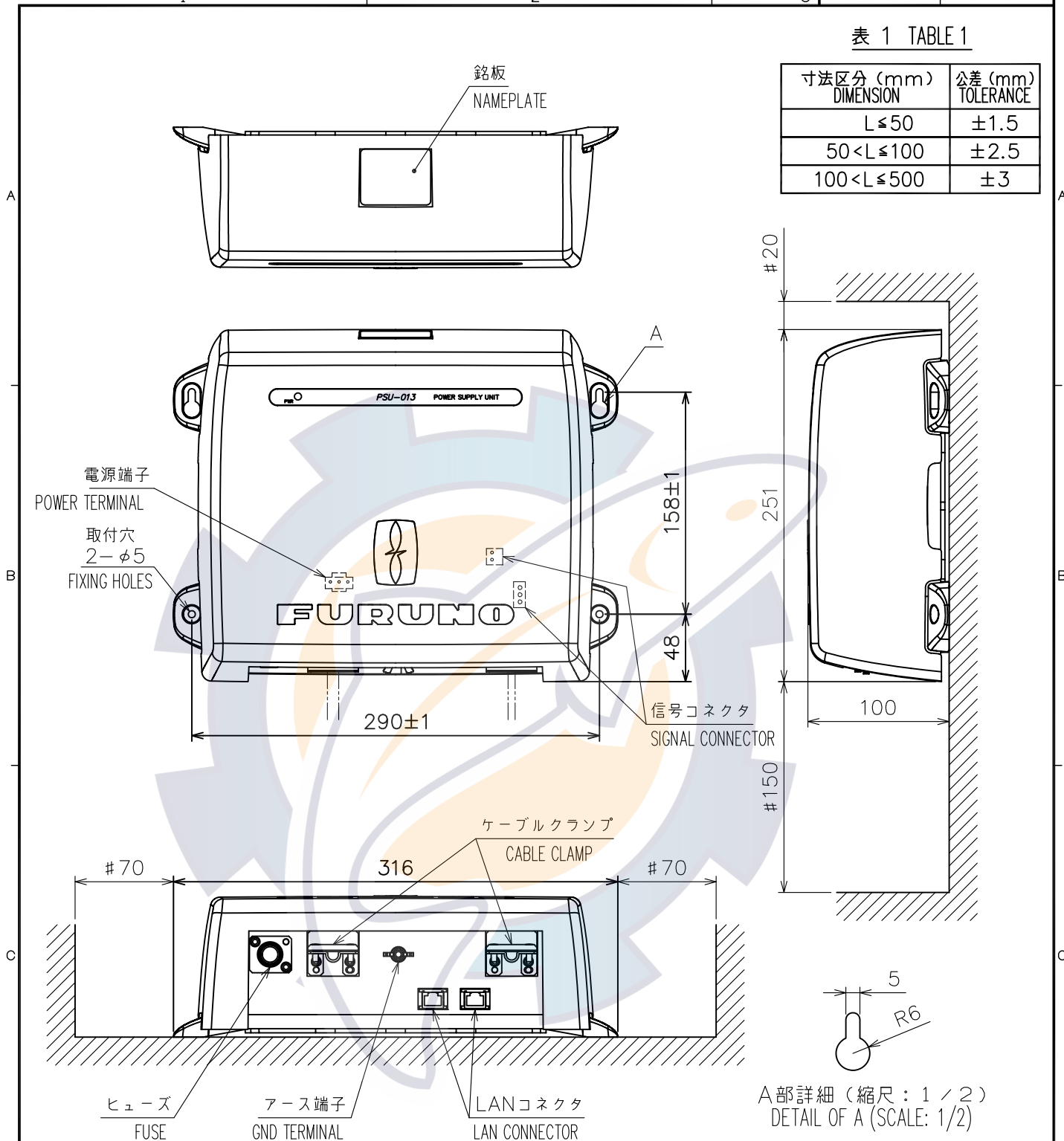
- 注 記 1) #印寸法は最小サービス空間寸法とする。  
 2) 指定外の寸法公差は表 1 による。  
 3) 取付用ネジはトラスタッピンネジ呼び径4×20を使用のこと。

- NOTE 1. #: MINIMUM SERVICE CLEARANCE.  
 2. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS WHICH IS NOT SPECIFIED.  
 3. USE TAPPING SCREWS φ4x20 FOR FIXING THE UNIT.

DRAWN	1/Apr/08 T.YAMASAKI	TITLE	PSU-012
CHECKED	1/Apr/08 T.TAKENO	名称	パワーサプライユニット
APPROVED	2/Apr/08 R.Esumi	DRS4A/6A/12A	外寸図
SCALE	1/4	MASS 1.8 ±10% kg	NAME POWER SUPPLY UNIT
DWG.No.	C3569-G02-D	REF.No.	03-174-900G-2
			OUTLINE DRAWING

表 1 TABLE 1

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

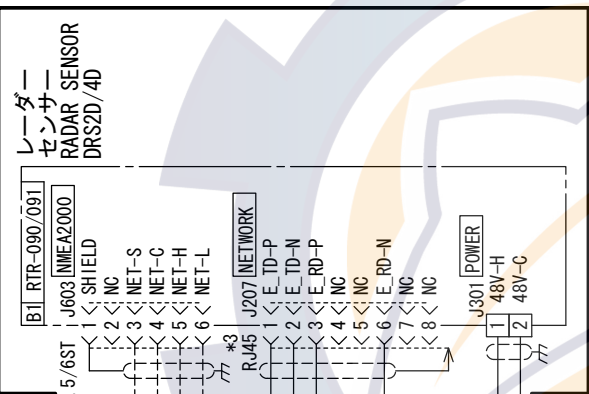


- 注 記 1) #印寸法は最小サービス空間寸法とする。  
 2) 指定外の寸法公差は表 1 による。  
 3) 取付用ネジはトラスタッピンネジ呼び径4×20を使用のこと。
- NOTE 1. #: MINIMUM SERVICE CLEARANCE.  
 2. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS WHICH IS NOT SPECIFIED.  
 3. USE TAPPING SCREWS  $\phi 4 \times 20$  FOR FIXING THE UNIT.

DRAWN Oct. 10 '07 I.YAMASAKI	TITLE PSU-013
CHECKED Oct. 10 '07 T.TAKENO	名称 パワーサプライユニット
APPROVED Oct. 15 '07 R.Esumi	DRS25A 外寸図
SCALE 1/4 MASS 2 ±10% kg	NAME POWER SUPPLY UNIT
DWG.No. C3573-G01-A	REF.No. 03-174-910G-1 OUTLINE DRAWING

航法装置またはセンサー  
NAV. EQUIPMENT OR SENSOR

GP-330B  
SC-30  
WS-200 etc.



マルチファンクションディスプレイ  
MULTI-FUNCTION DISPLAY

MFDS/12  
MFDDB (MPU-001)

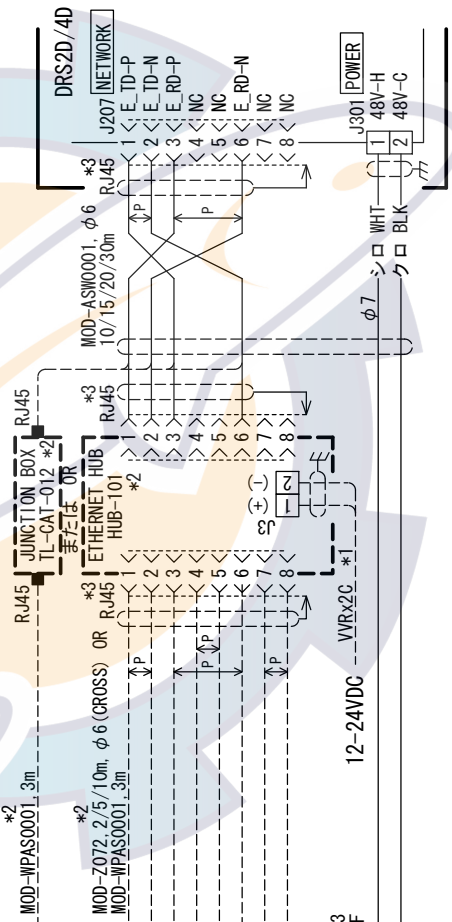
E\_TD-P > 1  
E\_TD-N > 2  
E\_RD-P > 3  
NC > 4  
NC > 5  
E\_RD-N > 6  
NC > 7  
NC > 8

MJ-A3SPF  
+48V > 1  
GND > 2  
SHIELD > 3

MFDS/12  
MFDDB (MPU-001)

E\_TD-P > 1  
E\_TD-N > 2  
E\_RD-P > 3  
NC > 4  
NC > 5  
E\_RD-N > 6  
NC > 7  
NC > 8

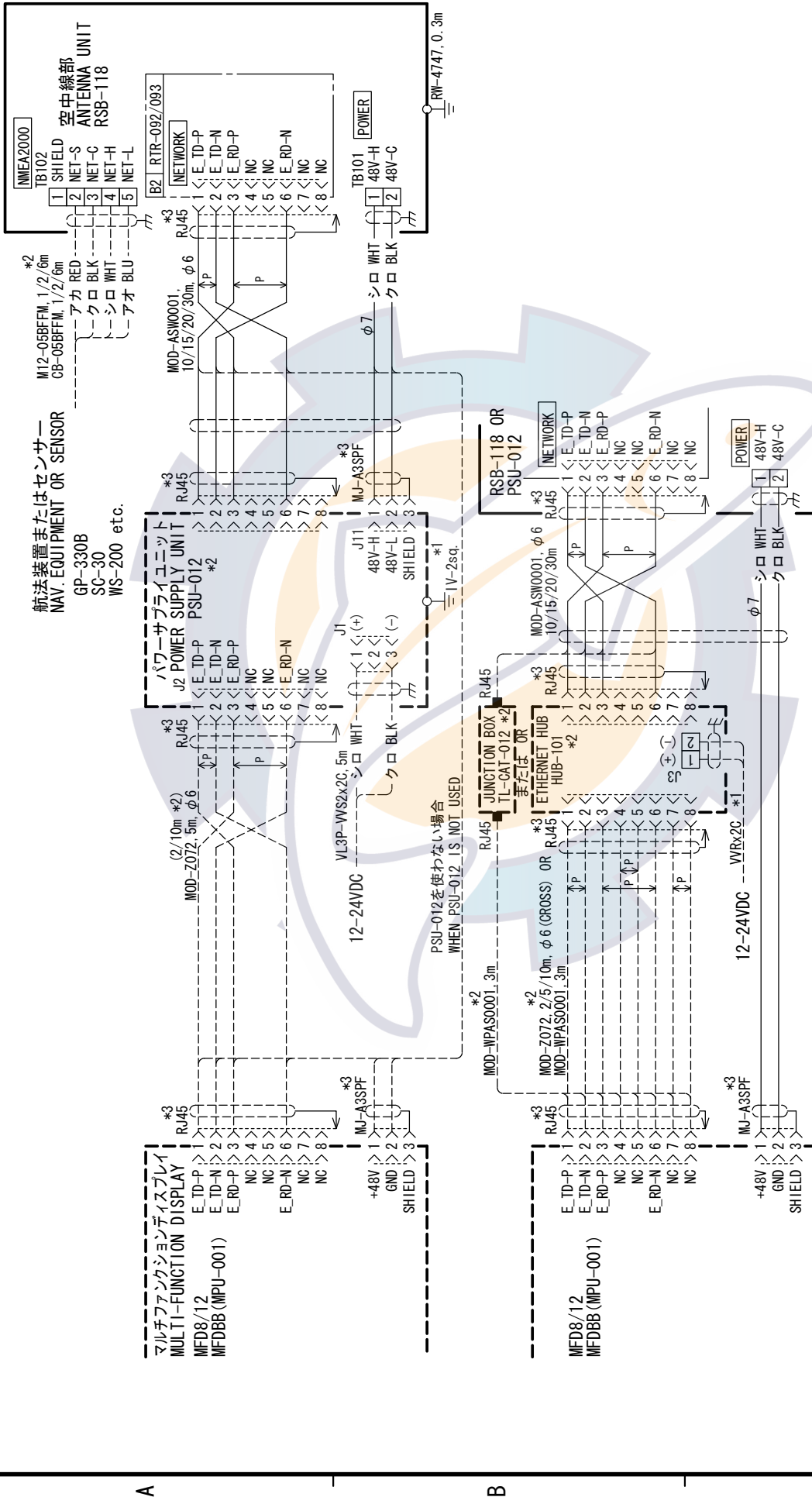
MJ-A3SPF  
+48V > 1  
GND > 2  
SHIELD > 3



注記  
1) 造船所手配。  
2) オプション。  
3) コネクタは工場にて取付済み。

NOTE  
1. SHIPYARD SUPPLY.  
2. OPTION.  
3. CONNECTOR PLUG FITTED AT FACTORY.

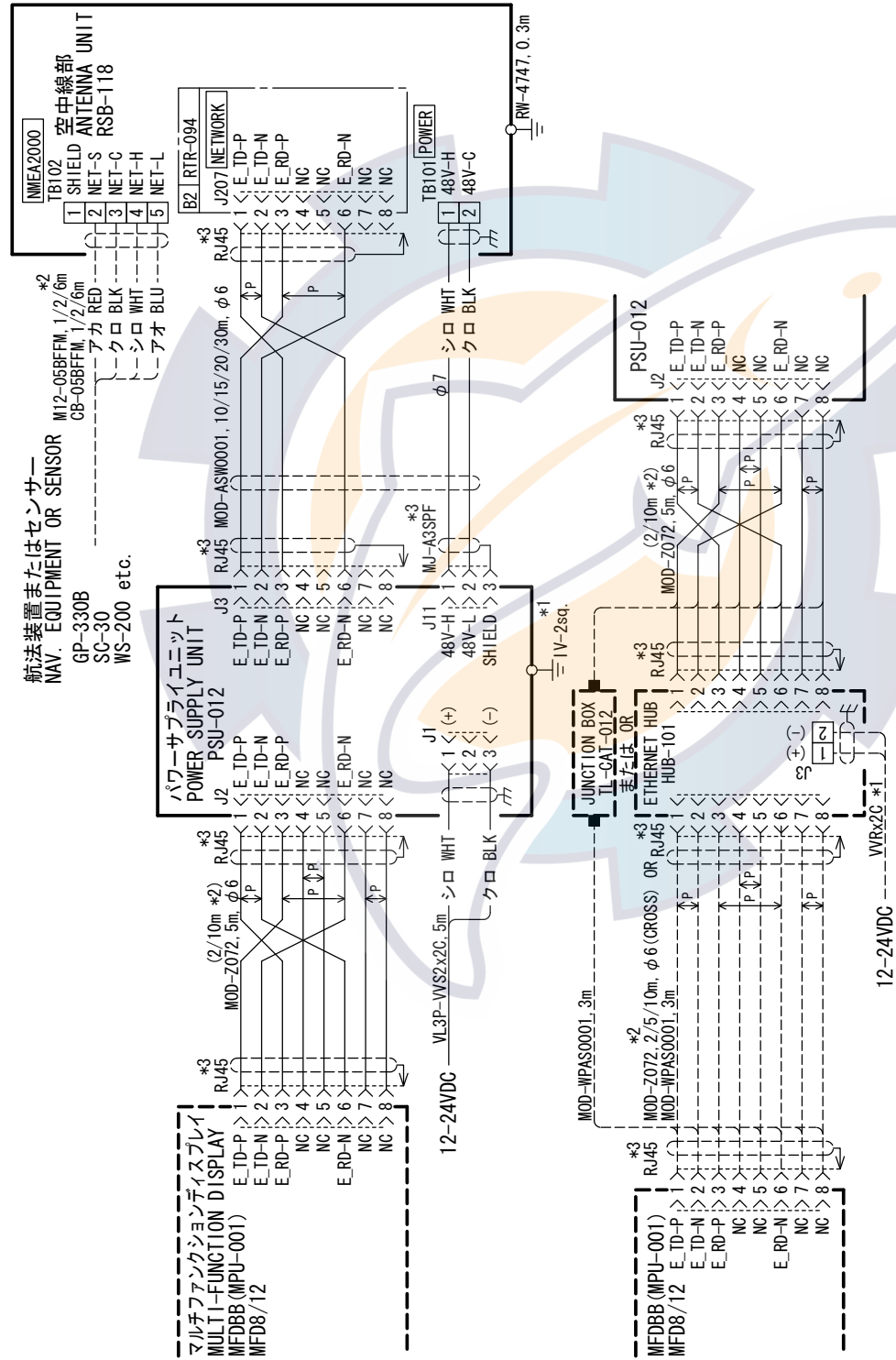
DRAWN Jan. 23 '08 I. YAMASAKI	TITLE DRS2D/4D
CHECKED Jan. 23 '08 T. TAKENO	名称 レーダーセンサー
APPROVED Jan. 23 '08 R. Esumi	相互結線図
SCALE 1/1000	NAME RADAR SENSOR
DWG. No. C3567-C01-B	INTERCONNECTION DIAGRAM
REF. No. 03-174-6001-1	



DRAWN	1/Apr./08	I. YAMASAKI	TITLE	DRS4A/6A
CHECKED	1/Apr./08	T. TAKENO	名称	レーダーセンサー
APPROVED	2/Apr./08	R. Esumi		相互結線図
SCALE		MASS	NAME	RADAR SENSOR
DWG. No.	C3569-C01-C	kg		INTERCONNECTION DIAGRAM
			REF. No.	03-174-6003-3



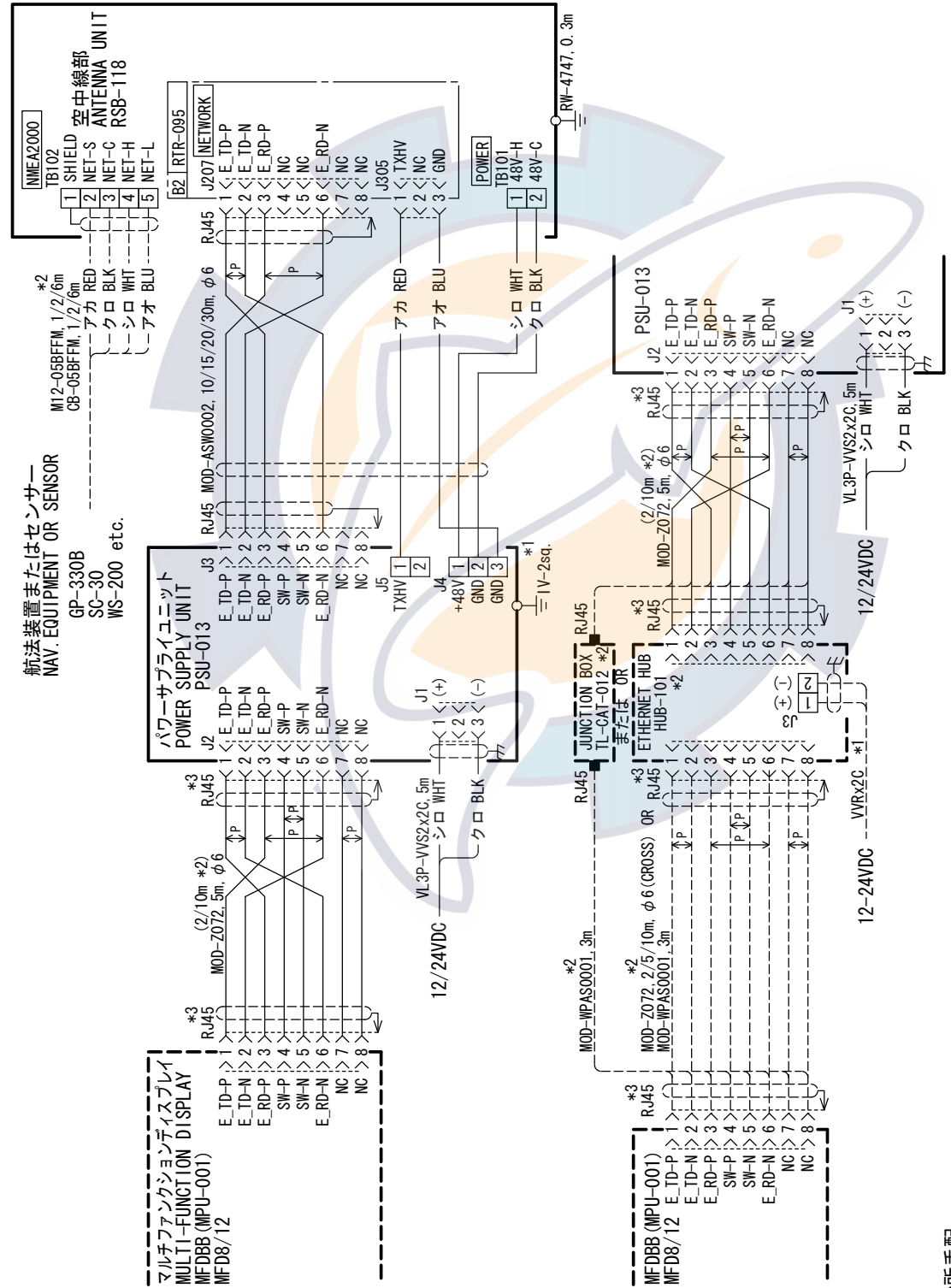
2 3 4



注記  
 1) 造船所手配。  
 2) オプション。  
 3) コネクタは工場にて取付済み。

NOTE  
 1. SHIPYARD SUPPLY.  
 2. OPTION.  
 3. CONNECTOR PLUG FITTED AT FACTORY.

DRAWN	1/Apr/08	I. YAMASAKI	TITLE	DRS12A
CHECKED	1/Apr/08	T. TAKENO	名称	レーダーセンサー
APPROVED	2/Apr/08	R. Esumi		相互結線図
SCALE		1/1	NAME	RADAR SENSOR
DWG. No.	C3571-C01-C	kg	REF. No.	03-174-6003-3
				INTERCONNECTION DIAGRAM

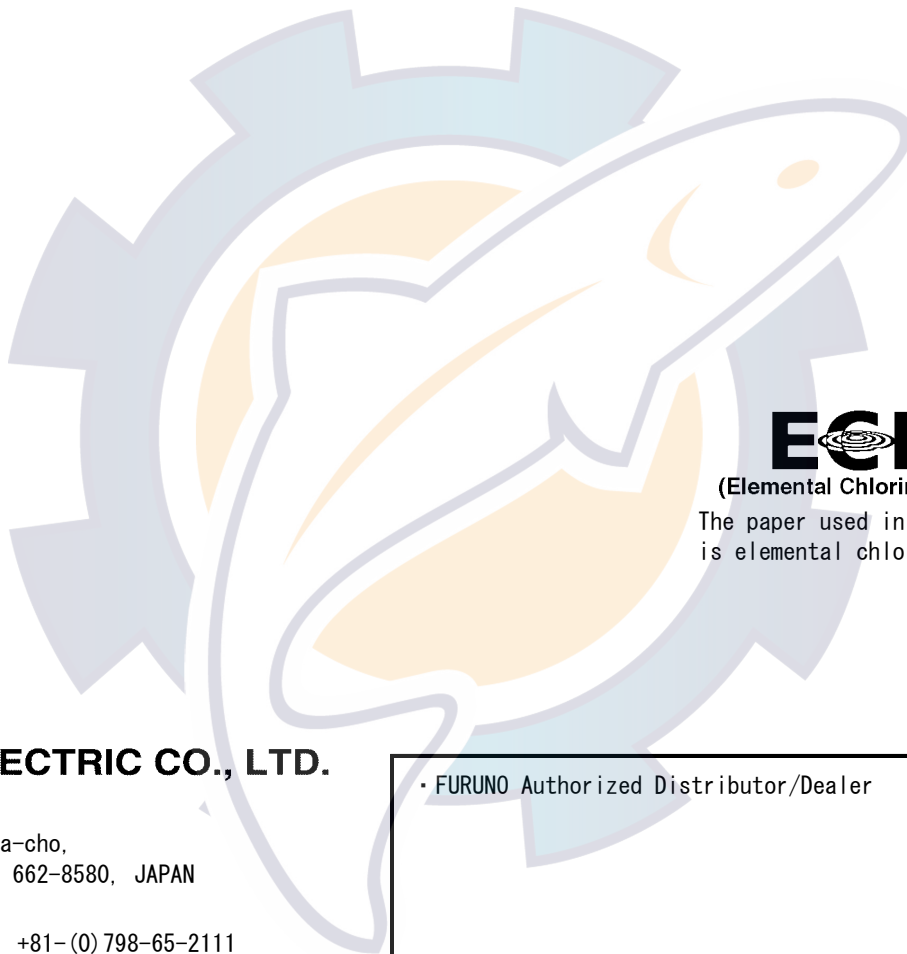


注記  
 1) 造船所手配。  
 2) オプション。  
 3) コネクタは工場にて取付済み。

NOTE  
 1. SHIPYARD SUPPLY.  
 2. OPTION.  
 3. CONNECTOR PLUG FITTED AT FACTORY.

DRAWN	Feb. 22 '08	I. YAMASAKI	TITLE	DRS25A
CHECKED	Feb. 22 '08	T. TAKENO	名称	レーダーセンサー
APPROVED	Mar. 12 '08	R. Esumi		相互結線図
SCALE		MASS	NAME	RADAR SENSOR
DWG. No.	C3573-C01-A	REF. No.	03-174-6003-3	INTERCONNECTION DIAGRAM





**ECF**

(Elemental Chlorine Free)

The paper used in this manual  
is elemental chlorine free.

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(HIMA ) DRS-2D/4D/4A-25A

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B1 : APR. 17, 2008



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