

Installation Manual

RADAR SENSOR



MODEL DRS4DL

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SAFETY INFORMATION

Read these safety instructions before installing or operating the equipment.

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

 Warning, Caution	 Prohibitive Action	 Mandatory Action
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 WARNING	
	ELECTRICAL SHOCK HAZARD Do not open the equipment. The installation does not require you to open the radar sensor.
	Do not disassemble or modify the equipment. Fire, electrical shock or serious injury can result.
	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.
	Be sure the power source is compatible with the voltage rating of the equipment. Connection of an incorrect power source can cause fire or damage the equipment.
	Turn off the power at the power source 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.
	Use the proper fuse. Use of a wrong fuse can damage the equipment or cause fire.
	Do not depend one navigation device for the navigation of the vessel. For the safety of vessel and crew, the navigator must check all aids available to confirm position.

WARNING



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, 50 and 10 W/m² exist are given in the table below.

100 W/m ²	50 W/m ²	10 W/m ²
N/A	N/A	1.1 m

NOTICE



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





Standard compass	Steering compass
1.55 m	0.95 m



It is recommended that you connect the sensor to a disconnecting device (circuit breaker, etc.) to control the power.

WARNING LABEL

A warning label is attached to the sensor. Do not remove the label. If the label is missing or damaged, contact a FURUNO agent or dealer about replacement.

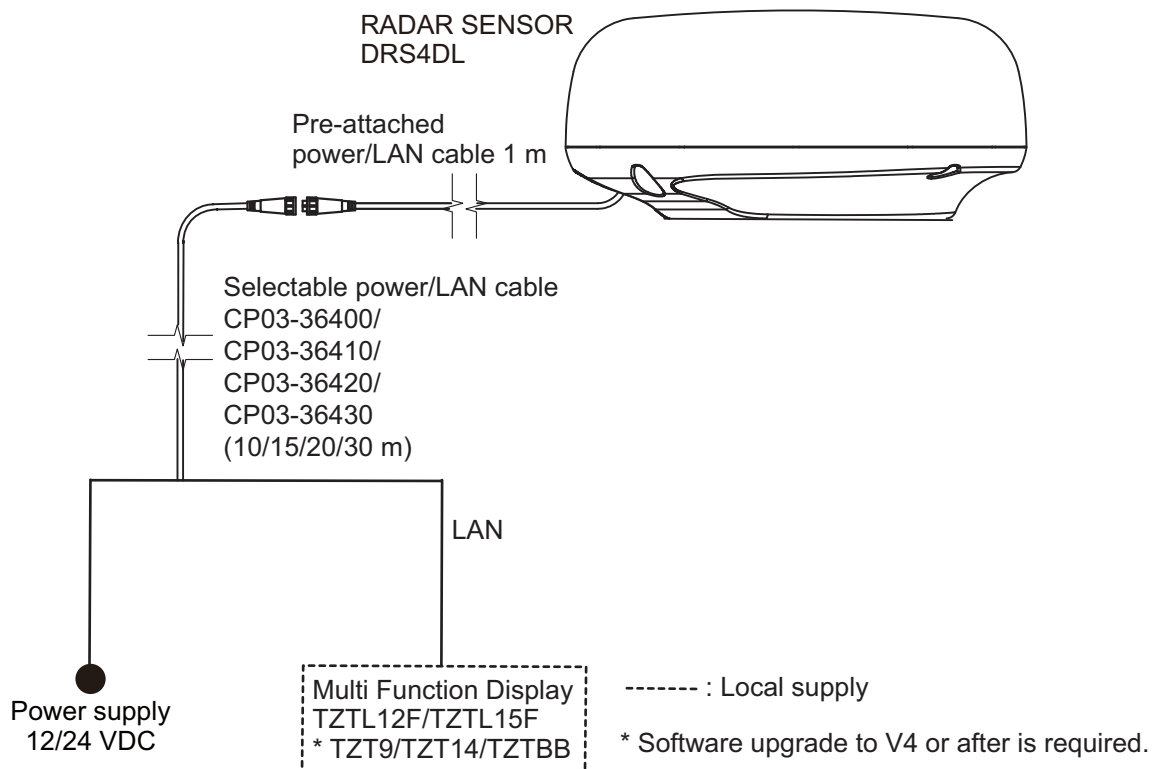
 WARNING 	 警告 
To avoid electrical shock, do not remove cover. No user-serviceable parts inside.	感電の恐れあり。サービスマン以外の方はカバーを開けないで下さい。内部には高電圧部分が多くあり、万一さわると危険です。

Name: Warning Label (2)

Type: 03-129-1001-3

Code No: 100-236-743

SYSTEM CONFIGURATION



EQUIPMENT LISTS

Standard supply

Name	Type	Code No.	Qty	Remarks
Radars Sensor	RSB-127-104	000-027-200	1	
Installation Materials	CP03-35701	001-265-920	1	
	CP03-36400	000-027-211	Select one	Power/LAN cable 10 m
	CP03-36410	000-027-212		Power/LAN cable 15 m
	CP03-36420	000-027-213		Power/LAN cable 20 m
	CP03-36430	000-027-214		Power/LAN cable 30 m
Spare Parts	SP03-17901	001-351-470	1	Fuses

Optional supply

Name	Type	Code No.	Qty	Remarks
Radome Mount	OP03-209	001-078-350	1	

1. INSTALLATION

1.1 Installation Considerations

General considerations

NOTICE

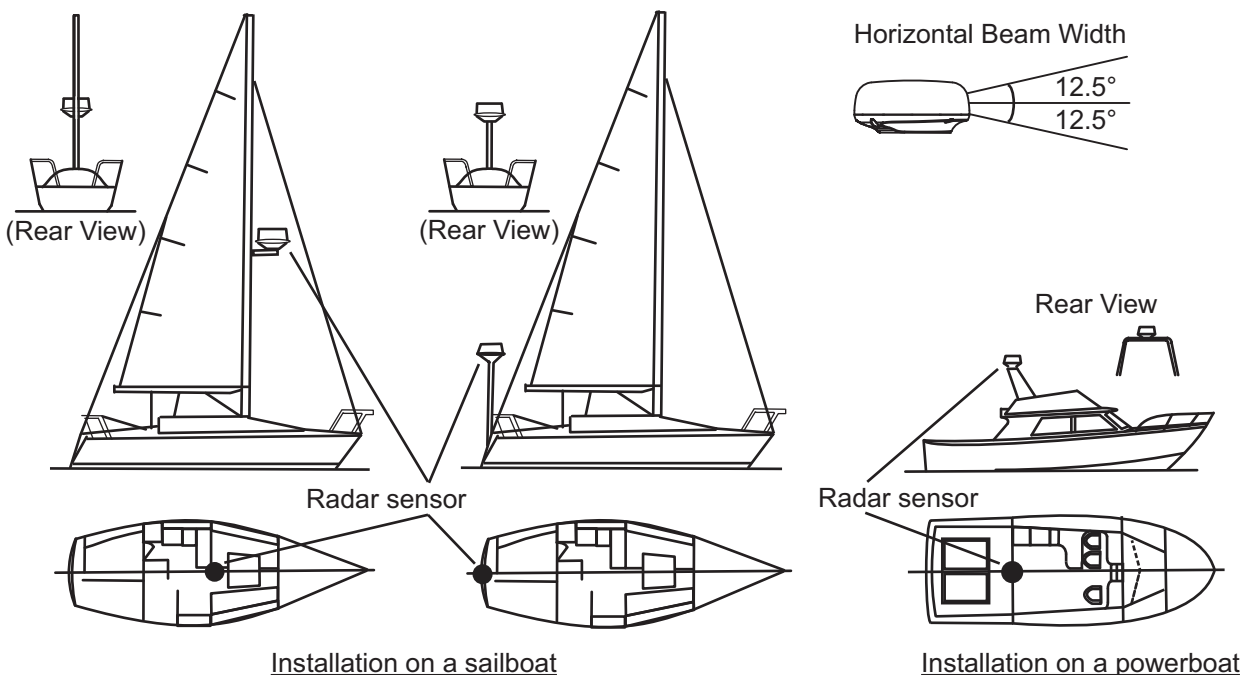
Do not apply paint, anti-corrosive sealant or contact spray to coating or plastic parts of the equipment.

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

- The radar sensor has no power switch. Therefore, it is recommended that you connect the sensor to a distribution switchboard with a switch for power control.

Sensor placement

- Install the radar sensor on the hardtop, radar arch or on a mast on an appropriate platform. (For sailboats, a “radome mount” is optionally available for fixing the sensor to a mast.) Place the sensor where there is a good all-round view with, as far as possible, no part of the ship’s superstructure or rigging intercepting the scanning beam. Any obstruction will cause shadow and blind sectors. A mast for instance, with a diameter considerably less than the horizontal beam width of the radiator, will cause only a small blind sector, but a horizontal spreader or cross trees 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. Be sure there are no metallic objects near the antenna. See illustrations below for typical placement on a sailboat and powerboat.



Typical installation on a sailboat and power boat

- 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.
- In order to reduce the chance of picking up electrical interference, avoid where possible routing the power cable near other electrical equipment on-board. Also, avoid running the cable in parallel with other power cables.
- Select a location that does not allow water to accumulate at the base of the sensor.
- A magnetic compass will be affected if the radar sensor is too close to the compass. Observe the compass safe distances mentioned in the SAFETY INFORMATION to prevent interference to a magnetic compass.
- Do not paint the radome to ensure proper emission of the radar waves.
- When this radar sensor is to be installed on a large vessel, consider the following points:
 - The length of the standard supply power/LAN cable is 1 m (from radome to the connector).
 - The power/LAN cable runs between the radar sensor and display and comes in lengths of 10 m, 15 m, 20 m or 30 m. Select the length when purchasing.
 - 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°C (131°F).

1.2 Installation of the Radar Sensor

Determine the suitability of the mounting location **BEFORE** permanently mounting the sensor. Incoming and outgoing signals may overlap one another depending on the shape of the vessel, preventing communication between the radar and display. Set the sensor on the selected location and connect the sensor to the distribution switchboard and display unit. Turn on the sensor and the display unit. Check that the picture is updated with each sweep on the display unit. Some trial and error may be necessary to find a suitable location.

Required tools for installation

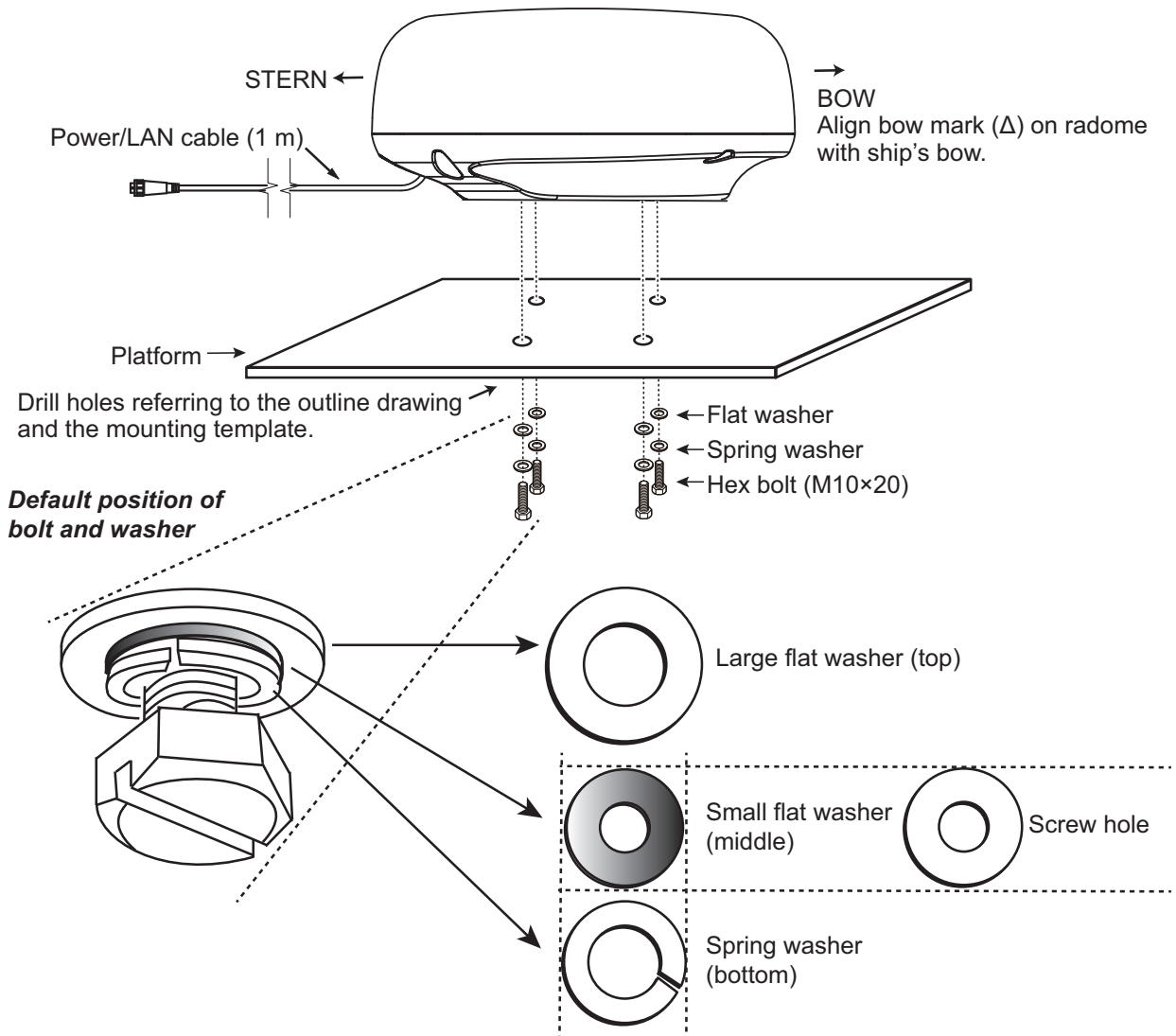
Prepare the tools shown below.

- A wrench for M10 bolts
- An electric drill with $\phi 11$ mm (0.43") drill bit

1. INSTALLATION

Installation on a platform

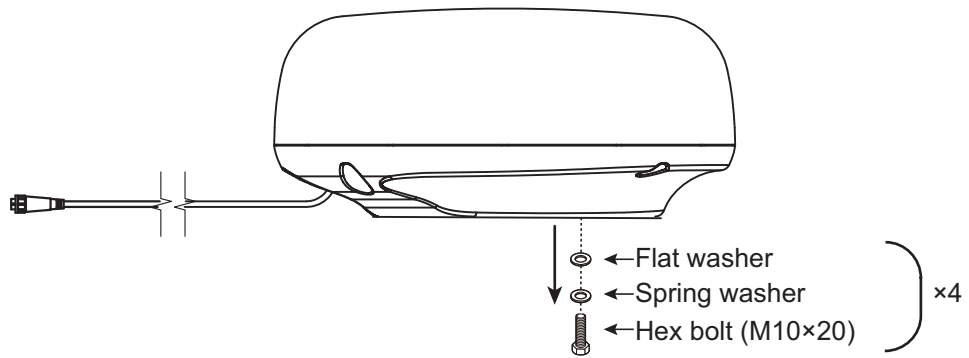
Follow the instructions below to install the sensor on a platform.



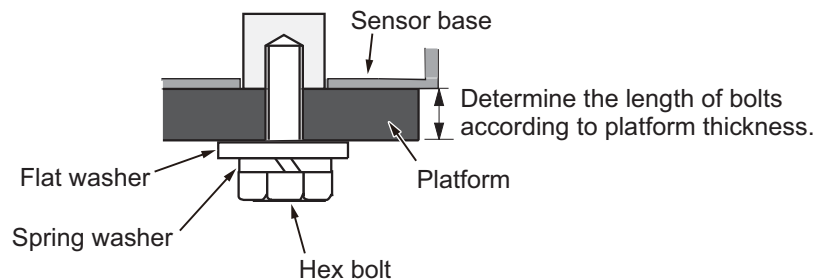
Note: The outer diameter of the small flat washer is the same size as the bolt hole. If the radome is put upside down with only the small flat washer and hex bolt in place, the hex bolt and flat washer may protrude into the radome and damage the RT unit. For this reason, DO NOT put the radome upside down when carrying the radome.

If it is necessary to transport the radome, be sure the large flat washers are in place before transporting, to prevent damage to the RT unit.

1. Remove four each of hex bolts (M10×20), flat washers and spring washers pre-attached to the bottom of the radar sensor.



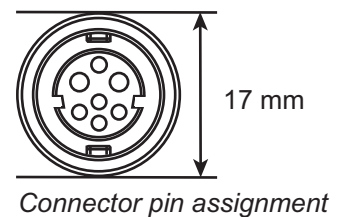
2. Using the template supplied, construct a platform and drill mounting holes in the platform to fasten the sensor. The holes must be parallel with the fore and aft line.
3. Put the radar sensor on the platform with the bow mark (Δ) on the sensor aligned with the ship's bow.
4. Use hex bolts (see the table on the next page for bolt length), flat washers and spring washers (removed at the first step) to fasten the radar sensor to the platform. The torque for the bolts is 19.6 to 24.5 N•m.



Platform thickness and bolt to use

Platform thickness	Size of bolts to use
5 mm or less	M10×20 (Supplied, prefastened to radome.)
6 - 10 mm	M10×25 (Supplied as spare parts)
Over 10 mm	Supply locally.

5. Connect the power/LAN cable pre-attached to the radar sensor to the power/LAN cable. The connector pin assignment is as below.



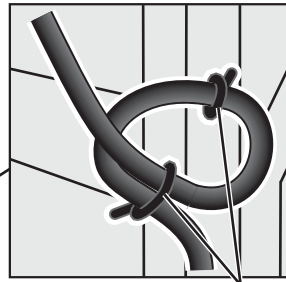
Observe below guidelines for laying the power/LAN cable.

Guidelines for laying the power/LAN cable

- The connectors must not strike any part of the vessel by wind, etc.
- The load applied to the connectors must not be more than the power/LAN cable.
- If the cable is passed through a mast on a sailboat, be sure the cable does not touch ropes (sheet, halyard, etc.).
- Do not fasten the cable to the hull.

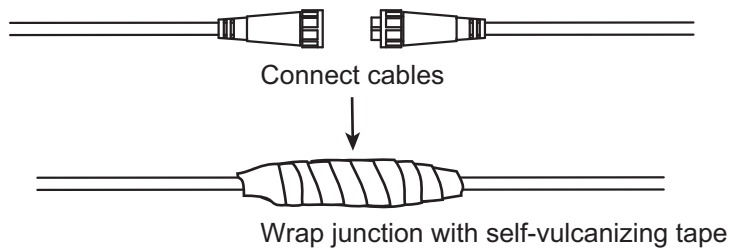
1. INSTALLATION

- The cable must be fixed so no tension is applied to the connectors. To prevent tension, create a loop in the cable close to the sensor and tie the loop with cable ties, as in the figure below.



Loop cable and tie loop with cable ties.
The minimum bend diameter is 80 mm.

- Wrap the junction of the connectors with self-vulcanizing tape for waterproofing.



- Fasten the cable to the mast, etc. at the neck of each connector with a cable tie.
6. Connect the power/LAN cable to the power source and display unit.

Installation with the radome mount

The optional radome mount lets you fasten the radar sensor to a mast on a sailboat.

Name, Type: Radome Mount, OP03-209

Code No.: 001-078-350

Name	Type	Code No.	Qty
Mounting plate	03-018-9001-0	100-206-740-10	1
Support plate (1)	03-018-9005-0	100-206-780-10	1
Support plate (2)	03-018-9006-0	100-206-790-10	1
Bracket (1)	03-028-9101-1	100-206-811-10	1
Bracket (2)	03-028-9101-2	100-206-812-10	1
Fixing plate	03-028-9103-1	100-206-831-10	2
Hex bolt w/washer	M8×20 SUS304	000-162-955-10	8
Hex bolt w/washer	M4×12 SUS304	000-162-956-10	4

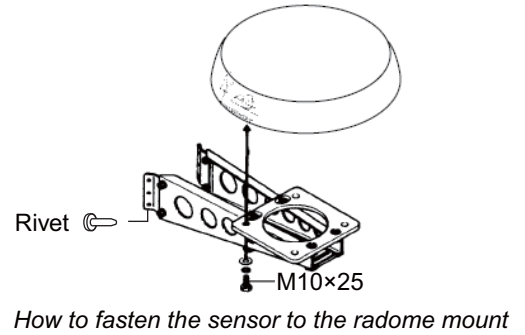
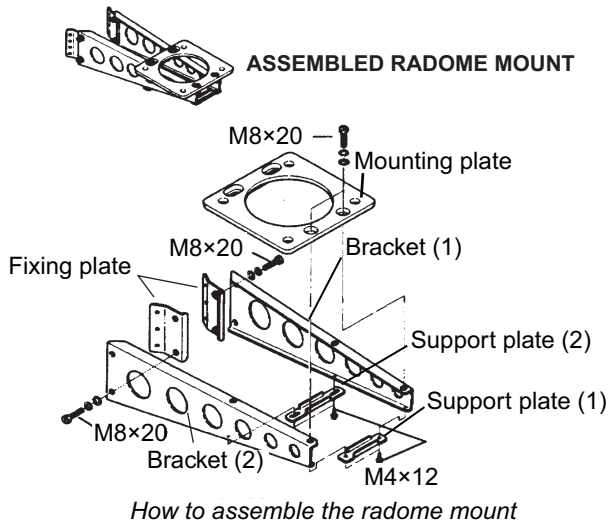
How to assemble the bracket

- Fasten the fixing plates to brackets (1) and (2) with four M8×20 hex bolts.
- Fit brackets (1) and (2) loosely with support plates (1) and (2) using four M4×12 hex bolts, so that the gap between the brackets can be adjusted.
- Place the mounting plate on the bracket and fix it loosely with four M8×20 hex bolts.

How to fasten the bracket to the mast

1. Drill eight holes of 6.5 mm diameter in the mast and fix the bracket with eight stainless steel rivets (local supply) of 6.4 mm diameter.
2. Tighten the bolts on the bracket.
3. Fasten the radar sensor to the bracket.

Connect the power cable to the power source, observing the guidelines for laying the power cable shown on this page.



2. WIRING

2.1 Connections

2.1.1 Power Requirement

The DRS4DL requires either 12 VDC or 24 VDC power. The 10/15/20 m cables are for 12 or 24 VDC, and the 30 m cable is for 24 VDC only. Connect the red cable to the positive terminal of ship's battery; the blue cable to the negative terminal. The black cable is a shielding cable for grounding.

2.1.2 LAN Cable Connection

Connect LAN cable to the multi function display device.

2.2 Check Points After Installation

Before using the product, carry out the following:

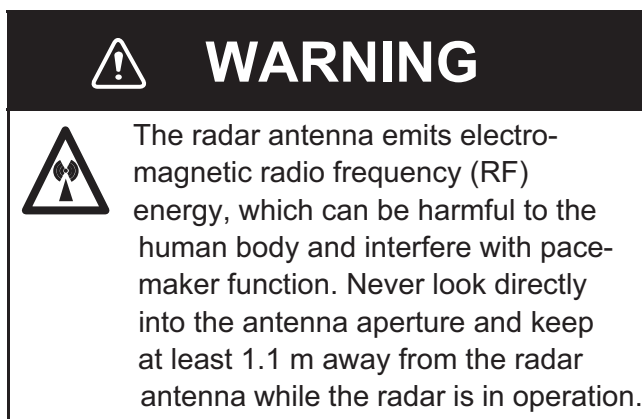
- Mechanical checks
- Turning the power on and initial setup

Mechanical checks

Check below points before switching on the DRS4DL.

- All washers are in place and bolts are fully tightened.
- All connections are secure.
- All connecting cables and wires are secured.
- LAN cable is connected to the multi function display device.

Turning the power on and initial setup



Use the information in this manual and the manual for TZTL12F/TZTL15F/TZT9/TZT14/TZTBB* to power the sensor and to proceed with initial setup.

* Hereafter these units are referred to as “multi function display device”.

1. Press and hold down the power key of your multi function display device until the unit is ON. The magnetron warm-up sequence starts. When the warm-up sequence is completed, the unit goes into the standby mode.
2. Take the appropriate action on your multi function display device to turn on the DRS4DL.
3. If necessary, adjust the brightness and change the language on the multi function display device.
4. Ensure that all personnel are clear of antenna.
5. Check if the heading is correctly aligned - targets should appear at their correct bearing relative to the boat's bow. Adjust the alignment if necessary, referring to installation manual of your multi function display device.
6. Check the display timing, referring to installation manual of your multi function display device.

3. MAINTENANCE, TROUBLE-SHOOTING

 **WARNING**

 **DO NOT OPEN THE SENSOR.**
Electrical shock hazard

There are no user-serviceable parts inside. Only qualified personnel are allowed to work inside the equipment.


3.1 Maintenance

Regular maintenance is important for good performance. Check the points mentioned below every 3 to 6 months to keep the radar sensor in good working order. Observe the safety instructions at the front of this manual when working on the mast.

Check point	Action
Fixing bolts • Corrosion • If they are tightly fastened	<ul style="list-style-type: none">• Replace corroded bolts.• Tighten loosened bolts.• Coat new bolts with marine sealant.
Radome • Cracks • Foreign material	<p>If a crack is found, repair it temporarily with a small amount of sealing compound or adhesive. Bring the unit to your dealer for permanent repairs.</p> <p>Foreign material on the radome can cause a considerable drop in sensitivity. Remove foreign material with a freshwater-moistened cloth. Do not use commercial cleaners to clean the sensor; they can remove paint and markings or deform the plastic.</p>

3.2 Replacement of Fuse

The 5A fuse (Type: FRU-2P5S-FU-5A-A, Code No.: 000-168-869-10) in the fuse holder on the power/LAN cable protects the radar sensor from overcurrent and equipment fault. If you cannot turn on the power, check the fuse to see if it has blown. If the fuse has blown, find the reason before you replace the fuse. If the fuse blows again after the replacement, contact your dealer for advice.

 **WARNING**

Use the proper fuse.

Use of the wrong fuse can damage the equipment or cause fire.

3.3 Troubleshooting

The table below provides simple troubleshooting procedures to restore normal operation. If you cannot restore normal operation, contact your dealer for advice.

Trouble	Remedy
The power cannot be turned on.	<ul style="list-style-type: none"> • Check if the power/LAN cable is connected to the power source and the power source is on. • Check the power cable for damage. • Check if the fuse has blown.
Picture is not updated or the picture freezes.	<ul style="list-style-type: none"> • Check antenna cable. • If the picture freezes, reboot the display unit.
Marks and characters appear on the display, but echoes do not appear.	Check that the antenna cable is fastened.
You changed the range, but the radar picture does not change.	<ul style="list-style-type: none"> • Try to zoom in or out the radar display. • Turn the power off and on.
Signal strength is too low.	Have a technician check the magnetron.

3.4 Replacement of Magnetron

The life expectancy of the magnetron is approx. 5,000 hours (including standby). The effectiveness of the magnetron decreases over time, causing lower-than-normal signal strength and loss of echoes. If you feel the signal strength is low, contact your dealer about replacement of the magnetron.

Name	Type	Code No.
Magnetron	E3571 (80-0691)	001-266-460

**SPECIFICATIONS OF RADAR SENSOR
DRS4DL**

1 RADIATOR

- 1.1 Antenna type Patch array antenna
- 1.2 Antenna length 18-inch
- 1.3 Horizontal beam width 5.2° typical (3 dB)
- 1.4 Vertical beam width 25° (3 dB)
- 1.5 Sidelobe attenuation -20 dB (within ±20°), -25 dB (±20° or more)
- 1.6 Rotation 24 rpm

2 RADAR FUNCTION

- 2.1 Tx frequency 9410±30 MHz, P0N
- 2.2 Output power 4 kW
- 2.3 Duplexer Ferrite circulator
- 2.4 Intermediate frequency 60 MHz
- 2.5 Range, Pulse length and Pulse repetition rate

Range (NM)	Pulse length (μs)	PRR (Hz approx.)
0.125 to 0.5	0.08	360
0.75 to 2	0.3	360
3 to 24	0.8	360

- 2.6 Minimum range 25 m
- 2.7 Range resolution 25 m
- 2.8 Range accuracy 1 % of range in use or 0.01 NM, which is the greater
- 2.9 Bearing resolution 5.2°
- 2.10 Bearing accuracy ±1°
- 2.11 Warming up time 90 s

3 INTERFACE

- LAN 1 port, Ethernet 100Base-T, RJ45

4 POWER SUPPLY

12-24 VDC: 2.1-1.0 A

5 ENVIRONMENTAL CONDITIONS

- 5.1 Ambient temperature -25°C to +55°C (storage: +70°C or less)
- 5.2 Relative humidity 95% or less at +40°C
- 5.3 Degree of protection IP26
- 5.4 Vibration IEC 60945 Ed.4

6 UNIT COLOR




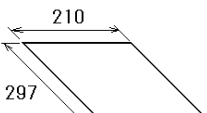
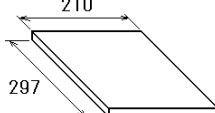
N9.5 (cover), 2.5PB3.5/10 (bottom)

PACKING LIST

03HP-X-9851 -1 1/1

DRS4DL/-N

A-1

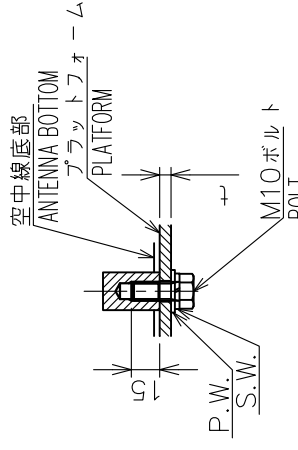
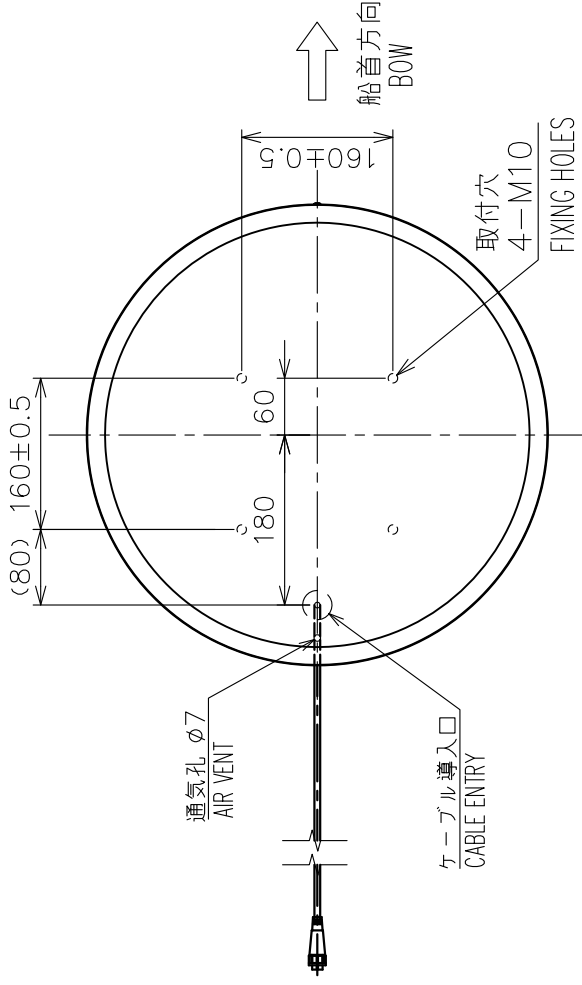
NAME	OUTLINE	DESCRIPTION/CODE No.	Q'TY
ユニット UNIT			
レーダーセンサー RADAR SENSOR		RSB-127-104* 000-027-200-00 **	1
予備品 SPARE PARTS			
予備品 SPARE PARTS		SP03-17901 001-351-470-00	1
工事材料 INSTALLATION MATERIALS			
工事材料 INSTALLATION MATERIALS		CP03-35701 001-351-480-00	1
図書 DOCUMENT			
型紙 TEMPLATE		E32-01314-* 000-178-948-1* **	1
装備要領書(英) INSTALLATION MANUAL (EN)		IME-36370-* 000-165-828-1* **	1

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

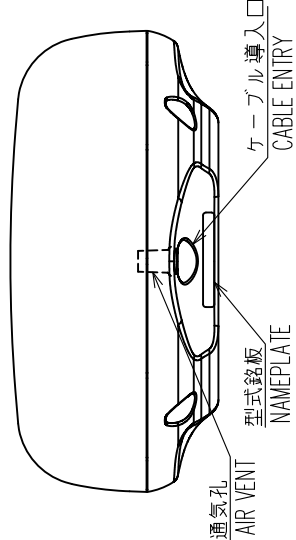
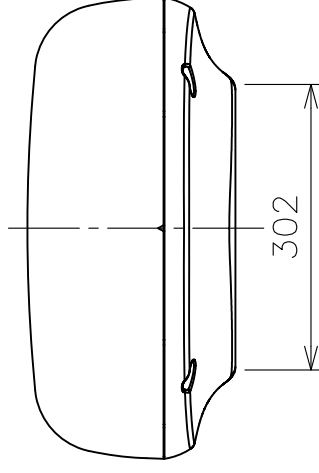
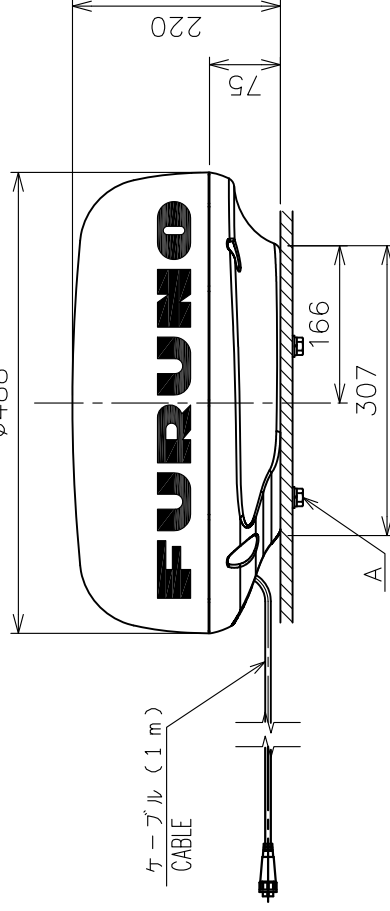
(略図の寸法は、参考値です。 DIMENSIONS IN DRAWING FOR REFERENCE ONLY.)

表 1 TABLE 1

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



A部 詳細 (尺度: 1/4)
DETAIL OF A (SCALE: 1/4)



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、 $20 (t \leq 5)$ または $25 (5 < t < 10)$ とする。

NOTE

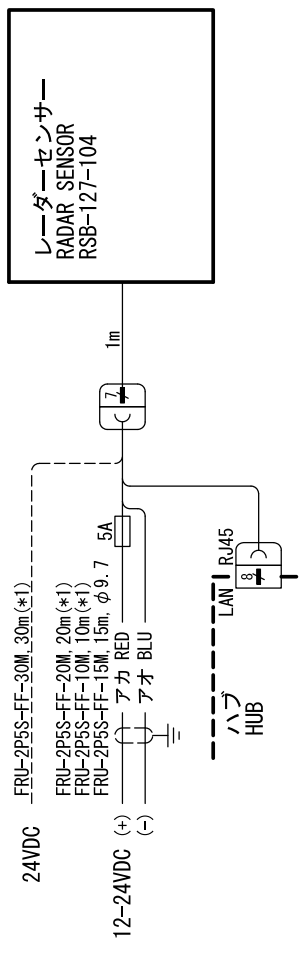
1. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS WHICH IS NOT SPECIFIED.
2. USE M10 BOLTS FOR FIXING THE UNIT. SCREW LENGTH SHOULD BE $20 (t \leq 5)$ OR $25 (5 < t < 10)$. t: THICKNESS OF PLATFORM.

DRAWN	5/Nov/2014	I.YAMASAKI	TITLE	RSB-127-104
CHECKED	5/Nov/2014	H.MAKI	名称	レーダーセンサー
APPROVED	6/Nov/2014	H.MAKI	外寸図	
SCALE	1/8	質量 5.7 kg	NAME	RADAR SENSOR
DWG.No.	C3637-001-A	質量はケーブル (1 m) を含む。 MASS INCLUDES 1m CABLE.	OUTLINE DRAWING	
		REF.No.	03-184-310G-0	

A

B

C



または OR
マルチファンクションディスプレイ
MULTI FUNCTION DISPLAY
TZ1L12F/15F, ETC.

注記

* 1) オプション。

NOTE

*1: OPTION.

DRAWN	10/Dec/2014	T. YAMASAKI	TITLE	DRS4DL
CHECKED	10/Dec/2014	H. MAKI	名称	レーダーセンサー
APPROVED	11/Dec/2014	H. MAKI		相互結線図
SCALE	MASS	kg	NAME	RADAR SENSOR
DWG. No.	C3637-C01-A		REF. No.	INTERCONNECTION DIAGRAM

FURUNO Worldwide Warranty for Pleasure Boats (Except North America)

This warranty is valid for products manufactured by Furuno Electric Co. (hereafter FURUNO) and installed on a pleasure boat. Any web based purchases that are imported into other countries by anyone other than a FURUNO certified dealer may not comply with local standards. FURUNO strongly recommends against importing these products from international websites as the imported product may not work correctly and may interfere with other electronic devices. The imported product may also be in breach of the local laws and mandated technical requirements. Products imported into other countries as described previously shall not be eligible for local warranty service.

For products purchased outside of your country please contact the national distributor of Furuno products in the country where purchased.

This warranty is in addition to the customer's statutory legal rights.

1. Terms and Conditions of Warranty

FURUNO guarantees that each new FURUNO product is the result of quality materials and workmanship. The warranty is valid for a period of 2 years (24 months) from the date of the invoice, or the date of commissioning of the product by the installing certified dealer.

2. FURUNO Standard Warranty

The FURUNO standard warranty covers spare parts and labour costs associated with a warranty claim, provided that the product is returned to a FURUNO national distributor by prepaid carrier.

The FURUNO standard warranty includes:

- Repair at a FURUNO national distributor
- All spare parts for the repair
- Cost for economical shipment to customer

3. FURUNO Onboard Warranty

If the product was installed/commissioned and registered by a certified FURUNO dealer, the customer has the right to the onboard warranty.

The FURUNO onboard warranty includes

- Free shipping of the necessary parts
- Labour: Normal working hours only
- Travel time: Up to a maximum of two (2) hours
- Travel distance: Up to a maximum of one hundred and sixty (160) KM by car for the complete journey

4. Warranty Registration

For the Standard Warranty - presentation of product with serial number (8 digits serial number, 1234-5678) is sufficient. Otherwise, the invoice with serial number, name and stamp of the dealer and date of purchase is shown.

For the Onboard Warranty your FURUNO certified dealer will take care of all registrations.

5. Warranty Claims

For the Standard Warranty - simply send the defective product together with the invoice to a FURUNO national distributor. For the Onboard Warranty – contact a FURUNO national distributor or a certified dealer. Give the product's serial number and describe the problem as accurately as possible.

Warranty repairs carried out by companies/persons other than a FURUNO national distributor or a certified dealer is not covered by this warranty.

6. Warranty Limitations

When a claim is made, FURUNO has a right to choose whether to repair the product or replace it.

The FURUNO warranty is only valid if the product was correctly installed and used. Therefore, it is necessary for the customer to comply with the instructions in the handbook. Problems which result from not complying with the instruction manual are not covered by the warranty.

FURUNO is not liable for any damage caused to the vessel by using a FURUNO product.

The following are excluded from this warranty:

- a. Second-hand product
- b. Underwater unit such as transducer and hull unit
- c. Routine maintenance, alignment and calibration services.
- d. Replacement of consumable parts such as fuses, lamps, recording papers, drive belts, cables, protective covers and batteries.
- e. Magnetron and MIC with more than 1000 transmitting hours or older than 12 months, whichever comes first.
- f. Costs associated with the replacement of a transducer (e.g. Crane, docking or diver etc.).
- g. Sea trial, test and evaluation or other demonstrations.
- h. Products repaired or altered by anyone other than the FURUNO national distributor or an authorized dealer.
- i. Products on which the serial number is altered, defaced or removed.
- j. Problems resulting from an accident, negligence, misuse, improper installation, vandalism or water penetration.
- k. Damage resulting from a force majeure or other natural catastrophe or calamity.
- l. Damage from shipping or transit.
- m. Software updates, except when deemed necessary and warrantable by FURUNO.
- n. Overtime, extra labour outside of normal hours such as weekend/holiday, and travel costs above the 160 KM allowance
- o. Operator familiarization and orientation.

FURUNO Electric Company, March 1, 2011

FURUNO Warranty for North America

FURUNO U.S.A., Limited Warranty provides a twenty-four (24) months LABOR and twenty-four (24) months PARTS warranty on products from the date of installation or purchase by the original owner. Products or components that are represented as being waterproof are guaranteed to be waterproof only for, and within the limits, of the warranty period stated above. The warranty start date may not exceed eighteen (18) months from the original date of purchase by dealer from Furuno USA and applies to new equipment installed and operated in accordance with Furuno USA's published instructions.

Magnetrons and Microwave devices will be warranted for a period of 12 months from date of original equipment installation.

Furuno U.S.A., Inc. warrants each new product to be of sound material and workmanship and through its authorized dealer will exchange any parts proven to be defective in material or workmanship under normal use at no charge for a period of 24 months from the date of installation or purchase.

Furuno U.S.A., Inc., through an authorized Furuno dealer will provide labor at no cost to replace defective parts, exclusive of routine maintenance or normal adjustments, for a period of 24 months from installation date provided the work is done by Furuno U.S.A., Inc. or an AUTHORIZED Furuno dealer during normal shop hours and within a radius of 50 miles of the shop location.

A suitable proof of purchase showing date of purchase, or installation certification must be available to Furuno U.S.A., Inc., or its authorized dealer at the time of request for warranty service.

This warranty is valid for installation of products manufactured by Furuno Electric Co. (hereafter FURUNO). Any purchases from brick and mortar or web-based resellers that are imported into other countries by anyone other than a FURUNO certified dealer, agent or subsidiary may not comply with local standards. FURUNO strongly recommends against importing these products from international websites or other resellers, as the imported product may not work correctly and may interfere with other electronic devices. The imported product may also be in breach of the local laws and mandated technical requirements. Products imported into other countries, as described previously, shall not be eligible for local warranty service.

For products purchased outside of your country please contact the national distributor of Furuno products in the country where purchased.

WARRANTY REGISTRATION AND INFORMATION

To register your product for warranty, as well as see the complete warranty guidelines and limitations, please visit www.furunousa.com and click on "Support". In order to expedite repairs, warranty service on Furuno equipment is provided through its authorized dealer network. If this is not possible or practical, please contact Furuno U.S.A., Inc. to arrange warranty service.

FURUNO U.S.A., INC.
Attention: Service Coordinator
4400 N.W. Pacific Rim Boulevard
Camas, WA 98607-9408
Telephone: (360) 834-9300
FAX: (360) 834-9400

Furuno U.S.A., Inc. is proud to supply you with the highest quality in Marine Electronics. We know you had several choices when making your selection of equipment, and from everyone at Furuno we thank you. Furuno takes great pride in customer service.

ECF

(Elemental Chlorine Free)

The paper used in this manual
is elemental chlorine free.

FURUNO ELECTRIC CO., LTD.

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• FURUNO Authorized Distributor/Dealer

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