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FURUNO

INSTALLATION MANUAL

UAIS TRANSPONDER

MODEL FA-100

FURUNO ELECTRIC CO., LTD.
NISHINOMIYA, JAPAN

PRINTED IN JAPAN

ECF
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(AKMU) FA-100

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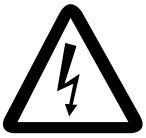
⚠ SAFETY INSTRUCTIONS

⚠ WARNING



ELECTRICAL SHOCK HAZARD
Do not open the equipment unless totally familiar with electrical circuits and service manual.

Only qualified personnel should work inside the equipment.

Turn off the power at the switchboard before beginning the installation.

Fire or electrical shock can result if the power is left on.

Do not install the equipment where it may get wet from rain or water splash.

Water in the equipment can result in fire, electrical shock or damage the equipment.

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

Connection of an incorrect power supply can cause fire or damage the equipment. The voltage rating of the equipment appears on the label above the power connector.

⚠ CAUTION

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

	Standard compass	Steering compass
FA-100	1.0 m	0.6 m
CB-100	0.6 m	0.4 m
GVA-100	0.3 m	0.3 m
DB-1	0.3 m	0.3 m
PR-240-CE	0.9m	0.6 m

Attach securely protection earth to the ship's body.

The protection earth is required to the power supply to prevent electrical shock

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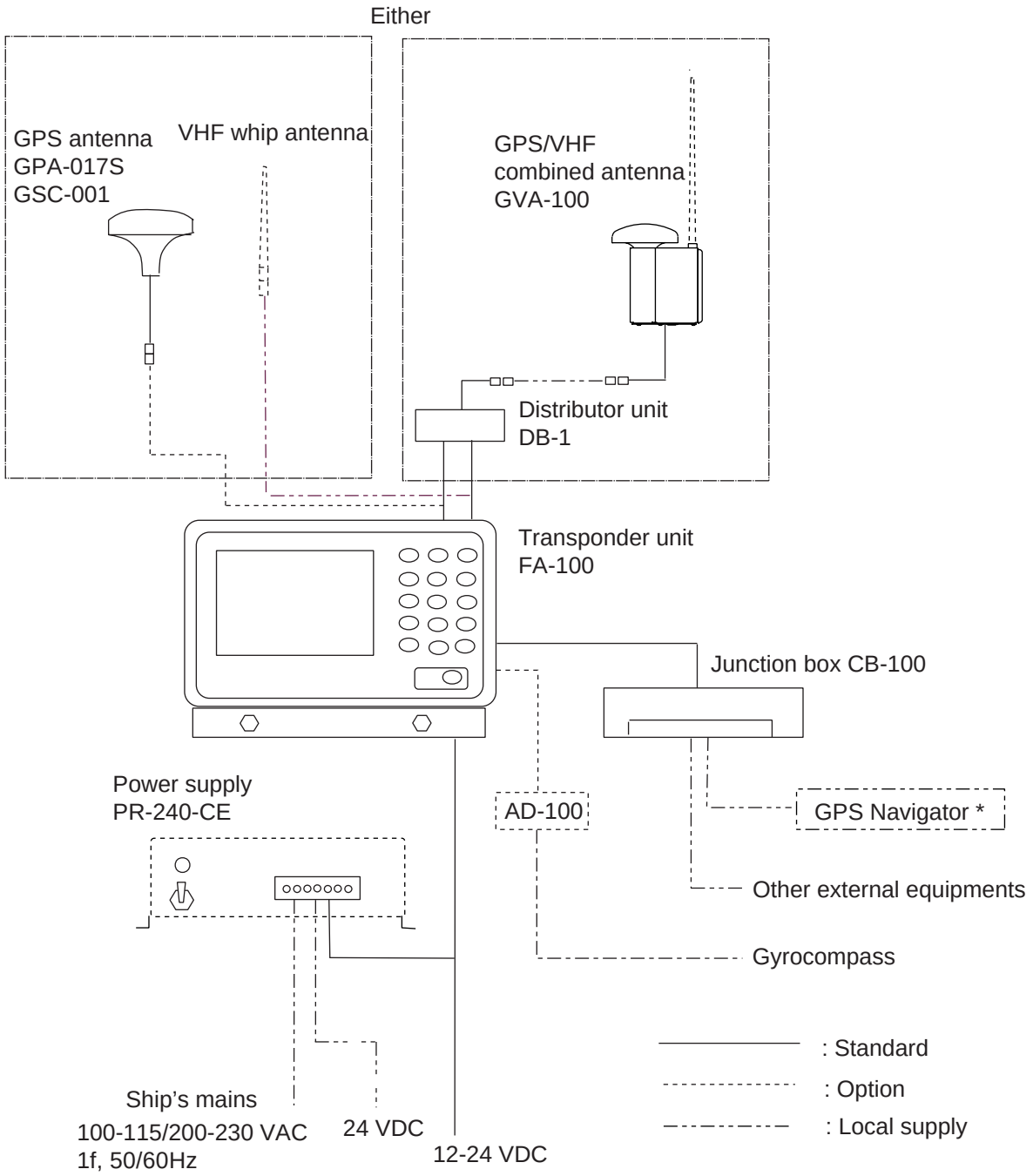
SYSTEM CONFIGURATION



*: External GPS Navigation is required.

Category of the units

GPA-017S	Exposed to the weather
GSC-001	Exposed to the weather
GVA-100	Exposed to the weather
FA-100	Protected from the weather
CB-100	Protected from the weather
DB-1	Protected from the weather
PR-240-CE	Protected from the weather

EQUIPMENT LISTS

Standard supply

No.	Name	Type	Code no.	Qty	Remarks
1	Transponder Unit	FA-100	-	1	
2	Junction Box	CB-100	-	1	
3	GPS Antenna	GPA-017S	-	1	Select one.
	GPS Antenna	GSC-001	-		
	GPS/VHF Combined Antenna	GVA-100*	-		
4	Installation Materials	CP24-00101*	005-950-730	1	For DB-1
		CP24-00102*	005-950-700	1	For FA-100
		CP05-08701*	005-949-280	1	For CB-100
		CP24-00121**	005-952-350	1	For GPA-017S
		CP24-00141*	005-952-330	1	For GVA-100

**: for Japan only

Optional supply

No.	Name	Type	Code no.	Remarks
1	Antenna cable set	CP20-01700(30m)	004-372-110	For GPS or Combined antenna 8D-FB-CV *30M*, CP20-01701
2	Antenna cable set	CP20-01710(50m)	004-372-120	For GPS or Combined antenna 8D-FB-CV *50M*, CP20-01701
3	Flush mount kit A	OP24-1	005-950-740	
4	Flush mount kit B	OP24-2	005-950-750	
5	Mast mount fixture	CP20-01111	004-365-780	For GPA-017S
6	Right-angle antenna base	No.13-QA330	000-803-239	For GPA-017S
7	L-angle antenna base	No.13-QA310	000-803-240	For GPA-017S
8	Antenna base for rail mount	No.13-RC5160	000-806-114	For GPA-017S
9	VHF whip antenna	FAB-151D	000-572-029	For Japan only
10	Antenna fixing bracket	4-310071	000-572-184	For FAB-151D
11	VHF whip antenna	150M-W2VN	000-113-498	For outside Japan
12	Power supply	PR-240-CE	-	Include installation materials CP24-00151*
13	Pilot plug	OP24-3	000-053-911	
14	AD-100	AD-100	-	For gyrocompass
15	PC AIS software kit	OP24-24-1	005-954-420	CD-ROM, USB protect key
16	ϕ80 Mast mount kit	OP24-5	005-954-510	For Combined antenna

*: Refer to packing list at the back of this manual.

1. MOUNTING

1.1 Antenna Unit

1.1.1 GPS antenna unit

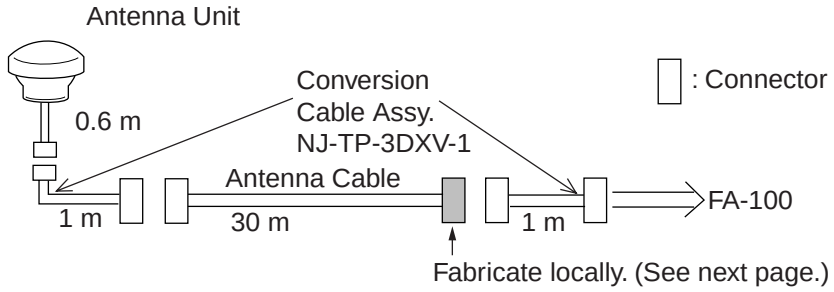
Install the GPS antenna unit referring to the drawing at the back of this manual D-1. When selecting a mounting location for the antenna, keep in mind the following points.

- Select a location out of the radar beam. The radar beam will obstruct or prevent reception of the GPS satellite signal.
- There should be no interfering object within the line-of-sight to the satellites. Objects within line-of-sight to a satellite, for example, a mast, may block reception or prolong acquisition time.
- Mount the antenna unit as high as possible to keep it free of interfering objects and water spray, which can interrupt reception of GPS satellite signal if the water freezes.

Extending antenna cable

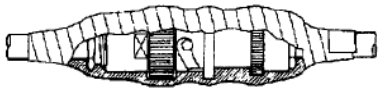
Three types of antenna cable extensions are optionally available.

a) Antenna cable set CP20-01700



◆ Waterproofing connector

Wrap connector with vulcanizing tape and then vinyl tape. Bind the tape end with a cable-tie.



Waterproofing connector

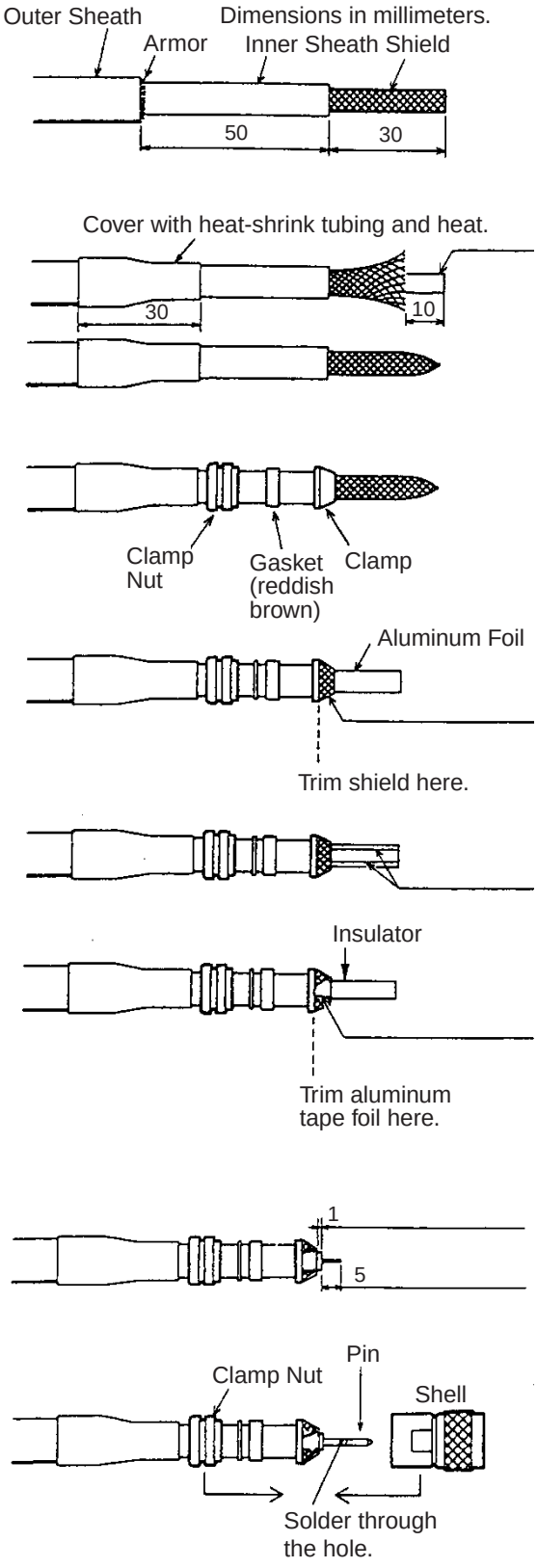
b) Antenna cable set CP20-01710 (8D-FB-CV, 50m)

Connect the cable the same as a) above.

c) Cable type RG-10U/Y (shipyard supply)

Note: The length of this cable should be less than 20 m to prevent signal loss. The coax. coupling cable assy.(type: NJ-TP+3DXV-1, code no. 000-123-809), coaxial connector(N-P-8DFB; supplied), vulcanizing tape and vinyl tape are required. Fabricate both ends of the cable as shown in the figure on the next page.

How to attach the connector N-P-8DFB for cable 8D-FB-CV



How to attach connector N-P-8DFB

1.1.2 VHF antenna

Location

Location of the mandatory AIS VHF-antenna should be carefully considered. Digital communication is more sensitive than analog/voice communication to interference created by reflections in obstructions like masts and booms. It may be necessary to relocate the VHF radiotelephone antenna to minimize interference effects.

To minimise interference effects, the following guidelines apply:

- The AIS VHF antenna should be placed in an elevated position that is as free as possible with a minimum of 0.5 meters in the horizontal direction from constructions made of conductive materials. The antenna should not be installed close to any large vertical obstruction. The objective for the AIS VHF antenna is to see the horizon freely through 360 degrees.
- The AIS VHF antenna should be installed safely away from interfering high-power energy sources like radar and other transmitting radio antennas, preferably at least 3 meters away from and out of the transmitting beam.
- There should not be more than one antenna on the same plane. The AIS VHF antenna should be mounted directly above or below the ship’s primary VHF radiotelephone antenna, with no horizontal separation and with a minimum of 2.8 meters vertical separation. If it is located on the same plane as other antennas, the distance apart should be at least 10 meters.

Cabling

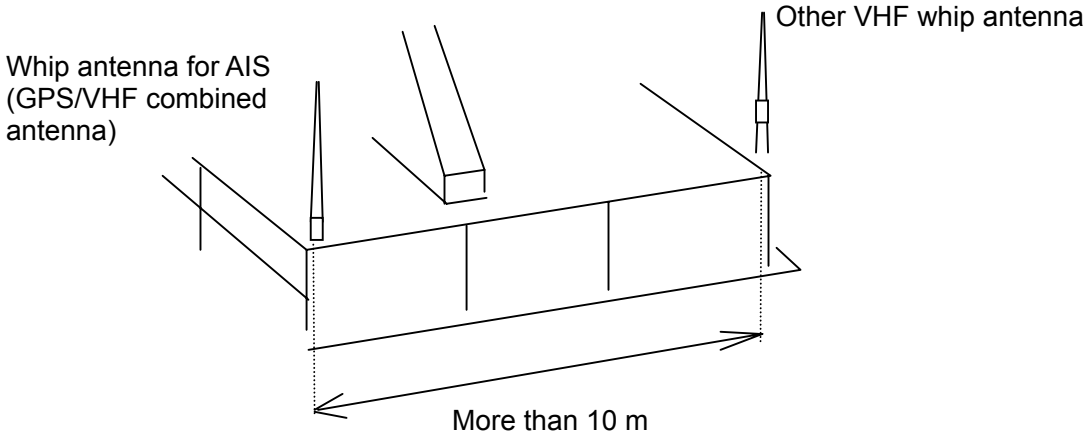
- The cable should be kept as short as possible to minimize signal attenuation. Coaxial cables equal to or better than RG10U/Y are recommended.

- All outdoor installed connectors on coaxial cables should be fitted with preventive isolation such as vulcanizing tape to protect against water penetration into the antenna cable.

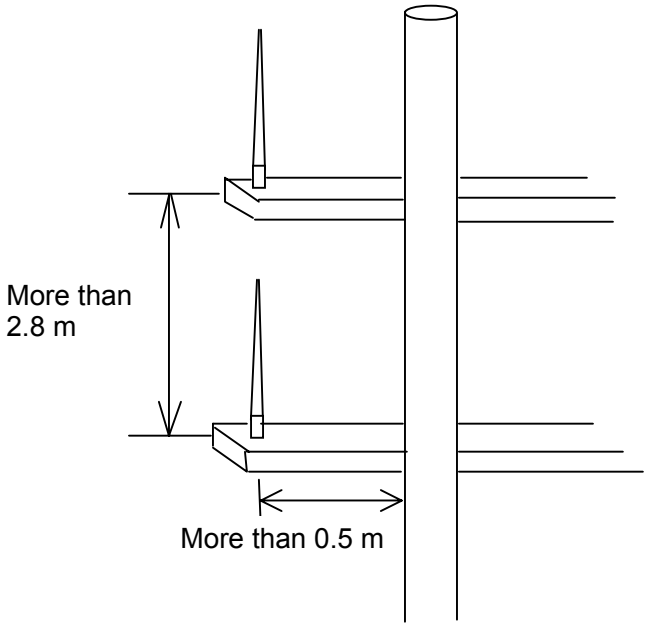
- Coaxial cables should be installed in separate signal cable channels/tubes and at least 10 cm away from power supply cables. Crossing of cables should be done at right angles (90°). The minimum bend radius of the coaxial cable should be 5 times the cable's outer diameter.

- Install the VHF whip antenna referring to the outline drawing at the back of this manual. Separate this antenna from other VHF radiotelephone antennas as shown on the next page to prevent interference to the FA-100.

Horizontal separation distance



Vertical separation distance

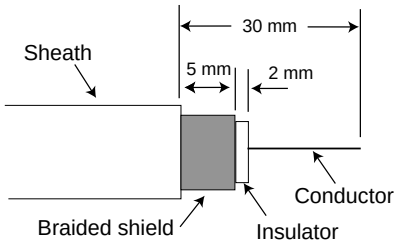


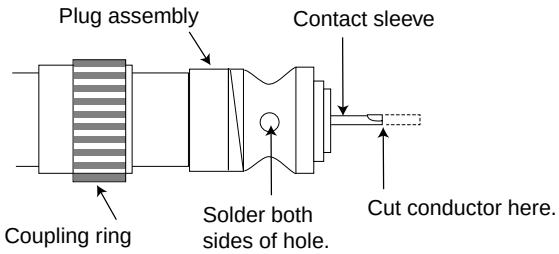
- When coaxial cable RG-10U/Y (shipyard supply) is used, attach the coaxial plug M-P-7 (dockyard supply) as shown on the next page.

How to attach the plug M-P-7

Lay the coaxial cable and attach an M-type plug (if necessary) to the cable as follows.

1. Remove the sheath by 30 mm.
2. Bare 23 mm of the center conductor. Trim braided shield by 5 mm and tin.
3. Slide coupling ring onto cable.
4. Screw the plug assembly on the cable.
5. Solder plug assembly to braided shield through solder holes. Solder contact sleeve to conductor.
6. Screw coupling ring into plug assembly.

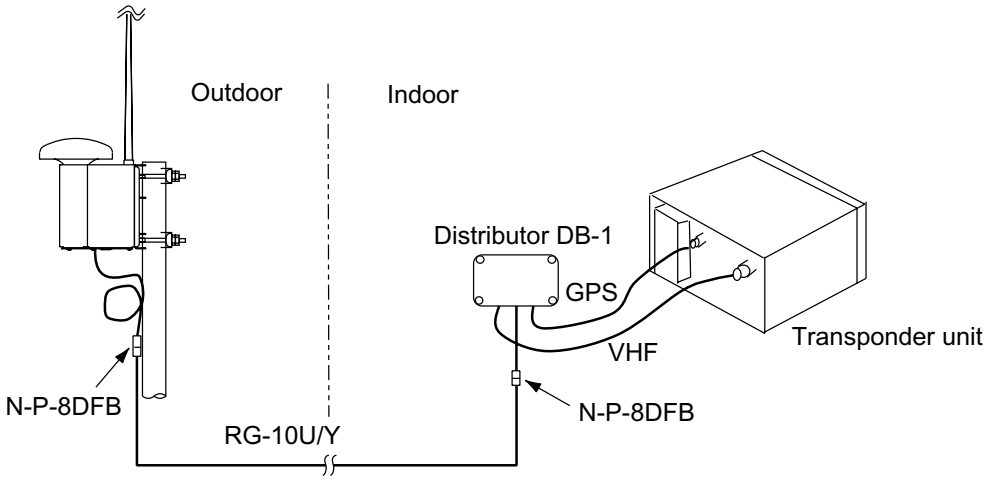




1.1.3 GPS/VHF combined antenna

Install the combined antenna unit referring to the outline drawing. When selecting a mounting location for the antenna, keep in mind the following points.

- Select a location out of the radar beam. The radar beam will obstruct or prevent reception of the GPS satellite signal.
- There should be no interfering object within the line-of-sight to the satellites. Objects within line-of-sight to a satellite, for example, a mast, may block reception or prolong acquisition time.
- Mount the antenna unit as high as possible. Mounting it this way keeps it free of interfering objects and water spray, which can interrupt reception of GPS satellite signal if the water freezes.
- Also, refer to the antenna installation guidelines page 3.



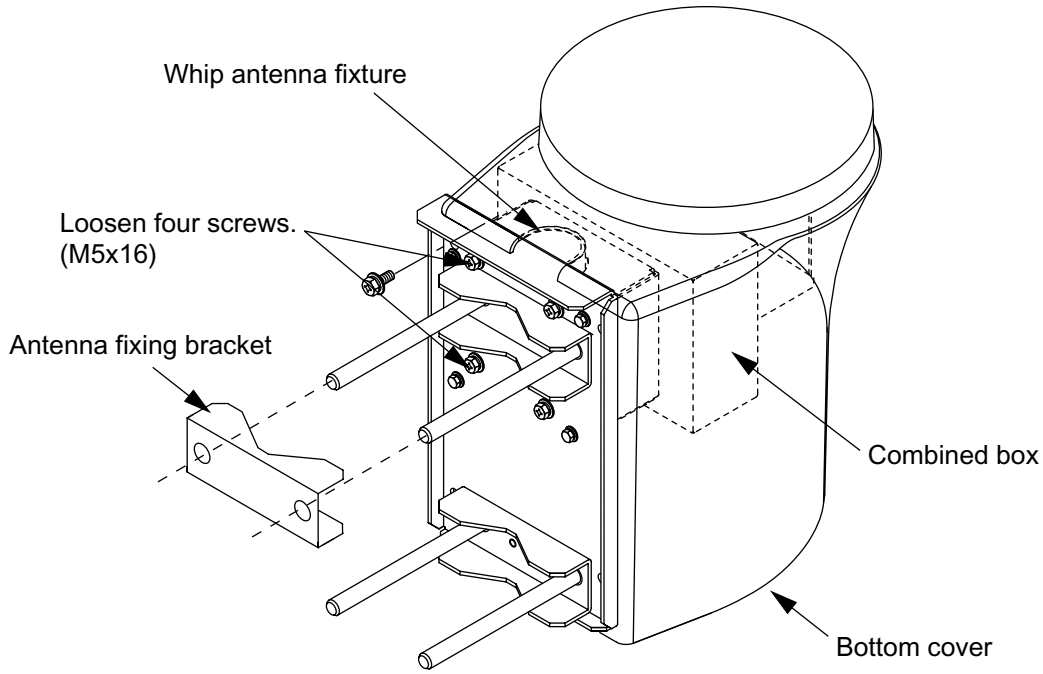
Installation overview of GPS/VHF combined antenna

Note: Optional ϕ80 mast mount kit (Type: OP24-5, Code no.: 005-954-510) is required to fix the GPS/VHF combined antenna to the mast (ϕ60 - 80).

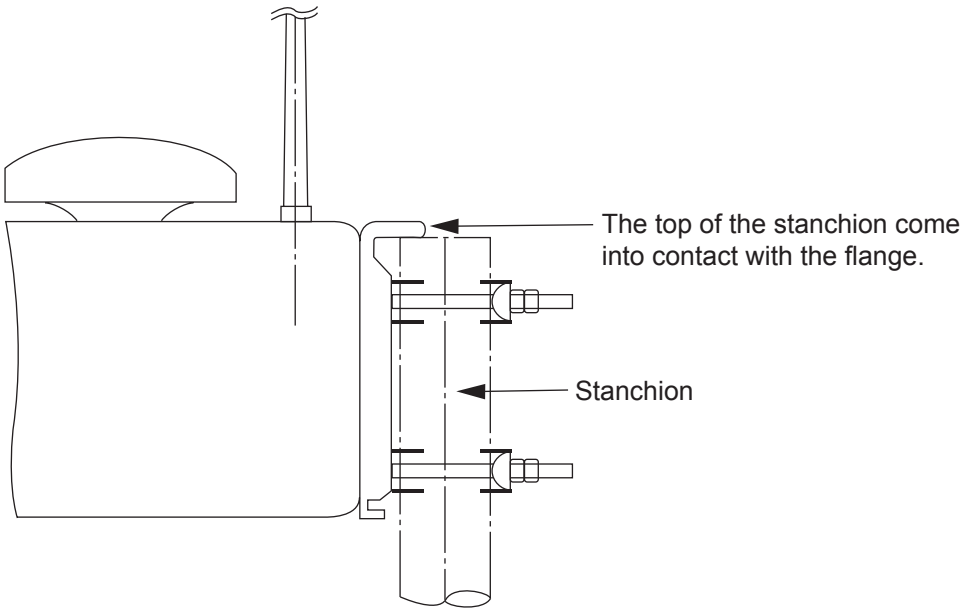
Mounting procedures

1. Dismount the bottom cover, cut the cable-tie inside the unit and take out the coaxial connector attached to the combined box.
2. Loosen four screws to loosen whip antenna fixture and pull out the coaxial connector coming from the combined box through the hole in the whip antenna fixture.
3. Connect the coaxial connector to the whip antenna base and wrap the junction part of the whip antenna with vulcanizing tape and then vinyl tape for waterproofing.
4. Insert the whip antenna from the top of the combined antenna.
5. Secure the whip antenna with whip antenna fixture.
6. Using a new plastic band (supplied), secure the cables and coaxial connector inside the antenna case.
7. Mount the bottom cover.
8. Fix the GPS/VHF combined antenna to the ship's stanchion (40 to 50 mm diameter) with antenna fixing brackets, flat washers and hex. nuts.

Note: Coat the exposed parts of bolts and nuts with silicon sealant.

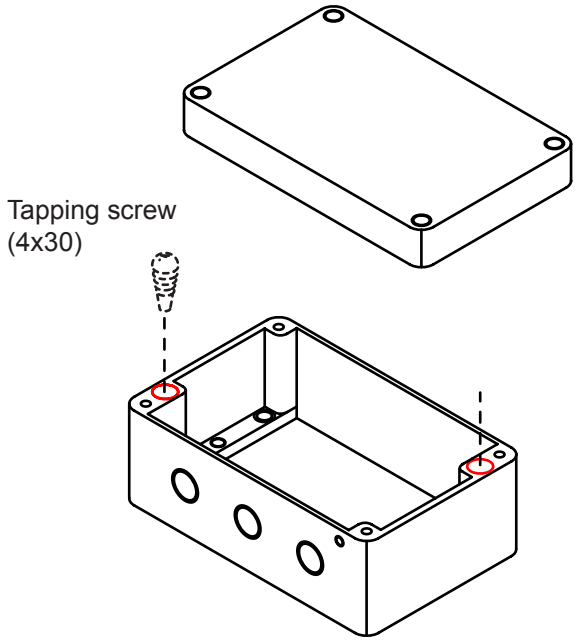


GPS/VHF Combined antenna



Installing distributor unit DB-1

The length of the cable between the distributor unit and transponder unit is 1 m so locate the distributor unit within 1 m from the transponder unit. Fix the distributor unit on the bulkhead, facing the cable entrance downward. Remove the lid of the distributor unit and secure the unit with two tapping screws.



Note: Be sure no foreign material or water enters the distributor unit.

1.2 Transponder Unit

The transponder unit can be installed on a desktop or flush mounted in a panel. Install it on the chart table or near the steering place, referring to the outline drawing.

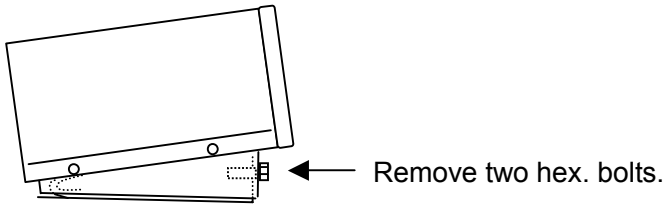
When selecting a mounting location for the transponder, keep the following in mind:

- Keep the transponder out of direct sunlight.
- The temperature and humidity should be moderate and stable. (Operating temperature range: -15°C to +55°C)
- Locate the unit away from exhaust pipes and vents.
- The mounting location should be well ventilated.
- Mount the unit where shock and vibration are minimal.
- Keep the unit away from electromagnetic field generating equipment such as motor, generator.
- For maintenance and checking purposes, leave sufficient space at the sides and rear of the unit and leave slack in cables. Refer to the outline drawing.
- A magnetic compass will be affected if the unit is placed too close to it. Observe the following compass safe distances to prevent disturbance to the magnetic compass:

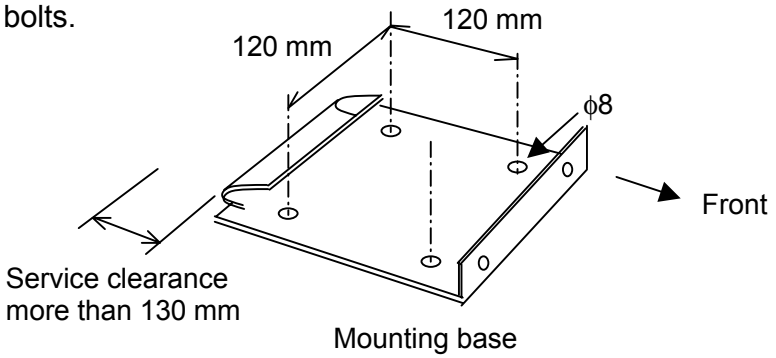
  Standard compass: 1.0 meters
  Steering compass: 0.6 meters

Desktop mounting

1. Remove two hex. bolts from the lower part of the transponder unit and dismount the mounting base.



2. Fix the mounting base to the desktop with four tapping screws (6x20: supplied) or hex. bolts.



Mounting base

3. Place the transponder unit on the mounting base and secure it with two hex. bolts.

Flush mounting

Optional flush mount kit A or B is required for flush mounting. For mounting dimensions, refer to the outline drawing at the back of this manual.

Flush mount kit A: Type OP24-1 Code no. 005-950-740

	Name	Type	Code no.	Qty
1	Cosmetic panel	24-003-2811	100-299-540	1
2	+Tapping screw	5x25	000-802-082	4

1. Cut out a hole in the mounting location, referring to the outline drawing.
2. Remove two hex bolts to dismount the mounting base.
3. Remove six hex bolts from the bottom of the transponder unit to dismount the mounting pedestal.
4. Set the transponder unit to the cosmetic panel and fix them with six hex bolts.
5. Set the assembly (transponder unit and cosmetic panel) to the hole and fix it with four tapping screws (5x25).

Flush mount kit B: Type OP24-2 Code no. 005-950-750

	Name	Type	Code no.	Qty
1	Mounting bracket	24-003-2821	100-299-550	1
2	Hex bolt	M5x25	000-862-125	6
3	Hex nut	M5	000-863-108	6
4	Flat washer	M5	000-864-128	6
5	Spring washer	M5	000-864-258	6

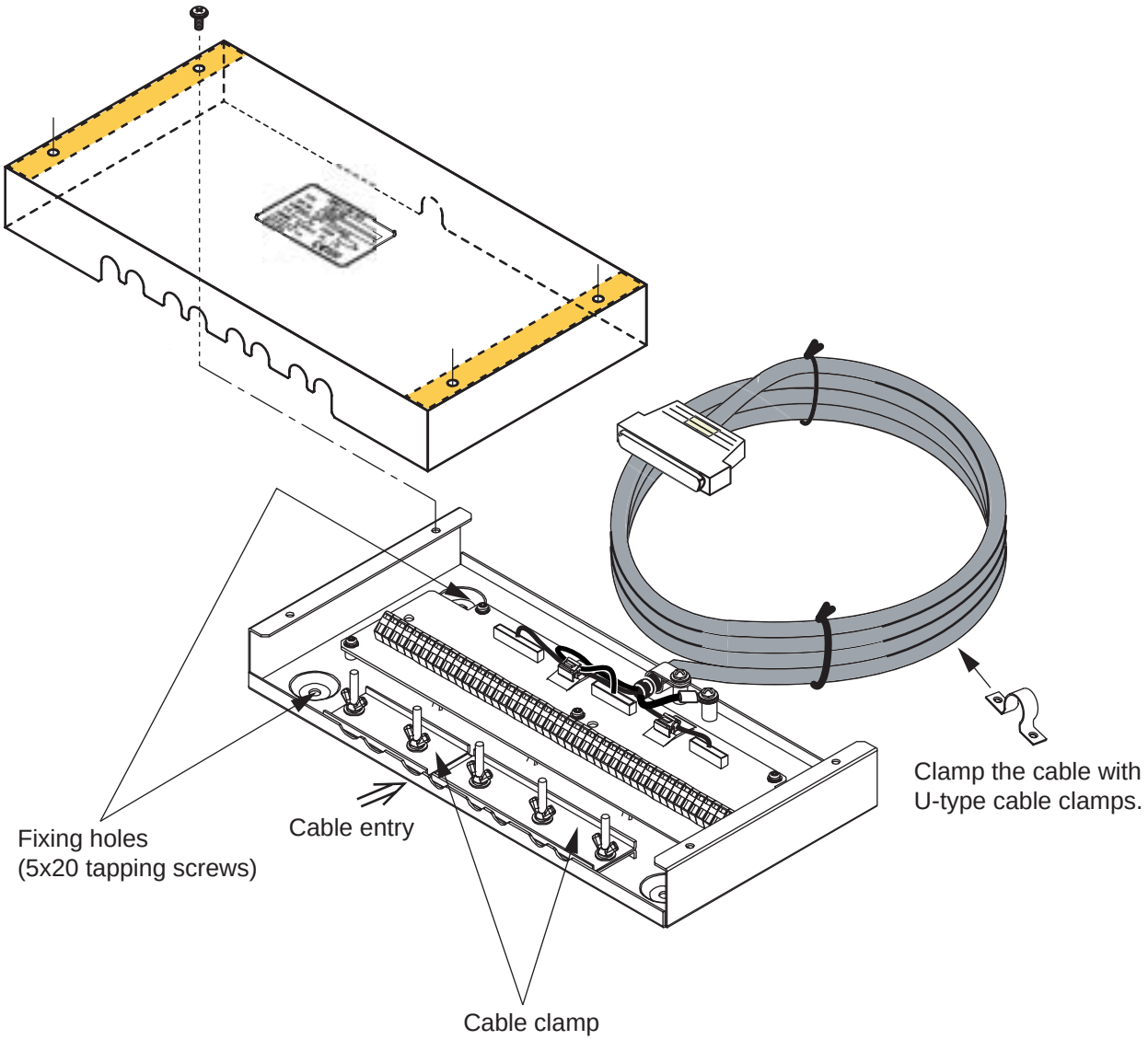
1. Cut out a hole in the mounting location, referring to the outline drawing.
2. Dismount the mounting base and mounting pedestal from the transponder unit.
3. Set the transponder unit to the hole. Using six hex bolts, attach the mounting bracket at the bottom of the transponder unit from the rear of the flush mounting panel.
4. Fix with six sets of hex bolt, nut, flat washers and spring washers from the rear of the flush mounting panel.

1.3 Junction Box

Mount the junction box where the junction box is protected from rain and water splash.

Mounting

1. Open the lid of the junction box and fix the junction box with four tapping screws (5x20). Avoid bundling the 3.3 m cable of the junction box together with any power cable. This causes malfunction.
2. Connect cables to the terminal board, referring to Chapter 2 and 3.
3. Fix the lid after connecting external equipment.
4. Clamp the cable with several U-type cable clamps (local supply) at suitable intervals.



1.4 Power Supply (option)

The length of the power cable between the power supply and the transponder unit is 3.5 m. Keep this length in mind when selecting a mounting location. A longer cable should not be used – voltage drop will result, affecting performance.

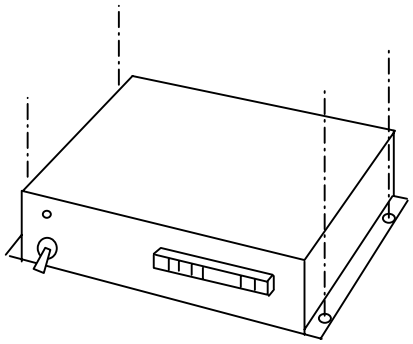
When selecting a mounting location for the unit, keep the following in mind:

- Keep the unit out away from areas subject to water splash.
- Locate the unit away from exhaust pipes and vents.
- The mounting location should be well ventilated.
- Mount the unit where shock and vibration are minimal.
- A magnetic compass will be affected if the unit is placed too close to it. Observe the following compass safe distances to prevent disturbance to the magnetic compass:

  Steering compass: 0.6 m

  Standard compass: 0.9 m

Fix the unit with four tapping screws (4x16) to a desktop or the deck as shown in the figure below. It is not necessary to open the cover.

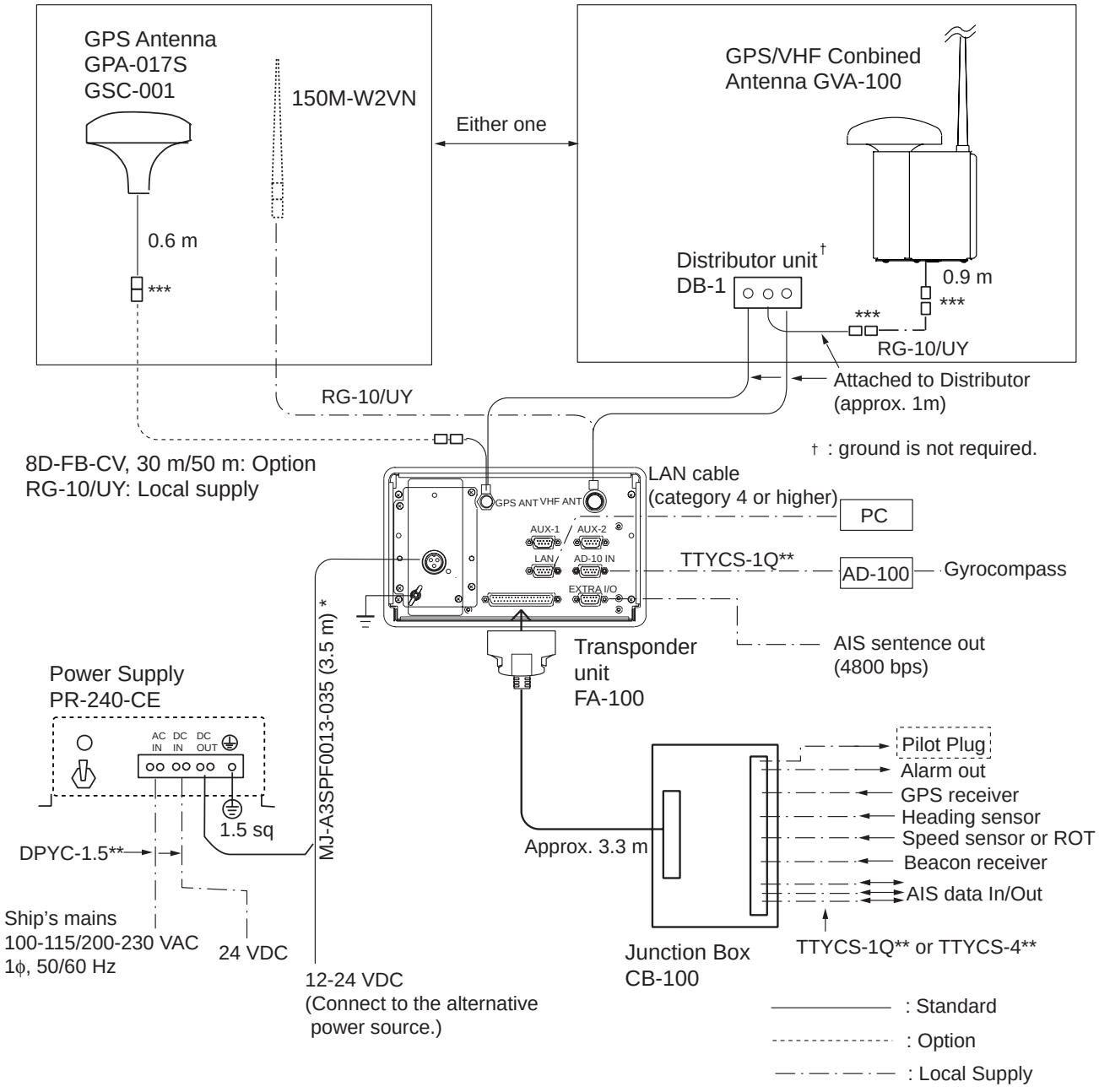


1.5 Pilot Plug (option)

The pilot plug should be mounted near where the pilot steers the ship. This plug is used to connect a PC to display AIS information for use by the pilot. Refer to the outline drawing at the back of this manual for mounting dimensions.

2. WIRING

Connect the equipment, referring to the interconnection diagram at the back this manual.

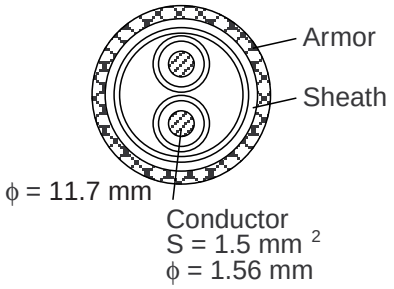


*: If the ship's mains is 12 VDC, cable length should be less than 50 cm.

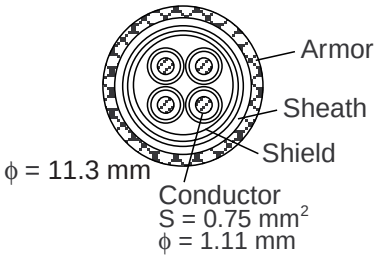
EXTRA IO port: Outputs AIS sentence (4800 bps).
AUX-1, AUX-2 port: Not used.

**: DPYC-1.5, TTYCS-1Q and TTYCS-4 are Japan Industry Standard cable. Use them or the equivalents.

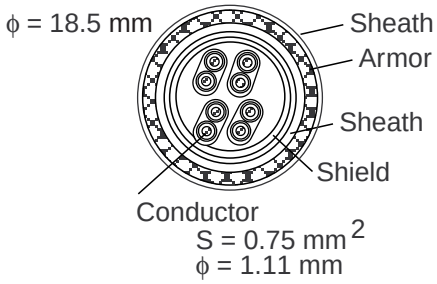
DPYC-1.5



TTYCS-1Q (Four core twisted)



TTYCS-4 (Four twisted pairs)



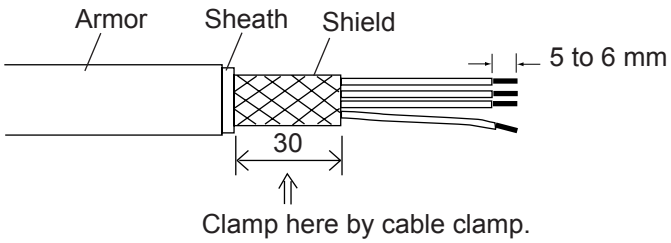
***: Waterproofing connectors

Wrap connector with vulcanizing tape and then vinyl tape. Bind the tape end with a cable-tie.

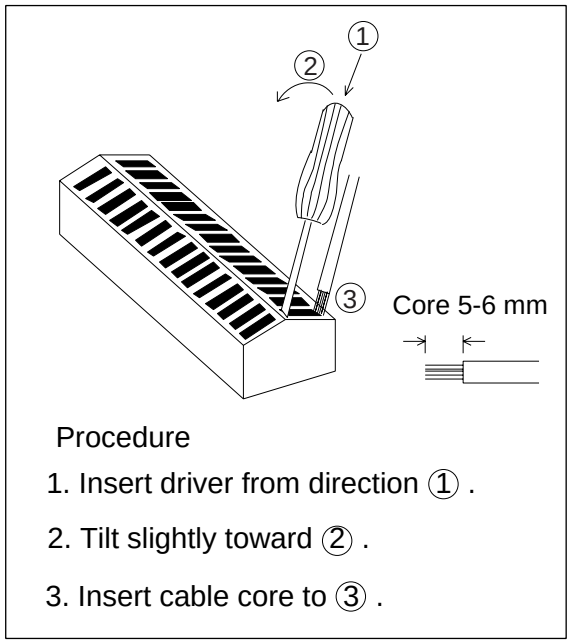
Waterproofing connector

Cable Connection at Junction Box

Cable fabrication



Connection

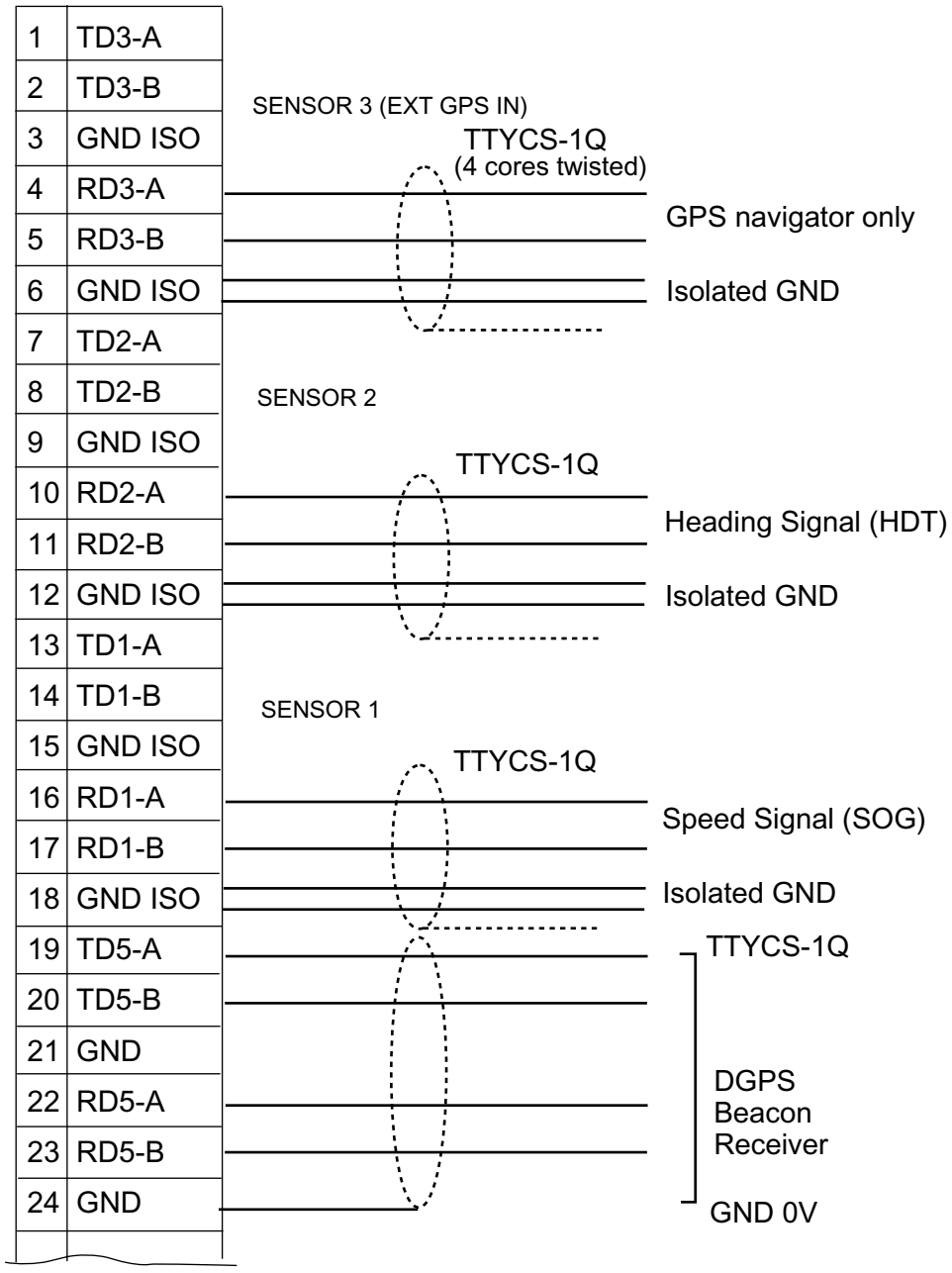


3. INPUT/OUTPUT SIGNAL

3.1 Inputs from Sensors

There are three input ports (SENSOR 1, 2 and 3) which are based on the IEC 61162-1/2. The protocol is RS422. If there is no HDT signal from a gyrocompass, connect the gyrocompass signal (Synchro or step signal) to the “AD-10 IN” port (D-sub 9 pins) of the transponder unit via the FURUNO A/D Converter AD-100 (See page 16).

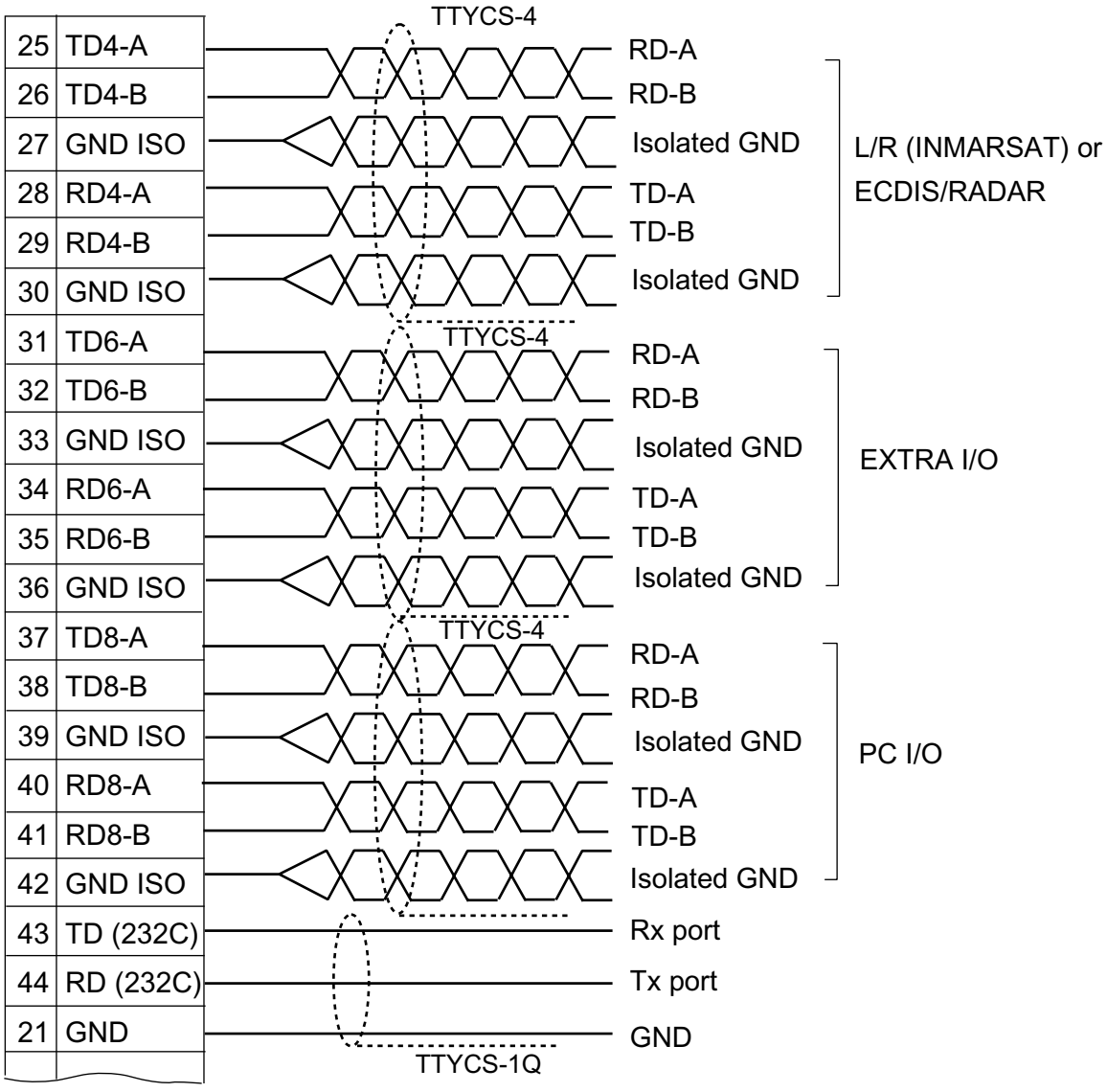
TB1 in the junction box



3.2 Input/Output of AIS Signal

Three input/output ports are provided for RS-422 protocol, based on the IEC 61162-1/2. Data transmission rate is selectable from 4800 bps and 38.4 kbps. Normally, Radar/ECDIS/PC, etc. are connected to these ports to exchange data with the AIS. PC standard protocol RS-232C is also provided in the D-sub port of the transponder unit.

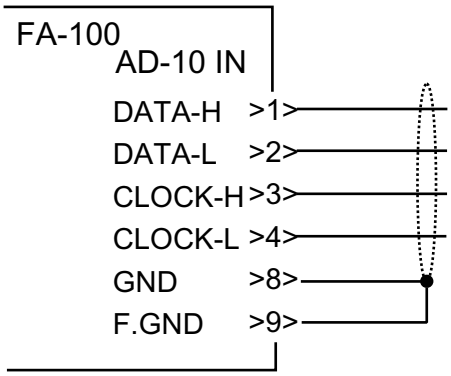
TB1 in the junctionbox



Note: For TD (232C) and RD (232C), use one twisted pair for TD and one twisted pair for RD, separately. Use pin #21 for SG.

3.3 Input of Gyrocompass Signal

If the gyrocompass has no HDT signal, the AD-10 format (FURUNO format) signal can be input via the FURUNO A/D Converter AD-100. Connect the AD-100 to the “AD-10 IN” port (D-sub 9 pin) on the rear panel of the transponder unit.



Twisted pair cable (Example: TTYCS-1Q cable) to DATA terminal of AD-100

Note: Set data output interval for 200 ms (instead of 25 ms) by internal jumper inside the AD-100.

3.4 Alarm Signal Output

The FA-100 generates an alarm signal (relay contact signal) for hardware failure such as transmitter block or sensor abnormality. For details of alarm type, see the operator’s manual.

Two kinds of contact signals, on (normal closure) or off (normal open), are output, and are selected at the junction box CB-100 according to the alarm generator connected. The maximum current and voltage of the contact are 1 A, 125 VAC and 60 VDC. Normally connect to the NC (normal close) between #45 and #47.

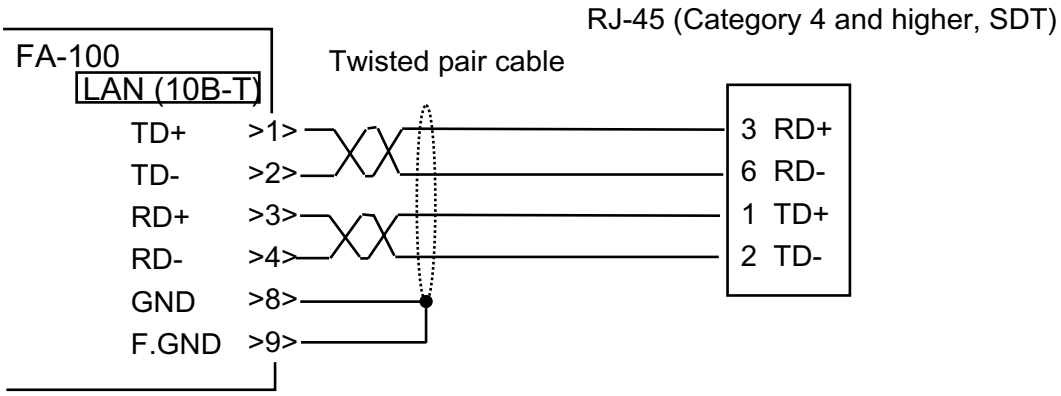
TB-1 in the junction box

45	AOL
46	AOH
47	AOC

#45-#47: Normal Close
#46-#47: Normal Open
47: common line

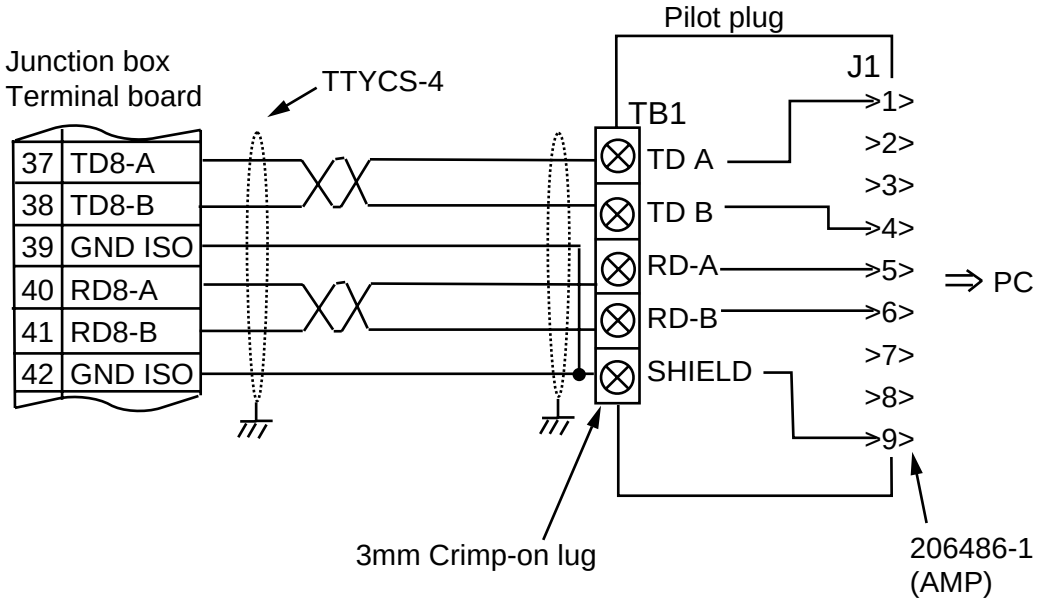
3.5 LAN Input/Output

The FA-100 supports Ethernet based on LAN. Its protocol is 10BASE-T and the transmission rate is 10 Mbps. To connect the FA-100 with other equipment (such as a PC), use a LAN cable category 4 or higher with shield (SDT). Connect it to the PC with an RJ-45 connector, and connect to the FA-100 with a D-sub 9 pin connector, to avoid noise leakage. To use a commercial LAN cable, remove one connector and solder a D-sub 9 pin connector, supplied in the installation materials.



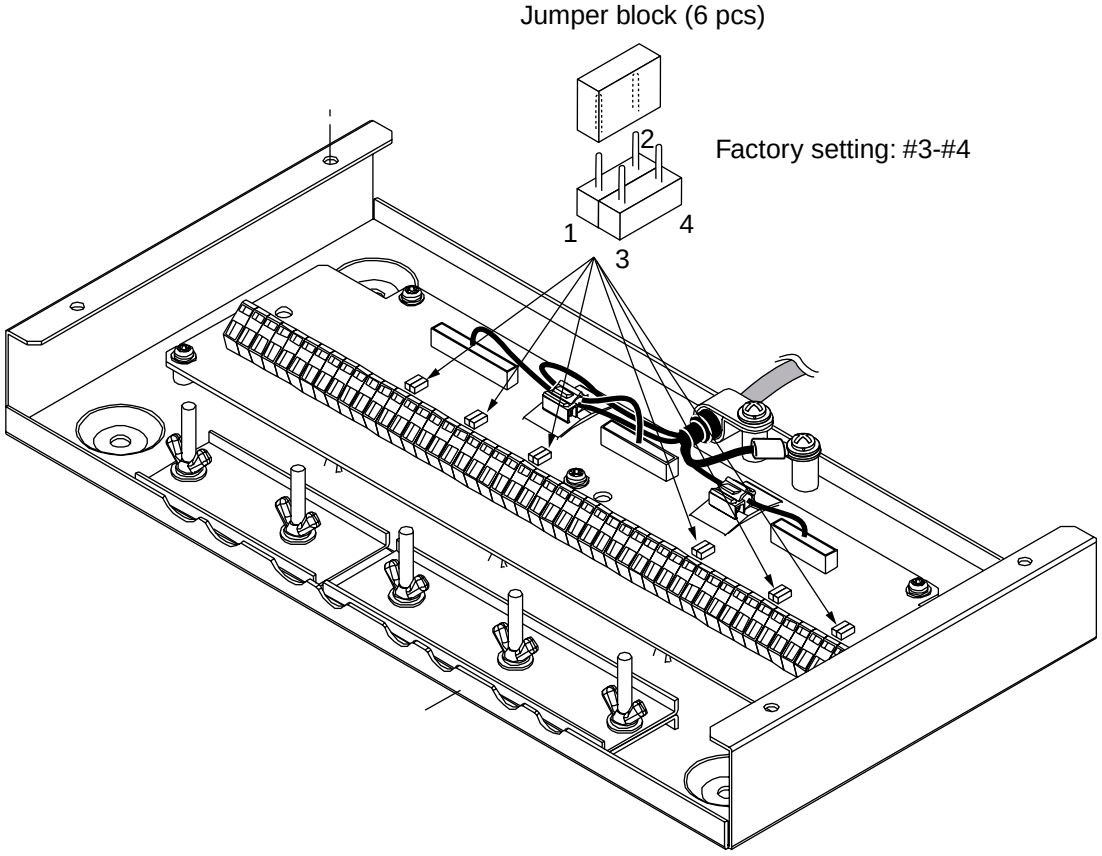
3.6 Pilot Plug

Use the twisted cable TTYCS-4 between the junction box and the pilot plug. The cable between the PC and the pilot plug should be prepared by the ship's pilot.



3.7 Jumper Setting in the Junction Box

Each RS-422 RX line (on the PCB 24P0031 in the junction box) has a jumper block with 240 ohms termination resistor. The junction box is shipped with all jumper blocks connected between the #3 and #4 terminals pins, terminating RX lines with 240 ohms. Assuming that an external equipment has the output voltage of ±5 V, more than 21 mA of output current is required.
If multiple equipment are connected to an output port of an external equipment, change to jumper block setting to between the #1 and #2 pins to reduce the load on the FA-100. Then, the input impedance of the RS-422 RX lines in the FA-100 becomes more than 2.4 k ohms.
We recommend that you leave the connection of the jumper block between #3 and #4 pins if only the FA-100 is connected to an external equipment.



3.8 Input/Output Sentences

1) SENSOR 1, SENSOR2, and SENSOR3 ports

These ports can receive IEC61162-1/2 standard data. The transmission rate of sensor 1, 2, and 3 is selectable from 4800 bps and 38.4 kbps through the menu.

Input sentences are as follows:

$xxDTM, $xxGBS, $xxGGA, $xxGLL, $xxGNS, $xxHDT
$xxOSD, $xxRMC, $xxROT, $xxVBW, $xxVTG

Note: The talker of the underlined sentences has priority as follows:

GN>GP>GL>LC>IN

Other sentences disregard talker.

2) PC I/O, LR or ECDIS/RADAR, EXTRA I/O and EXTRA 1 I/O ports

These ports can receive or output IEC61162-1/2 standard data. The transmission rate of signals is selectable from 4800 bps and 38.4 kbps through the menu. The transmission rate of the EXTRA IO port signal is fixed to 4800 bps.

Input sentences are as follows:

$xxABM, $xxACA, $xxACK, $xxAIR
$xxBBM, $xxDTM, $xxGBS, $xxGGA
$xxGLL, $xxGNS, $xxHDT, $xxLRF
$xxLRI, $xxOSD, $xxRMC, $xxROT
$xxSSD, $xxVBW, $xxVSD, $xxVTG

Note: The talker of the underlined sentences has priority as follows:

GN>GP>GL>LC>IN

Other sentences disregard talker.

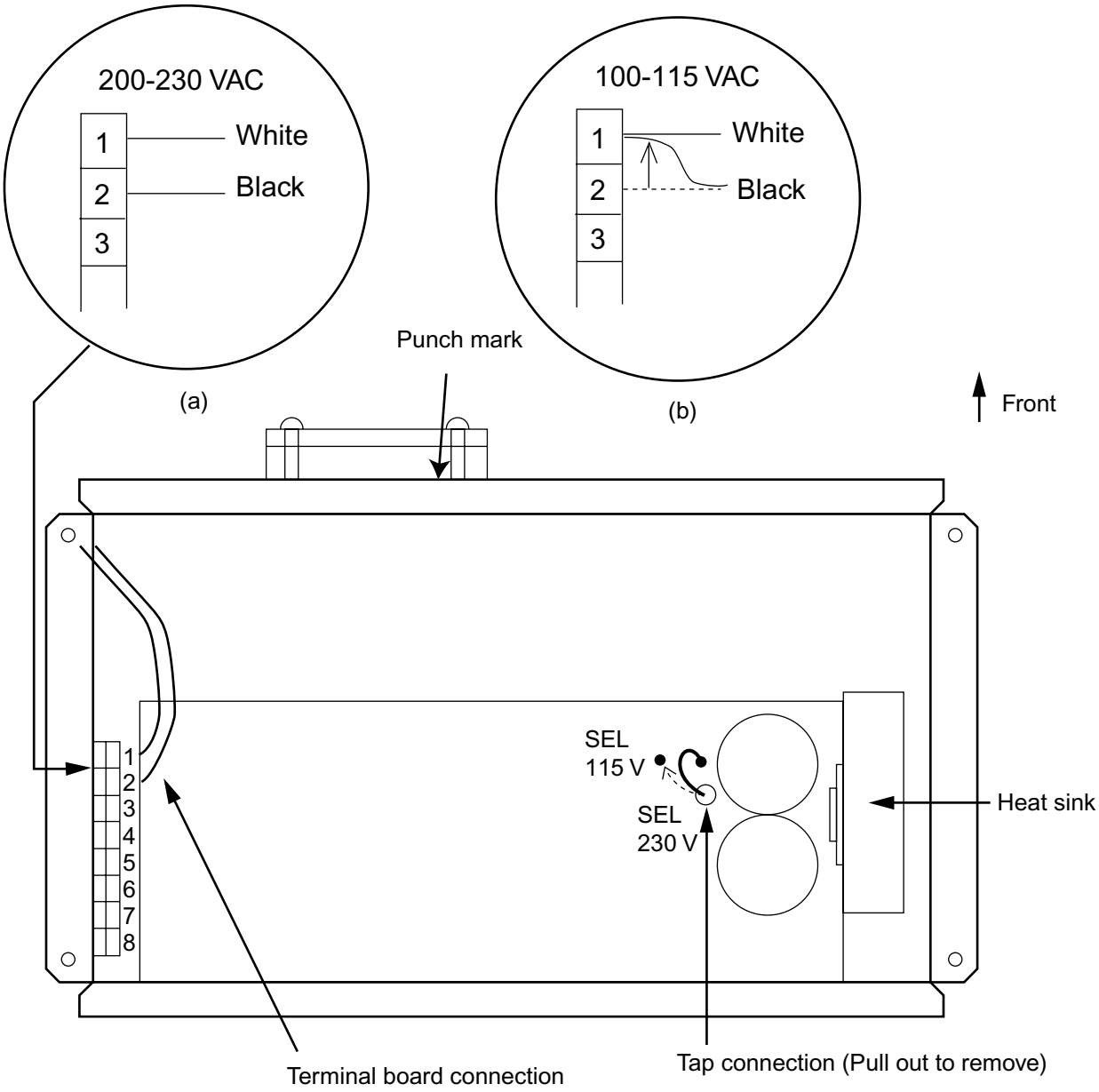
Output sentences are as follows:

$AIABK, $AIACA, $AIALR, $AILRF,
$AILR1, $AILR2, $AILR3, $AITXT,
$AIVDM, $AIVDO

3.9 Changing Ship's Mains Specifications

The power supply PR-240-CE is shipped ready for connection to a 200-230 VAC ship's mains. If the ship's mains is 100 VAC – 115 VAC, change the tap connection and terminal board connection as below. Attach label supplied as accessories to the punch mark in the front panel according to the ship's mains.

Ship's mains	Tap connection	Terminal board connection #1 & #2
100-115 VAC	SEL 115 V	b
200-230 VAC	SEL 230 V	a



Top view (Cover removed)

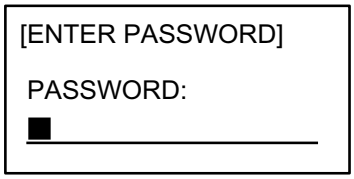
4. SETTING AND ADJUSTMENT

After installing the equipment, set up the own ship's static information (MMSI, IMO number, ship's name, call sign, type of ship and GPS antenna position). Also, set up the system settings.

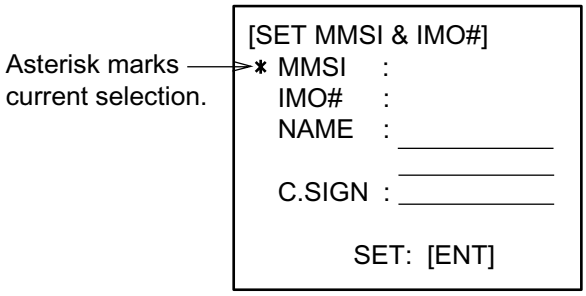
4.1 Setting MMSI, IMO No., Name and Call Sign

1. While holding down the [0] key, press the [POWER] key.
2. After the following message appears, release the [0] key. (It takes several seconds before the message appears.)

3. After the following window appears, enter the password. Note that the password is known by only the FURUNO dealer.



4. Press the [ENT] key to display the SET MMSI & IMO# window.

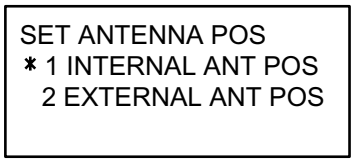


5. Enter ship's MMSI (Maritime Mobile Service Identity) in nine digits.
6. Press the [NEXT] key to select IMO#.
7. Enter ship's IMO number in nine digits. If the IMO number has 7 digits, enter "0" twice followed by IMO#. IF the ship has no IMO number, enter all zeroes.
8. Press the [NEXT] key to select NAME.

9. Enter ship’s name, using up to 20 alphanumeric characters. To switch between alphabet and numerical character, press the [SFT] key. To enter an alphabet, press corresponding key several times until desired letter is displayed. For example, if you press the [2] key continuously, the character A, B and C appear cyclically. If you want to enter the same letter or an other letter with the same key (for example, AA or AC), press the [6] key while pressing the [SFT] key, to send the cursor to the next position.
10. Press the [NEXT] key to select C.SIGN.
11. Enter call sign, using up to seven alphanumeric characters.
12. Press the [ENT] key to register data. The INIT SETTINGS sub-menu appears.

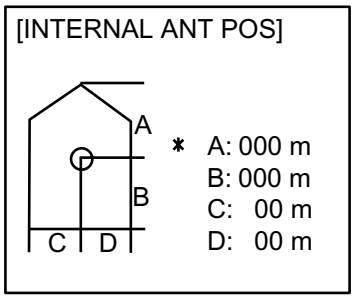
4.2 Setting GPS Antenna Position and Ship's Type

1. In the INIT SETTING sub-menu, press the [6] key to open the SET ANTENNA POS window.



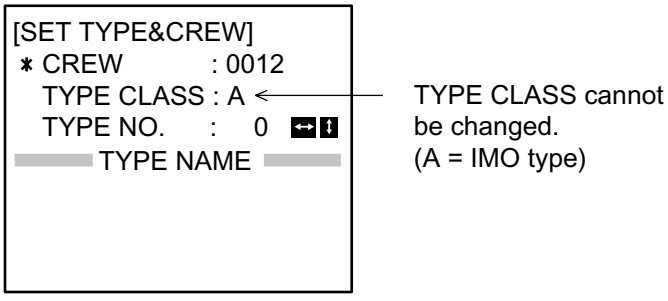
SET ANTENNA POS window

2. With 1 selected, press the [ENT] key. The 1 is for entering internal GPS antenna position and 2 is for external GPS which is connected to the AIS.



INTERNAL ANT POS window

3. Enter locations of GPS antenna, by using the numeric keys and the [NEXT] key, and finally press the [ENT] key.
   - A: Distance from bow to GPS antenna position
   - B: Distance from stern to GPS antenna position
   - C: Distance from port to GPS antenna position
   - D: Distance from starboard to GPS antenna position
4. Enter external GPS antenna position similar to how you entered internal GPS antenna position.
5. Press the [MENU] key to return to the INIT SETTINGS sub-menu.
6. Press the [4] key to display the SET TYPE&CREW window.



SET TYPE&CREW window

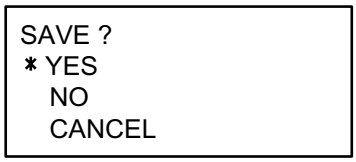
7. Press the [NEXT] key to select TYPE NO.
   Confirm type of ship with ship's captain before setting it.
8. Press the [2], [4], [6] or [8] key as appropriate to select your ship's type, referring to the list on below.

10	FUTURE USE	ALL SHIPS OF THIS TYPE	
11	FUTURE USE	CARRYING DG, HS, OR MP(A)	
12	FUTURE USE	CARRYING DG, HS, OR MP(B)	
13	FUTURE USE	CARRYING DG, HS, OR MP(C)	
14	FUTURE USE	CARRYING DG, HS, OR MP(D)	
15	FUTURE USE	FUTURE USE	
16	FUTURE USE	FUTURE USE	
17	FUTURE USE	FUTURE USE	
18	FUTURE USE	FUTURE USE	
19	FUTURE USE	NONE	
20	WIG	ALL SHIPS OF THIS TYPE	
21	WIG	CARRYING DG, HS, OR MP(A)	
22	WIG	CARRYING DG, HS, OR MP(B)	
23	WIG	CARRYING DG, HS, OR MP(C)	
24	WIG	CARRYING DG, HS, OR MP(D)	
25	WIG	FUTURE USE	
26	WIG	FUTURE USE	
27	WIG	FUTURE USE	
28	WIG	FUTURE USE	
29	WIG	NONE	
30	FISHING		
31	TOWING		
32	LENGTH OF THE TOW EXCEEDS 200M OR BREADTH EXCEEDS 25M		
33	ENGAGED IN DREDGING OR UNDERWATER OPERATIONS		
34	ENGAGED IN DIVING OPEARATIONS		
35	ENGAGED IN MILITARY OPEARATIONS		
36	SAILING		
37	PLEASURE CRAFT		
38	FUTURE USE		
39	FUTURE USE		
40	HSC	ALL SHIPS OF THIS TYPE	
41	HSC	CARRYING DG, HS, OR MP(A)	
42	HSC	CARRYING DG, HS, OR MP(B)	
43	HSC	CARRYING DG, HS, OR MP(C)	
44	HSC	CARRYING DG, HS, OR MP(D)	
45	HSC	FUTURE USE	
46	HSC	FUTURE USE	
47	HSC	FUTURE USE	
48	HSC	FUTURE USE	
49	HSC	NONE	
50	PILOT		
51	SEACH AND RESCURE VESSELS		
52	TUGS		
53	PORT TENDERS		
54	VESSELS WITH ANTI-POLUUTION FACILITIES OR EQUIPMENT		
55	LAW ENFOREMENT VESSELS		
56	SPARE-FOR ASSIGNMENTS TO LOCAL VESSELS		
57	SPARE-FOR ASSIGNMENTS TO LOCAL VESSELS		
58	MEDICAL TRANSPORTS		
59	SHIPS ACCORDING TO RESOLUTION NO 18		
60	PASSENGER SHIPS	ALL SHIPS OF THIS TYPE	
61	PASSENGER SHIPS	CARRYING DG, HS, OR MP(A)	
62	PASSENGER SHIPS	CARRYING DG, HS, OR MP(B)	
63	PASSENGER SHIPS	CARRYING DG, HS, OR MP(C)	
64	PASSENGER SHIPS	CARRYING DG, HS, OR MP(D)	
65	PASSENGER SHIPS	FUTURE USE	
66	PASSENGER SHIPS	FUTURE USE	
67	PASSENGER SHIPS	FUTURE USE	
68	PASSENGER SHIPS	FUTURE USE	
69	PASSENGER SHIPS	NONE	
70	CARGO SHIPS	ALL SHIPS OF THIS TYPE	
71	CARGO SHIPS	CARRYING DG, HS, OR MP(A)	
72	CARGO SHIPS	CARRYING DG, HS, OR MP(B)	
73	CARGO SHIPS	CARRYING DG, HS, OR MP(C)	
74	CARGO SHIPS	CARRYING DG, HS, OR MP(D)	
75	CARGO SHIPS	FUTURE USE	
76	CARGO SHIPS	FUTURE USE	
77	CARGO SHIPS	FUTURE USE	
78	CARGO SHIPS	FUTURE USE	
79	CARGO SHIPS	NONE	
80	TANKER	ALL SHIPS OF THIS TYPE	
81	TANKER	CARRYING DG, HS, OR MP(A)	
82	TANKER	CARRYING DG, HS, OR MP(B)	
83	TANKER	CARRYING DG, HS, OR MP(C)	
84	TANKER	CARRYING DG, HS, OR MP(D)	
85	TANKER	FUTURE USE	
86	TANKER	FUTURE USE	
87	TANKER	FUTURE USE	
88	TANKER	FUTURE USE	
89	TANKER	NONE	
90	OTHER TYPE OF SHI	ALL SHIPS OF THIS TYPE	
91	OTHER TYPE OF SHI	CARRYING DG, HS, OR MP(A)	
92	OTHER TYPE OF SHI	CARRYING DG, HS, OR MP(B)	
93	OTHER TYPE OF SHI	CARRYING DG, HS, OR MP(C)	
94	OTHER TYPE OF SHI	CARRYING DG, HS, OR MP(D)	
95	OTHER TYPE OF SHI	FUTURE USE	
96	OTHER TYPE OF SHI	FUTURE USE	
97	OTHER TYPE OF SHI	FUTURE USE	
98	OTHER TYPE OF SHI	FUTURE USE	
99	OTHER TYPE OF SHI	NONE	

WIG: Wing in ground
HSC: High speed craft
DG: Dangerous goods
HS: Harmful substances
MP: Marine pollutants
0-9: Undefined

9. Press the [ENT] key to return to the INIT SETTING sub-menu.

10. Press the [MENU] key. The SAVE confirmation window appears.

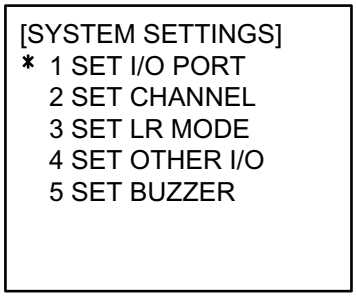


SAVE confirmation window

11. With YES selected, press the [ENT] key to save the data.

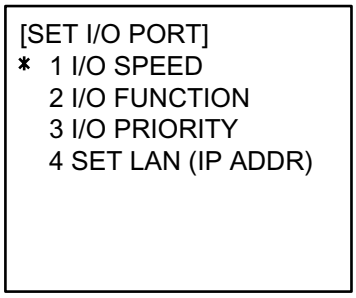
4.3 System Settings

1. Press the [MENU] key to open the main menu.
2. Press the [6] key to open the SYSTEM SETTINGS sub-menu.



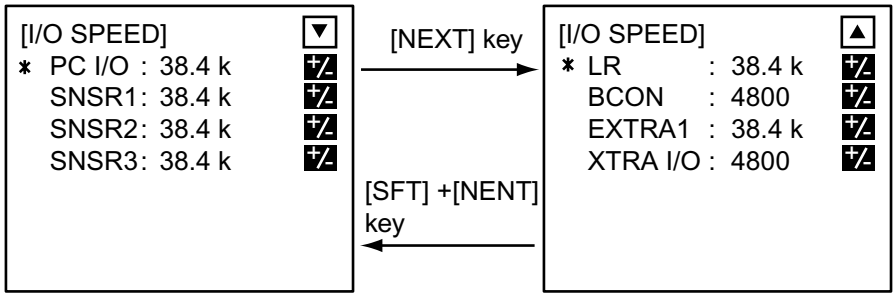
SYSTEM SETTINGS sub-menu

3. Press the [1] key to display the SET I/O PORT sub-menu.



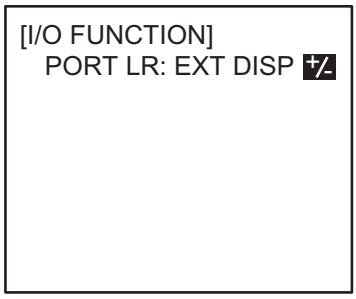
SET I/O PORT sub-menu

4. Press the [1] key to display the I/O SPEED window.



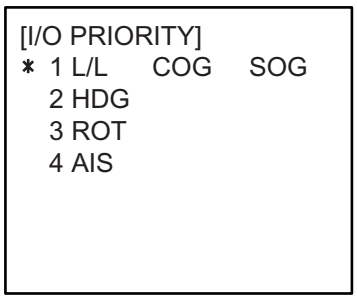
I/O SPEED window

5. Select the appropriate data transmission rate from 4800 bps and 38.4 kbps for PC I/O, SNSR 1, SNSR 2, SNSR 3, LR, BCON (beacon receiver), EXTRA1 and EXTRA2, by pressing the [SFT] key. To select each item, press the [NEXT] key. To go backward, press the [NEXT] key while pressing the [SFT] key.
6. Press the [ENT] key to return to the SET I/O PORT sub-menu.
7. Press the [2] key to display the I/O FUCTION window.



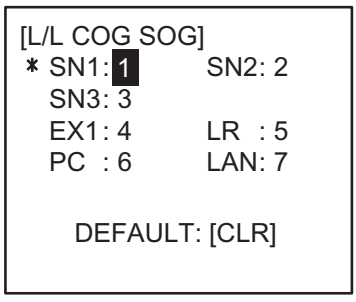
I/O FUNCTION window

8. Press the [SFT+/-] key to select EXT DISP or LR, depending on equipment connected.
   EXT DISP: External display, such as radar, ECDIS
   LR: Long range communication, such INMARSAT communication equipment
9. Press the [ENT] key to return to the SET I/O PORT sub-menu.
10. Press the [3] key to display the I/O PRIORITY window.



I/O PRIORITY window

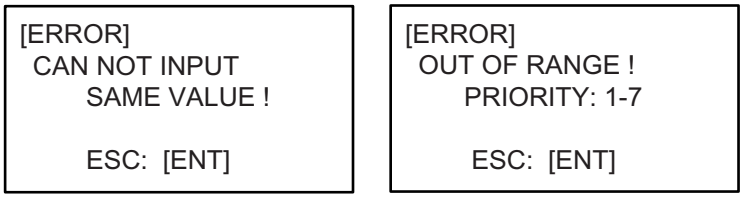
11. Press the [1] key to display the L/L COG SOG window.



L/L/COG/SOG PRIORITY window

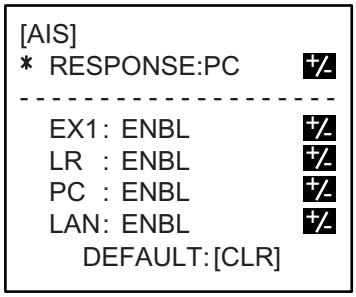
12. Set L/L position, COG and SOG data priority with the numeric keys according to sensors connected.
    COG: Course over ground
    SOG: Speed over ground
13. Press the [ENT] key to return to the I/O PRIORITY window.

Note: If you have entered 8, 9 or the same value for more than one item at step 12, the following error message appears. In this case, press the [ENT] key and set the priority correctly.



ERROR message

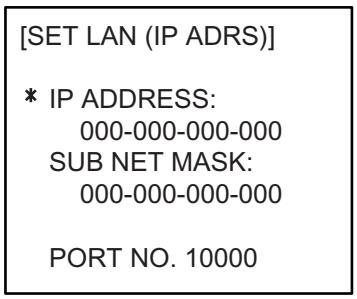
14. Set the priority for HDG and ROT similar to how you did for “L/L COG SOG”.
    The priority of heading data entered from the AD-10 IN port is the lowest.
15. To set the priority of AIS, press the [4] key to choose AIS.



AIS PRIORITY setting window

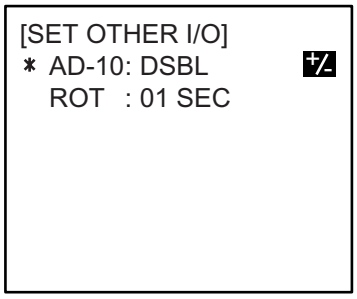
16. With RESPONSE selected, press the [SFT] key to select PC, NONE, LAN, EX1 or LR as appropriate.
    Set an output port for response from other party after you transmit messages or interrogation from the PC, ECDIS, LR, or LAN.
    NONE : No output for response
    PC : Output to PC I/O port
    LAN : Output to LAN port
    LR : Output to LR or ECDIS/RADAR port
    EX1 : Output to EXTRA1 port
    The PC I/O port provides RS-422 and RS-232C terminals. For example, to connect a PC for pilot, connect it to the RS-422 terminal and set 34.8 Kbps for bit rate on the PC I/O option in the I/O SPEED window.
17. Press the [NEXT] key to select EX1, LR, PC or LAN.
18. Press the [SFT] key to select ENBL (enable) or DSBL (disable) as appropriate.
    This setting is for communication between FA-100 and each external equipment.
    “DSBL” disables communication with selected item.
19. Press the [ENT] key and then [MENU] key to return to the SET I/O PORT sub-menu.

20. Press [4] key to display the SET LAN (IP ADRS) window.



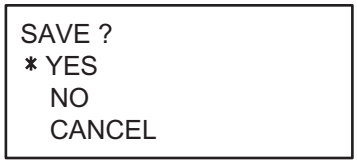
SET LAN (IP ADDR) window

21. If the FA-100 is connected to a network, enter IP address, sub net mask and port number with the numeric keys and the [NEXT] key.
22. Press the [ENT] key and then the [MENU] key to return to the SYSTEM SETTINGS sub-menu.
23. Press the [4] key to display the SET OTHER I/O window.



SET OTHER I/O window

24. Select or set other I/O as follows.
    1) AD-10: Select ENBL to use AD-10 format gyrocompass signal.
    2) ROT: Set smoothing time (1 to 10 seconds) of the ship's rate of turn if you are using a ROT meter. This time is used to smooth the variations of data from the AD-100 for calculation of ROT.
    3) Press the [ENT] key to register setting. The display returns to the SYSTEM SETTINGS sub-menu.
25. Press the [MENU] key. The following confirmation window appears.



SAVE confirmation window

26. Select YES and press the [ENT] key. The main menu appears.

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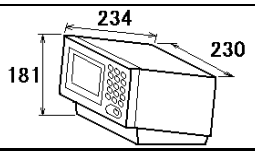
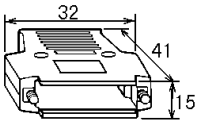
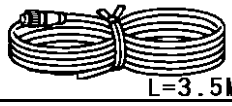
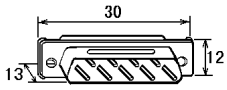
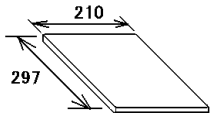
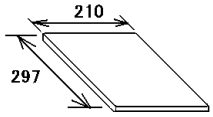
PACKING LIST

FA-100-J/E,FA-100-J/E-HK

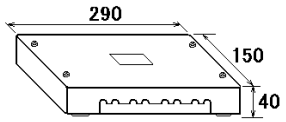
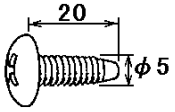
NAME	OUTLINE	DESCRIPTION/CODE №	Q'TY
ユニット UNIT			
ﾄﾗﾝｽﾎﾟﾝﾀﾞ部 TRANSPONDER UNIT		FA-100 000-053-889 **	1
工事材料 INSTALLATION MATERIALS		**CP24-00102**	
ｺﾈｸﾀﾌｰﾄﾞ(XM2) HOUSING CASE		XM2S-0912 000-145-422	1
ｹｰﾌﾞﾙ組品MJ CABLE ASSY.		MJ-A3SPF0015-035 000-137-340	1
ｺﾈｸﾀ(XM2) CONNECTOR(XM2)		XM2A-0901 000-111-785	1
図書 DOCUMENT			
装備要領書 INSTALLATION MANUAL		IMJ-44170-* 000-809-324 **	1
取扱説明書 OPERATOR'S MANUAL		OMJ-44170-* 000-809-322 **	1

1.ｺｰﾄﾞ番号末尾の[**]は、選択品の代表型式/ｺｰﾄを表します。
CODE NUMBER ENDED BY "**" INDICATES THE NUMBER OF TYPICAL MATERIAL.

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

PACKING LIST

CB-100-A、CB-100-A-HK

NAME	OUTLINE	DESCRIPTION/CODE №	Q'TY
ユニット UNIT			
接続箱 JUNCTION BOX UNIT		CB-100-A 000-053-873**	1
工事材料 INSTALLATION MATERIALS		**CP05-08701**	
+ﾄﾗｽﾀｯﾋﾟﾝﾈｼﾞ +TAPPING SCREW		5X20 SUS304 1ｼｭ 000-802-081	4

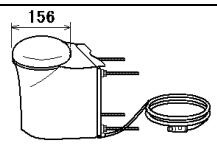
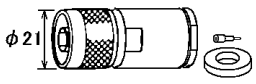
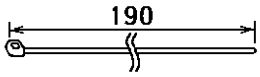
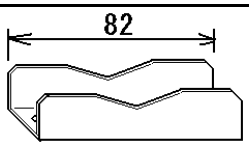
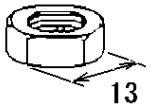
1.ｺｰﾄﾞ番号末尾の[**]は、選択品の代表型式/ｺｰﾄを表します。
DOUBLE ASTERISK DENOTES COMMONLY USED EQUIPMENT.

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

PACKING LIST

24AA-X-9853 -3 1/1

GVA-100

NAME	OUTLINE	DESCRIPTION/CODE №	Q'TY
ユニット UNIT			
複合空中線部 GPS/VHF COMBINED ANTENNA		GVA-100 000-053-810	1
工事材料 INSTALLATION MATERIALS		**CP24-00141**	
ｺﾈｸﾀ(N) CONNECTOR		N-P-8DFB 座金付き 000-140-463	2
ｺﾝﾍﾞｯｸｽ PLASTIC BAND		CV-200HT 000-809-226	2
ｱﾝﾃﾅ取付金具 ANTENNA FIXING BRACKET		24-003-3015-0 100-302-670	2
ﾐｶﾞｷ平座金 FLAT WASHER		M8 SUS304 000-864-130	4
六角ﾅｯﾄ 1種 HEX.NUT		M8 SUS304 000-863-110	8

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

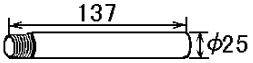
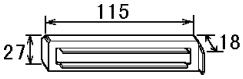
FURUNO

CODE NO.	004-365-780	20AG-X-9403 -1
TYPE	CP20-01111	1/1

工事材料表

INSTALLATION MATERIALS

マスト取付金具
MAST FIXTURE

番号 NO.	名称 NAME	略図 OUTLINE	型名／規格 DESCRIPTIONS		数量 Q'TY	用途／備考 REMARKS
1	ﾊﾟｲﾌﾟ PIPE		20-007-3011-2		1	
			CODE NO.	100-183-262		
2	取付補助金具 INSTALLING SPACER		20-007-3012-1		1	
			CODE NO.	100-183-271		
3	ﾊﾟｰｶｰｸﾗﾝﾌﾟ HOSE CLAMP		NO.6348 SUS303		2	
			CODE NO.	000-805-906		

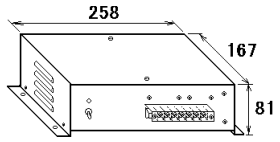
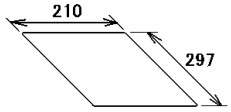
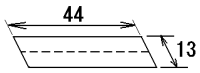
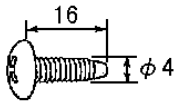
20AG-X-9403

FURUNO ELECTRIC CO ., LTD.

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

PACKING LIST

PR-240-CE

NAME	OUTLINE	DESCRIPTION/CODE No.	Q'TY
ユニット UNIT			
AC-DC電源 POWER SUPPLY UNIT		PR-240-CE 000-053-879	1
工事材料 INSTALLATION MATERIALS		**CP24-00151**	
PR-240-CE電源変更手順書 POWER MODIFICATION PROCEDURES		C52-00205-A 000-147-013	1
ﾃﾞﾝｹﾞﾝﾊﾘﾏｰｸ POWER LABEL		24-003-4101-3 100-299-773	1
+ﾄﾗｽﾀｯﾋﾟﾝﾈｼﾞ +TAPPING SCREW		4X16 SUS304 1ｼｭ 000-802-080	4

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

FURUNO

CODE NO.		20AG-X-9404 -1
TYPE		1/1

工事材料表

INSTALLATION MATERIALS

GP-80,GP-90,SC-55,GP-3500/F
GP-1850,GP-1650,FA-100,GP-1640/F
SC-60/120,GD/GP-280/680/380

番号 NO.	名称 NAME	略図 OUTLINE	型名／規格 DESCRIPTIONS		数量 Q'TY	用途／備考 REMARKS
1	ｱﾝﾃﾅｹｰﾌﾞﾙ組品 ANTENNA CABLE ASSY.	 L=30M	8D-FB-CV *30M*		1	選択 TO BE SELECTED
			CODE NO.	000-111-547		
2	ｹｰﾌﾞﾙ組品 CABLE ASSY.	 L=50M	8D-FB-CV *50M*		1	選択 TO BE SELECTED
			CODE NO.	000-117-599		

FURUNO ELECTRIC CO .,LTD.

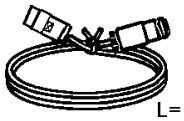
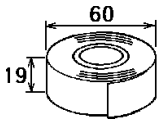
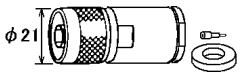
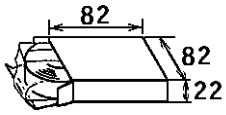
（略図の寸法は、参考値です。 DIMENSIONS IN DRAWING FOR REFERENCE ONLY.）

FURUNO

CODE NO.	004-372-420	20AG-X-9405 -1
TYPE	CP20-01701	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	変換ｹｰﾌﾞﾙ組品 CONVERT CABLE ASSY.		NJ-TP-3DXV-1		2	
			CODE NO.	000-123-809		
2	ﾋﾞﾆｰﾙﾃｰﾌﾟ VINYL TAPE		NO360 02X19X10000 ｸﾛ ｴｽﾛﾝ		1	
			CODE NO.	000-835-215		
3	ｺﾈｸﾀ(N) CONNECTOR		N-P-8DFB		1	
			CODE NO.	000-111-549		
4	絶縁ﾃｰﾌﾟ SELF-BONDING TAPE		Uﾃｰﾌﾟ 0.5X19X5M		1	
			CODE NO.	000-800-985		

20AG-X-9405

FURUNO ELECTRIC CO .,LTD.

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

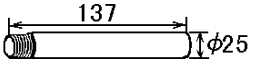
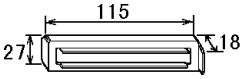
FURUNO

CODE NO.	004-365-780	20AG-X-9403 -1
TYPE	CP20-01111	1/1

工事材料表

INSTALLATION MATERIALS

マスト取付金具
MAST FIXTURE

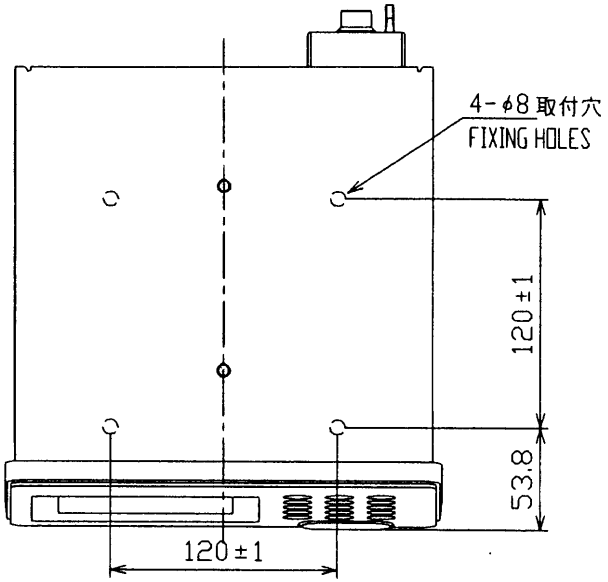
番号 NO.	名称 NAME	略図 OUTLINE	型名／規格 DESCRIPTIONS		数量 Q'TY	用途／備考 REMARKS
1	ﾊﾟｲﾌﾟ PIPE		20-007-3011-2		1	
			CODE NO.	100-183-262		
2	取付補助金具 INSTALLING SPACER		20-007-3012-1		1	
			CODE NO.	100-183-271		
3	ﾊﾟｰｶｰｸﾗﾝﾌﾟ HOSE CLAMP		NO.6348 SUS303		2	
			CODE NO.	000-805-906		

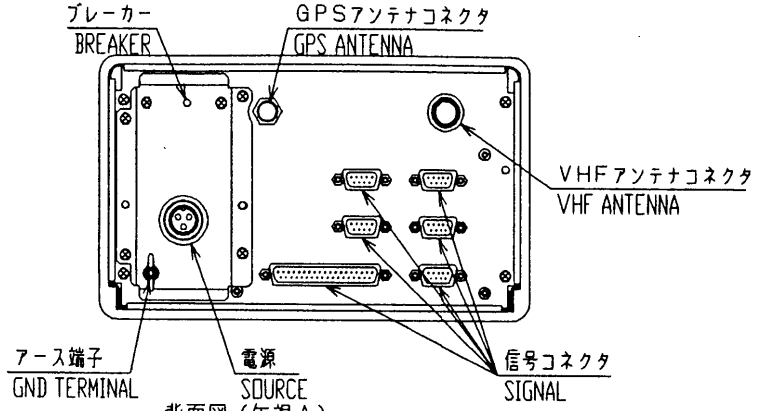
20AG-X-9403

FURUNO ELECTRIC CO ., LTD.

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

FURUNO

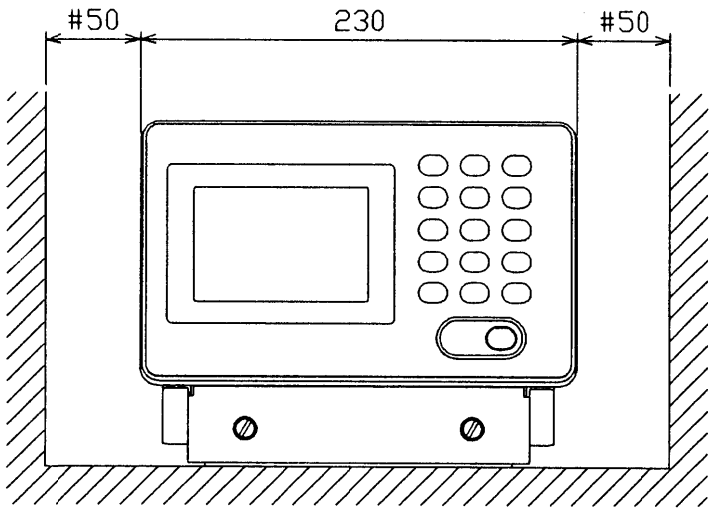


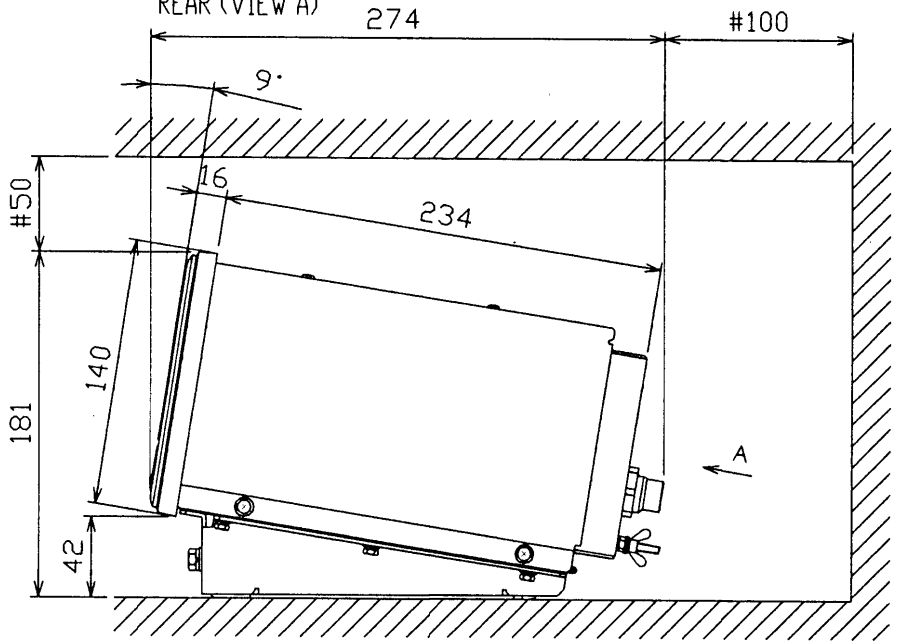


背面図（矢視A）
REAR (VIEW A)

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

表1 TABLE 1





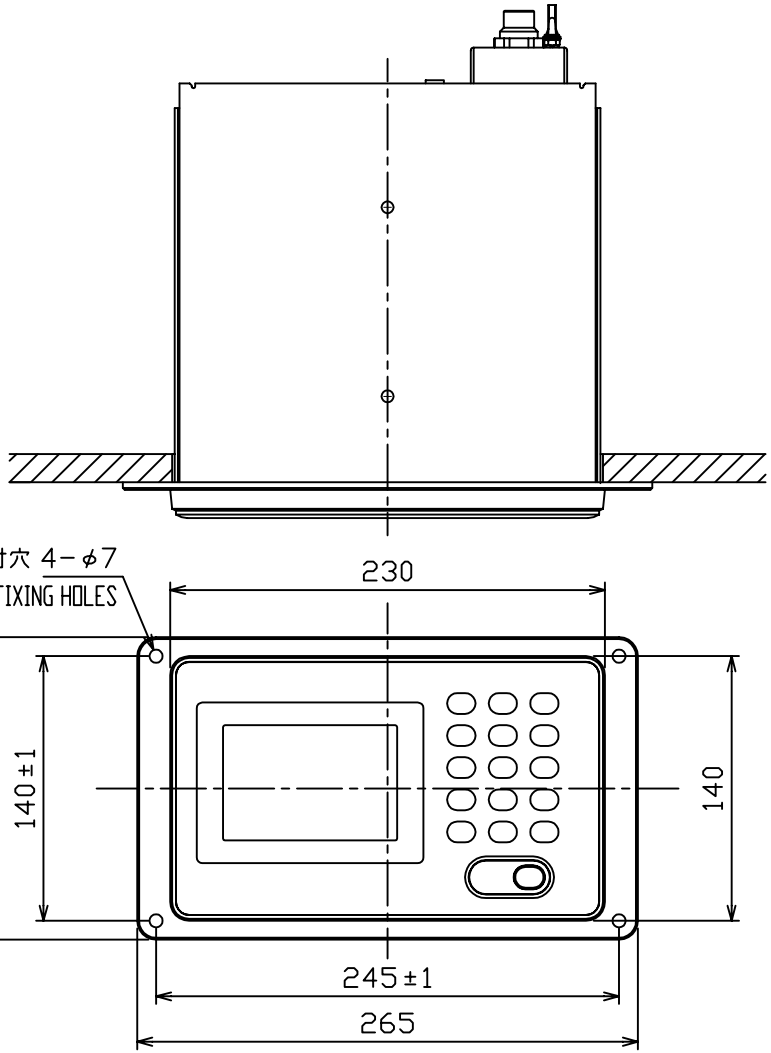
注　記　1）＃印寸法は最小サービス空間寸法とする。
　　2）指定外の寸法公差は表1による。
　　3）取付用ネジは六角ボルトM6、又はコーチボルト呼び径6を使用。

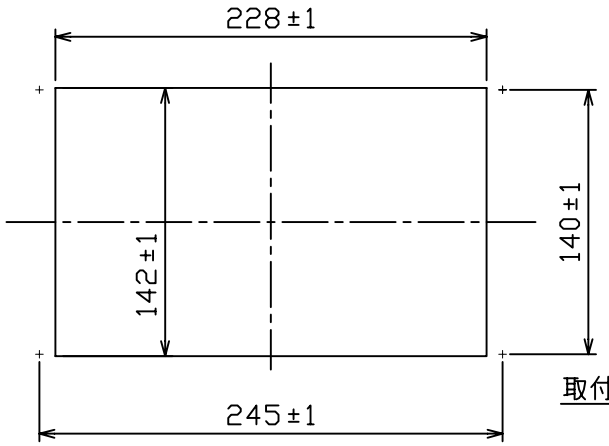
NOTE　1. #: RECOMMENDED SERVICE CLEARANCE.
　　2. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS.
　　3. USE M6 BOLTS OR COACH SCREWS φ6 FOR FIXING THE UNIT.

DRAWN July 23'02 T.YAMASAKI			TITLE FA-100
CHECKED			名称 トランスポンダ部（卓上装備）
APPROVED		FA-100	外寸図
SCALE 1/4	MASS 7.3 ±10% kg		NAME TRANSPONDER UNIT (DESKTOP MOUNT)
DWG No. C4417-G01-C		24-003-200G-4	OUTLINE DRAWING

FURUNO ELECTRIC CO., LTD.

FURUNO

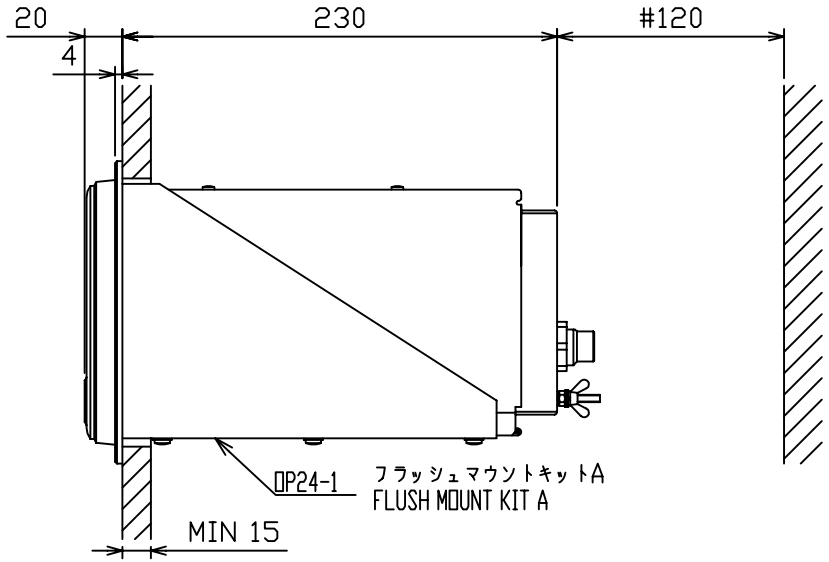




取付穴寸法図（参考図）
CUTOUT DIMENSIONS

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

表1 TABLE 1



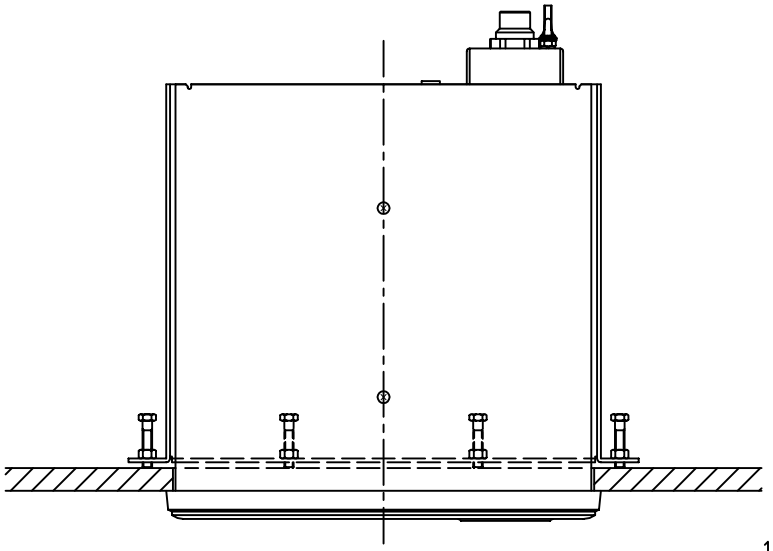
注　記　1）＃印寸法は最小サービス空間寸法とする。
　　2）指定外の寸法公差は表1による。
　　3）取付用ネジは＋トラスタッピンネジ5×25を使用のこと。

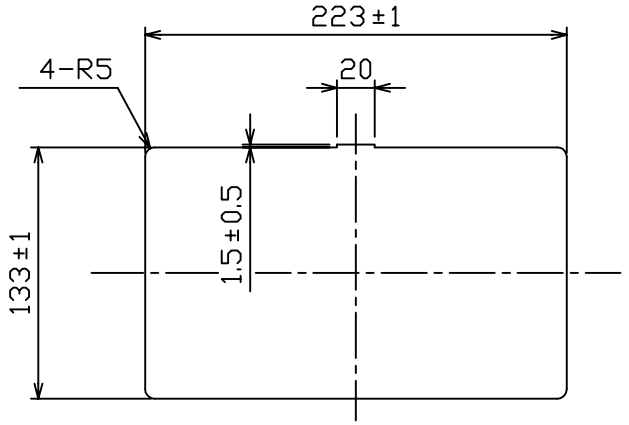
NOTE　1. #: RECOMMENDED SERVICE CLEARANCE.
　　2. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS.
　　3. USE TAPPING SCREWS 5 x 25 FOR FIXING THE UNIT.

DRAWN Oct. 21 '02 T.YAMASAKI		TITLE FA-100
CHECKED Oct. 21 '02 Y.KIMURA		名称 トランスポンダ部（埋込装備A）
APPROVED Oct. 21,'02 y. Kimura	FA-100	外寸図
SCALE 1/4 MASS 7.3 ±10% kg		NAME TRANSPONDER UNIT (FLUSH MOUNT A)
DWG No. C4417-G05-D	24-003-281G-2	OUTLINE DRAWING

D-2

FURUNO ELECTRIC CO., LTD.

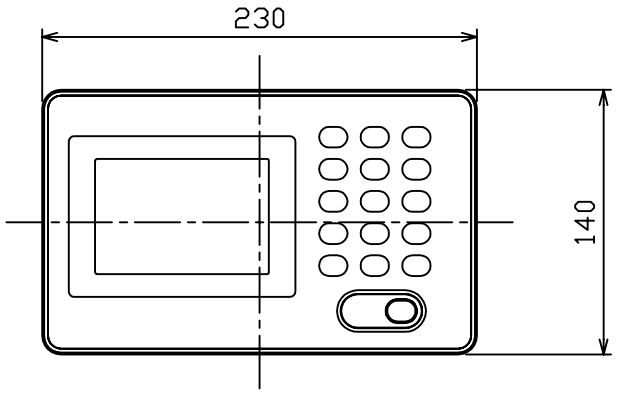


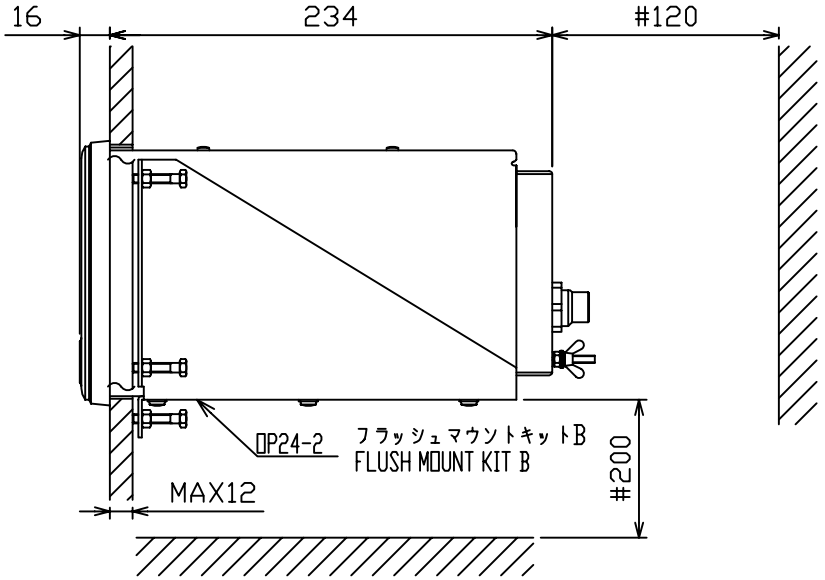


取付穴寸法図（参考図）
CUTOUT DIMENSIONS

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

表1 TABLE 1





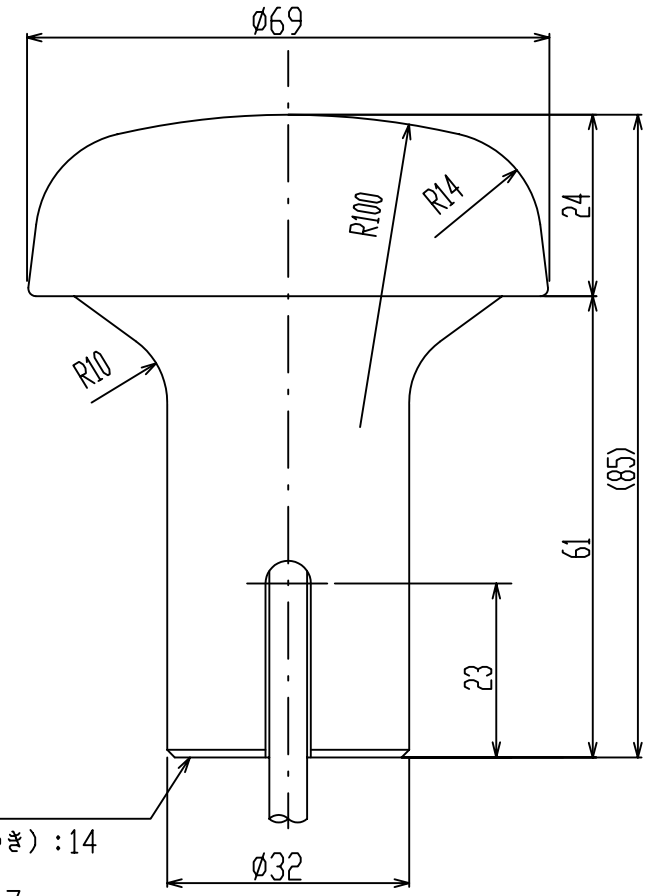
注　記　1）＃印寸法は最小サービス空間寸法とする。
　　2）指定外の寸法公差は表1による。

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

DRAWN Oct. 21 '02 T.YAMASAKI			TITLE FA-100
CHECKED Oct. 21 '02 Y.KIMURA			名称 トランスポンダ部（埋込装備B）
APPROVED Oct. 21,'02 Y. Kimura		FA-100	外寸図
SCALE 1/4	MASS 7.2 ±10% kg		NAME TRANSPONDER UNIT (FLUSH MOUNT B)
DWG No. C4417-G06-D		24-003-282G-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



1-14UNS1B
ねじ山数（25.4mmにつき）：14
ピッチ： 1.8143 mm
オネジ有効長さ： 24.17 mm
オネジ有効径：19 mm以上

THREAD PER 25.4mm (1 INCH): 14
PITCH: 1.8143 mm
THREAD LENGTH: 24.17 mm
PITCH DIAMETER: 19 mm OR MORE

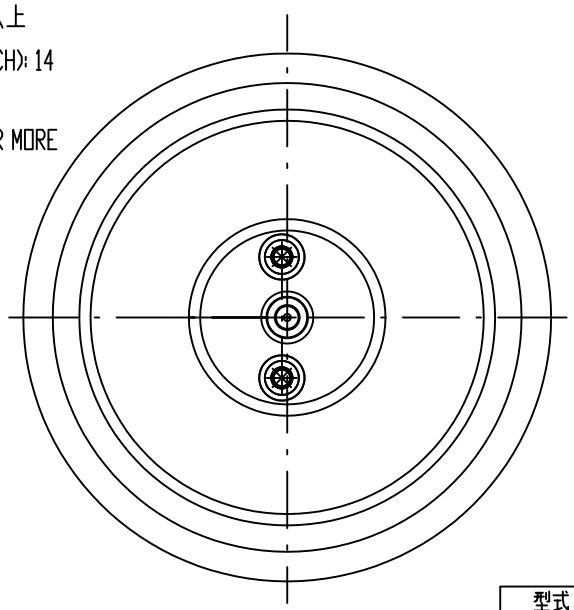


表2 TABLE 2

型式 TYPE	ケーブル長(m) CABLE LENGTH	プラグ PLAG	質量(kg±10%) MASS
GPA-017	10	TNC-P-3	0.6
GPA-017S	0.2	TNC-J-3	0.15

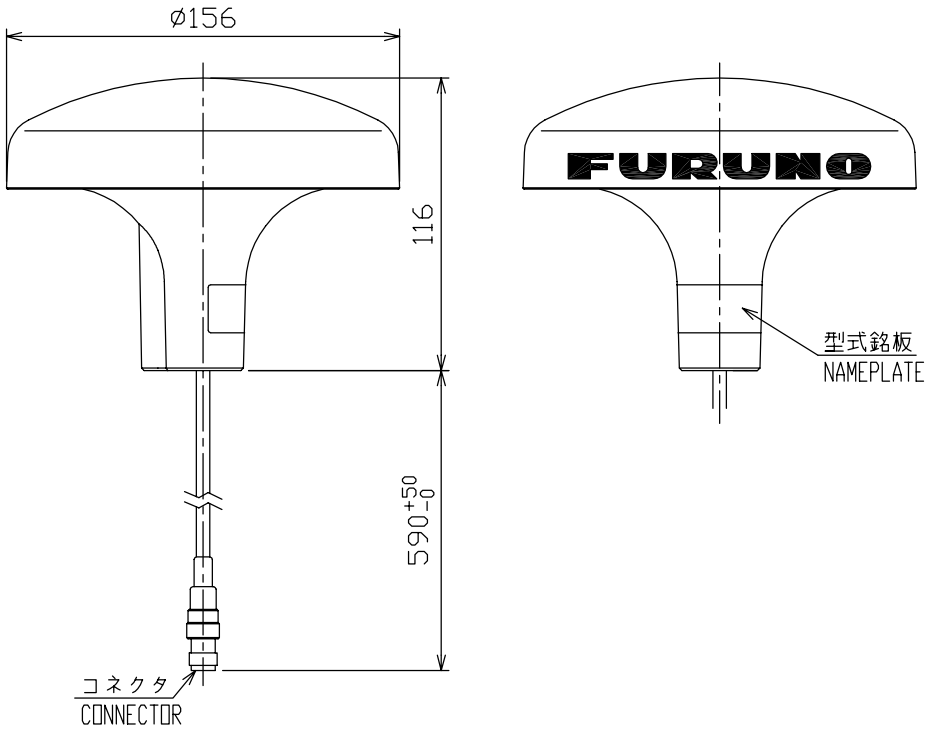
注記
指定外の寸法公差は表1による。

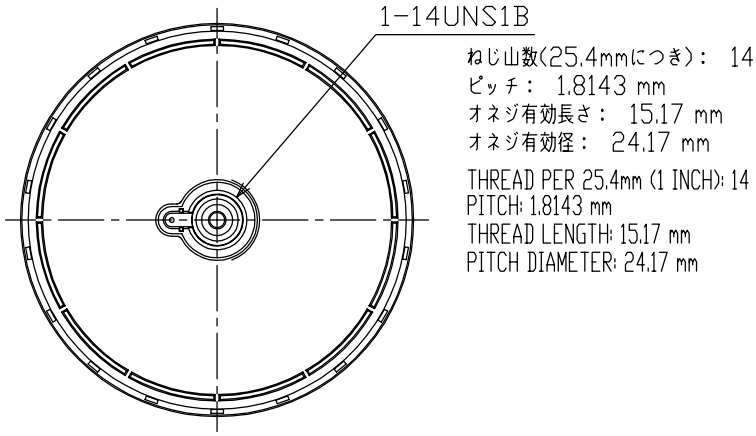
NOTE
TABLE 1 INDICATES TOLERANCE OF DIMENSIONS WHICH IS NOT SPECIFIED.

DRAWN Sep. 22 '05 T.YAMASAKI		TITLE GPA-017/017S
CHECKED Sep. 22 '05 T.TAKENO		名称 空中線部
APPROVED Sep. 29'05 T. Matsuguchi		外寸図
SCALE 1/1 MASS TABLE 2 表2参照		NAME ANTENNA UNIT
DWG.No. C4384-G04-K		OUTLINE DRAWING

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

表 1 TABLE 1





注 記 1） 指定外の寸法公差は表 1 による。

NOTE 1. TABLE 1 INDICATES TOLERANCE OF DIMENDIONS.

DRAWN May 12 '03 T. YAMASAKI			TITLE GSC-001-FA
CHECKED May 12 '03 T.Matsuguchi			名称 GPSアンテナ部
APPROVED May 20 '03 T. Matsuguchi		FA-100	外寸図
SCALE 1/3	MASS ±10% 0.47 kg	質量はケーブルを含む。 MASS W/ CABLE.	NAME GPS ANTENNA UNIT
DWG.No. C4417-G07- B		24-003-330G-0	OUTLINE DRAWING

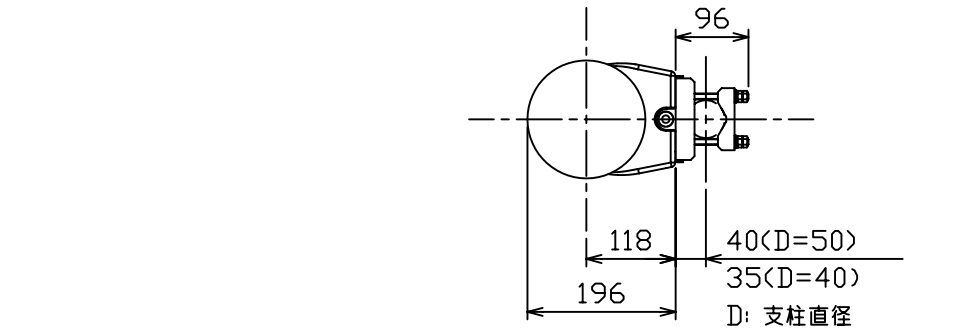
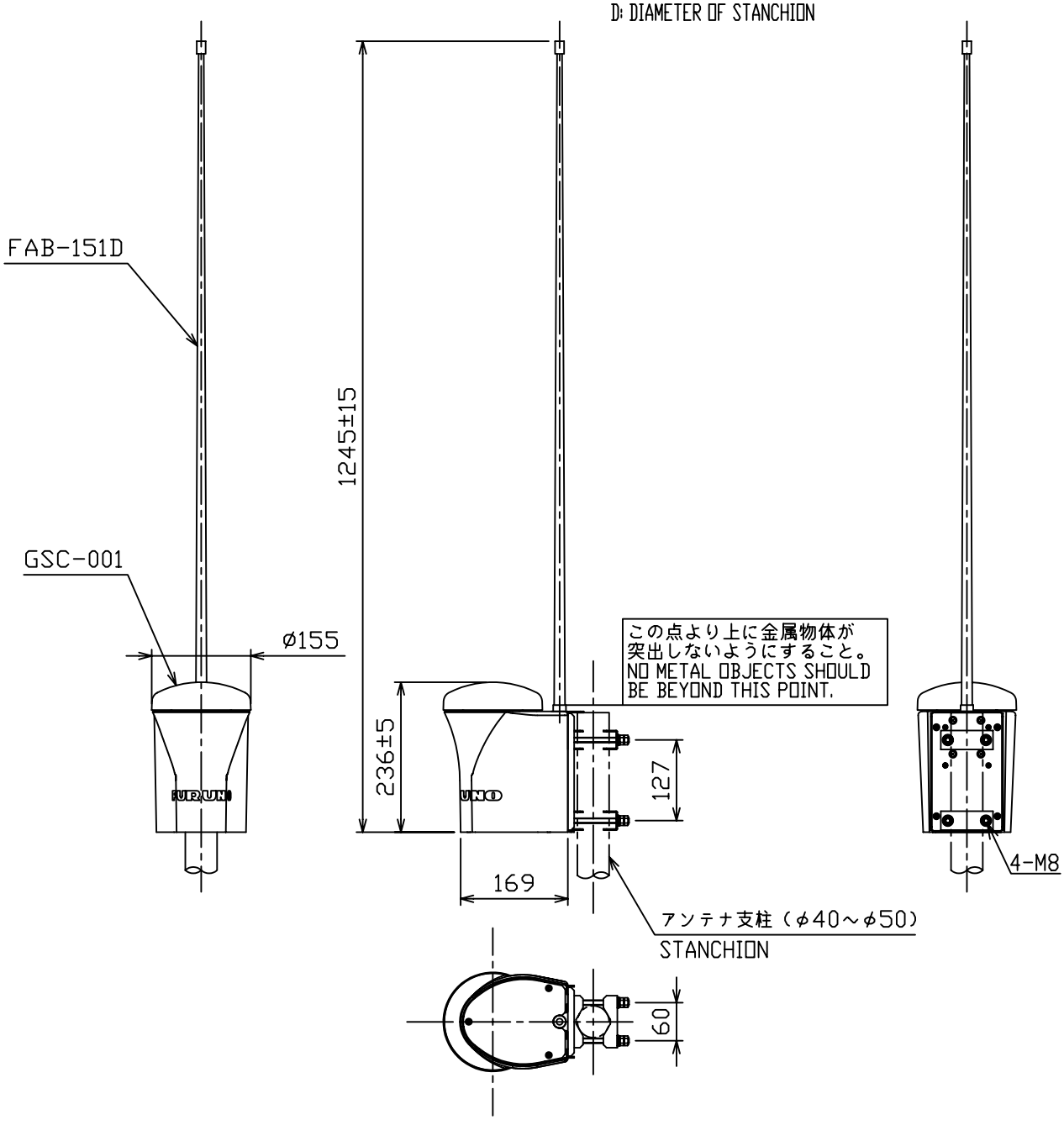


表 1 TABLE 1

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

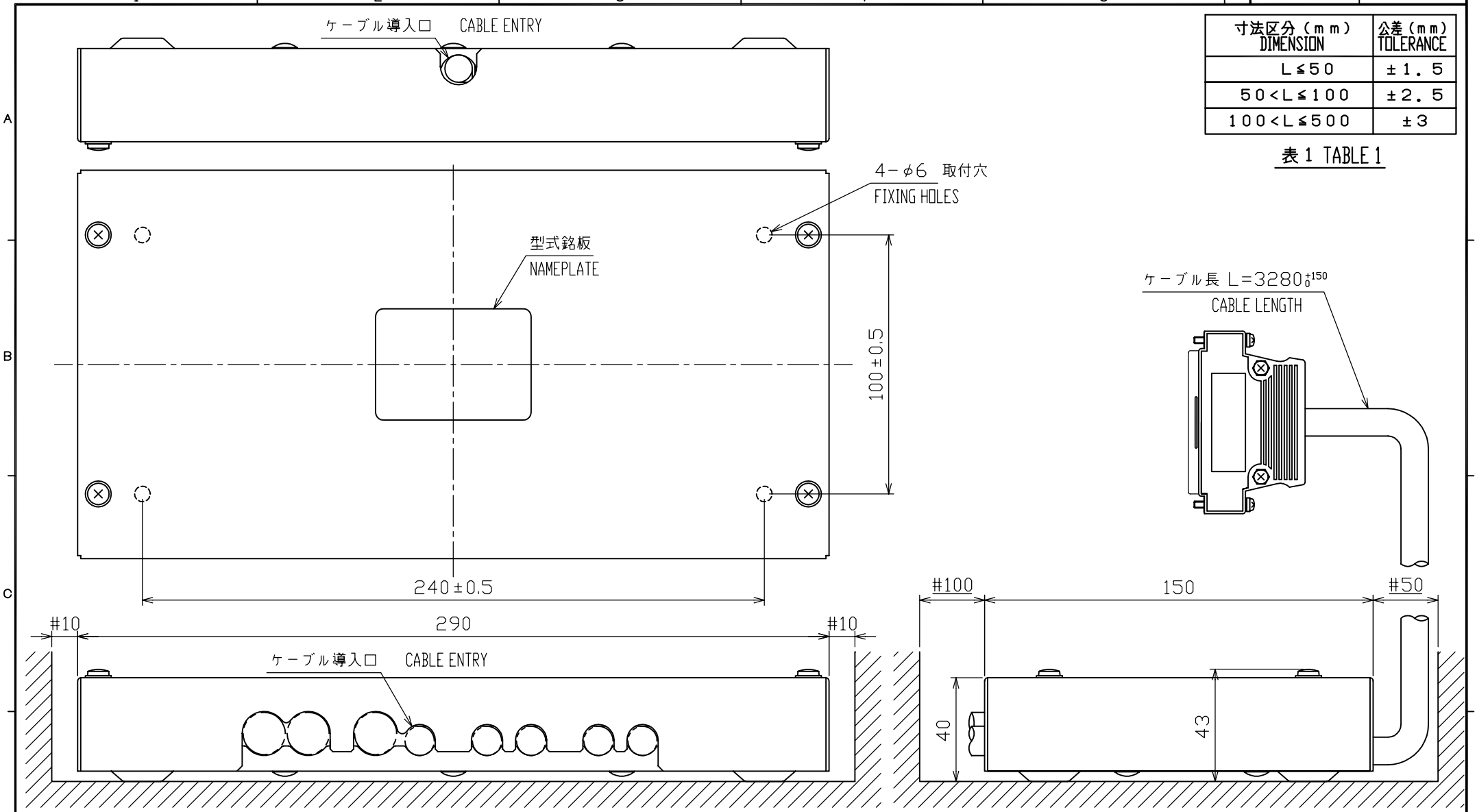


注　記　1）指定外の寸法公差は表 1 による。

NOTE　1.　TABLE 1 INDICATES TOLERANCE OF DIMENSIONS WHICH IS NOT SPECIFIED.

DRAWN Feb. 9 '05 T.YAMASAKI		TITLE	GVA-100
CHECKED Feb. 9 '05 T.MATSUGUCHI		名称	GPS/VHF複合空中線部
APPROVED Feb.22'05 T.Matsuguchi	FA-100		外寸図
SCALE 1/10 MASS 3.3 ±10% kg		NAME	GPS/VHF COMBINED ANTENNA
DWG.No. C4417-G02- F	24-003-301G-1		OUTLINE DRAWING

FURUNO



寸法区分（mm） DIMENSION	公差（mm） TOLERANCE
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。

NOTE 1. #: RECOMMENDED SERVICE CLEARANCE.
2. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS.
3. USE TAPPING SCREWS 5x20 FOR FIXING THE UNIT.

DRAWN Jan. 9 '03 T.YAMASAKI			TITLE CB-100
CHECKED Jan. 9 '03 Y.KIMURA			名称 接続箱
APPROVED Jan. 9,'03 Y. Kimura	FA-100		外寸図
SCALE 1/2	MASS 2.0 ±10% kg		NAME JUNCTION BOX
DWG No. C4417-G03- B	24-003-400G-5		OUTLINE DRAWING

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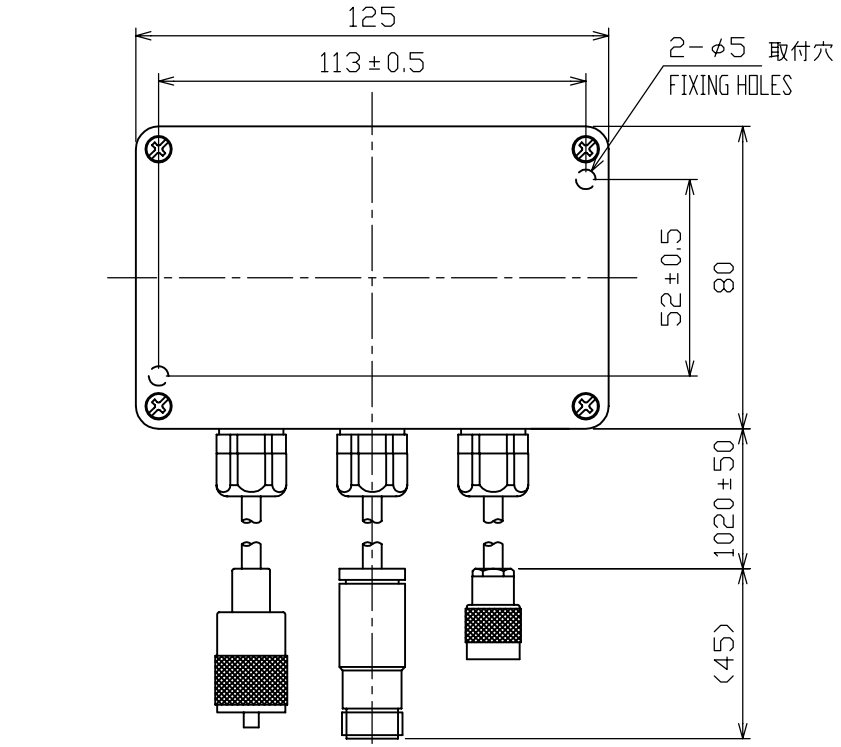
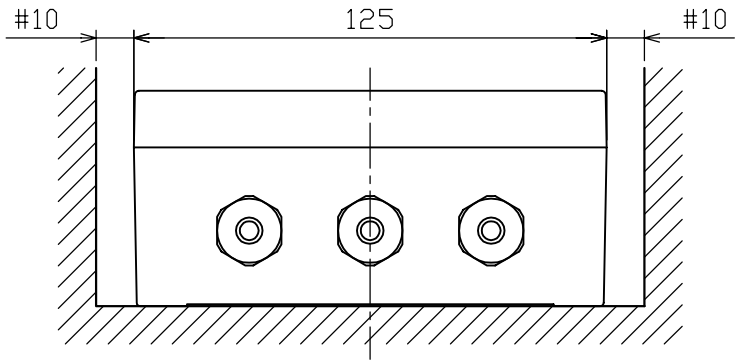
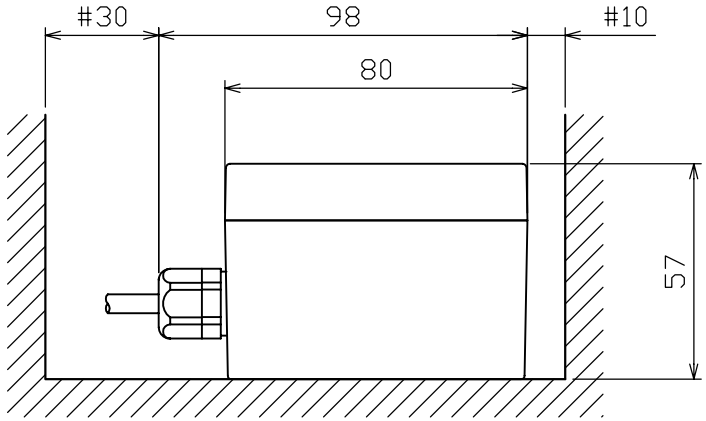


寸法区分（mm） DIMENSION	公差（mm） TOLERANCE
L≦50	±1.5
50<L≦100	±2.5
100<L≦500	±3

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＋ナベタッピンネジ４×３０を使用のこと。

NOTE　1. #: RECOMMENDED SERVICE CLEARANCE.
　　2. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS.
　　3. USE TAPPING SCREWS 4x30 FOR FIXING THE UNIT.

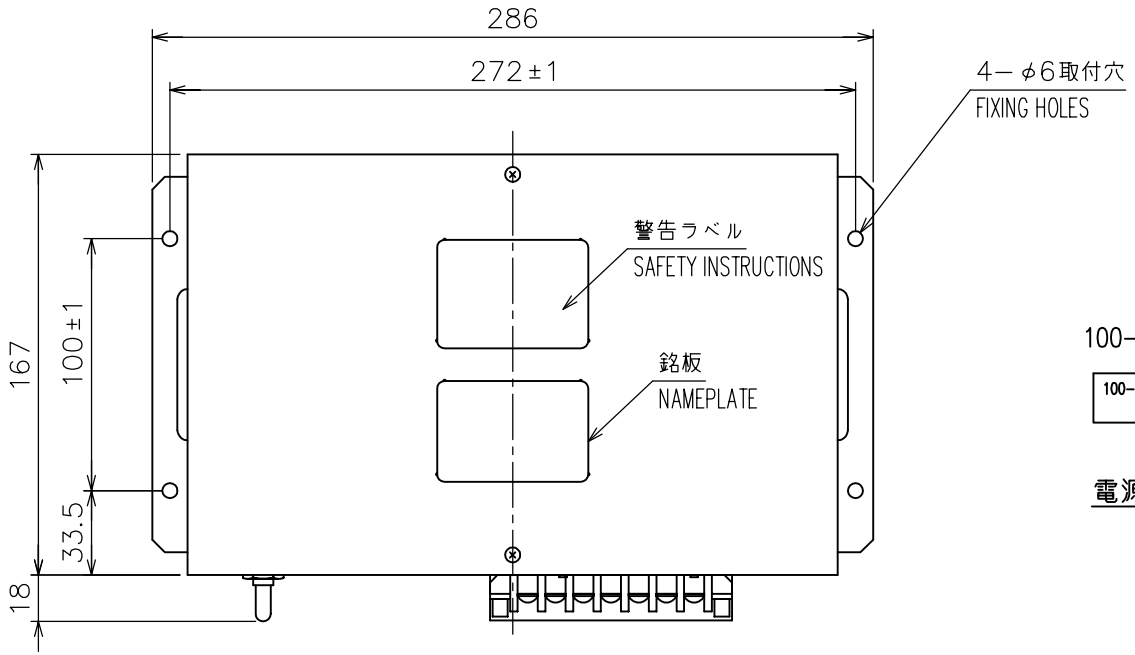
DRAWN Jan. 9 '03 T.YAMASAKI			TITLE DB-1
CHECKED Jan. 9 '03 Y.KIMURA			名称 分配器
APPROVED Jan. 9, '03 Y. Kimura	FA-100		外寸図
SCALE 1/2	MASS 0.85 ±10% kg		NAME DISTRIBUTOR
DWG No. C4417-G04-C	24-003-320G-4		OUTLINE DRAWING

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

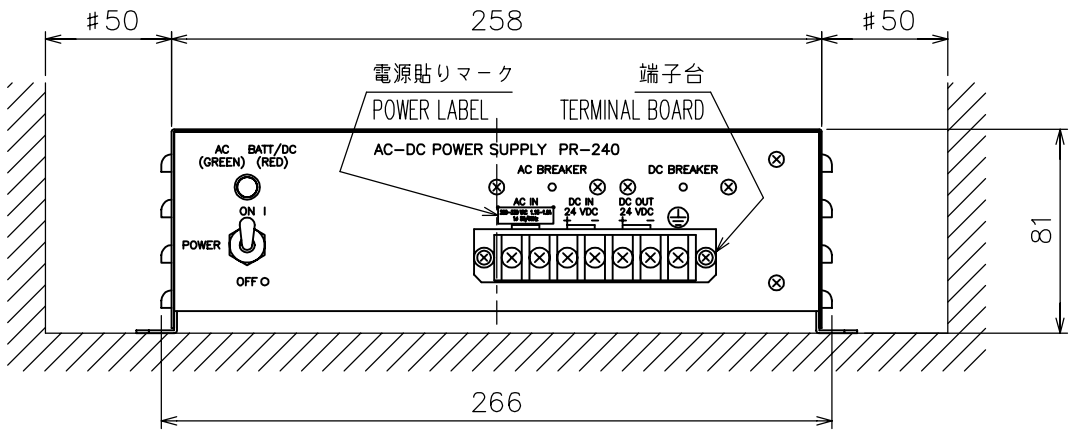


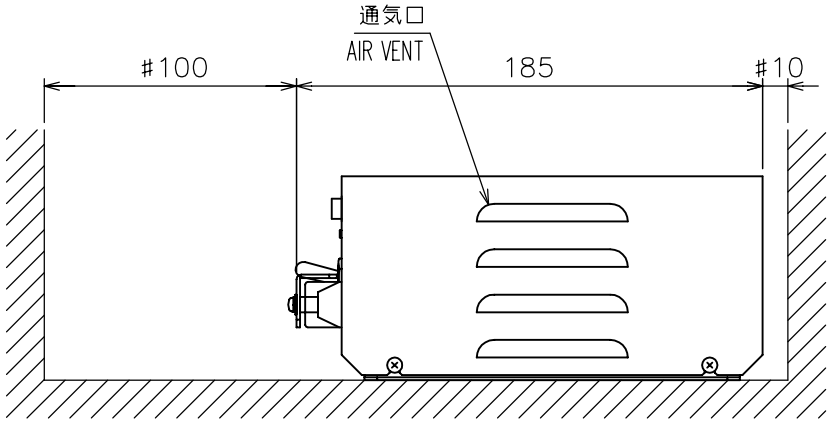
100－115 VACの時　200－230 VACの時

100－115 VAC 2.3－2.0A 1φ 50/60Hz

200－230 VAC 1.15－1.0A 1φ 50/60Hz

電源貼りマーク（尺度１：１）
POWER LABEL (SCALE 1:1)





注　記　１）指定なき寸法公差は表１による。
２）#印寸法は推奨する最小サービス空間寸法とする。
３）取付用ネジは＋トラスタッピンネジ 呼び径４ｘ１６を使用のこと。

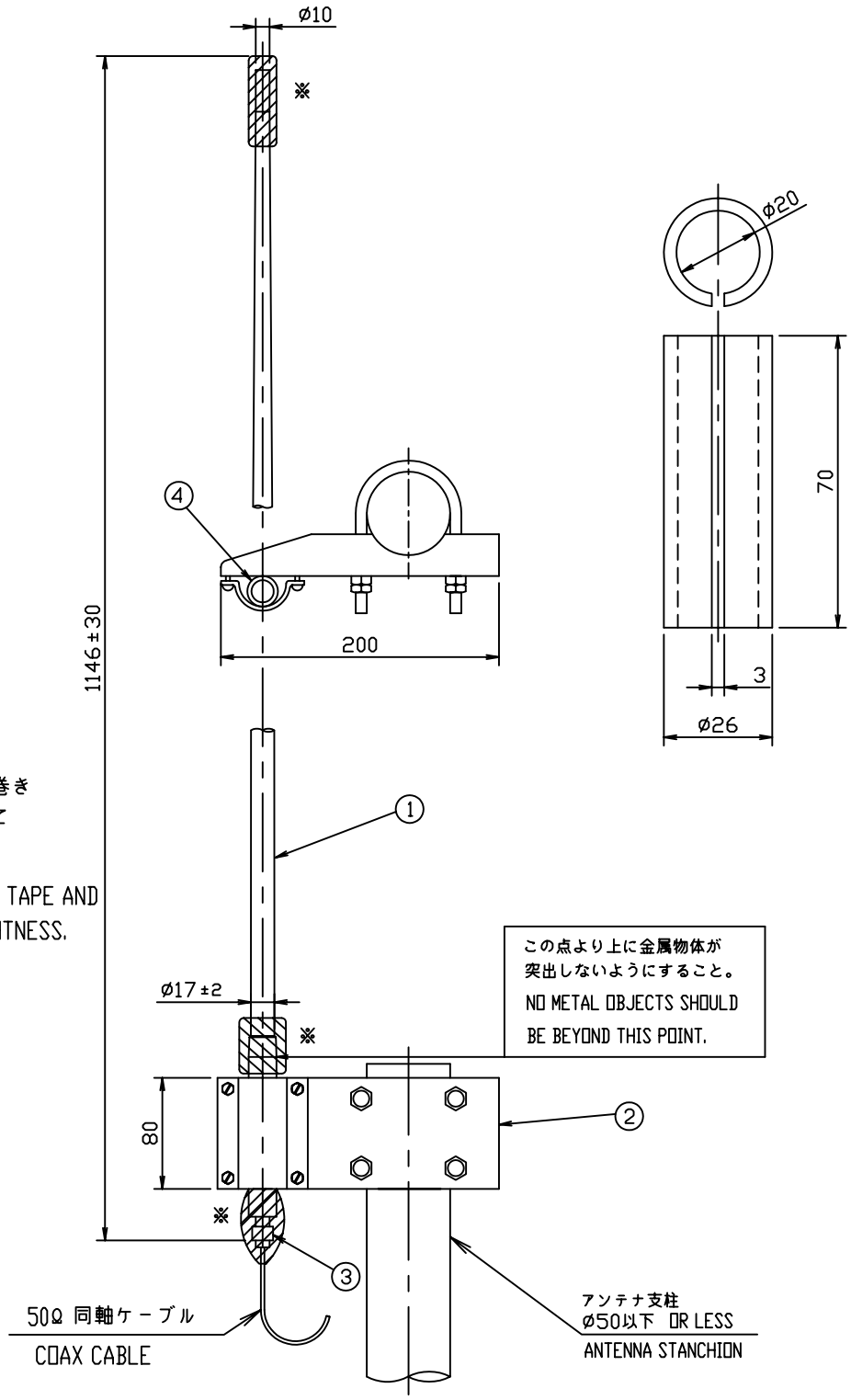
NOTE
1. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS WHICH IS NOT SPECIFIED.
2. #: MINIMUM SERVICE CLEARANCE.
3. USE TAPPING SCREWS 4x16 FOR FIXING THE UNIT.

DRAWN Mar. 3 '04 T.YAMASAKI		TITLE	PR-240-CE
CHECKED Mar. 3 '04 T.TAKENO		名称	AC/DC電源ユニット
APPROVED Mar.11'04 H.Hayashi			外寸図
SCALE 1/3	MASS 2.8 ±10% kg	NAME	AC/DC POWER SUPPLY UNIT
DWG No. C5003-G03- F	24-003-5006-3		OUTLINE DRAWING

FURUNO ELECTRIC CO., LTD.

FURUNO

D-9



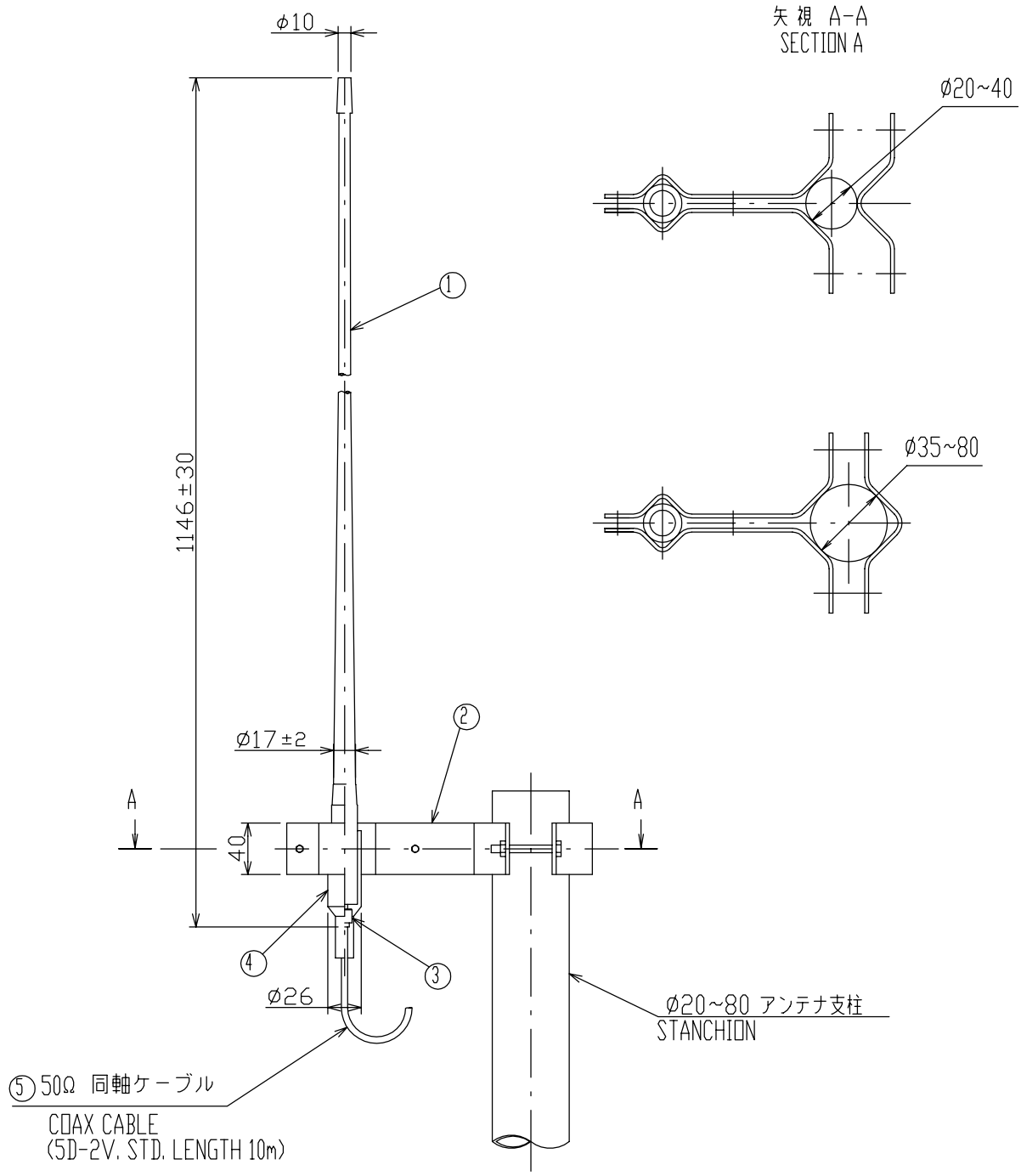
※ 斜線部は自己融着テープを巻き
更にビニールテープを巻いて
防水処理をおこなうこと。

SEAL WITH SELF-BONDING TAPE AND
PVC TAPE FOR WATERTIGHTNESS.

品番 ITEM	品名 NAME	材質 MATERIAL	数量 Q'TY	図番 DWG.No.	摘要 REMARKS
4	固定用パイプ LINER PIPE	硬質塩ビ VINYL CHLORIDE	1		
3	同軸コネクタ COAX. CONNECTOR		1		M-R
2	アンテナ取付金具 ANTENNA BRACKET	SUS	1 式 SET	4-310071	0.6kg
1	アンテナ棒 ANTENNA ELEMENT	FRP	1		0.25kg

DRAWN Feb.1'05 T.YAMASAKI		TITLE	FAB-151D
CHECKED Feb.1'05 T.MATSUGUCHI		名称	150MHz ホイップアンテナ
APPROVED Feb.02'05 T.Matsuguchi			外寸図
SCALE 1/5	MASS 0.85 ±10% kg	NAME	150MHz WHIP ANTENNA
DWG.No. C5013-019- J	4-110718		OUTLINE DRAWING

FURUNO ELECTRIC CO., LTD.



ITEM 品番	NAME 品名	MATERIAL 材質	Q'TY 数量	DWG.No. 図番	REMARKS 摘要
5	同軸ケーブル 50Ω COAX. CABLE		10m	5D-2V	
4	塩ビキャップ CONNECTOR CAP		1		
3	同軸コネクタ COAX. CONNECTOR		2	M-P-5	
2	アンテナ取付金具 ANTENNA BRACKET		1 式 SET		t2
1	アンテナ棒 ANTENNA ELEMENT	FRP	1	150M-W2VN	0.25kg

DRAWN Nov. 26 '03 T.YAMASAKI	TITLE	150M-W2VN
CHECKED Nov. 26 '03 T.TAKENO	名称	150MHzホイップアンテナ
APPROVED Nov.28'03 T.Matsuguchi		外寸図
SCALE 1/5 MASS 0.7 ±10% kg	NAME	150MHz WHIP ANTENNA
DWG.No. C5011-042- C		OUTLINE DRAWING

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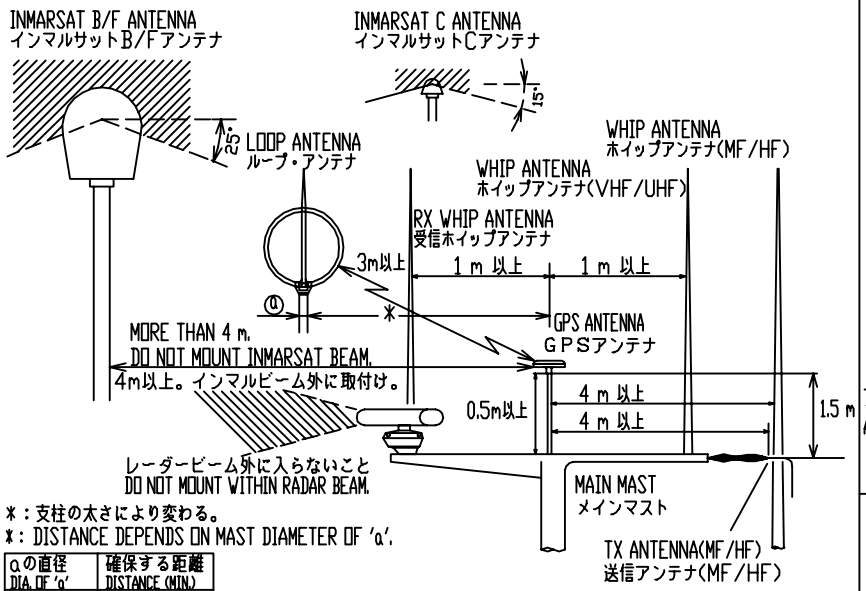
取付位置
MOUNTING LOCATION

他の機器のアンテナから下の図の距離以上離す。
THIS FIGURE SHOWS THE SEPARATION DISTANCES FROM OTHER ANTENNAS TO AVOID MUTUAL INTERFERENCE.

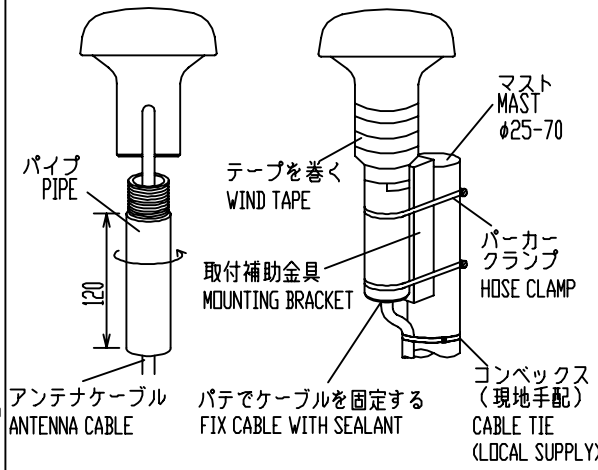


＊：支柱の太さにより変わる。
＊: DISTANCE DEPENDS ON MAST DIAMETER OF 'a'.

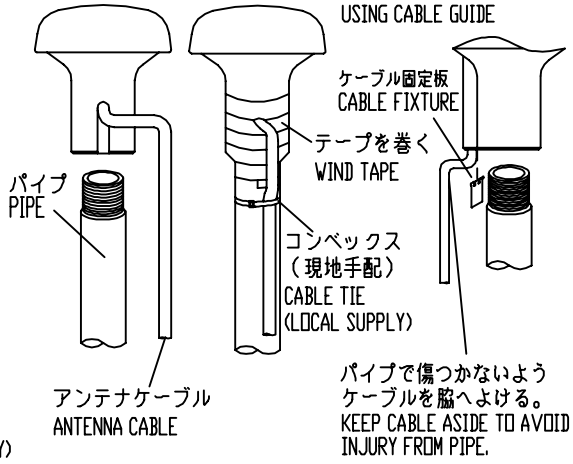
aの直径 DIA. OF 'a'	確保する距離 DISTANCE (MIN.)
10 cm	1.5 m
30 cm	3 m

A）マストへの取付け　MAST MOUNTING

a)マスト取付金具CP20-01111(工事材料)でマストに固定する。
USE MAST MOUNTING KIT CP20-01111.



b)パイプのみを使うとき
USE A PIPE ONLY.

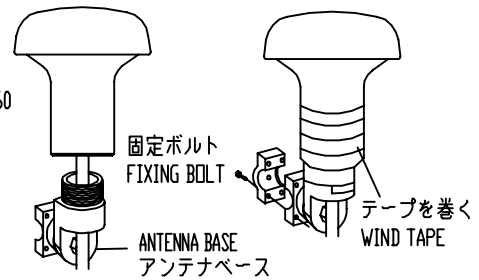


B）スタンションやパルピットにつけるとき

レール用アンテナベース No.13-RC5160
（取付可能レール直径：ø19~ø32）
（コード番号：000-806-114）

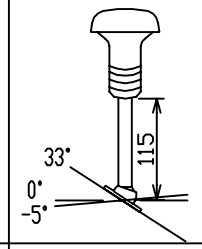
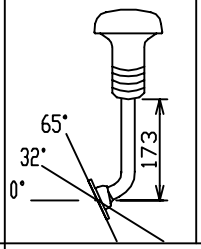
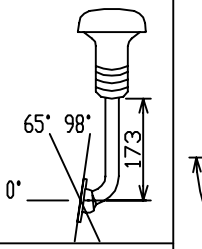
HANDRAIL MOUNTING

USE HANDRAIL MOUNTING BASE No.13-RC5160 (CODE No.000-806-114, OPTION).
THE DIAMETER OF THE HANDRAIL MAY BE FROM ø19mm TO ø32mm.

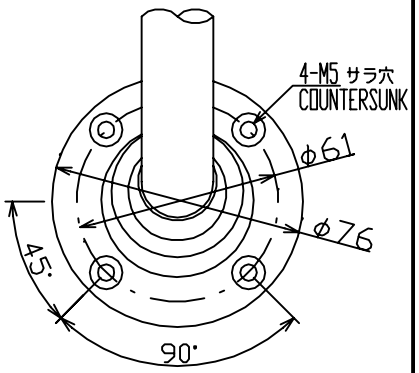


C）取付ける場所が傾斜しているとき　ANTENNA BASE MOUNTING

オプションのアンテナベースを使う。
USE OPTIONAL ANTENNA BASE.

傾斜 INCLINATION	-5° - 33°	32° - 65°	65° - 98°
装備方法 MOUNTING METHOD			
アンテナベース型式 ANT. BASE TYPE	直型アンテナベース RIGHT ANGLE ANTENNA BASE No.13-QA330	L型アンテナベース L-TYPE ANTENNA BASE No.13-QA310	
コード番号 CODE No.	000-803-239	000-803-240	

アンテナベース基部
MOUNTING DIMENSIONS OF ANTENNA BASE.



注記 1）パイプやアンテナベースはアンテナユニットにねじ込んだ後に固定する。
2）アンテナを固定するときはパイプ（アンテナベース）をアンテナにねじ込むこと。
アンテナ側をねじるとコネクタ部やケーブルに無理がかかり、故障の原因となる。

NOTE 1. FASTEN PIPE(ANTENNA BASE) TO ANTENNA UNIT FIRST THEN FIX THEM TO MAST OR HANDRAIL.
2. WHEN FIXING ANTENNA, TURN PIPE OR ANTENNA BASE; NOT THE ANTENNA.
TURNING THE ANTENNA MAY TWIST THE CABLE AND PLACE STRESS ON CONNECTOR.

DRAWN	Oct. 13, '05 E.MIYOSHI	TITLE	GPA series
CHECKED	TAKAHASHI.T	名称	空中線部
APPROVED	Y. Hatai		装備要領図
SCALE	MASS	NAME	ANTENNA UNIT
DWG.No.	C4384-Y01- D		INSTALLATION PROCEDURE

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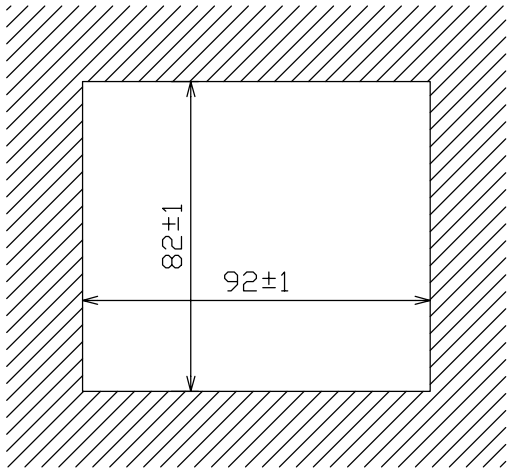
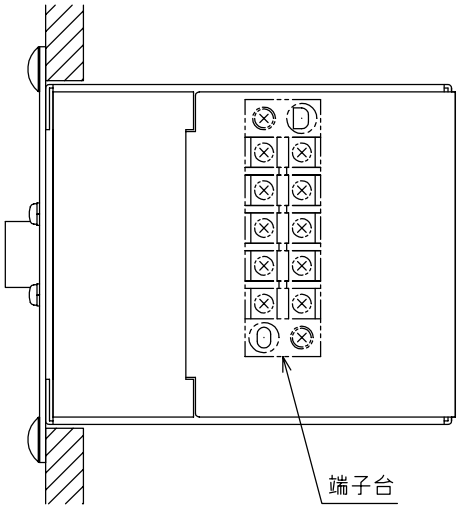
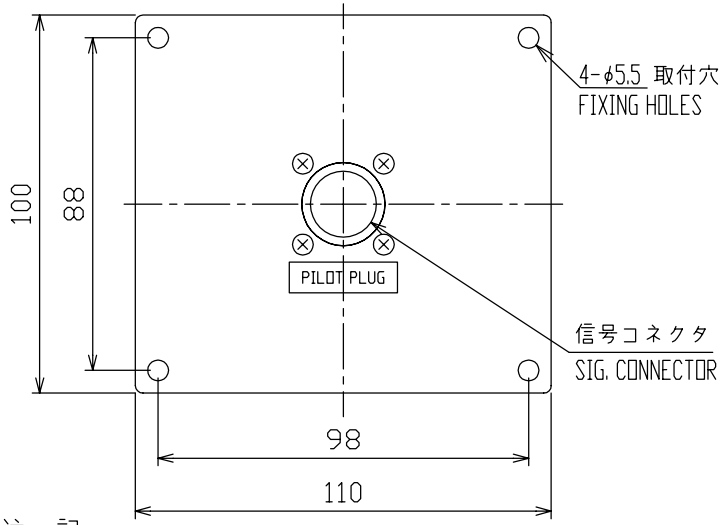
寸法区分（ｍｍ）DIMENSION	公差（mm）TOLERANCE
L≦50	±1．5
50<L≦100	±2．5
100<L≦500	±3

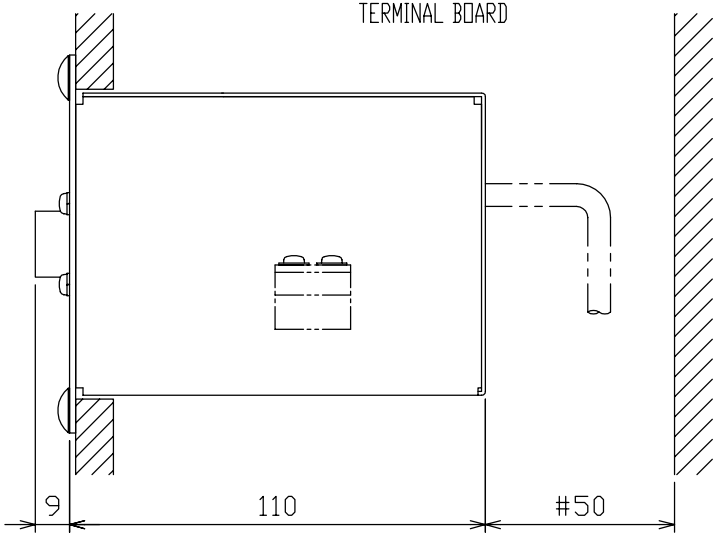
表１ TABLE 1

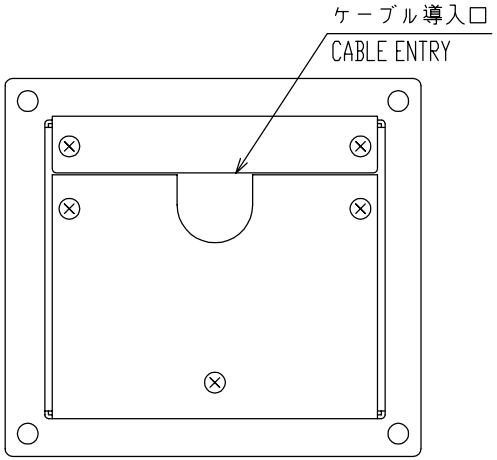


取付穴寸法図（参考図）CUTOUT DIMENSIONS









注　記

１）＃印寸法は推奨するサービス空間寸法。

２）指定外の寸法公差は表１による。

３）取付にはＭ５ボルト、またはトラスタッピンネジ呼び径５を使用のこと。

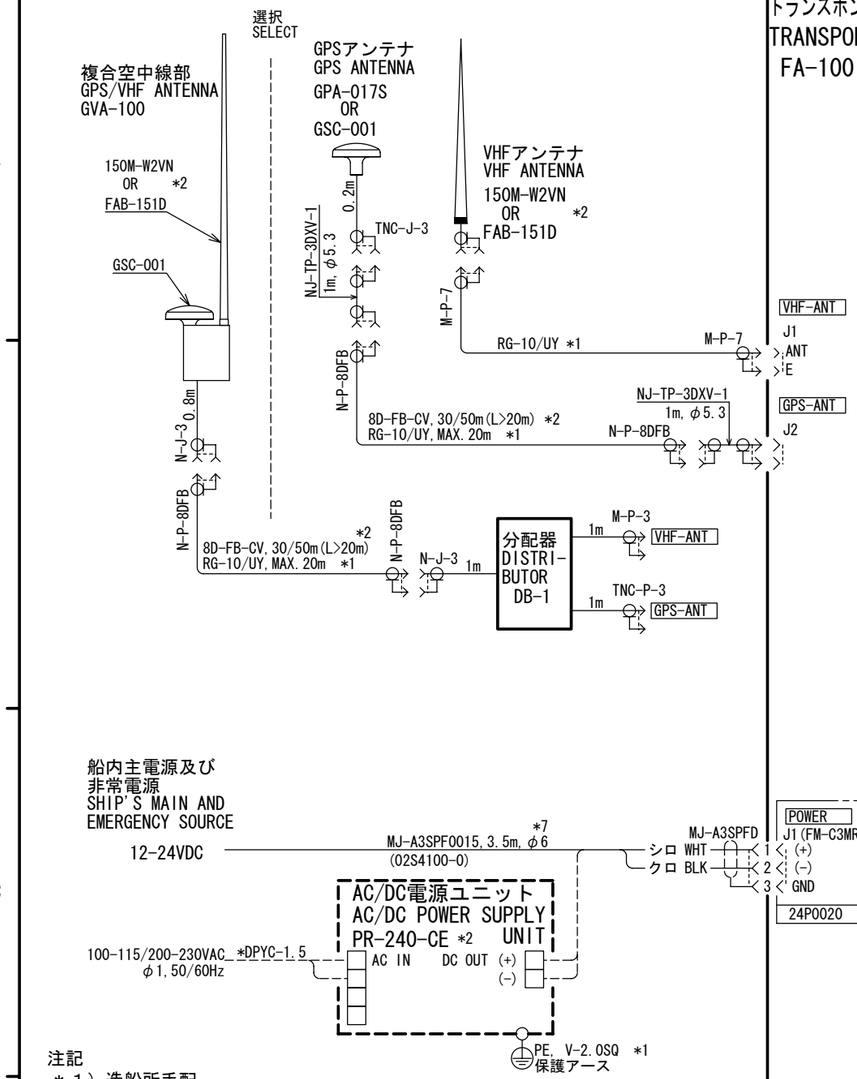
NOTE

1. #: RECOMMENDED SERVICE CLEARANCE.
2. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS.
3. USE M5 BOLTS OR TAPPING SCREWS φ5 FOR FIXING THE UNIT.

DRAWN Oct. 2 '03 T.YAMASAKI			TITLE □P24-3
CHECKED Oct. 2 '03 T.MATSUGUCHI			名称 パイロットプラグユニット
APPROVED Oct.02'03 T. Matsuguchi	FA-100		外寸図
SCALE 1/2 MASS 0.58 ±10% kg			NAME PILOT PLUG UNIT
DWG.No. C4417-G08- D	24-003-420G-1		□UTLINE DRAWING

D-12

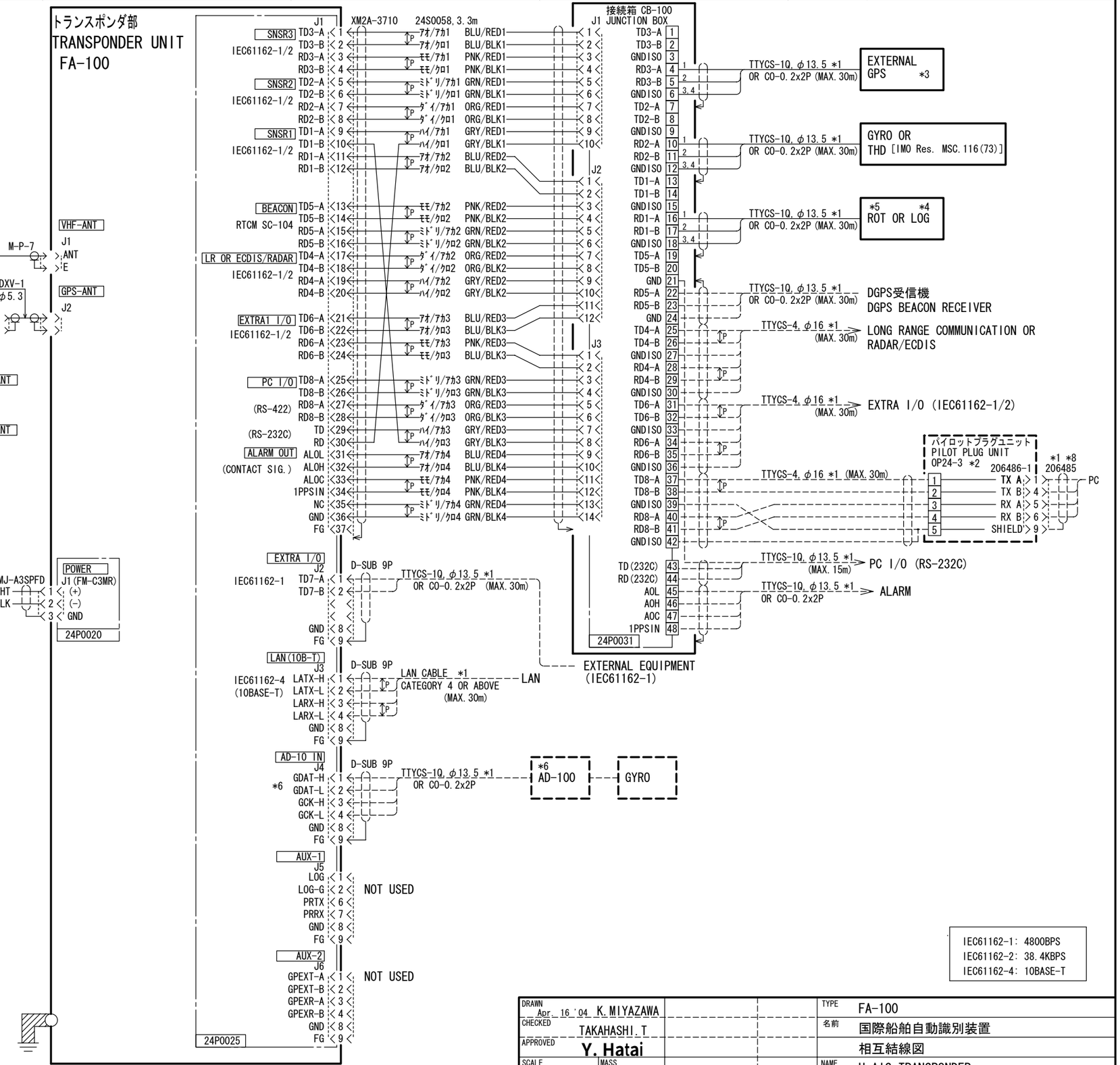
FURUNO ELECTRIC CO., LTD.



注記
＊１）造船所手配。
＊２）オプション。
＊３）外部GPS受信機からのL/Lデータ入力が必要。
＊４）SOG、COGが外部GPSから出力可能な場合は不要。
＊５）ROTは接続可能な場合のみ。
＊６）AD-10ﾌｫｰﾏｯﾄ（GYRO-IEC61162がないときに必要）
＊７）12V仕様の場合、ケーブル最大長は0.5m。
＊８）AMP社製。

NOTE:
*1: SHIPYARD SUPPLY.
*2: OPTION.
*3: POSITION DATA (L/L) IS REQUIRED BY EXTERNAL GPS RECEIVER.
*4: SPEED LOG IS NOT REQUIRED WHEN SOG (SPEED OVER GROUND) AND COG (COURSE OVER GROUND) DATA ARE FED BY EXTERNAL GPS RECEIVER.
*5: ROT (RATE OF TURN) INDICATOR CAN BE CONNECTED IF PROVIDED.
*6: GYRO CONVERTOR AD-100 IS REQUIRED WHEN GYRO SIGNAL (IEC61162) IS NOT AVAILABLE.
*7: MAX. CABLE LENGTH IS 0.5m FOR 12 VDC SPECIFICATIONS.
*8: SUPPLIED BY AMP INC.

CO-0.2x2P: CO-SPEVV-SB-C 0.2x2P, φ10.5



IEC61162-1: 4800BPS
IEC61162-2: 38.4KBPS
IEC61162-4: 10BASE-T

DRAWN	Apr. 16, '04 K.MIYAZAWA	TYPE	FA-100
CHECKED	TAKAHASHI.T	名前	国際船舶自動識別装置
APPROVED	Y. Hatai		相互結線図
SCALE	MASS kg	NAME	U-AIS TRANSPONDER
DWG. No.	C4417-C02- K		INTERCONNECTION DIAGRAM

FURUNO ELECTRIC CO., LTD.