

Installation Manual

MARINE RADAR

Model FCR-2119-BB/2129-BB/2819/2829

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SAFETY INSTRUCTIONS

The operator and installer must read the applicable safety instructions before attempting to install or operate the equipment.

 DANGER	Indicates a potentially hazardous situation which, if not avoided, will result in death or serious injury.
 WARNING	Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.
 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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 **DANGER**

 **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 antenna mast.

WARNING


 **Radio Frequency Radiation Hazard**


The radar antenna emits electromagnetic radio frequency (RF) energy which can be harmful, particularly to your eyes. Never look directly into the antenna aperture from a close distance while the radar is in operation or expose yourself to the transmitting antenna at a close distance. Distances at which RF radiation level of 100, 50 and 10 W/m² are given in the table below.

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

Model	Transceiver	Magnetron	Antenna *1	100W/m ²	50W/m ²	10W/m ²
FCR-2819/ 2119-BB	RTR-078A (X-12 kW)	MAF1565N	XN-20AF	0.1 m	0.7 m	2.2 m
			XN-24AF	0.1 m	0.4 m	1.5 m
FCR-2829/ 2129-BB	RTR-079A (X-25 kW)	MG5436	XN-20AF	0.5 m	1.7 m	4.6 m
			XN-24AF	0.2 m	1.0 m	3.3 m

* : XN20AF: 6.5 ft, XN24AF: 8 ft


WARNING



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

ELECTRICAL SHOCK HAZARD Only qualified personnel should work inside the equipment.


Construct a suitable service platform from which to install the antenna unit. Serious injury or death can result if someone falls from the radar antenna mast.

Turn off the power at the mains switchboard 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.


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.

Use only the specified power cable. Fire or damage to the equipment can result if a different cable is used.

Do not install the monitor unit, processor unit or control unit where they may get wet from rain or water splash, or in a dusty environment. Water in the units can result in fire, electrical shock, or damage the equipment.



Attach protective earth securely to the ship's body. The protective earth (grounding) is required for the AC power supply to prevent electrical shock.


CAUTION

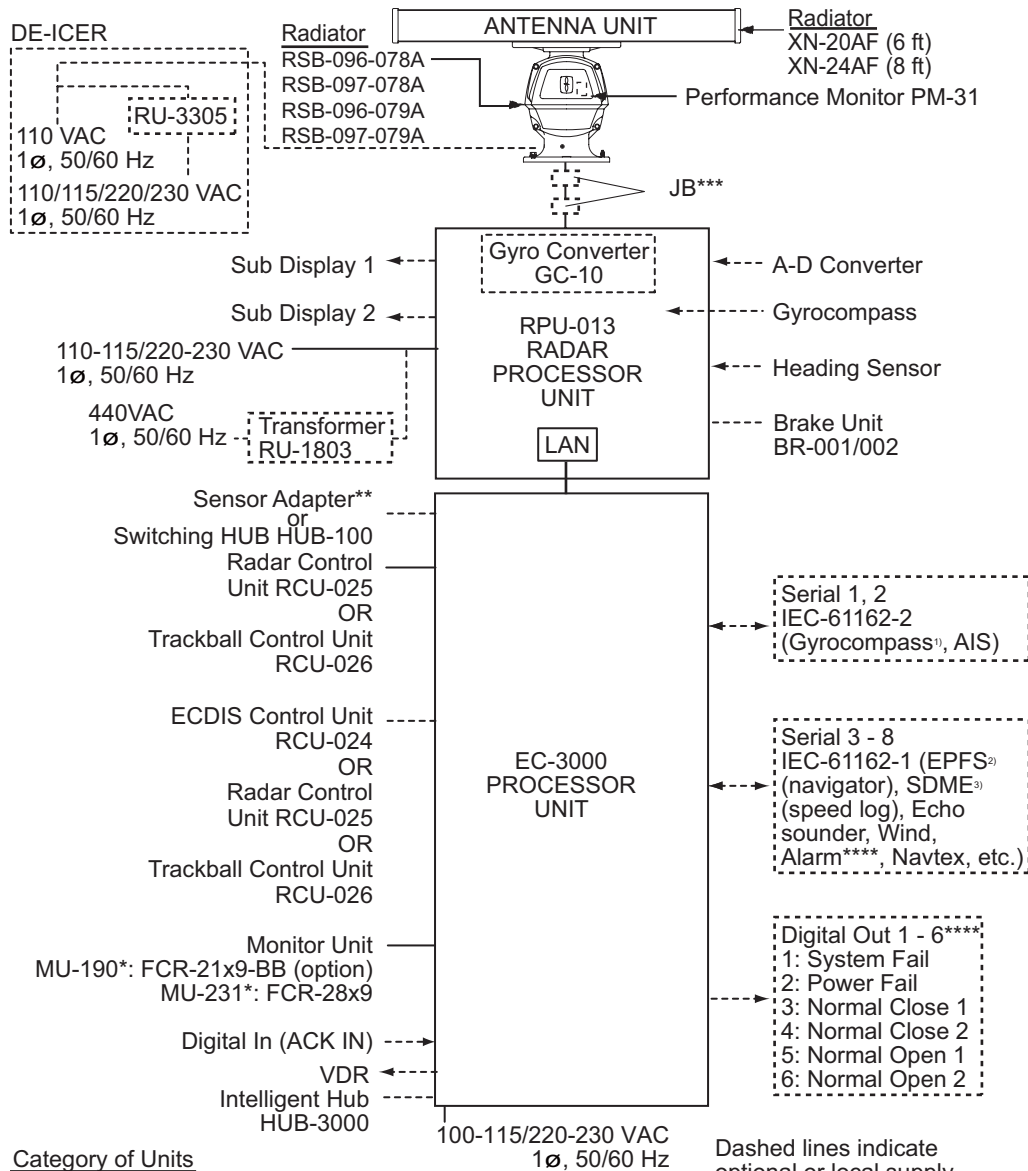
Observe the following compass safe distances to prevent deviation of a magnetic compass:

	Standard compass	Steering compass
Antenna Unit (12 kw)	2.15 m	1.40 m
Antenna Unit (25 kw)	2.05 m	1.30 m
Processor Unit (EC-3000)	2.40 m	1.55 m
Monitor Unit (MU-190)	1.65 m	1.05 m
Monitor Unit (MU-231)	0.85 m	0.55 m
Radar Processor Unit (RPU-013)	1.35 m	0.85 m
ECDIS Control Unit (RCU-024)	0.30 m	0.30 m
Radar Control Unit (RCU-025)	0.30 m	0.30 m
Trackball Control Unit (RCU-026)	0.30 m	0.30 m
Intelligent HUB (HUB-3000)	1.20 m	0.75 m
Sensor Adapter (MC-3000S)	2.05 m	1.35 m
Sensor Adapter (MC-3010A)	0.75 m	0.50 m
Sensor Adapter (MC-3020D)	1.05 m	0.70 m
Sensor Adapter (MC-3030D)	0.90 m	0.60 m
Sensor Adapter (MC-3030D)	1.10 m	0.70 m
Switching HUB (MC-3030D)	1.00 m	0.60 m

Note

For more information, please refer to IMO SN/Circ.271 "Guidelines for the installation of shipborne radar equipment."

SYSTEM CONFIGURATIONS



Category of Units

Antenna Unit: Exposed to the weather
 All other units: Protected from the weather

- 1) Use the gyrocompass having an update rate that is adequate for the ship's rate of turn. Gyrocompass must have update rate better than 40 Hz (HSC) or 20Hz (other than HSC).
- 2) Connect the EPFS which is approved in accordance with the requirements of the IMO in resolution MSC.112(73) is used. The GPS speed may not meet IMO requirements unless type approved for compliance with IMO resolution MSC.96(72).
- 3) Connect the SDME which is approved in accordance with the requirements of IMO in resolution MSC.96(72) is used.

* These monitors have been approved by the IMO, MU-190 for CAT 2C and CAT 2HC, MU-231 for CAT 1C and CAT 1HC. If a different monitor is to be used on IMO vessels, its effective diameter must meet the applicable Category requirements:
 CAT 1C and CAT 1HC: effective diameter 320 mm or higher
 CAT 2C and CAT 2HC: effective diameter 250 mm or higher
 For installation, operation and viewing distance of other monitor, see its manuals.

** Control Serial MC-3000S, Analog IN MC-3010A, Digital IN MC-3020D, Digital OUT MC-3030D

*** Junction boxes are required for more than 100 m antenna cables.

**** Contact output for Alarm
 (Load current) 250 mA
 (Polarity) Normally Open: 2 ports, Normally Close: 2 ports
 Serial I/O for alarm is also possible, which complies with IEC 61162-1.

EQUIPMENT LIST

Standard Supply

Name	Type	Code No.	Qty	Remarks
Antenna Unit	XN20AF-RSB096-078A	-	1	FCR-2x19/-BB, 24 rpm, 2000 mm, w/CP03-19101
	XN20AF-RSB097-078A	-		FCR-2x19/-BB, 42 rpm, 2000 mm, w/CP03-19101
	XN24AF-RSB096-078A	-		FCR-2x19/-BB, 24 rpm, 2400 mm, w/CP03-19101
	XN24AF-RSB097-078A	-		FCR-2x19/-BB, 42 rpm, 2400 mm, w/CP03-19101
	XN20AF-RSB096-079A	-		FCR-2x29/-BB, 24 rpm, 2000 mm, w/CP03-19101
	XN20AF-RSB097-079A	-		FCR-2x29/-BB, 42 rpm, 2000 mm, w/CP03-19101
	XN24AF-RSB096-079A	-		FCR-2x29/-BB, 24 rpm, 2400 mm, w/CP03-19101
	XN24AF-RSB097-079A	-		FCR-2x29/-BB, 42 rpm, 2400 mm, w/CP03-19101
Monitor Unit	MU-231	-	1	For FCR-28x9
Processor Unit*	RPU-013	-	1	For radar function
Processor Unit*	EC-3000	-	1	For chart function
Control Unit	RCU-025	-	1	Standard type
	RCU-026	-		Trackball type
Installation Materials	CP03-25601	008-535-550	1	For antenna unit
	CP03-35000	000-021-352		15 m cable RW-9600, w/CP03-35001
	CP03-35010	000-021-353		30 m cable RW-9600, w/CP03-35001
	CP03-35020	000-021-354		40 m cable RW-9600, w/CP03-35001
	CP03-35030	000-021-355		50 m cable RW-9600, w/CP03-35001
	CP03-35040	000-021-356		15 m cable RW-9600, w/CP03-35002
	CP03-35050	000-021-357		30 m cable RW-9600, w/CP03-35002
	CP03-35060	000-021-358		40 m cable RW-9600, w/CP03-35002
	CP03-35070	000-021-359		50 m cable RW-9600, w/CP03-35002
	CP03-25602	008-535-940	1	For RPU-013

*: This radar has two processor units; RPU-013 and EC-3000. In this book, RPU-013 is called "radar processor unit" and EC-3000 is called "processor unit".

Optional Supply

Name	Type	Code No.	Remarks
Sensor Adapter	MC-3000S	-	Serial type
	MC-3010A	-	Analog IN
	MC-3020D	-	Digital IN
	MC-3030D	-	Digital OUT
Switching HUB	HUB-100	-	See manual of HUB-100.
Intelligent HUB	HUB-3000	-	
Bracket Assembly	OP26-5	000-016-270	For MU-190
	OP26-15	001-116-730	For MU-231
	OP26-21	001-139-310	For MU-190
Dust Cover	26-007-1201	001-116-260-10	For MU-190
	26-007-2141	001-121-240-10	For MU-231
Monitor Replacement Kit	OP26-22	001-139-320	For MU-190, flush mount
	OP26-23	001-139-360	For MU-190, desktop
	OP26-26	001-139-390	For MU-190, hood
	OP26-27	001-139-570	For MU-231, desktop
Junction Box	RJB-001	-	For more than 100 m antenna cable
Hood Assembly	OP26-6	001-080-930	For MU-190
	OP26-16	001-116-740	For MU-231
	OP26-24	001-139-370	For MU-190
	OP26-25	001-139-380	For MU-231
Monitor Unit	MU-190	-	For 21x9-BB
	MU-231	-	
Flush Mount Kit	OP26-12	001-116-280	For MU-190
	OP26-17	001-116-750	For MU-231
	OP26-13	001-116-290	For two MU-190s
	OP26-14	001-116-300	For three MU-190s
	OP26-18	000-017-273	For two MU-231s
	OP26-19	000-017-274	For three MU-231s
Gyro Converter	GC-10-2	000-080-440	
Performance Monitor	PM-31	000-080-438	Mandatory for IMO radar
Control Unit	RCU-025	-	Radar standard type
	RCU-026	-	Trackball type
	RCU-024	-	ECDIS standard type
Transformer Unit	RU-1803	-	Converts 440 VAC to 100 VAC, for processor unit
	RU-3305	-	Converts 110/115/220/230 VAC to 100 VAC, for de-icer
Rectifier	RU-3424	-	AC220V
	RU-1746B-2	-	
Installation Materials	CP03-28900	000-082-658	FR-FTPC-CY 10 m, w/armor
	CP03-28910	000-082-659	FR-FTPC-CY 20 m, w/armor
	CP03-28920	000-082-660	FR-FTPC-CY 30 m, w/armor
Spare Parts	SP24-00801	001-235-320	For HUB-3000
Connector Assy.	DSUB9P- DSUB9P- L10.0M	000-150-676-11	For control the MU-190/231 brilliance
Connector	CP03-28901	008-542-460	Modular connector

EQUIPMENT LIST

Name	Type	Code No.	Remarks
LAN Cable Assy.	MOD-Z072-100+	000-167-177-10	10 m
	MOD-Z072-020+	000-167-175-10	2 m
Signal Cable	S03-9-5 (8-8P)	008-206-640	For external radar, 5 m
	S03-9-10 (8-8P)	008-206-650	For external radar, 10 m
	S03-9-15 (8-8P)	008-209-160	For external radar, 15 m
Cable Assy	DVI-D/D S-LINK 5M	001-132-960-10	Between processor and control units, 5 m
	DVI-D/D S-LINK 10 M	001-133-980-10	Between processor and control units, 10 m
	DSUB9P-X2-L10M	001-188-270	For MU-190/231 brill control, 10 m
	DSUB9P-X2-L5M	001-188-260	For MU-190/231 brill control, 5 m
	DSUB9P-X2-L10M-WP	000-177-247-10	For monitor unit, 5 m, waterproofing type
	DSUB9P-X2-L5M-WP	000-177-053-10	For monitor unit, 5 m, waterproofing type
	OP24-32	001-188-300	USB cable, 5 m (w/EMI core)
	DVI-BNCX5-L2000	001-204-150	For VDR connection
	6TPSH-XH12X2-L5.0SP1	001-186-260-10	For RCU-024/025, 5 m
	6TPSH-XH12X2-L10SP1	001-186-270-10	For RCU-024/025, 10 m
	6TPSH-XH12X2-L20SP1	001-186-280-10	For RCU-024/025, 20 m
	6TPSH-XH12X2-30SP1	001-186-290-10	For RCU-024/025, 30 m
	6TPSH-XH12X2-L5.0SP2	001-186-310-10	For RCU-026, 5 m
	6TPSH-XH12X2-L10SP2	001-186-320-10	For RCU-026, 10 m
	6TPSH-XH12X2-L20SP2	001-186-330-10	For RCU-026, 20 m
	6TPSH-XH12X2-L30SP2	001-186-340-10	For RCU-026, 30 m
	00619-001	000-171-765-10	For MU-190/231

Name	Type	Code No.	Remarks
Cable	MC1.5-W-L600	001-187-470-10	For sensor adapters, 6 m
	MC1.5-W-L1000	001-187-480-10	For sensor adapters, 10 m
	MC1.5-W-L2000	001-187-490-10	For sensor adapters, 20 m
	MC1.5-W-L3000	001-187-500-10	For sensor adapter, 30 m
	DTI-C5E350 VCV L=10M	001-197-600-10	LAN cable, CAT5E, 10 m
	DTI-C5E350 VCV L=20M	001-197-610-10	LAN cable, CAT5E, 20 m
	DTI-C5E350 VCV L=30M	001-197-620-10	LAN cable, CAT5E, 30 m
10 Core Multiple Cable	RW-4864	001-103-640-10	10 m
Brake Unit	BRU-001	000-015-549	For 24 rpm
	BRU-002	000-015-550	For 48 rpm
AC/DC Power Supply Unit	PR-240	000-013-632	
Case Gasket	OP24-28	001-169-970	For MC-3000S
	OP24-29	001-169-960	For MC-3010A/3020D/3030D
IPX2 Kit	OP24-23	001-171-780	For EC-3000
Flush Mount	OP24-27	001-171-820	For RCU-026
Control Unit Replacement Kit	OP24-31	001-181-700	For RCU-024/025
Terminal Opener	OP24-33	001-188-850	
Operator's Manual	OME-36040-*	-	
Crimping Tool	CRIMPFOX10 S	001-206-920	For ferrule

About the category sticker

This radar meets the requirements in IEC62388 (Marine navigation and radiocommunication equipment and systems-Shipborn radar-Performance requirements, method of testing and required test results).

Check the appropriate box on the sticker which is pre-attached on the radar processor unit, according to your radar's specification. Refer to the table shown below to confirm your category.

Comply with MSC.192(79)			
<input type="checkbox"/>	CAT 1C	<input type="checkbox"/>	CAT 1HC
<input type="checkbox"/>	CAT 2C	<input type="checkbox"/>	CAT 2HC

Sticker for category

Category	Radar type	ANT. rotation speed
CAT 1C	FCR-2819, FCR-2829, FCR-2839S, FCR-2829W, FCR-2839SW	Normal speed
CAT 1HC	FCR-2819, FCR-2829, FCR-2839S	HSC
CAT 2C	FCR-2119-BB, FCR-2129-BB, FCR-2139S/BB	Normal speed
CAT 2HC	FCR-2119-BB, FCR-2129-BB, FCR-2139S/BB	HSC

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1. MOUNTING

NOTICE

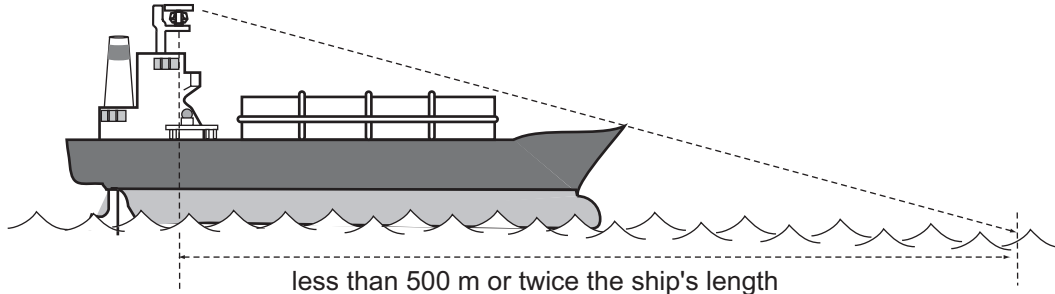
Do not apply paint, anti-corrosive sealant or contact spray to coating or plastic parts of the equipment.

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

1.1 Antenna Unit

1.1.1 Mounting considerations

- The antenna unit is generally installed either on top of the wheelhouse or on the radar mast, on a suitable platform. Locate the antenna unit in an elevated position to permit maximum target visibility.
- A line of sight from the antenna unit to the bow of the ship should hit the surface of the sea in not more than 500 m or twice the ship's length, depending which value is smaller, for all load and trim conditions.



- Mount the antenna unit so that any blind sectors caused by objects (mast, etc.) are kept to a minimum. No blind sector should exist in arc of the horizon from right ahead to 22.5° aft of the beam to either side (see Figure 1 below). Also, individual blind sectors of more than 5° , or the total arc of both blind sectors of more than 20° , should not occur in the remaining arc (Figure 2). Note that any two blind sectors separated by 3° or less are regarded as one sector.

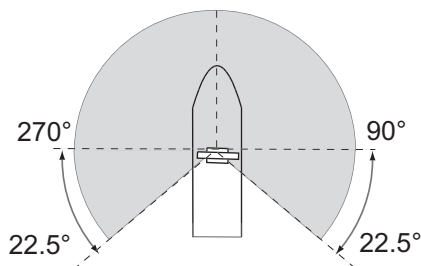


Figure 1

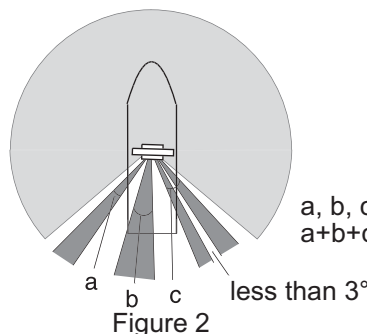
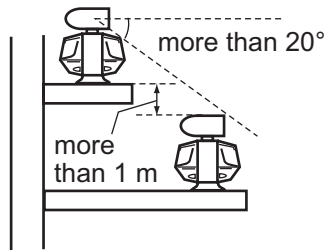


Figure 2

1. MOUNTING

- Install the antenna unit away from interfering high-power energy sources and other transmitting radio antenna.
- Keep the lower edge of the antenna unit above the safety rail by 500 mm or more.
- Two antenna units should be mounted as below:



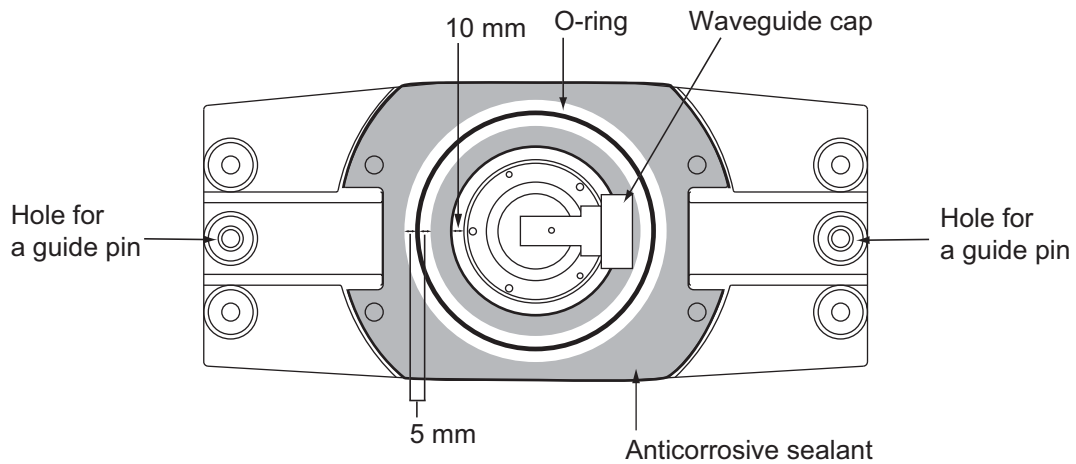
- No funnel, mast or derrick should be within the vertical beamwidth of the antenna unit in the bow direction, especially zero degree $\pm 5^\circ$, to prevent blind sectors and false echoes on the radar picture.
- It is rarely possible to place the antenna unit where a completely clear view in all directions 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.
- Locate an EPFS antenna clear of the antenna unit to prevent interference to the EPFS. A separation of more than two meters is recommended.
- A magnetic compass will be affected if the antenna unit is placed too close to the magnetic compass. Observe the compass safe distances on page ii to prevent deviation of the magnetic compass.
- Do not paint the radiator aperture, to ensure proper emission of the radar waves.
- The antenna base is made of cast aluminum. To prevent electrolytic corrosion of the antenna base, use the seal washers and corrosion-proof rubber mat and ground the unit with the ground wire (supplied).
- 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 antenna unit must not be mounted where the temperature is more than 55°C .
- Leave sufficient space around the unit for maintenance and servicing. See the antenna unit outline drawing for recommended maintenance space.

1.1.2 Assembling the antenna unit

The antenna unit consists of the antenna radiator and the antenna unit chassis, and they are packed separately. Fasten the antenna radiator to the antenna unit chassis as follows:

1. Attach two guide pins to the underside of the antenna radiator.
2. Remove the waveguide cap from the radiator bracket. The cap may be discarded.

3. Coat the waveguide flange with anticorrosive sealant as shown below.



Coating the waveguide flange with anticorrosive sealant

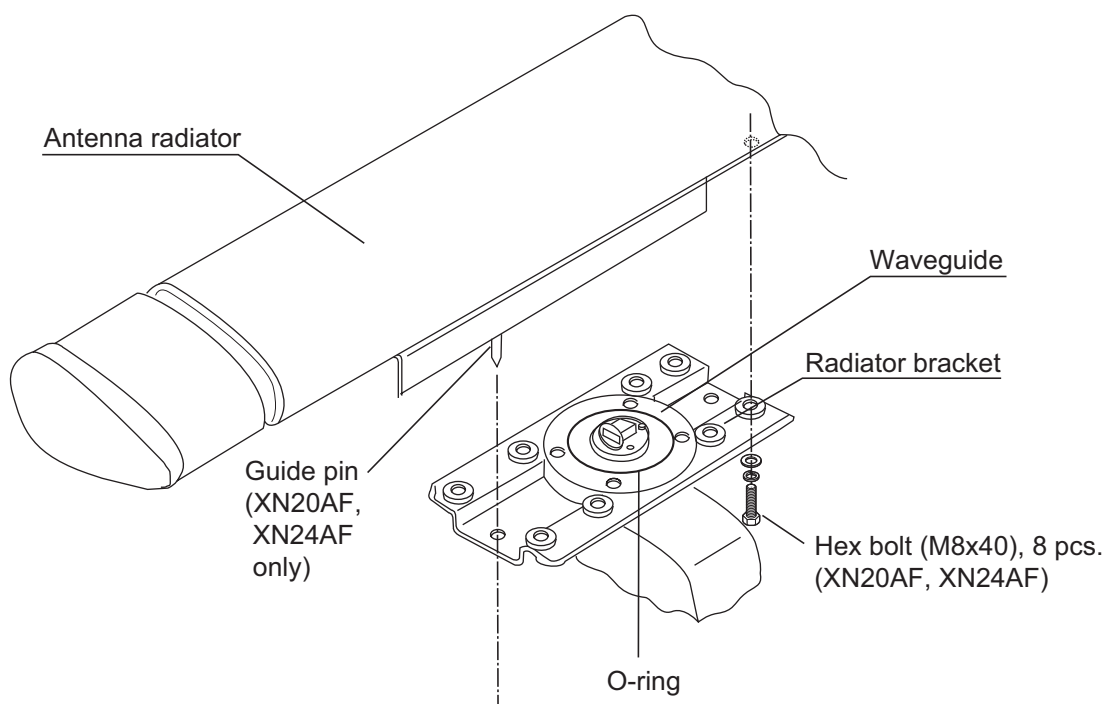
4. Coat fixing holes for the antenna radiator with anticorrosive sealant.
5. Grease the O-ring and set it to the O-ring groove of the radiator flange.
6. Set the antenna radiator to the radiator bracket.
7. Coat hex bolts M8 x 40 with anticorrosive sealant and use them to loosely fasten the antenna radiator to the antenna unit chassis.
8. Remove two guide pins (inserted at step 1), and then tighten fixing bolts.



CAUTION

Be sure to remove the guide pins.

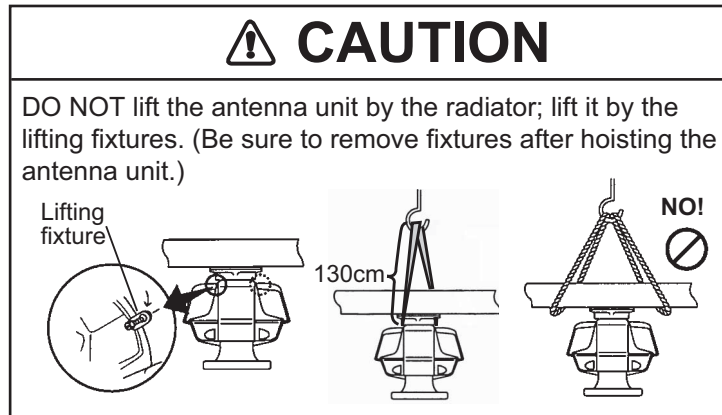
Do not fall the guide pins when removing them from the antenna radiator.



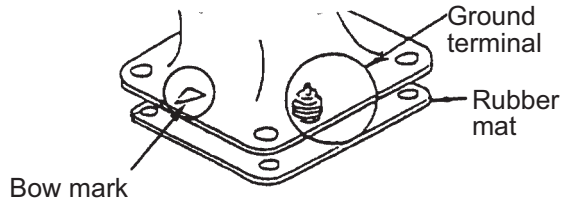
1. MOUNTING

1.1.3 Fastening the antenna unit to the mounting platform

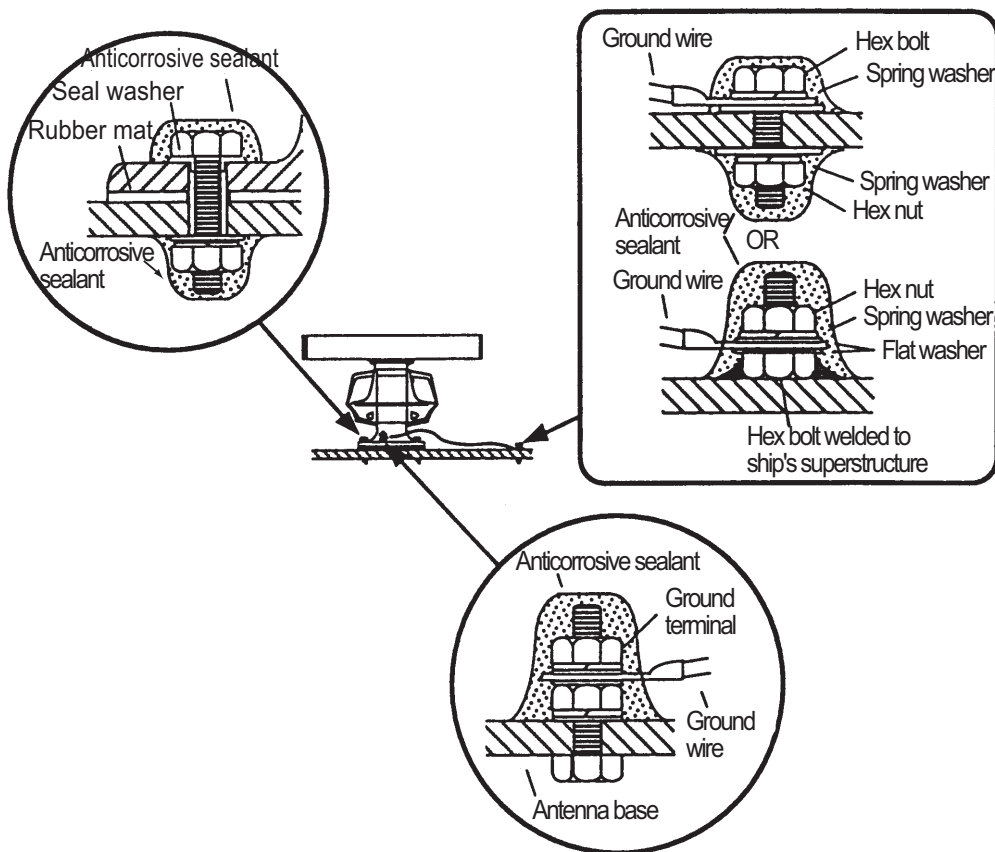
The antenna unit may be assembled before hoisting it to the mounting platform. However, do not lift the antenna unit by the radiator. Always hold the unit by its housing. When using a covers of the antenna housing.



1. Construct a suitable mounting platform referring to the outline drawing at the end of this manual.
2. Drill four mounting holes of 15 mm diameter and one cable entry hole of about 50 mm diameter in the mounting platform.
3. Lay the rubber mat (supplied) on the mounting platform.
4. Place the antenna unit on the rubber mat, orienting the unit so the bow mark on its base is facing the ship's bow.



5. Fasten the antenna unit to the mounting platform with M12 x 60 hex bolts, nuts, flat washers and seal washers.
6. Using hex bolt (M6 x 25), nut (M6) and flat washer (M6), establish the ground system on the mounting platform as shown below. The location should be within 340 mm of the ground terminal on the antenna unit. Connect the ground wire (RW-4747, 240 mm, supplied) between the grounding point and ground terminal on the antenna unit. Coat the entire ground system with silicone sealant (supplied).



1.2 Monitor Unit

To mount the monitor unit, see the operator's manual for MU-231 (OMC-44690).

1.3 Radar Control Unit/Trackball Control Unit

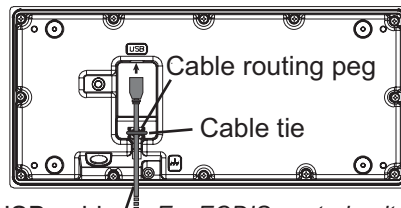
The control units can be mounted on a desktop, with or without the KB fixing metal (supplied), which mounts the control units at an angle. The control unit also can be mounted in a console panel using the optional kit.

Note: The control unit RCU-025 can be used instead of the RCU-020 (for FAR-2xx7) mounted in the connection stand (OP03-184 or OP26-20) using the option OP24-31.

Mounting consideration

When you select a mounting location, keep in mind the following points:

- Select a location where the control unit can be operated conventionally.
- Locate the unit away from heat sources because of heat that can build up inside the cabinet.
- Locate the equipment away from places subject to water splash and rain.
- Leave sufficient space at the sides and rear of the unit to facilitate maintenance.
- Determine the mounting location considering the length of the signal cable between the control unit and the processor unit.
- A magnetic compass will be affected if the control unit is placed too close to the magnetic compass. Observe the compass safe distances on page i to prevent compass malfunction.
- Make sure that the ground wire is connected between the earth terminal on the chassis and the ship's earth.
- Fasten the USB cable with the cable tie.

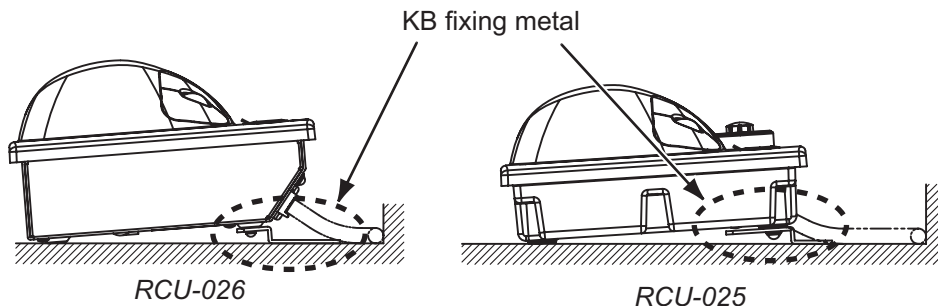


USB cable Ex. ECDIS control unit, bottom view RCU-02

1.3.1 Desktop Mounting

Fixing with KB fixing metal

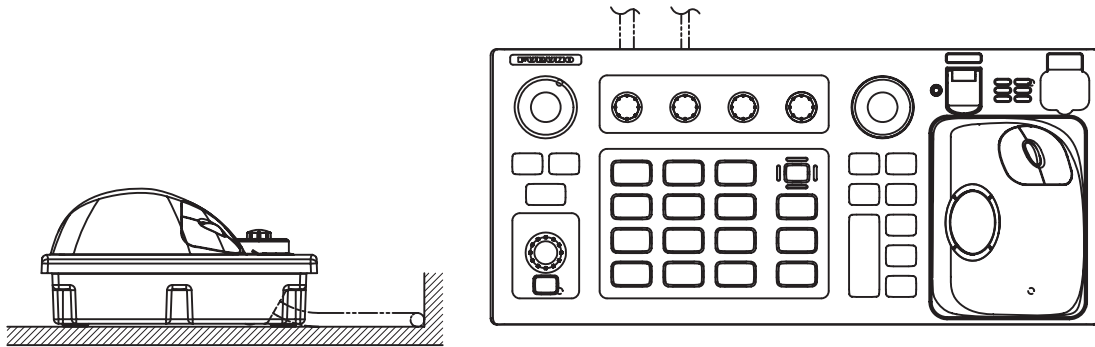
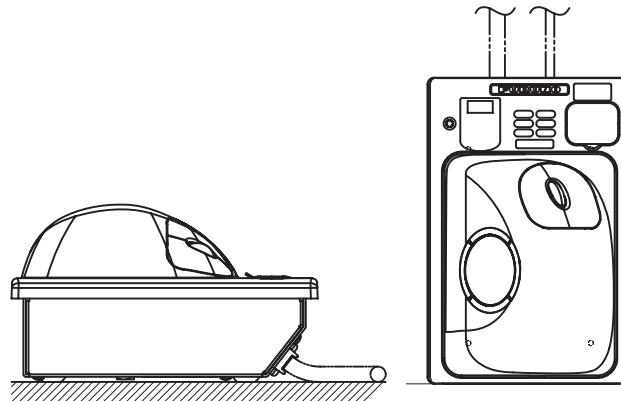
1. Fix the KB fixing metal to the bottom of the control unit.
2. Fix it to a desired location with self-tapping screws (local supply).



Side view of control units

Fixing without KB fixing metal

1. Drill four mounting holes of 5 mm diameter referring to the outline drawing at the back of this manual.
2. Fix the control unit with four screws (M4) from under side of the desktop. (The M4 screws with a sufficient length for the thickness of the desktop should be provided locally.)

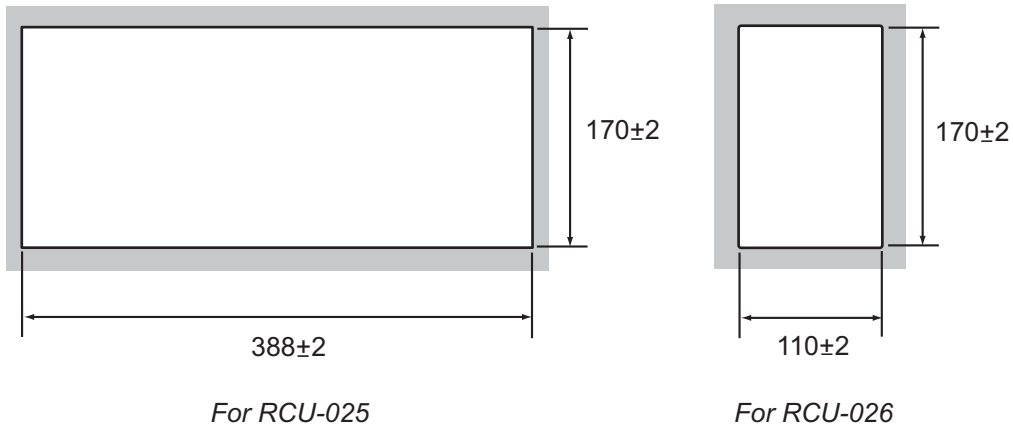
*Control Unit RCU-025**Control unit RCU-026*

1. MOUNTING

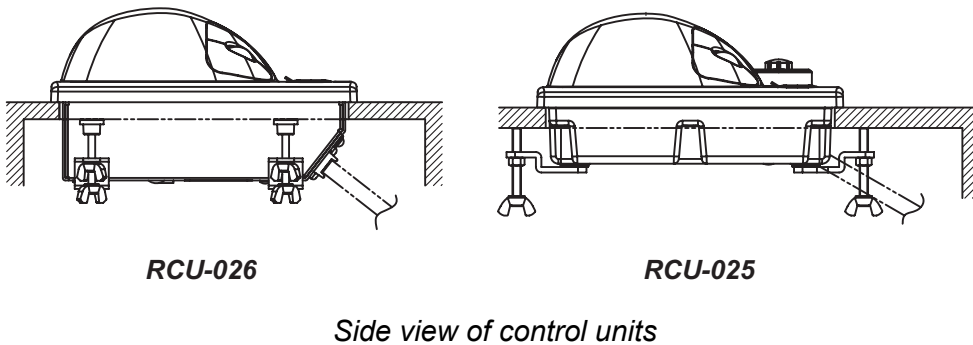
1.3.2 Flush mounting

Use the optional flush mount kit (RCU-025: OP24-24, RCU-026: OP24-27) to mount the control unit in a console panel.

1. Prepare a cutout in the mounting location as shown in the figure as below.



2. Set the control unit to the cutout.
3. Attach the mounting plate to the control unit with four screws from the rear side.
4. Screw the wing screw to each mounting plate and then insert hex. bolt to each wing screw.
5. Fasten each wing screw and then fasten the hex. nuts as shown in figure below.



Side view of control units

1.4 Radar Processor Unit

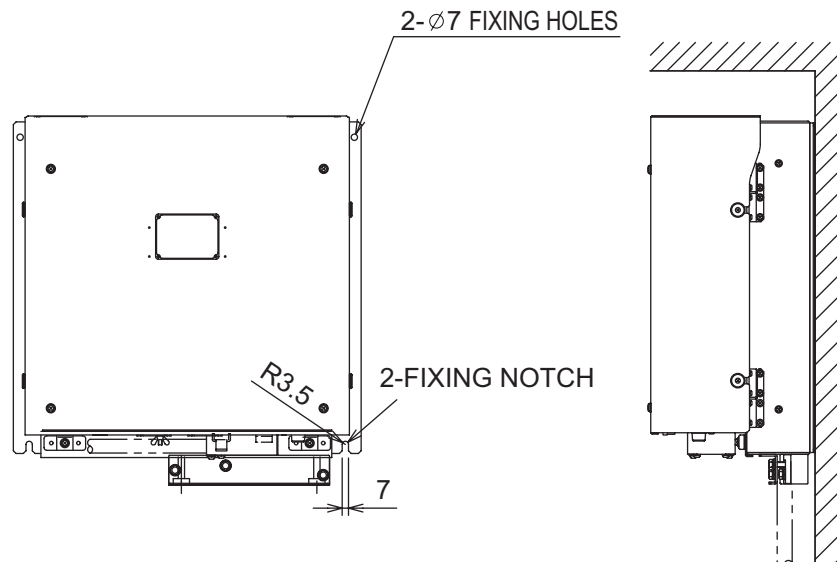
1.4.1 Mounting considerations

When you select a mounting location, keep in mind the following points:

- Locate the processor unit away from heat sources because of heat that can build up inside the cabinet.
- Locate the equipment away from places subject to water splash and rain.
- Leave sufficient space at the sides and rear of the unit to facilitate maintenance.
- A magnetic compass will be affected if the processor unit is placed too close to the magnetic compass. Observe the compass safe distances on page ii to prevent deviation of a magnetic compass.

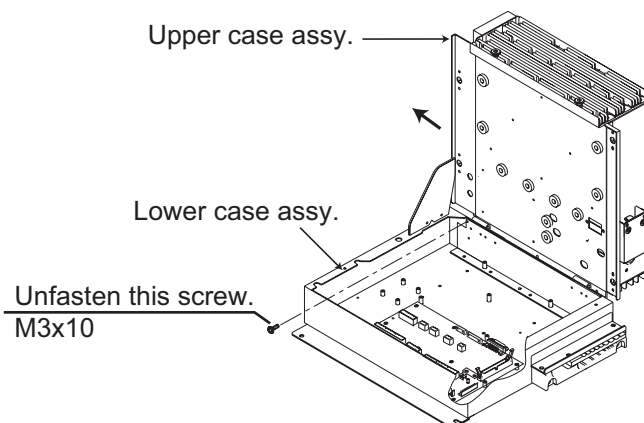
1.4.2 Mounting procedure

1. Fix the unit with four M6 bolts, or self-tapping screws.



Floor mounting or bulkhead mounting

Note: If you fix the unit, cable entry upside, never remove the screw M3x10 that joints the upper case assy. and lower case assy. of the processor unit.

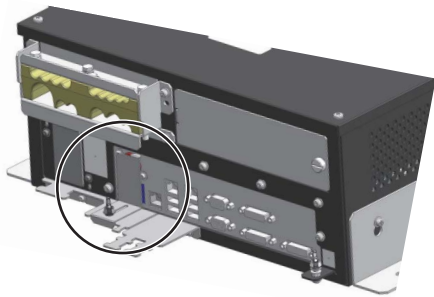


1.5 Processor Unit

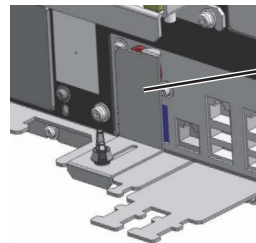
1.5.1 Mounting considerations

When you select a mounting location, keep in mind the following points:

- Locate the processor unit away from heat sources because of heat that can build up inside the cabinet.
- The vibration at the mounting location should be minimum.
- Locate the equipment away from places subject to water splash and rain.
- Make the service clearance of 100 mm in front of the vent hole (left side).
- Leave sufficient space at the sides and rear of the unit to facilitate maintenance.
- Make sure that the ground wire is connected between the earth terminal on the chassis and the ship's earth.
- A magnetic compass will be affected if the processor unit is placed too close to the magnetic compass. Observe the compass safe distances on page ii to prevent compass malfunction.
- Do not remove the dummy plate to prevent the wrong operation of the power switch. The items behind the plate are for use by the serviceman.

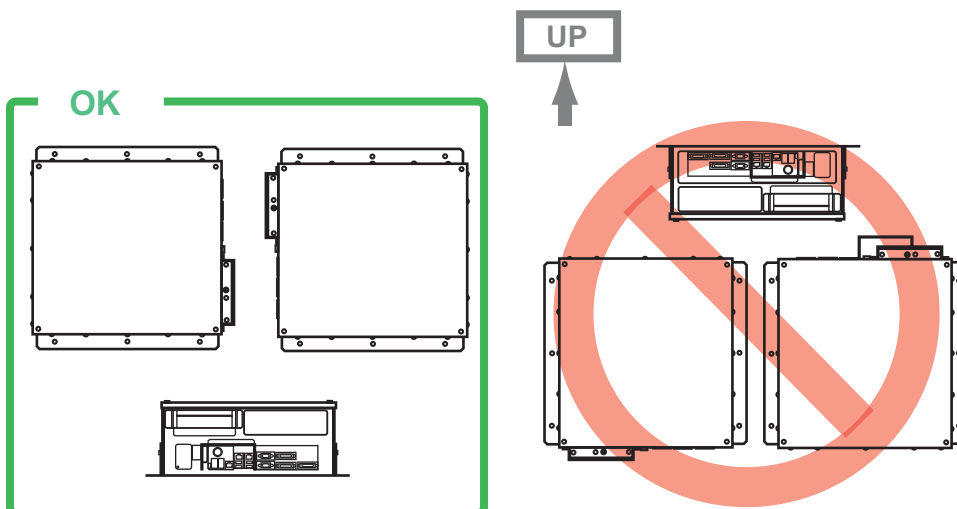


Processor unit, front view



Keep the dummy plate in this position.

- Mount the processor unit on the floor, or on a bulkhead with the following direction (horizontal), because of the DVD drive unit.

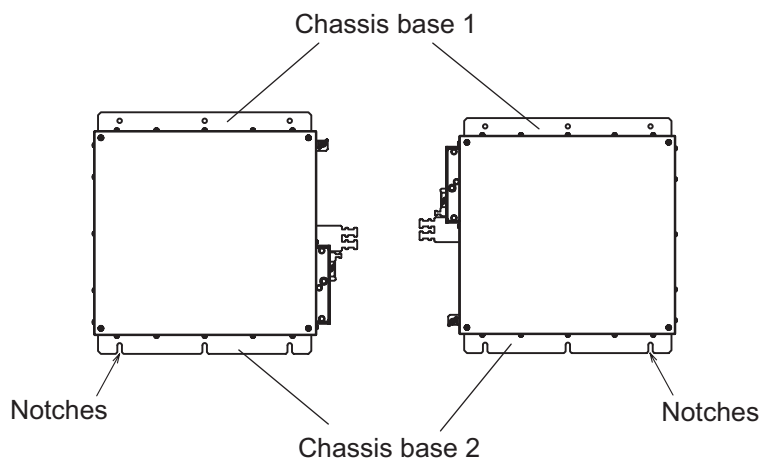


1.5.2 How to mount the processor unit

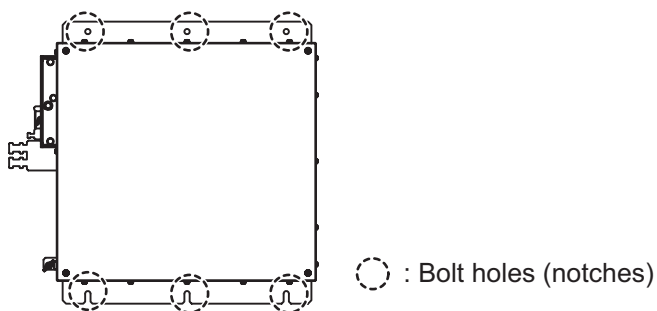
Use six bolts (M6, local supply) to mount the processor unit.

1. Use 10 binding head screws (M4x8, supplied) to attach the chassis bases 1 and 2 to the processor unit.

Note: For bulkhead mounting, attach the chassis base 2 so that the notches on it are facing the deck.



2. Use six bolts (M6, local supply) to fix the processor unit.



1.6 Sensor Adapter MC-3000S/3010A/3020D/3030D (option)

Mounting considerations

When you select a mounting location, keep in mind the following points:

- Locate the adapter away from heat sources because of heat that can build up inside the cabinet.
- The vibration should be minimal.
- Locate the equipment away from places subject to water splash and rain.
- Make sure that the ground wire is connected between the earth terminal on chassis and the ship's earth.
- Leave sufficient space at the sides and rear of the unit to facilitate maintenance.
- A magnetic compass will be affected if the adapter is placed too close to the magnetic compass. Observe the compass safe distances at the front of this manual to prevent interference to a magnetic compass.
- Select the mounting location considering the numbers of the sensor adapters connected.

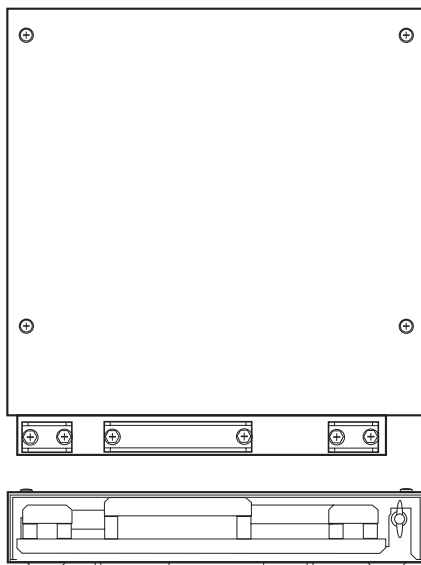
Maximum eight MC-3000S can be connected to a sensor network.

Maximum 10 sensor adapters (MC-3010A/3020D/3030D) can be connected to a MC-3000S. However, note that five MC-3010A can be connected.

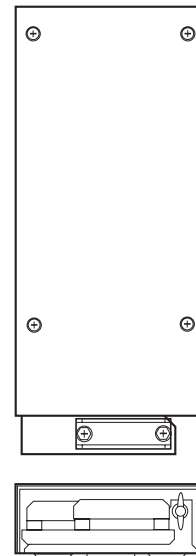
- Select the mounting location so that the length of cables among the sensor adapters (MC-3000S, 3010A, 3020D and 3030D) is less than 6 m. If the length is more than 6 m, the equipment may not work properly.

How to mount the sensor adapter

1. Unfasten a pan head screws to remove the cover from the sensor adapter.
2. Fasten four self-tapping screws (4x20, supplied) to fix the sensor adapter.
3. Reattach the cover.



MC-3000S



MC-3010A/3020D/3030D

1.7 Intelligent Hub HUB-3000 (option)

Use the optional Intelligent Hub HUB-3000 to connect gateway network equipment. This network cannot be connected with the LAN network on board. Note that a commercial PC cannot be connected in this network, other than for the maintenance.

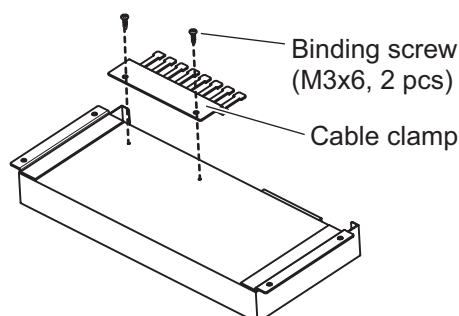
Mounting considerations

When you select a mounting location, keep in mind the following points:

- Locate the adapter away from heat sources because of heat that can build up inside the cabinet.
- The vibration should be minimal.
- Locate the equipment away from places subject to water splash and rain.
- Make sure that the ground wire is connected between the earth terminal on chassis and the ship's earth.
- Leave sufficient space at the sides and rear of the unit to facilitate maintenance.
- A magnetic compass will be affected if the adapter is placed too close to the magnetic compass. Observe the compass safe distances at the front of this manual to prevent interference to a magnetic compass.

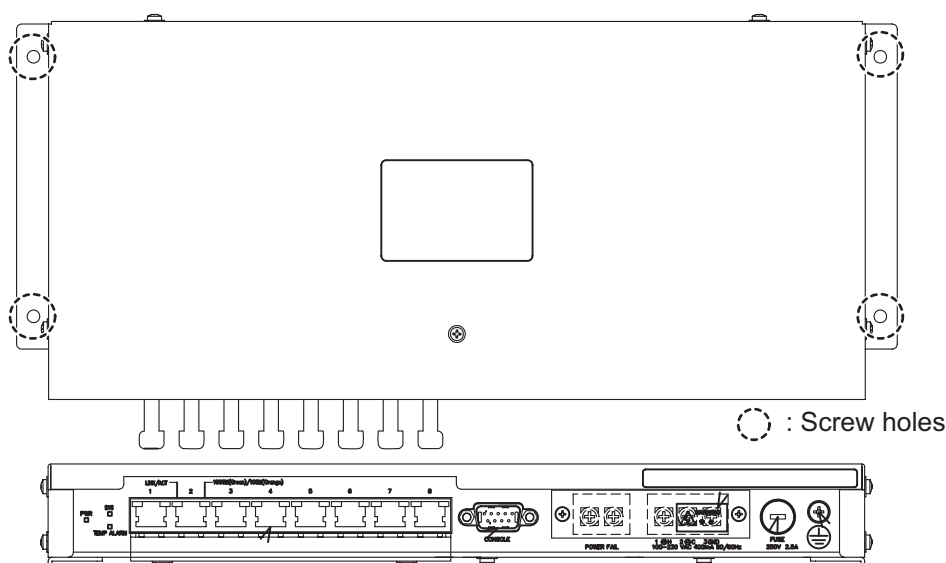
How to mount the intelligent hub HUB-3000

1. Use two binding screws (M3x6, supplied) to attach the cable clamp (supplied) to the bottom of the HUB-3000.



HUB-3000, bottom view

2. Fasten four self-tapping screws (4x20, supplied) to fix the unit.



1.8 Switching HUB HUB-100 (option)

Use the optional Switching HUB HUB-100 to connect sensor networks. This network cannot be connected with the LAN network on board. Note that a commercial PC cannot be connected in this network, other than for the maintenance. The total length of all cables connected to the hub is 6 m.

For the mounting procedures, see the operator's manual for HUB-100 (Pub. No.OMC-35191).

Mounting considerations

When you select a mounting location, keep in mind the following points:

- Locate the adapter away from heat sources because of heat that can build up inside the cabinet.
- The vibration should be minimal.
- Locate the equipment away from places subject to water splash and rain.
- Make sure that the ground wire is connected between the earth terminal on chassis and the ship's earth.
- Leave sufficient space at the sides and rear of the unit to facilitate maintenance.
- A magnetic compass will be affected if the adapter is placed too close to the magnetic compass. Observe the compass safe distances at the front of this manual to prevent compass malfunctions.

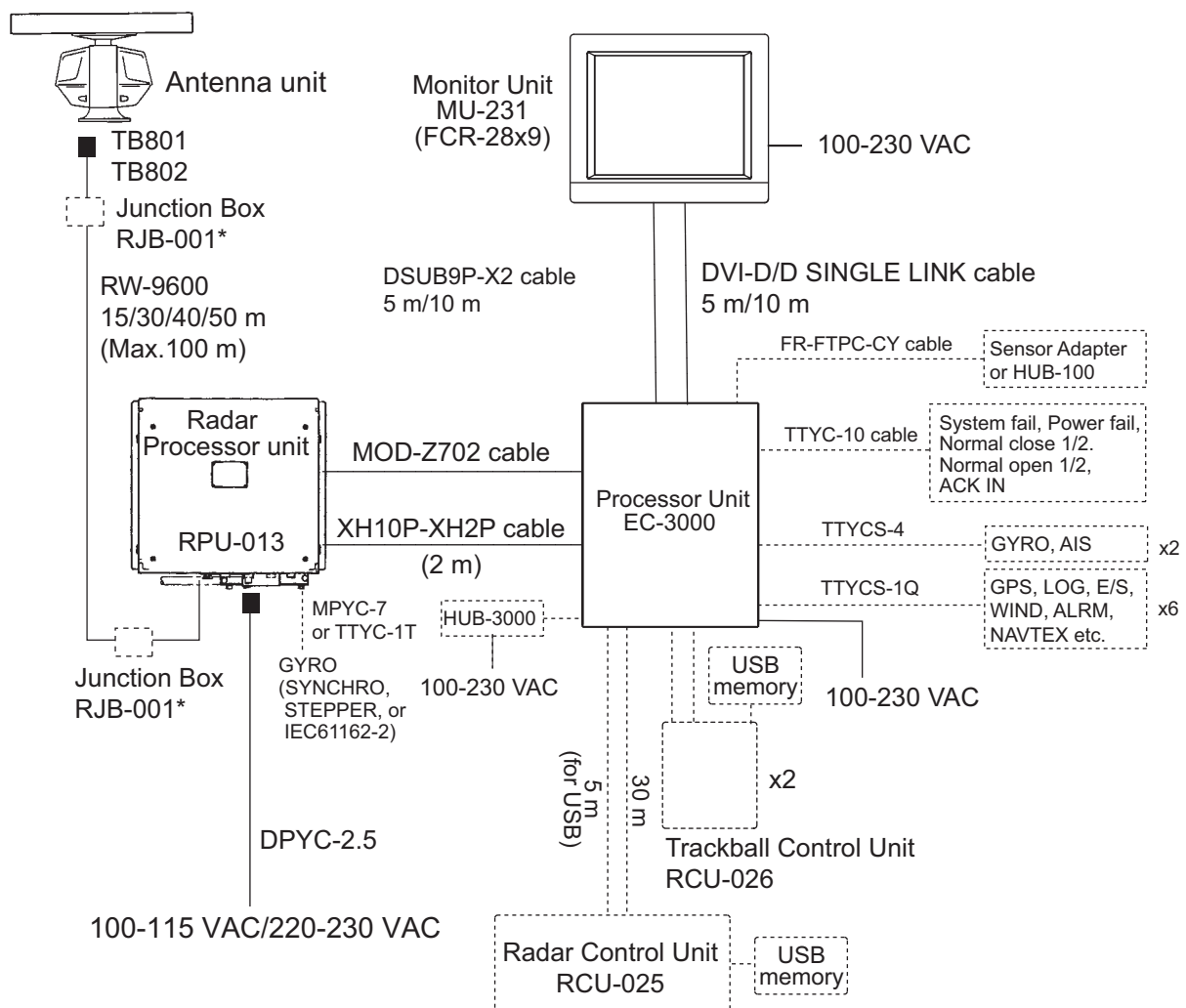
2. WIRING

2.1 Interconnection

Wiring consideration

To lessen the chance of picking up electrical interference, avoid where possible routing the signal cable near other onboard electrical equipment (radars, transmitting radio antennas, etc.) Also avoid running the cable in parallel with power cables. When a cable crosses with other cable, the angle should be 90° to minimize the magnetic field coupling. The signal cable between the antenna and processor units is available in length of 15 m, 30 m, 40 m and 50 m. Whatever length is used, it must be unbroken; namely, no splicing allowed. Use the signal cable as short as possible to minimize attenuation of the signal.

The radar should be connected to an emergency power source, as required by SOLAS II-1.



*: If the cable run between the antenna unit and radar processor unit is more than 100m, use Junction box RJB-001. However, the maximum length is 300m.

■ : Cable requires fabrication

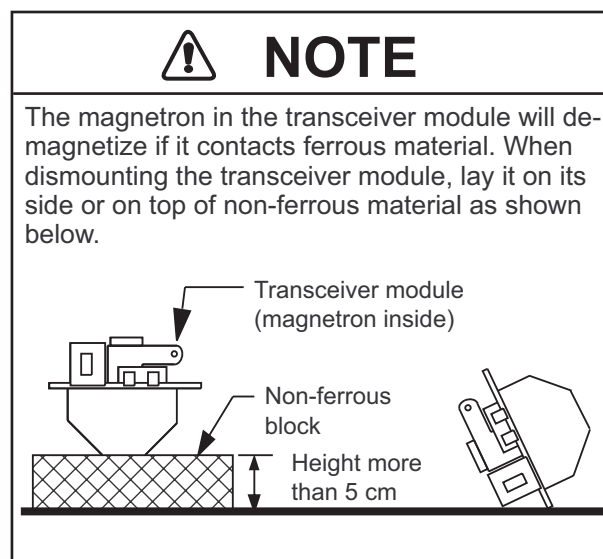
Notice for the network construction

- Use the optional Switching HUB HUB-100 to connect the sensor networks. For the gateway networks, use the optional Intelligent Hub HUB-3000.
- Do not connect the LAN network on board to the above optional HUBs. Also, commercial PCs cannot be connected to the gateway network, other than for maintenance.
- To connect the FEA-2xx7 or FAR-2xx7 series via LAN network, use the gateway network.

Notice on wiring

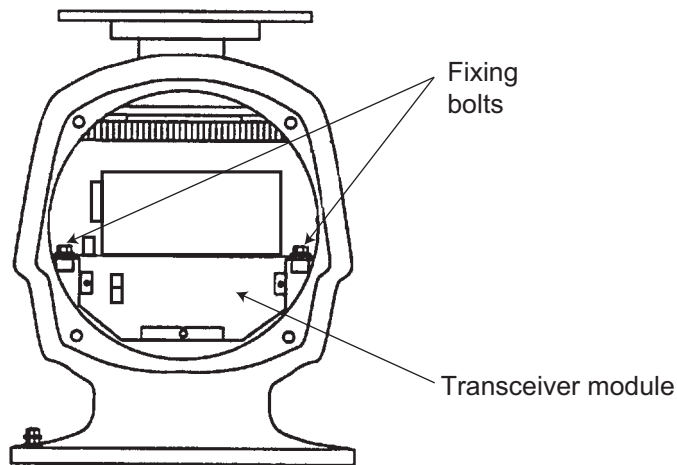
- Use the optional USB cable (type: OP24-32) to connect to USB port on the control unit.
- The length of the USB cable should be within 5 m to prevent equipment trouble.
- The length of LAN cables should be within 50 m.
- Use the CAT5E or CAT6 LAN cables for the network if available locally.
- If LAN cables are not available locally, use the optional LAN cables (FR-FTPC-CY for sensor network, DTI-C5E350 VCV for gateway network).
- If extension or division of the DVI or ERGB cables is necessary, use the dividers shown below.
 - DVI cable divider: DVI-12A (maker: INAGICS)
 - RGB divider: CIF-12H, DD-106 or WBD-14F (maker: INAGENICS)
- Make sure that the ground wires are connected between the ground terminals on each equipment and the ship's earth.
- If a UPS (user supply) is connected to this equipment, be sure that the grounding lamp does not light.

2.2 Antenna Unit

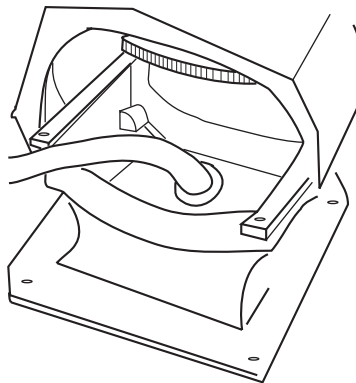


1. Open the antenna unit cover.

2. Disconnect plugs P823, P803, P831 and P421. If the PM-31 is installed, also disconnect plug P911.
3. Unfasten two bolts and remove the transceiver module.



4. Unfasten the four fixing bolts from the cable gland at the base of the antenna unit. Remove clamping ring, rubber gasket and washers.
5. Pass the signal cable through the cable entry hole in the antenna unit mounting platform. Trim the cable so about 80 cm of it protrudes past the cable gland.

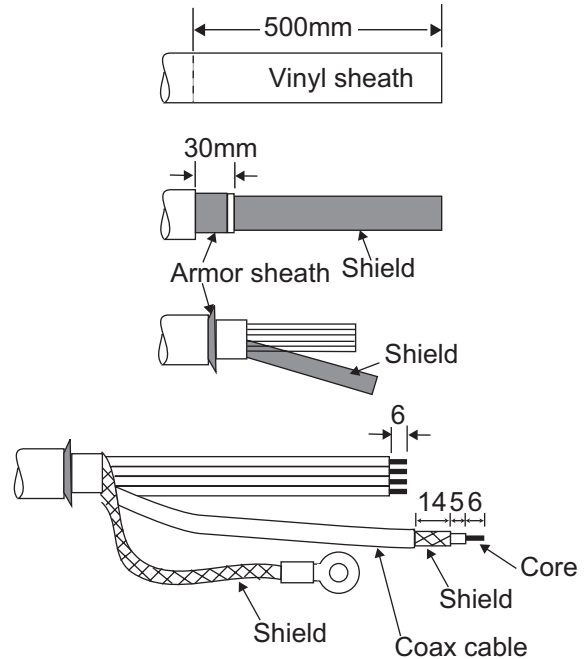


Antenna unit, front view, cover removed

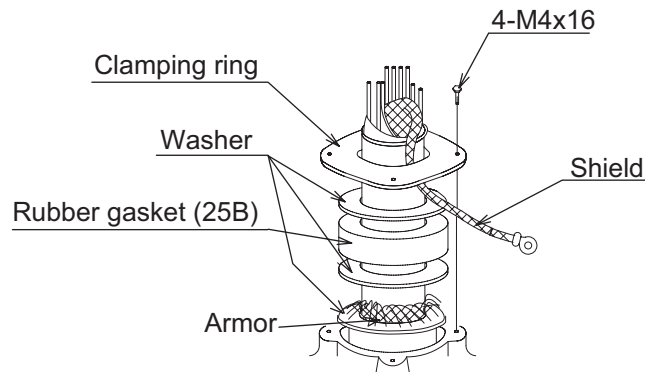
2. WIRING

6. Fabricate the signal cable RW-9600 as shown below.

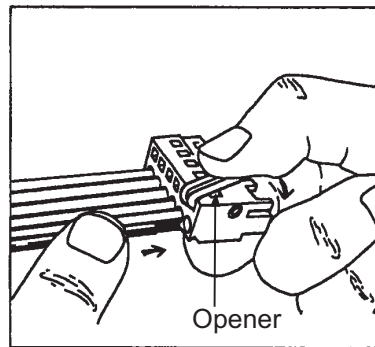
- 1) Remove the outer vinyl sheath, by about 500 mm, then armor and inner sheath by about 470 mm.
- 2) Unravel the shield to expose the core wires.
- 3) Trim each core wire (except coaxial wire) considering its location on the terminal board.
- 4) Trim the shield leaving about 500 mm and attach crimp-on lug FV5.5-4 (yellow, $\phi 4$).
- 5) Remove insulation of each wire by about 6 mm.



7. Fold back armor, and then slide washer, rubber gasket, washer and clamping ring in order. Cut the armor around the washer so it is level with the washer.
8. Nip the armor between two washers, and trim the excess armor from around washers. Pass the shield between the clamping ring and the washer as shown below. Fasten the clamping ring with the screws.

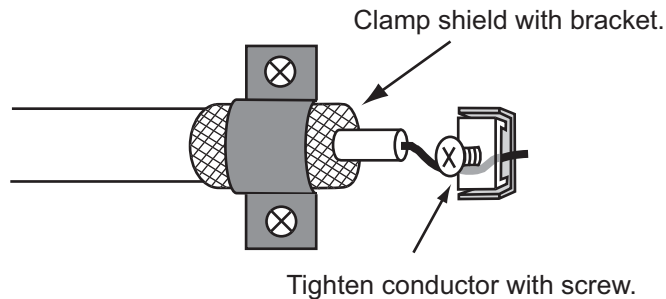


9. Connect the signal cable to the terminal board TB801 and TB802 on the RFTB board 03P9349 by referring to the interconnection diagram. Keep “slack” in the coaxial wire to prevent breakage. Insert the cores (except coaxial wire) to the connector with the opener.




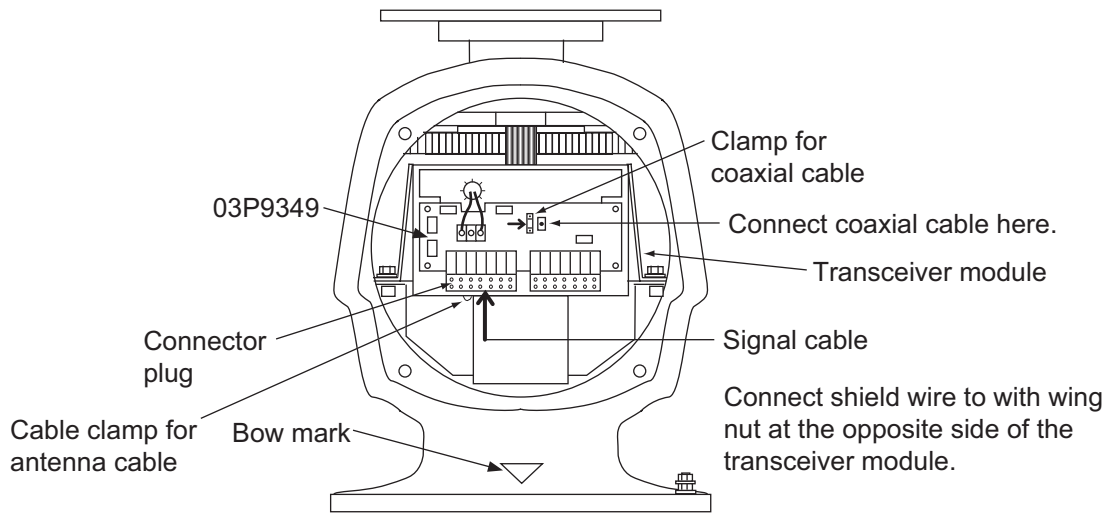
1. Insert opener.
2. Push opener.
3. Insert a core.
4. Release opener.

Clamp the coaxial cable with cable clamp on the board 03P9349 as shown below.



10. Bind cores of cables with cable ties.
11. Set the transceiver module to the antenna unit, push it in until it stops, and then tighten fixing bolts (4 pcs.) Connect plugs P823, P803, P831, P921 and J911 (if installed). Fasten the shield wire to the wing nut on the transceiver module.

	CAUTION
<p>Push in transceiver unit until it stops.</p> <p>Failure to do so may cause leakage of microwaves.</p>	



Antenna unit, front view

12. Confirm that all screws are tightened and all wirings are properly made. Confirm that waterproofing gasket, bolts and tapping holes of antenna unit are coated with silicone grease. Close the antenna unit cover.

2.3 Radar Processor Unit

Four cables are terminated at the radar processor unit: the antenna unit cable, LAN cable, power switch cable, and the power cable. Cables other than the power cable come with a connector pre-attached to them for connection to the processor unit. Fabricate the power cable as below. For the power cable, use DPYC-2.5 (Japan Industry Standard) cable or the equivalent.

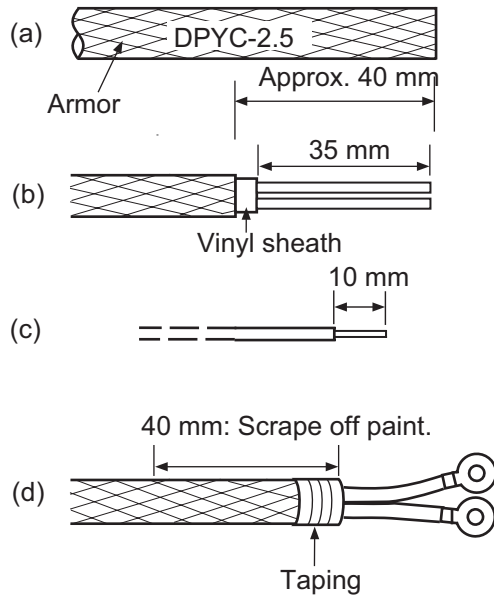
Note: For AC unit

Pass the AC line through a double-contact breaker (shipyard supply).

2.3.1 Fabricating the power cable

1. Cut armor of the cable by 40 mm.
2. Cut vinyl sheath by 35 mm.
3. Remove insulation of wires by about 10 mm. Fix crimp-on lugs to the cores.
4. Scrape off paint of the armor by 40 mm.

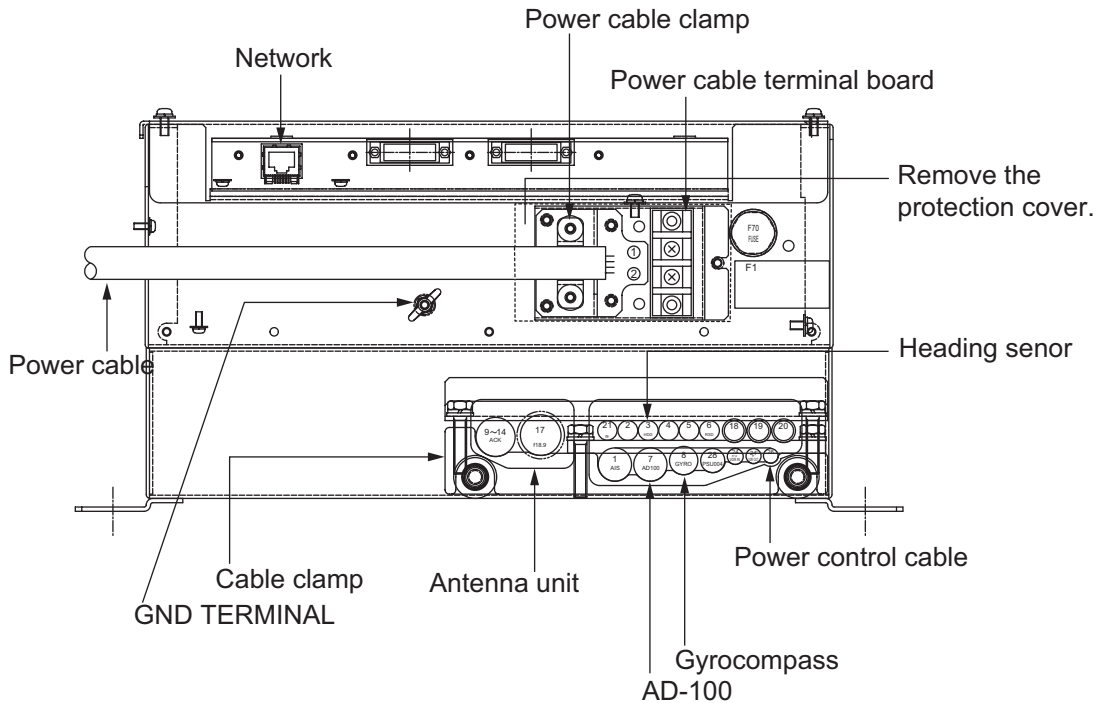
5. Cover the end of armor with vinyl tape.



Fabricating power cable

2.3.2 Connection of cables

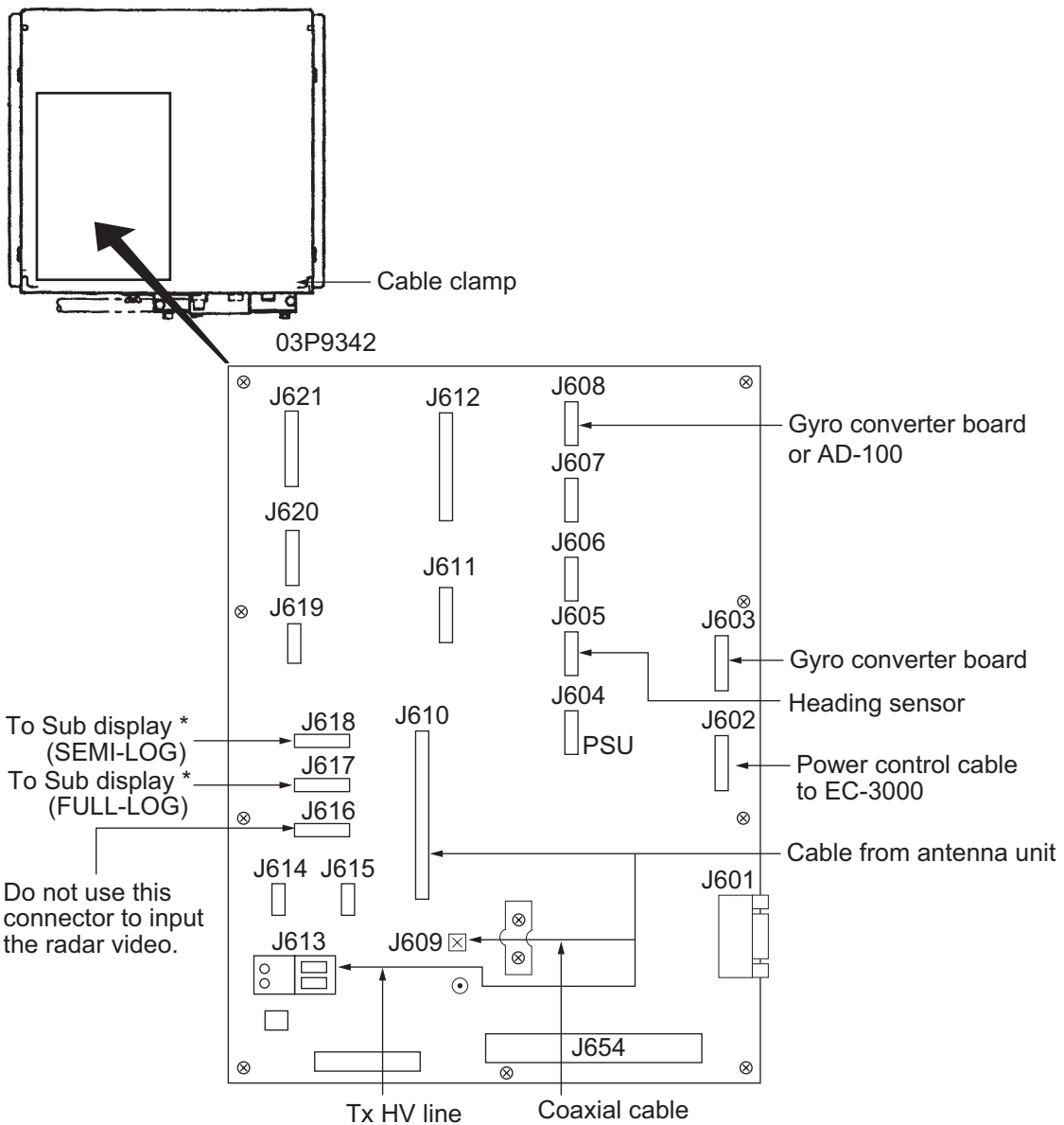
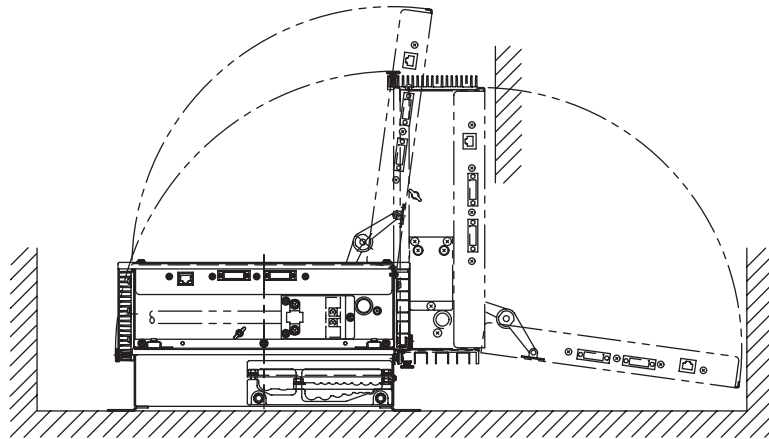
The power cable is connected to the terminal board on the rear panel and LAN cable to EC-3000 is connected to the NETWORK connector. Other cables are connected to the printed circuit board 03P9342.



2. WIRING

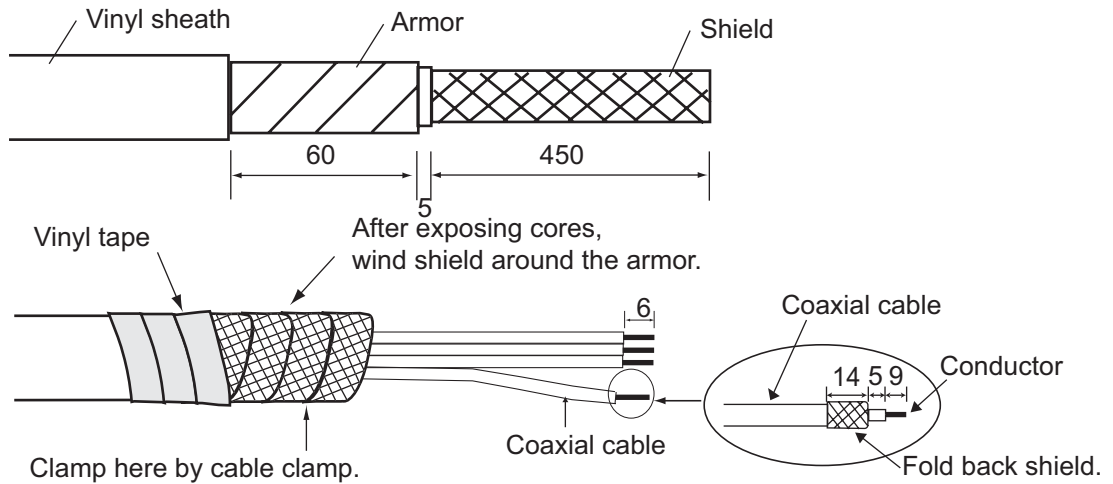
2.3.3 Location of connectors

Open the processor unit as follows and the 03P9342 board appears.

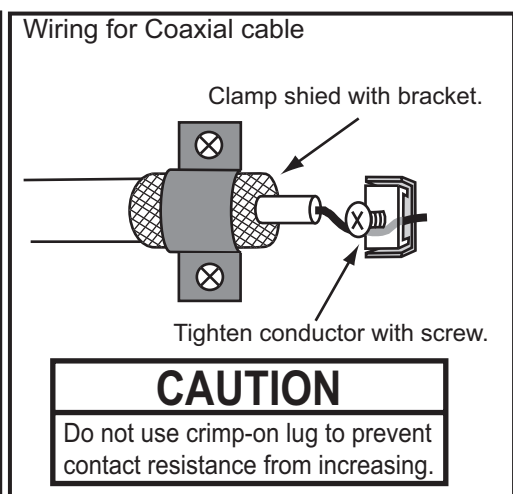
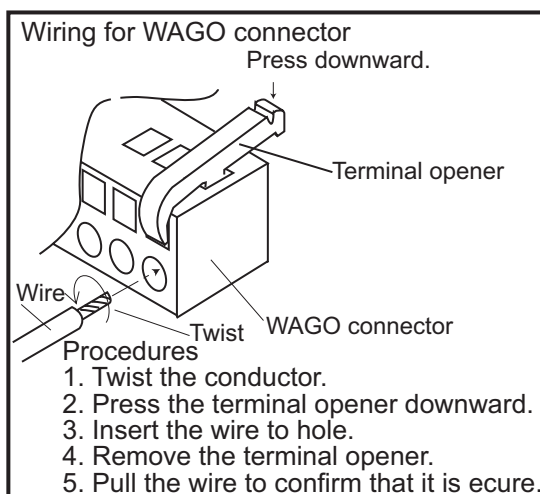
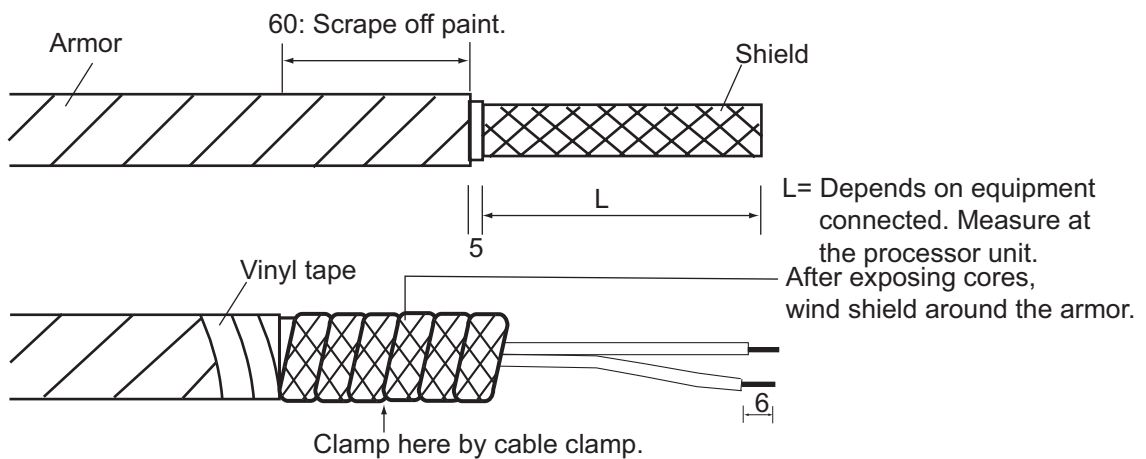


2.3.4 Cable fabrication for the cables connected to the 03P9342 board

- Signal cable RW-9600 (between antenna unit and radar processor unit)



- Other cables for optional units
Use TTYCS-1 or TTYCS-1Q (Japan Industry Standard cable) or equivalent. For details, see the appendix.



2.3.5 Connection of sub-display

A conventional remote display and/or FCR-2xx9 series radar can be connected to J617 and J618 in the processor unit as a sub display. However, the controls for GAIN and STC are different depending on J617 and J618. Refer to the table to connect sub-display.

Port		Conventional remote display	FCR-2xx9 series radar
J617 (FULL-LOG)	Overall gain	Even if input video level is adjusted to 4 Vp-p, the gain is 8 dB lower than that on the master radar.	The gain is 8 dB lower than that on the master radar.
	GAIN control	The GAIN control is effective.	The GAIN control has no effect.
	STC control	The STC control is effective	The STC control has no effect.
J618 (SEMI-LOG)	Overall gain	When input video level is adjusted to 4 Vp-p, the gain becomes the same as that on the master radar.	The gain is almost same as that on the master radar.
	GAIN control	The GAIN control is effective.	The GAIN control has no effect.
	STC control	The STC control is effective, however this control is added on the signal adjusted by the master radar. So this port is not recommended to use.	The STC control has no effect.

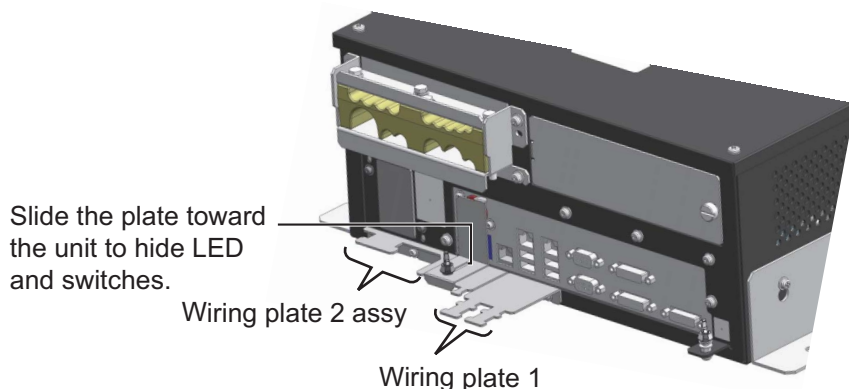
2.4 Processor Unit

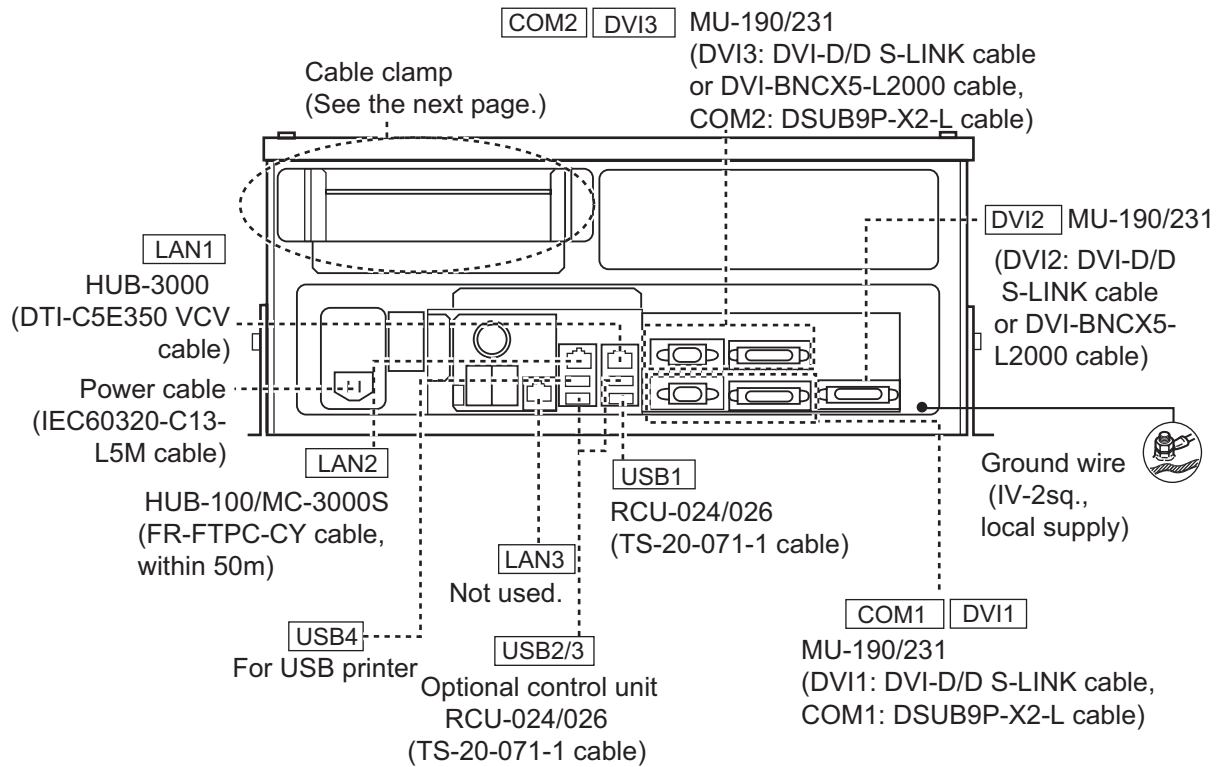
2.4.1 How to connect cables to terminals on the processor unit

Use screws (M3x6, supplied) to attach the wiring plate 1 and wiring plate 2 assy to the processor unit. Connect the cables shown below to the connectors at the front of the processor unit. After the connection, bind cables to the appropriate fixing metal with the cable ties (supplied).

For the cables from the monitor unit (type: DVI-D/D SLINK5M/10M (MU-190 only), DSUB9P-X2-L5/10M) and ground wire, connect them to the processor unit directly (without fixing to a wiring plate). Tighten the fixing screws on these connectors to prevent disconnection from the processor unit.

Note: Connect the cables so that they do not interfere with the opening or closing of the DVD tray.





Cables connected at the wiring plate 1

- Power cable (Type: IEC60320-C13-L5M)
- LAN cable to the LAN3 port

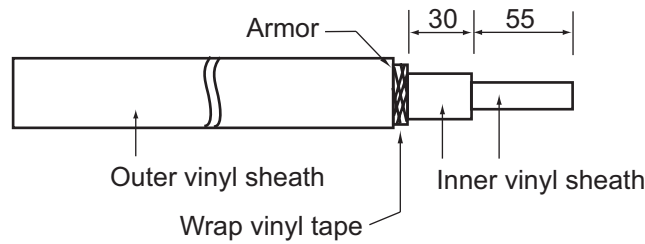
Cables connected at wiring plate 2 assy

- USB cables from the control units
- Printer cable
- LAN cable (type: DTI-C5E350 VCV) from the HUB-3000
- LAN cable (type: FR-FTPC-CY) from the HUB-100/MC-3000S

2. WIRING

Fabricating LAN cable

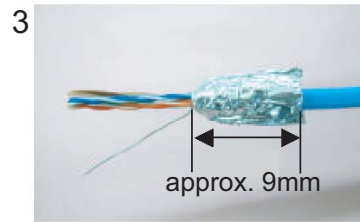
Fabricate the LAN cable (FR-FTPC-CY, DTI-C5E350 VCV), as shown below. (Wrap both edges of the armor with vinyl tape.) Confirm that the shield of the cable touches to the shell of the modular plug.



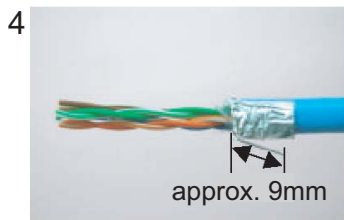
Expose inner vinyl sheath.



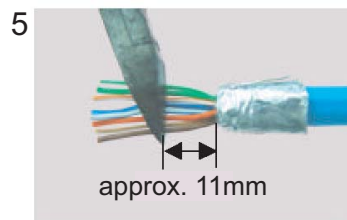
Remove the outer sheath by approx 25 mm. Be careful not to damage inner shield and cores.



Fold back the shield, wrap it onto the outer sheath and cut it, leaving 9 mm.



Fold back drain wire and cut it, leaving 9 mm.



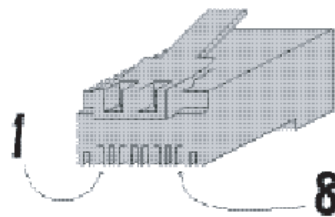
Straighten and flatten the core in order and cut them, leaving 11 mm.



Insert the cable into the modular plug so that the folded part of the shield enters into the plug housing. The drain wire should be located on the tab side of the jack.



Using special crimping tool MPT5-8 (PANDUIT CORP.), crimp the modular plug. Finally check the plug visually.



[Cross cable]

[Straight cable]



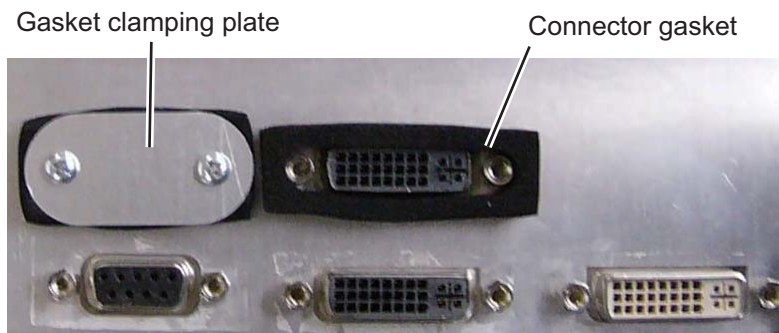
IPX2 kit

The optional IPX2 kit (Type: OP24-23, Code No.: 001-171-780) protects the connectors shown below to waterproofing standard IPX2.

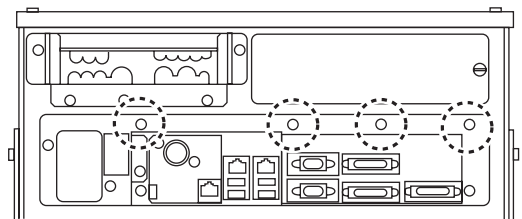
Contents of IPX2 kit

Name	Type	Code No.	Qty	Remarks
Binding Screw	#4-40UNCX3/16	000-176-619-10	10	
Connector Gasket 1	24-014-0107	100-367-730-10	2	For D-sub connectors
Connector Gasket 2	24-014-0108	100-367-741-10	3	For DVI connectors
Rainproof Cover	24-014-0109	100-372-202-10	1	
Gasket Clamping Plate	24-014-0114	100-372-210-10	2	For D-sub connectors
	24-014-0115	100-372-220-10	3	For DVI connectors

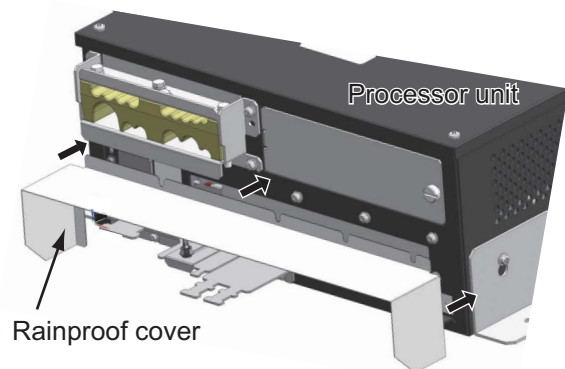
1. Set the connector gasket to the unused connector not used.
2. Fasten two binding screws to fix the connector gasket.



3. Peel the paper from the double-sided tape on the rainproof cover, then attach the cover to the position shown below by using four screws preattached to the processor unit.



Screws to fix the rainproof cover



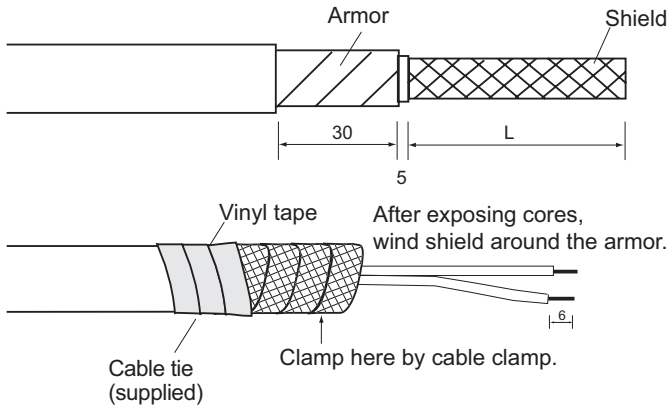
2.4.2 How to connect cables inside the processor unit

Fabrication

Fabricate JIS cables as shown below to connect them to the WAGO connectors on the I/O Board 24P0124 inside the processor unit.

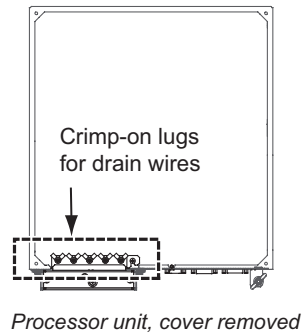
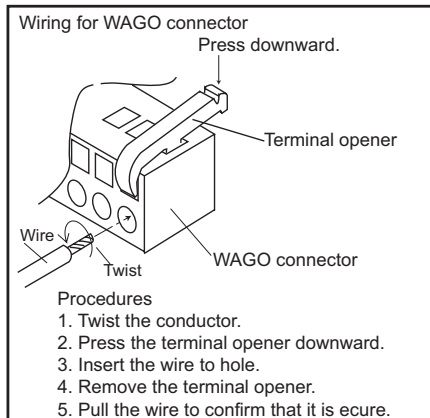
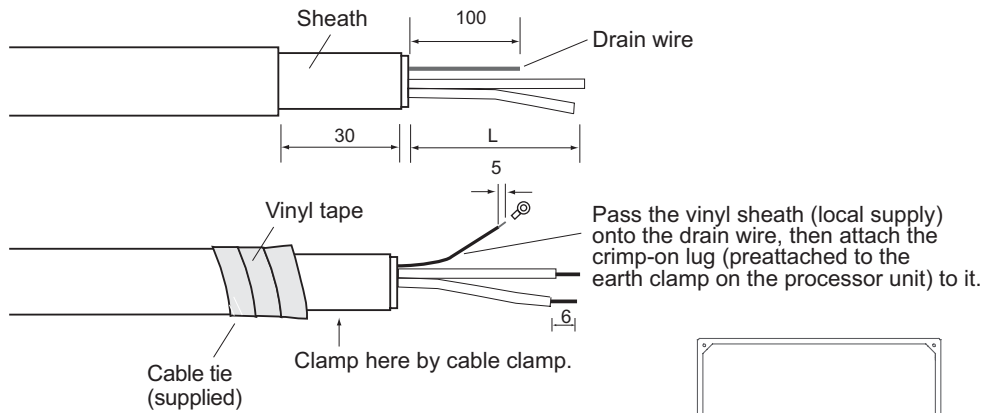
For locations of cables and cores, see the sticker on the reverse side of the top cover. (All dimensions in millimeters)

Fabrication of TTYCS series



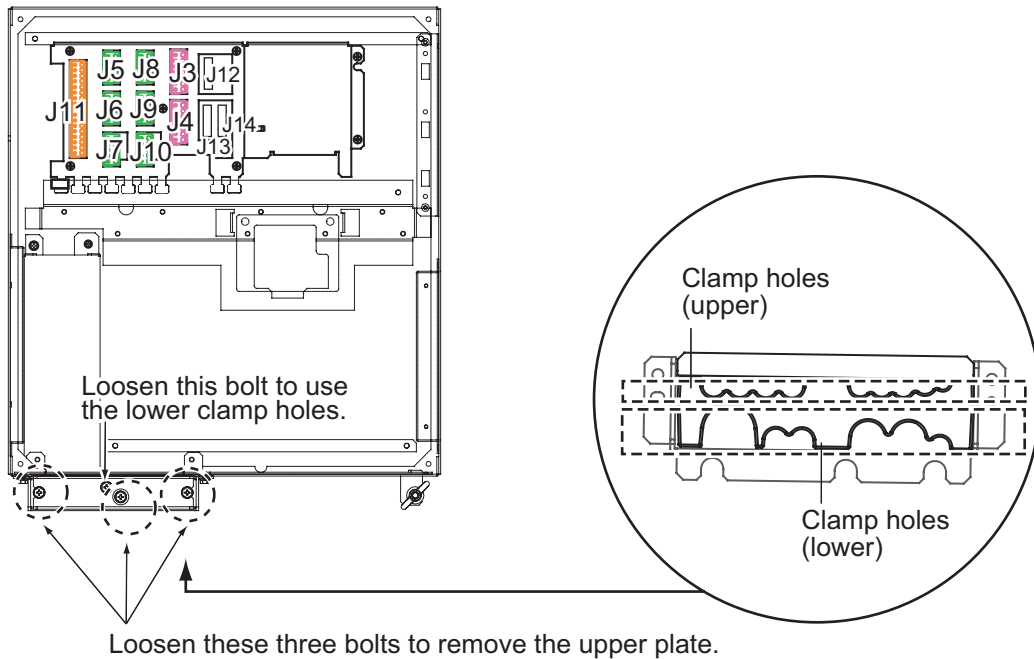
Cable type (JIS)	Length of "L"
TTYCS-4, TTYCSLA-4, TTYCS-1Q, TTYCSLA-1Q	400
TTYCS-10, TTYCSLA-10	380

Fabrication of TTYCSLA series



Connection

1. Unfasten four screws (M4x8) to remove the top cover from the processor unit.
2. Unfasten three bolts shown below to remove the upper plate of the cable clamp.

*Processor unit, top view*

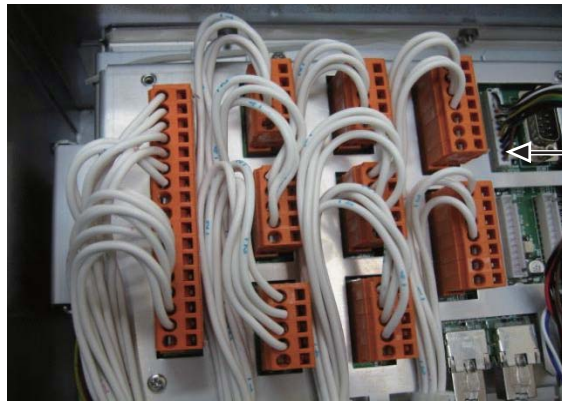
3. Pass the cables through the clamp holes, then fasten the bolts removed at step 2 to fix the cables.



Lay shields of cables under this clamp then tighten the clamp.

2. WIRING

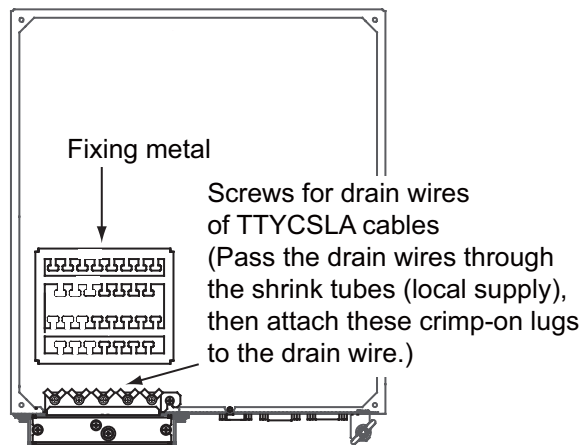
4. Connect the WAGO connectors appropriately to the I/O Board, referring to the interconnection diagram.



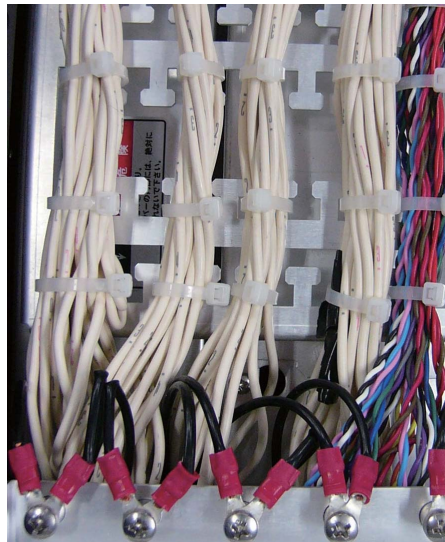
J12 (main control unit)

For J13 and J14 (sub control units), see the figure at step 2 on the previous page.

5. Bind the cables to the fixing metal in the processor unit with the cable ties (supplied).



6. For TTYCSLA series cables, pass the drain wire into the shrink tube (local supply), then fasten crimp-on lugs at the end of drain wires to screws shown above.



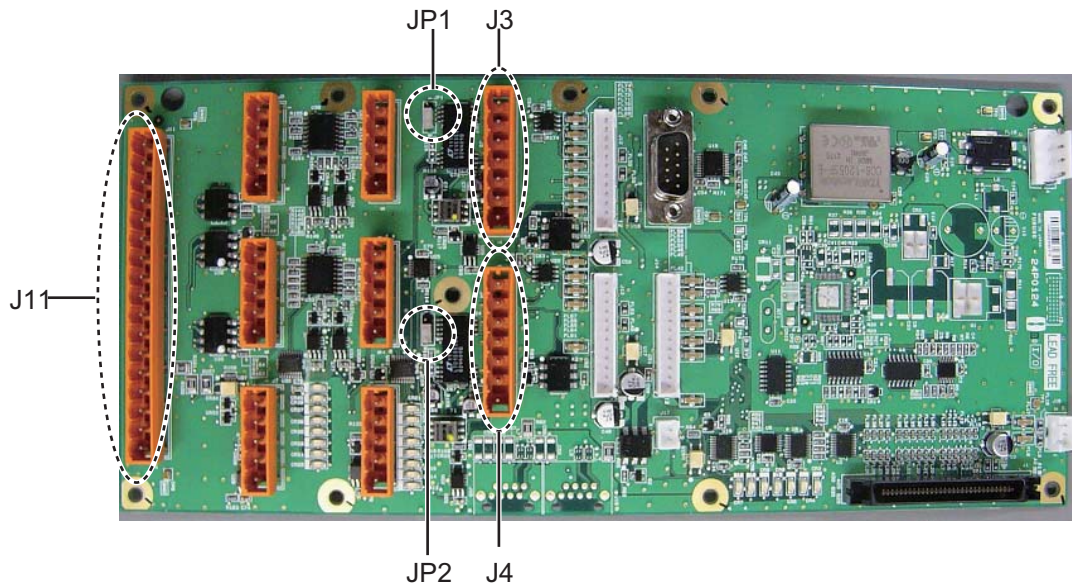
Example of wiring (inside the processor unit)

2.4.3 How to set jumper blocks on I/O Board

How to set the termination resistors

Use the jumper blocks JP1 and JP2 on the I/O Board (24P0124) to set the termination resistor J3 and J4 on or off. The default setting is termination resistor: on.

- When setting the starting/ending terminal for the multipoint connection, or multipoint is not connected (CH1 or CH2): termination resistor ON
- When not setting the starting/ending terminal for the multipoint connection (CH1 or CH2): termination resistor OFF



Processor unit, I/O Board (24P0124)

Jumper block J1		Connector J3
1-2	SHORT	Termination resistor: ON (default setting)
2-3	OPEN	
1-2	OPEN	Termination connector: OFF
2-3	SHORT	

Jumper block J2		Connector J4
1-2	SHORT	Termination resistor: ON (default setting)
2-3	OPEN	
1-2	OPEN	Termination connector: OFF
2-3	SHORT	

2. WIRING

How to select the serial input/output format

Use the connectors J3 and J4 to set the input/output format for serial CH1/CH2, from IEC-61162-1 or IEC-61162-2. For connectors J5 to J10, use TTYCS-1Q or TTYCSLA-1Q cable for a connector.

Connector J3

Pin#	Signal	In/Out	Description	IEC61162-2	IEC61162-1
1	TD1-A	Out	Serial CH1, output IEC61162-1/2	TTYCS(LA)-4	TTYCS(LA)-4
2	TD1-B	Out	Serial CH1, output IEC61162-1/2		
3	RD1-A	In	Serial CH1, input IEC61162-2		No connection
4	RD1-B	In	Serial CH1, input IEC61162-2		
5	ISOGND1	-	Isolation GND (CH1)		
6	RD1-H	In	Serial CH1, input IEC61162-1	No connection	TTYCS(LA)-4
7	RD1-C	In	Serial CH1, input IEC61162-1		

Connector J4

Pin#	Signal	In/Out	Description	IEC61162-2	IEC61162-1
1	TD2-A	Out	Serial CH2, output IEC61162-1/2	TTYCS(LA)-4	TTYCS(LA)-4
2	TD2-B	Out	Serial CH2, output IEC61162-1/2		
3	RD2-A	In	Serial CH2, input IEC61162-2		No connection
4	RD2-B	In	Serial CH2, input IEC61162-2		
5	ISOGND2	-	Isolation GND (CH2)		
6	RD2-H	In	Serial CH2, input IEC61162-1	No connection	TTYCS(LA)-4
7	RD2-C	In	Serial CH2, input IEC61162-1		

Connector J5

Pin#	Signal	In/Out	Description	Remarks
1	TD3-A	Out	Serial CH3, output IEC61162-1	Use TTYCS(LA)-1Q, IEC61162-1 only
2	TD3-B	Out	Serial CH3, output IEC61162-1	
3	RD3-H	In	Serial CH3, input IEC61162-1	
4	RD3-C	In	Serial CH3, input IEC61162-1	
5	GND	-	GND	

Connector J6

Pin#	Signal	In/Out	Description	Remarks
1	TD4-A	Out	Serial CH4, output IEC61162-1	Use TTYCS(LA)-1Q, IREC61162-1 only
2	TD4-B	Out	Serial CH4, output IEC61162-1	
3	RD4-H	In	Serial CH4, input IEC61162-1	
4	RD4-C	In	Serial CH4, input IEC61162-1	
5	GND	-	GND	

Connector J7

Pin#	Signal	In/Out	Description	Remarks
1	TD5-A	Out	Serial CH5, output IEC61162-1	Use TTYCS(LA)-1Q, IREC61162-1 only
2	TD5-B	Out	Serial CH5, output IEC61162-1	
3	RD5-H	In	Serial CH5, input IEC61162-1	
4	RD5-C	In	Serial CH5, input IEC61162-1	
5	GND	-	GND	

Connector J8

Pin#	Signal	In/Out	Description	Remarks
1	TD6-A	Out	Serial CH6, output IEC61162-1	Use TTYCS(LA)-1Q, IREC61162-1 only
2	TD6-B	Out	Serial CH6, output IEC61162-1	
3	RD6-H	In	Serial CH6, input IEC61162-1	
4	RD6-C	In	Serial CH6, input IEC61162-1	
5	GND	-	GND	

Connector J9

Pin#	Signal	In/Out	Description	Remarks
1	TD7-A	Out	Serial CH7, output IEC61162-1	Use TTYCS(LA)-1Q, IREC61162-1 only
2	TD7-B	Out	Serial CH7, output IEC61162-1	
3	RD7-H	In	Serial CH7, input IEC61162-1	
4	RD7-C	In	Serial CH7, input IEC61162-1	
5	GND	-	GND	

Connector J10

Pin#	Signal	In/Out	Description	Remarks
1	TD8-A	Out	Serial CH8, output IEC61162-1	Use TTYCS(LA)-1Q, IREC61162-1 only
2	TD8-B	Out	Serial CH8, output IEC61162-1	
3	RD8-H	In	Serial CH8, input IEC61162-1	
4	RD8-C	In	Serial CH8, input IEC61162-1	
5	GND	-	GND	

2. WIRING

How to set contact input/output

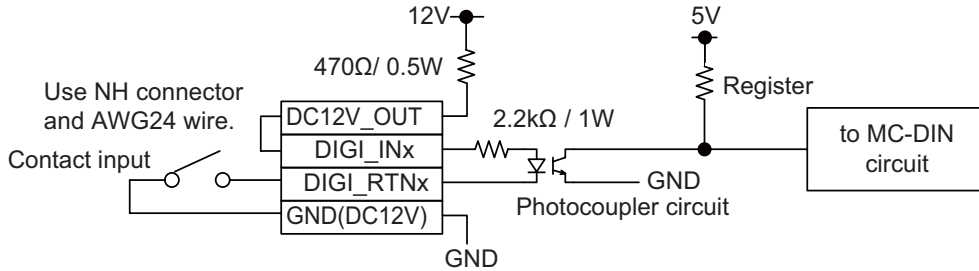
The connector J11 can be used for the connection of contact input or voltage input. Refer to the figures shown below to make the wiring which complies with the input specification.

Note: The input must not exceed the range of the input voltage, to prevent malfunction.

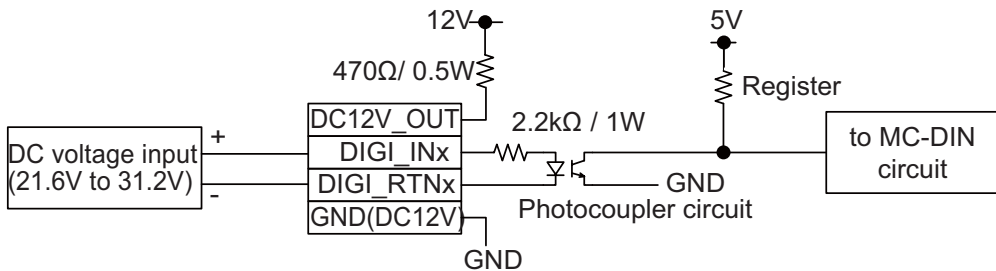
-Setting for voltage input: 21.6V to 31.2V

-Setting for contact input: Voltage cannot be input (contact signal only).

- (Setting for contact input)



- (Setting for voltage input)



Connector J11

Pin #	Signal name	In/Out	Description	Contact input	Voltage input
1	SYS_FAIL-A	Out	System fail output	TTYCS(LA)-10	TTYCS(LA)-10
2	SYS_FAIL-B	Out	System fail output		
3	PWR_FAIL-A	Out	Power fail output		
4	PWR_FAIL-B	Out	Power fail output		
5	NC1-A	Out	Alarm output (NC1)		
6	NC1-B	Out	Alarm output (NC1)		
7	NC2-A	Out	Alarm output (NC2)		
8	NC2-B	Out	Alarm output (NC2)		
9	NO1-A	Out	Alarm output (NO1)		
10	NO1-B	Out	Alarm output (NO1)		
11	NO2-A	Out	Alarm output (NO2)		
12	NO2-B	Out	Alarm output (NO2)		
13	DC12V_OUT	Out	ACK input	#13-#14: short	No connection
14	DIGI_IN1	In	ACK input		TTYCS(LA)-10
15	DIGI_RTN1	Out	ACK input	TTYCS(LA)-10	No connection
16	GND (DC12V)	In	ACK input		
17	GND	-	GND	NO connection	

Note: NC1/2 and NO1/2 are output with a fixed value.

2.5 Monitor Unit

For the wiring of the monitor unit MU-190/231, see the operator's manual supplied with the monitor unit.

Mounting consideration

(Standard type)

- Connect the ECDIS main monitor to the DVI1 and COM1 ports.
- For the sub ECDIS monitor, connect it to the DVI2 and COM2 port.

(Conning type)

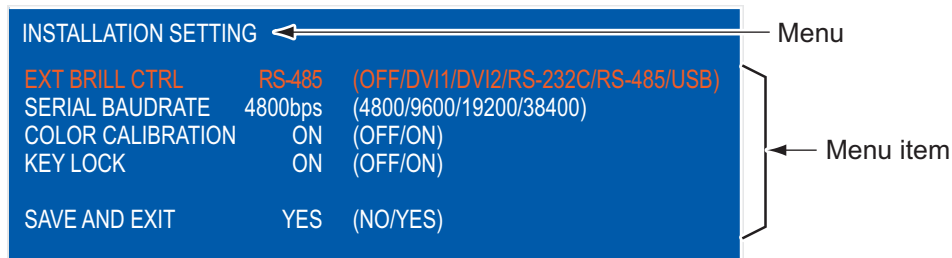
- ECDIS main monitor: DVI1 and COM1 ports, conning monitor: DVI3 port and COM2 ports
- When an ECDIS sub monitor is added to the above connection, connect it to the DVI2 port (the brilliance adjustment is not available).

(VDR connection, ask your dealer)

To connect a VDR, it is necessary to output data in analog format. See the installation manuals for VDR to prepare the cables to use.

- When connecting a VDR to the DVI3 port::
Use the optional DVI-BNCX5-L2000 cable to output RGB signal from the DVI-I. Adjustment of the output picture is necessary.
- When connecting a VDR to the DVI2 port:
Use a DVI/RGB converter (maker: IMAZINICS, type: DVI-12A, local supply) to convert DVI output from DVI2 port to RGB.

The [INSTALLATION SETTING] menu appears only when the power is turned on for the first time after installation of the monitor unit.



Adjust the settings referring to the following table.

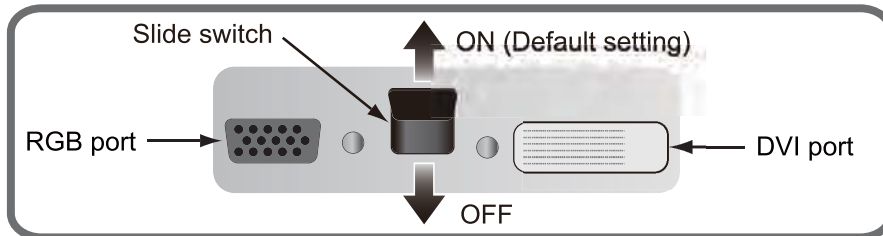
EXT BRILL CTRL	SERIAL BAIDRATE	COLOR CALIBRATION	KEY LOCK	DVI PWR SYNC*
RS-485	4800bps	ON	ON	YES

*: [DVI PWR SYNC] is the slide switch at the bottom rear of the monitor unit. Confirm that this switch is set to [ON] (default setting). See Slide switch below for details.

Slide switch

Set the slide switch to “ON” (default setting). This setting automatically powers the monitor unit on or off according to the DVI signal input. The power switch of the monitor unit is inoperative.

Note: The OFF position provides control of the monitor unit power with the power switch of the monitor unit.



How to open the [INSTALLATION SETTING] menu

Turn off the monitor unit. While you hold the DISP key, press the BRILL key to turn on the monitor unit. Press and hold the DISP key for more than five seconds.

Note: When the [DVI PWR SYNC] slide switch is ON, turn on the connected external equipment while you press the DISP key to turn on the monitor unit.

2.6 Sensor Adapters (option)

Maximum eight MC-3000S can be connected to a sensor network (for the redundant connection: 16). The MC-3000S (serial input/output, IEC61162-2/1, 4ch) can connect max. 10 sensor adapters using the MC1.5-W cables. The maximum number of MC-3010A units is five.

When fabricating the MC1.5-W cables, use the lot terminal (ferrule type, supplied) to maintain performance. This fabrication requires the optional crimping tool (type: CRIMPFOX 10S). For the relations between the connectors and rod terminals, see page AP-2. Also, the stickers attached on the reverse side of the covers show the detailed connections.

Attache the cables to the applicable pins.

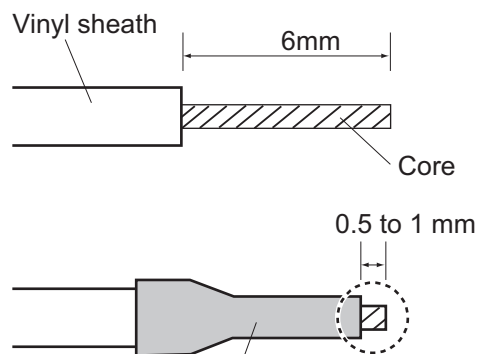
Pin No.	Cable color	Signal
1	Red	24V_OUT or 24V_IN
2	Black	24V_GND
3	White	MODBUS-A
4	Blue	MODBUS-B
5	Gray	GND

Use the ferrule-type terminals (supplied) to connect the cables to the terminals in the sensor adapters. This connection requires a crimping tool (CRIMPFOX10S, option).

Note 1: Use the MC1.5-W cable between the sensor adapters.

Note 2: The total length of the MC1.5-W cables should be less than 6 m to prevent malfunction.

How to attach the rod terminal (ferrule type)



Rod terminal (ferrule type):
After attaching the rod terminal, use the optional crimping tool CRIMPFOX 10S to crimp.

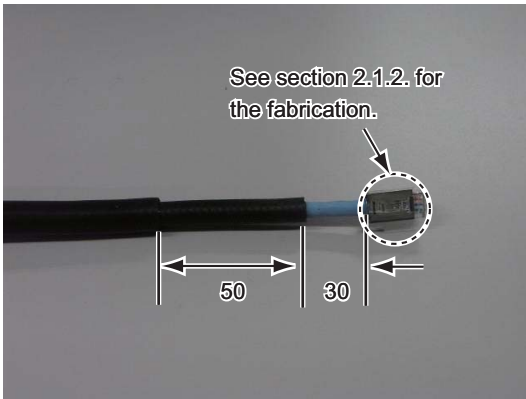
2. WIRING

2.6.1 MC-3000S

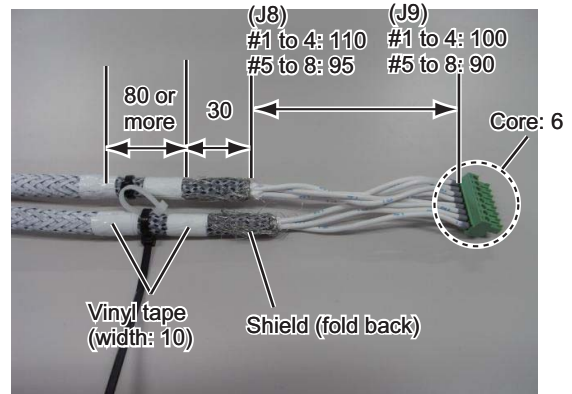
Use the LAN cable FR-FTPC-CY cable to connect the MC-3000S and the processor unit. With HUB-100, a maximum of eight MC-3000S can be connected.

Fabrications

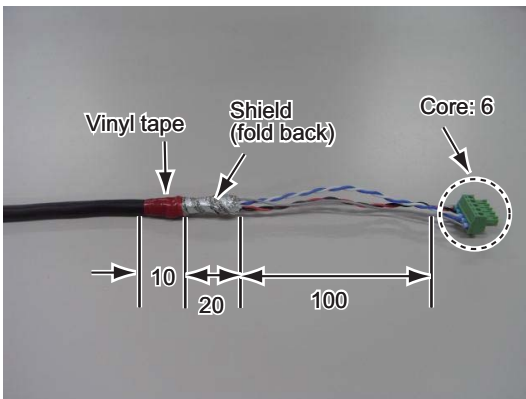
LAN cable (FR-FTPC-CY)



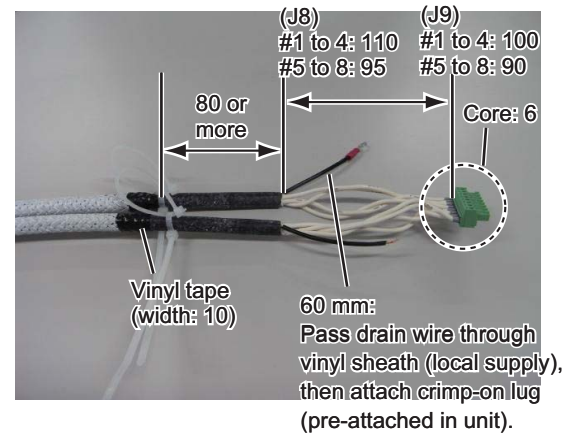
TTYCS-1Q cable



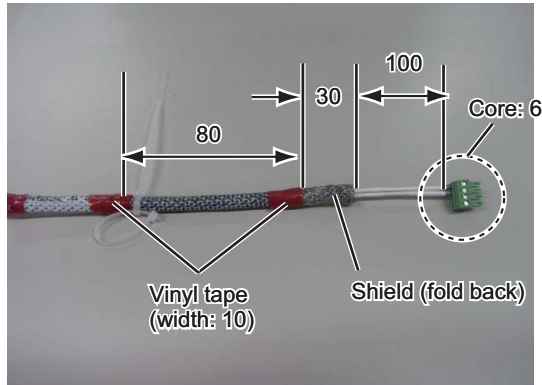
MC1.5-W-L600/1000/2000/3000 cable



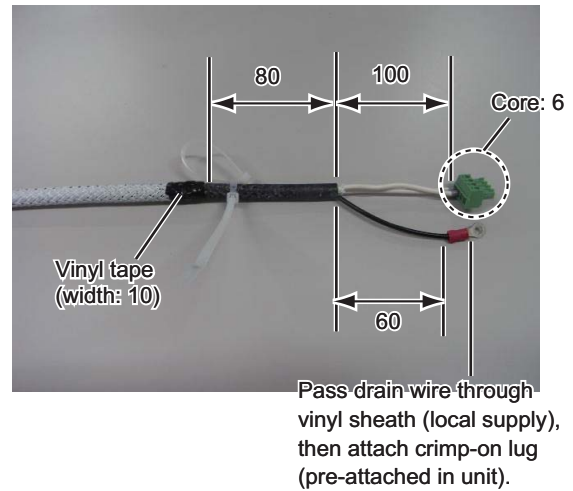
TTYCSLA-1Q cable



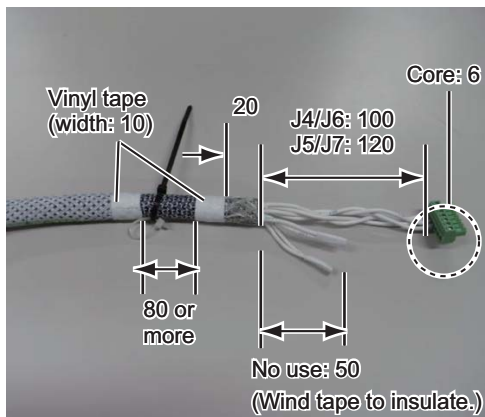
TTYCS-1 cable



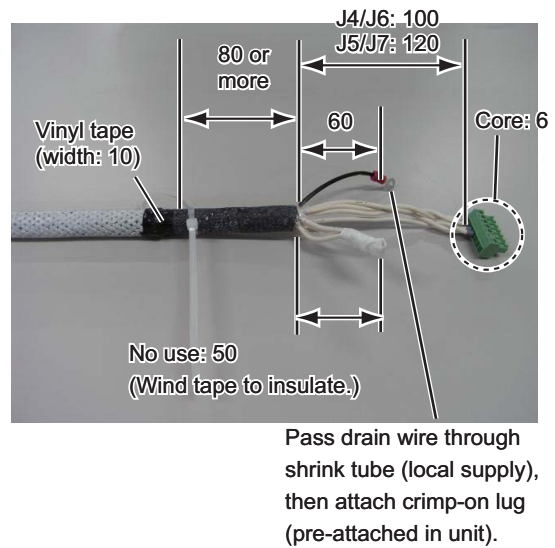
TTYCSLA-1 cable



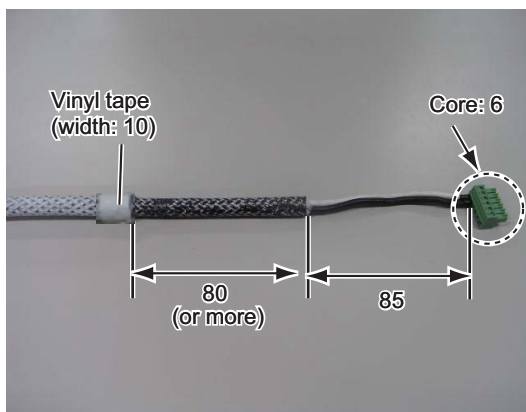
TTYCS-4 cable



TTYCSLA-4 cable



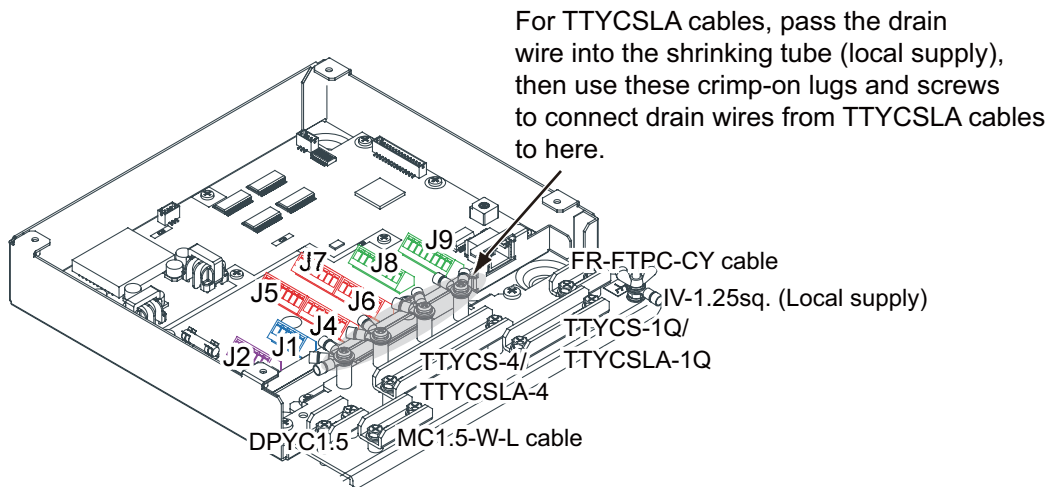
DPYC-1.5 cable



2. WIRING

Connections

Unfasten four screws to remove the cover, pass the cables through the clamps and attach the cables to respective connectors. The shield part of the cable (or drain wire) must be fastened by (connected to) the clamp.



Note: Fasten the cable shield with the cable clamp.

How to set NC/NO output (J2)

The POWER FAIL signal on the connector J2 can be set to NC (normal close) output or NO (normal open) output as shown in the table below.

Connector J2

Pin #	Signal name	In/Out	Remarks	NO	NC
1	24V_IN	-	24 VDC	DPYC-1.5	
2	24V_GND	-	GND (24 VDC)	DPYC-1.5	
3	PWR_FAIL_A	Out	Power fail output	TTYCS(LA)-1	No connection
4	PWR_FAIL_COM	Out	Power fail output		TTYCS(LA)-1
5	PWR_FAIL_B	Out	Power fail output	No connection	

How to set input specification (J4 to J9)

For connectors J4 to J7, the connections are different depending on the input specifications as shown below.

Connector J4

Pin #	Signal name	In/Out	Remarks	IEC61162-2	IEC61162-1	Modbus*		
1	TD1-A	Out	Serial CH1, output IEC61162-1/2/modbus	TTYCS(LA)-4	TTYCS(LA)-4	TTYCS(LA)-4		
2	TD1-B	Out	Serial CH1, output IEC61162-1/2/modbus					
3	RD1-A	In	Serial CH1, output IEC61162-2/modbus				No connection	No connection
4	RD1-B	In	Serial CH1, output IEC61162-2/modbus					
5	ISOGND1	-	Isolation, GND (CH1)					
6	RD1-H	In	Serial CH1, output IEC61162-1	No connection	TTYCS(LA)-4			
7	RD1-C	In	Serial CH1, output IEC61162-1					

*: Set the jumpers J20/J21 to Modbus.

Connector J5

Pin #	Signal name	In/Out	Remarks	IEC61162-2	IEC61162-1	Modbus*		
1	TD2-A	Out	Serial CH2, output IEC61162-1/2/modbus	TTYCS(LA)-4	TTYCS(LA)-4	TTYCS(LA)-4		
2	TD2-B	Out	Serial CH2, output IEC61162-1/2/modbus					
3	RD2-A	In	Serial CH2, output IEC61162-2/modbus				No connection	No connection
4	RD2-B	In	Serial CH2, output IEC61162-2/modbus					
5	ISOGND2	-	Isolation, GND (CH2)					
6	RD2-H	In	Serial CH2, output IEC61162-1	No connection	TTYCS(LA)-4			
7	RD2-C	In	Serial CH2, output IEC61162-1					

*: Set the jumpers J20/J21 to Modbus.

2. WIRING

Connector J6

Pin #	Signal name	In/Out	Remarks	IEC61162-2	IEC61162-1	
1	TD3-A	Out	Serial CH3, output IEC61162-1/2	TTYCS(LA)-4	TTYCS(LA)-4	
2	TD3-B	Out	Serial CH3, output IEC61162-1/2			
3	RD3-A	In	Serial CH3, output IEC61162-2			No connection
4	RD3-B	In	Serial CH3, output IEC61162-2			
5	ISOGND3	-	Isolation, GND (CH3)			
6	RD3-H	In	Serial CH3, output IEC61162-1	No connection	TTYCS(LA)-4	
7	RD3-C	In	Serial CH3, output IEC61162-1			

Connector J7

Pin #	Signal name	In/Out	Remarks	IEC61162-2	IEC61162-1	
1	TD4-A	Out	Serial CH4, output IEC61162-1/2	TTYCS(LA)-4	TTYCS(LA)-4	
2	TD4-B	Out	Serial CH4, output IEC61162-1/2			
3	RD4-A	In	Serial CH4, output IEC61162-2			No connection
4	RD4-B	In	Serial CH4, output IEC61162-2			
5	ISOGND4	-	Isolation, GND (CH4)			
6	RD4-H	In	Serial CH4, output IEC61162-1	No connection	TTYCS(LA)-4	
7	RD4-C	In	Serial CH4, output IEC61162-1			

Connector J8

Pin#	Signal name	In/Out	Description	Used cable
1	TD5-A	Out	Serial CH5, output IEC61162-1	TTYCS-1Q or TTYCSLA-1Q
2	TD5-B	Out	Serial CH5, output IEC61162-1	
3	RD5-H	In	Serial CH5, input IEC61162-1	
4	RD5-C	In	Serial CH5, input IEC61162-1	
5	TD6-A	Out	Serial CH6, output IEC61162-1	
6	TD6-B	Out	Serial CH6, output IEC61162-1	
7	RD6-H	In	Serial CH6, input IEC61162-1	
8	RD6-C	In	Serial CH6, input IEC61162-1	

Connector J9

Pin#	Signal name	In/Out	Description	Used cable
1	TD7-A	Out	Serial CH7, output IEC61162-1	TTYCS-1Q or TTYCSLA-1Q
2	TD7-B	Out	Serial CH7, output IEC61162-1	
3	RD7-H	In	Serial CH7, input IEC61162-1	
4	RD7-C	In	Serial CH7, input IEC61162-1	
5	TD8-A	Out	Serial CH8, output IEC61162-1	
6	TD8-B	Out	Serial CH8, output IEC61162-1	
7	RD8-H	In	Serial CH8, input IEC61162-1	
8	RD8-C	In	Serial CH8, input IEC61162-1	

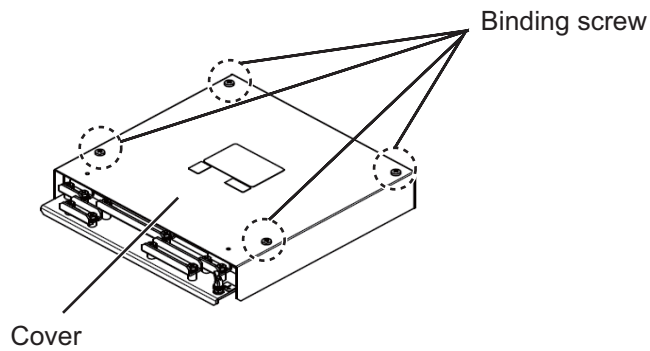
Case packing OP24-28

The optional kit OP24-28 protects the connectors on the MC-3000C to waterproofing standard IPX2.

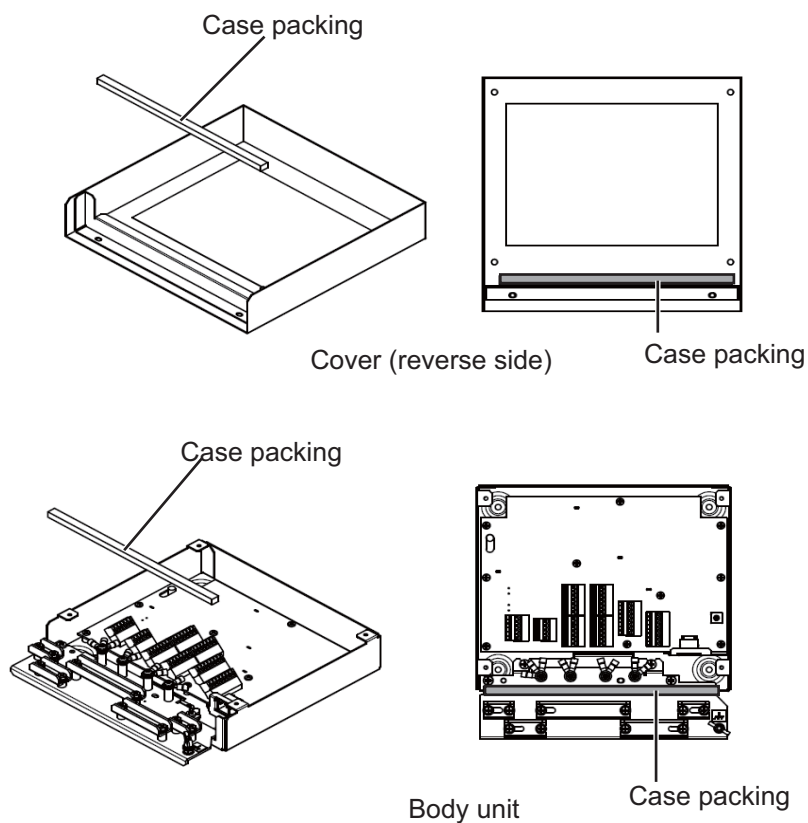
Case packing (type: OP24-28, code no.: 001-169-970)

Name	Type	Code No.	Qty	Remarks
Case packing (serial)	21-014-2051	100-367-880-10	2	For MC-3000S

1. Unfasten four binding screws to remove the cover from the adapter.



2. Peel the paper from the case packing, then attach the case packing to the reverse side of the cover and the body unit as shown below.



3. Attach the cover to the MC-3000S body unit.

2. WIRING

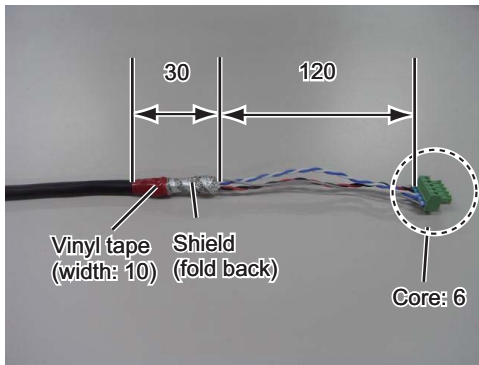
2.6.2 MC-3010A/3020D/3030D

- MC-3010A: Inputs analog signal. To use MC-3010A as current input, connect short pins to each terminals.
- MC-3020D: Inputs digital signal (8ch contact input). Contact or voltage input is selectable (contact input requires jumper pins).
- MC-3030D: Outputs digital signal (8ch, normal open/close).

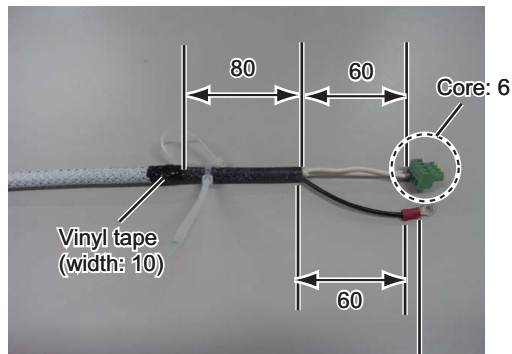
Fabrications

MC1.5-W-L600/1000/2000/3000 cable

(Input)



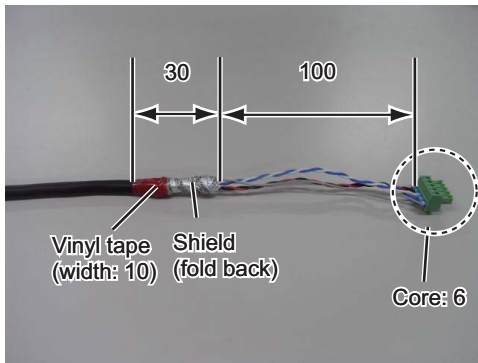
TTYCSLA-1 (MC-3010A)



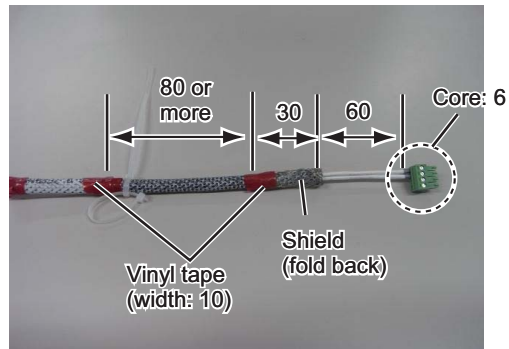
Pass drain wire into vinyl sheath (local supply), then attach crimp-on lug (pre-attached in unit).

MC1.5-W-L600/1000/2000/3000 cable

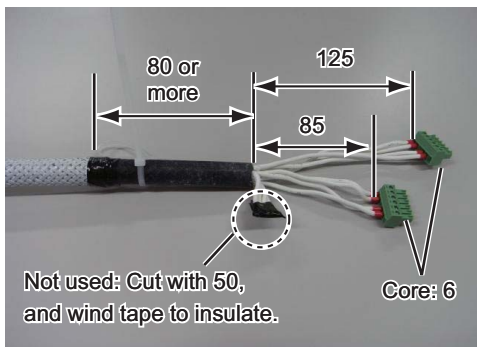
(Output)



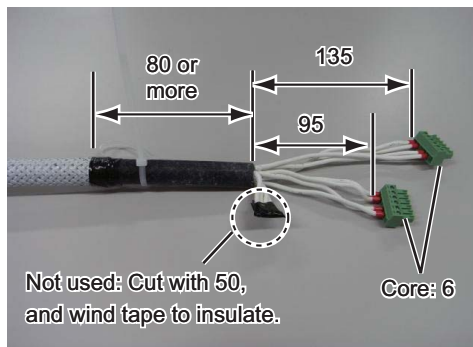
TTYCS-1 (MC-3010A)

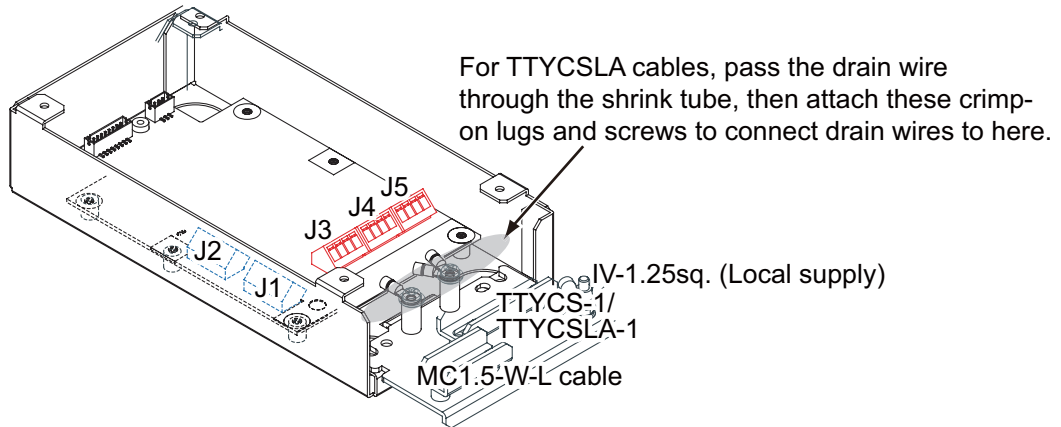


MPYC-12 cable (MC-3030D)

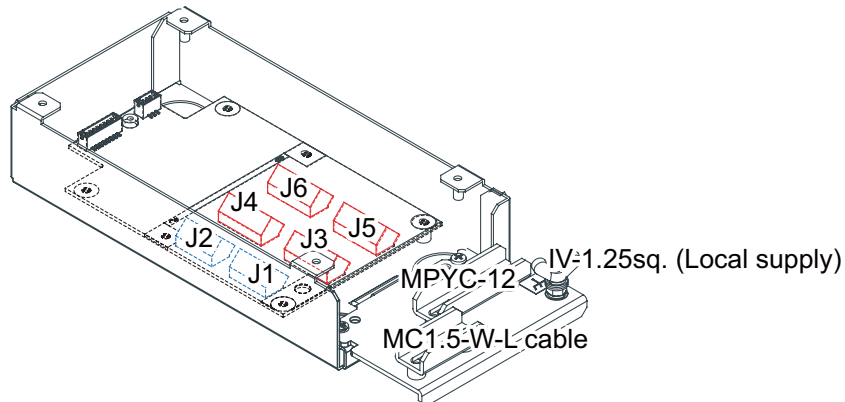


MPYC-12 cable (MC-3020D)



Connection

Note: Fasten the cable shield with the cable clamp.



Note: Fasten the cable shield with the cable clamp.

MC-3020D/3030D

Input method (MC-3010A only)

Select the method of the analog data input, power voltage or power current.

Note 1: The input must not exceed the range of the input voltage, to prevent malfunction.

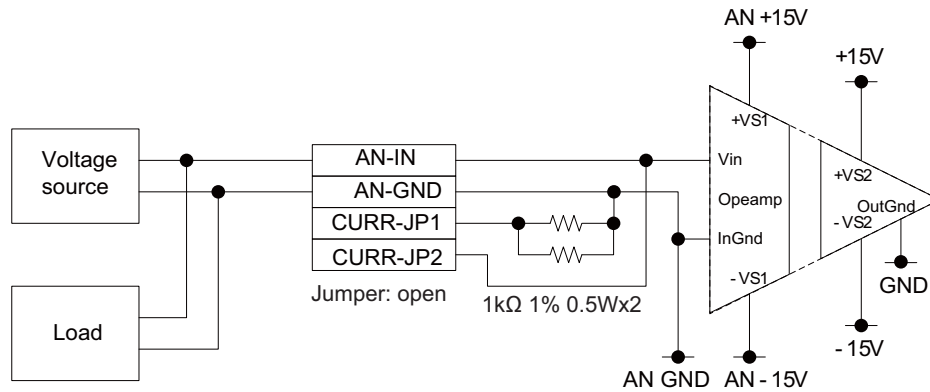
-Setting for voltage input: -10V to +10V or 0 to 10V (depending on the setting)

-Setting for contact input: Voltage 4mA to 20mA.

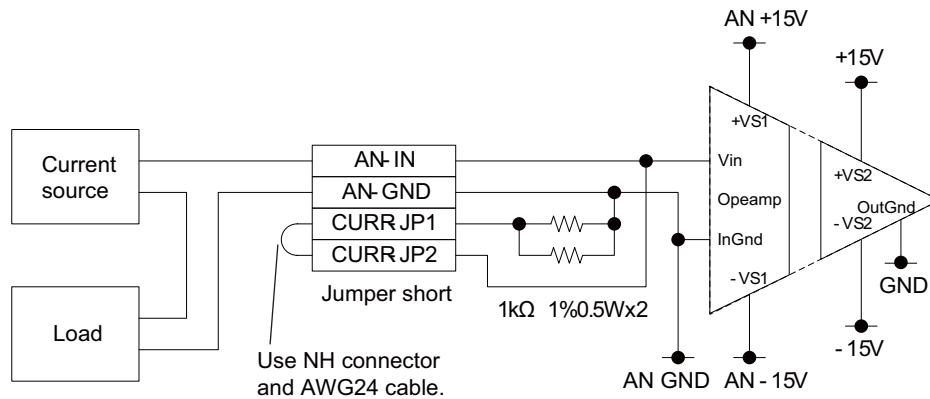
Note 2: When changing the input method, turn off the MC-3010A and on again to put change in effect.

2. WIRING

- Power voltage: Input the amount of power voltage change to the operational amplifier.



- Power current: Pass the power current to the shunt resistor, 1kΩ/parallel (combined resistance: 500Ω) to input the amount of voltage change at the both ends of the resistor to the operational amplifier.



Connector J3

Pin #	Signal name	In/Out	Description	Power voltage	Power current
1	AN1_IN	In	Analog 1 input	TTYCS(LA)-1	
2	AN1_GND	-	Analog 1 GND		
3	CURR1_JP1	-	Analog 1 input, power current/voltage setting jumper 1	Pin #3-#4: open	Pin #3-#4: short
4	CURR1_JP2	-	Analog 2 input, power current/voltage setting jumper 1		

Connector J4

Pin #	Signal name	In/Out	Description	Power voltage	Power current
1	AN2_IN	In	Analog 2 input	TTYCS(LA)-1	
2	AN2_GND	-	Analog 2 GND		
3	CURR2_JP1	-	Analog 2 input, power current/voltage setting jumper 1	Pin #3-#4: open	Pin #3-#4: short
4	CURR2_JP2	-	Analog 2 input, power current/voltage setting jumper 1		

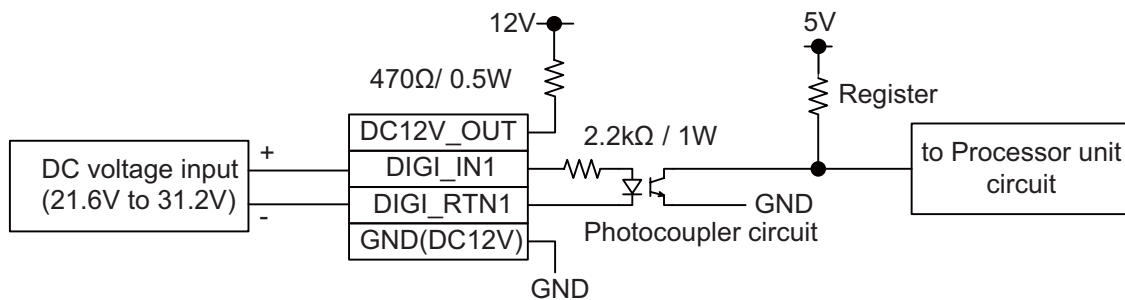
Connector J5

Pin #	Signal name	In/Out	Description	Power voltage	Power current
1	AN3_IN	In	Analog 3 input	TTYCS(LA)-1	
2	AN3_GND	-	Analog 3 GND		
3	CURR3_JP1	-	Analog 3 input, power current/voltage setting jumper 1	Pin #3-#4: open	Pin #3-#4: short
4	CURR3_JP2	-	Analog 3 input, power current/voltage setting jumper 1		

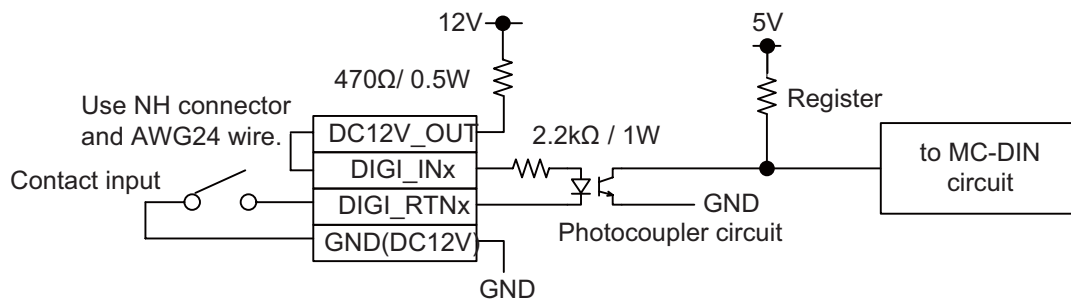
How to set ACK input (MC-3020D)

Use the connectors J3 to J6 on the MC-DIN Board (24P0116) to set the ACK input for ACK1 to ACK8 as shown below.

- Input circuit for voltage input



- Input circuit for contact input



Note 1: The input must not exceed the range of the input voltage, to prevent malfunction.

-Setting for voltage input: 21.6V to 31.2V

-Setting for contact input: Voltage cannot be input (contact signal only).

Note 2: For analog input, see paragraph 2.6.2

Connector J3

Pin #	Signal name	In/Out	Remarks	ACK1 contact	ACK voltage	ACK2 contact	ACK2 voltage
1	DC12V_OUT	Out	ACK1 In	Pin #1-#2: short	No connection	Depending on ACK1 input	
2	DIGI_IN1	In			MPYC-12		
3	DIGI_RTN1	Out		MPYC-12			
4	GND (DC12V)	In		No connection			

2. WIRING

Pin #	Signal name	In/Out	Remarks	ACK1 contact	ACK voltage	ACK2 contact	ACK2 voltage
5	DC12V_OUT	Out	ACK2 In	Depending on ACK2 input		Pin #1-#2: short	No connection
6	DIGI_IN2	In					MPYC-12
7	DIGI_RTN2	Out				MPYC-12	NO connection
8	GND (DC12V)	In					

Connector J4

Pin #	Signal name	In/Out	Remarks	ACK1 contact	ACK1 voltage	ACK2 contact	ACK2 voltage	
1	DC12V_OUT	Out	ACK3 In	Pin #1-#2: short	No connection		-	
2	DIGI_IN3	In			MPYC-12			
3	DIGI_RTN3	Out			MPYC-12			No connection
4	GND (DC12V)	In						
5	DC12V_OUT	Out	ACK4 In		-	Pin #1-#2: short	No connection	
6	DIGI_IN4	In					MPYC-12	
7	DIGI_RTN4	Out				MPYC-12	NO connection	
8	GND (DC12V)	In						

Connector J5

Pin #	Signal name	In/Out	Remarks	ACK1 contact	ACK voltage	ACK2 contact	ACK2 voltage	
1	DC12V_OUT	Out	ACK5 In	Pin #1-#2: short	No connection		-	
2	DIGI_IN5	In			MPYC-12			
3	DIGI_RTN5	Out			MPYC-12			No connection
4	GND (DC12V)	In						
5	DC12V_OUT	Out	ACK6 In		-	Pin #1-#2: short	No connection	
6	DIGI_IN6	In					MPYC-12	
7	DIGI_RTN6	Out				MPYC-12	NO connection	
8	GND (DC12V)	In						

Connector J6

Pin #	Signal name	In/Out	Remarks	ACK1 contact	ACK voltage	ACK2 contact	ACK2 voltage
1	DC12V_OUT	Out	ACK1 In	Pin #1-#2: short	No connection	-	
2	DIGI_IN1	In			MPYC-12		
3	DIGI_RTN1	Out		MPYC-12	No connection		
4	GND (DC12V)	In					
5	DC12V_OUT	Out	ACK2 In	-		Pin #1-#2: short	No connection
6	DIGI_IN2	In				MPYC-12	
7	DIGI_RTN2	Out					
8	GND (DC12V)	In				NO connection	

How to set alarm output (MC-3030D)

Use the connector J3 to J6 on the MC_OUT Board (24P0117) to select NC (normal close) or NO (normal open) for alarm output 1 to 8.

Connector J3

Pin #	Signal name	In/Out	Remarks	Alarm1 NO Out	Alarm1 NC Out	Alarm2 NO Out	Alarm2 NC Out
1	A1	Out	Alarm1 Out	MPYC-12	No connection	-	
2	COM1				MPYC-12		
3	B1			No connection			
4	A2	Out	Alarm2 Out	-		MPYC-12	No connection
5	COM2					MPYC-12	
6	B2					No connection	

Connector J4S

Pin #	Signal name	In/Out	Remarks	Alarm3 NO Out	Alarm3 NC Out	Alarm4 NO Out	Alarm4 NC Out
1	A3	Out	Alarm3 Out	MPYC-12	No connection	-	
2	COM3				MPYC-12		
3	B3			No connection			
4	A4	Out	Alarm4 Out	-		MPYC-12	No connection
5	COM4					MPYC-12	
6	B4					No connection	

2. WIRING

Connector J5

Pin #	Signal name	In/Out	Remarks	Alarm1 NO Out	Alarm1 NC Out	Alarm2 NO Out	Alarm2 NC Out
1	A5	Out	Alarm5 Out	MPYC-12	No connection	-	
2	COM5				MPYC-12		
3	B5			No connection			
4	A6		Alarm5 Out	-		MPYC-12	No connection
5	COM6					MPYC-12	
6	B6			No connection			

Connector J6

Pin #	Signal name	In/Out	Remarks	Alarm7 NO Out	Alarm7 NC Out	Alarm8 NO Out	Alarm8 NC Out
1	A7	Out	Alarm7 Out	MPYC-12	No connection	-	
2	COM7				MPYC-12		
3	B7			No connection			
4	A8		Alarm8 Out	-		MPYC-12	No connection
5	COM8					MPYC-12	
6	B8			No connection			

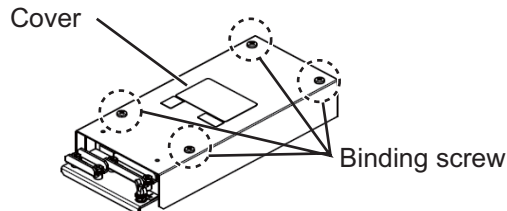
Case packing OP24-29

The optional kit OP24-29 protects the connectors on the MC-3010A/3020D/3030D to waterproofing standard IPX2.

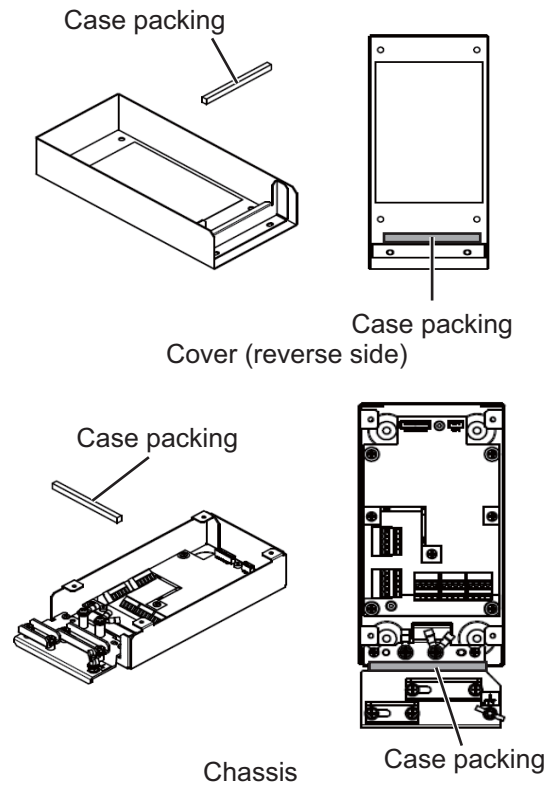
Case packing (type: OP24-29, code no.: 001-169-970)

Name	Type	Code No.	Qty	Remarks
Case packing (analog)	21-014-2052-2	100-367-961-10	2	MC-3010A/3020D/3030D

1. Unfasten four binding screws to remove the cover from the adapter.



2. Peel the paper from the case packing, then attach the case packing to the reverse side of the cover and the body unit as shown below.

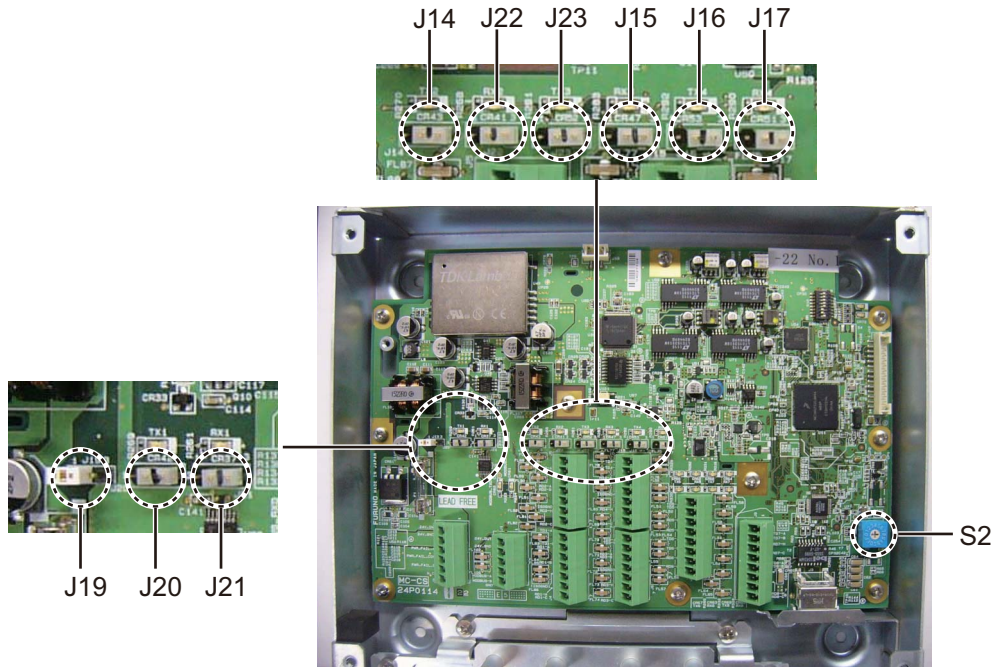


3. Attach the cover to the MC-3010A/3020D/3030D chassis.

2.6.3 How to set jumper blocks in the sensor adapters

MC-3000S

See the jumper blocks in the MC-CS Board (24P0114) referring to the tables that follow.



MC-CS Board (24P0114)

Rotary switch: Use the rotary switch (S2) to set the Modbus address when setting connectors J4/J5 to Modbus. The Modbus address set at J4/J5 in the network is not used. When setting J4/J5 to IEC61162-1/2, use the default setting (“0”).

Jumper block:

Use the jumper block J19 to set the termination resistor on/off for the MODBUS communication on the connector J1. For the first and last sensor adapter in a series, their termination resistors should be set to ON. Use the MC-CS Board with the default setting because it becomes the “first” adapter in a series.

Jumper block J19		Connector J1
1-2	SHORT	Termination resistor: ON (default setting)
2-3	OPEN	
1-2	OPEN	Termination resistor: OFF
2-3	SHORT	

Set the jumper blocks J14 through J17 to turn the termination resistors on connectors J4 through J7 respectively.

(Termination resistor ON)

- When setting the starting/ending terminal for the multipoint, or the multipoint is not connected (CH1 to 4).
- When setting the starting/ending terminal for Modbus (CH1, CH2)

(Terminal resistor OFF)

- When setting the terminal other than starting/ending for the multipoint (CH1 to 4).
- When setting the terminal other than starting/ending for Modbus (CH1/CH2)

Jumper block J14		Connector J4 (CH1)
1-2	SHORT	Termination resistor: ON (default setting)
2-3	OPEN	
1-2	OPEN	Termination resistor: OFF
2-3	SHORT	

Jumper block J15		Connector J5 (CH2)
1-2	SHORT	Termination resistor: ON (default setting)
2-3	OPEN	
1-2	OPEN	Termination resistor: OFF
2-3	SHORT	

Jumper block J16		Connector J6 (CH3)
1-2	SHORT	Termination resistor: ON (default setting)
2-3	OPEN	
1-2	OPEN	Termination resistor: OFF
2-3	SHORT	

Jumper block J17		Connector J7 (CH4)
1-2	SHORT	Termination resistor: ON (default setting)
2-3	OPEN	
1-2	OPEN	Termination resistor: OFF
2-3	SHORT	

Set the jumper blocks J20 and J21 to choose the communication type (IEC-61162-1/2 or MODBUS) of the connector J4 (CH1).

The setting of the jumper block JP20 and JP21 must be identical.

Jumper block J20/J21		Communication type of J4 (between RD1 and TD1)
1-2	OPEN	IEC-61162-1/2 (default setting)
2-3	SHORT	
1-2	SHORT	MODBUS (The setting of J14 is different depending on the unit position (starting/ending terminal).)
2-3	OPEN	

The jumper blocks J22 and J23 are used to set the communication type of the connector J5 (CH2).

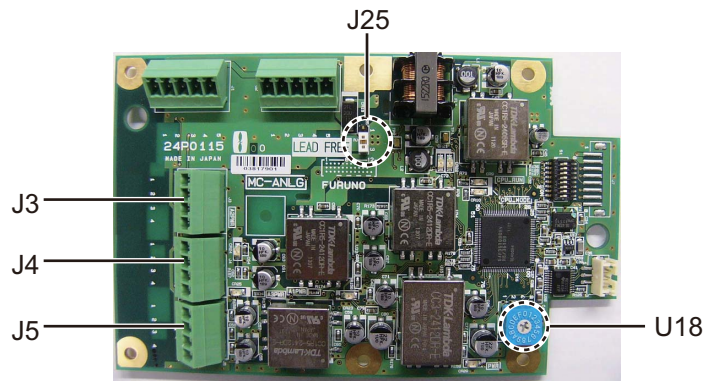
Jumper block J22/J23		Communication type of J5 (between RD2 and TD2)
1-2	OPEN	IEC-61162-1/2 (default setting)
2-3	SHORT	
1-2	SHORT	MODBUS (The setting of J14 is different depending on the unit position (starting/ending terminal).)
2-3	OPEN	

2. WIRING

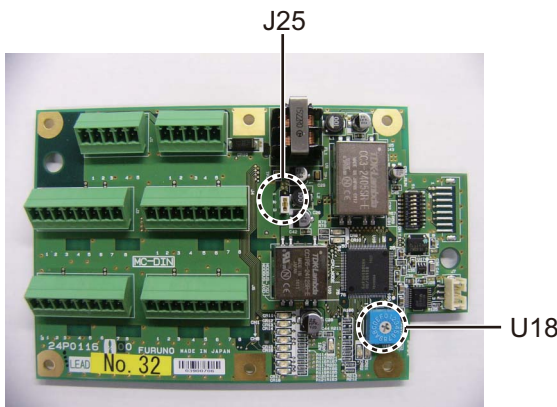
MC-3010A/3020D/3030D

This paragraph shows how to set the MC-ANLG Board (24P0115, for MC-3010A), MC-DIN Board (24P0116, for MC-3020D) and MC-DOUT Board (24P0117, for MC-3030D).

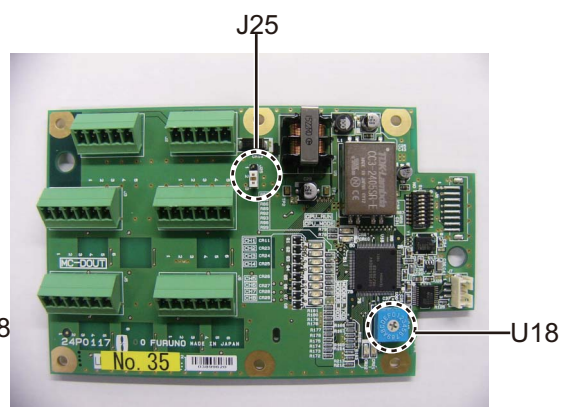
Rotary switch: Use the rotary switch (U18) to set the MODBUS address with a digit of number from “0”. When multiple sensor adapters are connected to the MC-3000S, the same number cannot be used among them. (It is allowed to use the same number between the MC-3000S and a sensor adapter.)



MC-ANLG Board (24P0115)



MC-DIN Board (24P0116)



MC-DOUT Board (24P0117)

Jumper block

Use the jumper block J25 to set the termination resistor on/off for the MODBUS communication on the connector J1. For the first and last sensor adapter in a series, their termination resistors should be set to ON. If not, communication between sensor adapters is not possible.

Jumper block J25		Connector J1
1-2	OPEN	Termination resistor: ON (default setting)
2-3	SHORT	
1-2	SHORT	Termination resistor: OFF
2-3	OPEN	

Input method (MC-3010A only)

Select the method of the analog data input, power voltage or power current.

Note 1: The input must not exceed the range of the input voltage, to prevent malfunction.

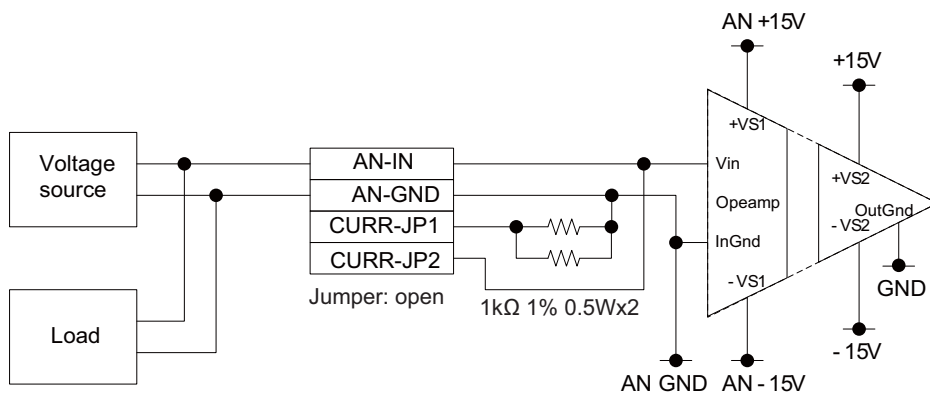
-Setting for voltage input: -10V to +10V or 0 to 10V (depending on the setting)

-Setting for contact input: Voltage 4mA to 20mA.

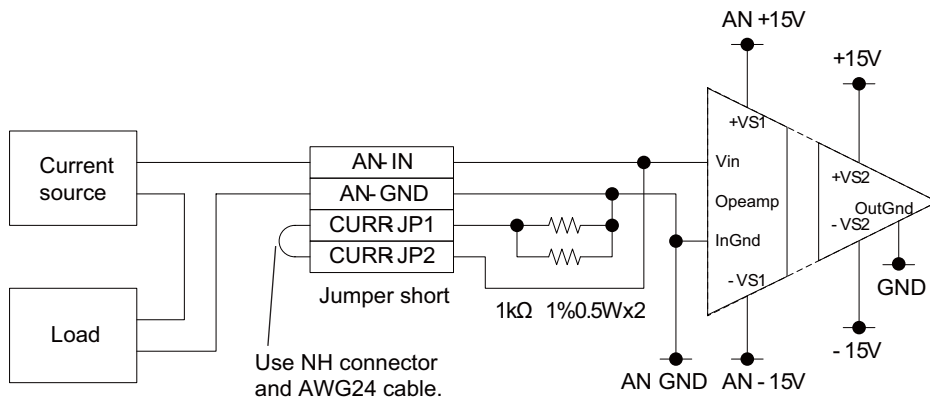
Note 2: When changing the input method, turn off the MC-3010A and on again to reflex it.

Jumper block J3 to J5		Input method
3-4	OPEN	Power voltage (default setting)
	SHORT	Power current

- Power voltage: Input the amount of power voltage change to the operational amplifier.

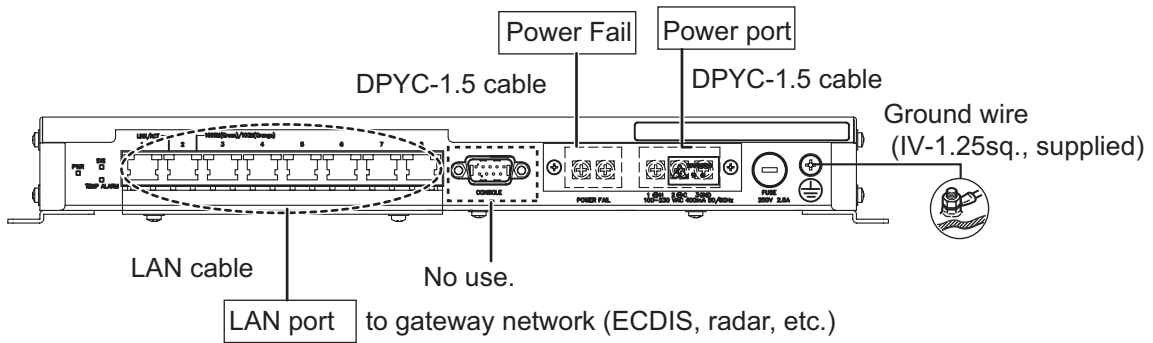


- Power current: Pass the power current to the shunt resistor, 1kΩ/parallel (combined resistance: 500Ω) to input the amount of voltage change at the both ends of the resistor to the operational amplifier.

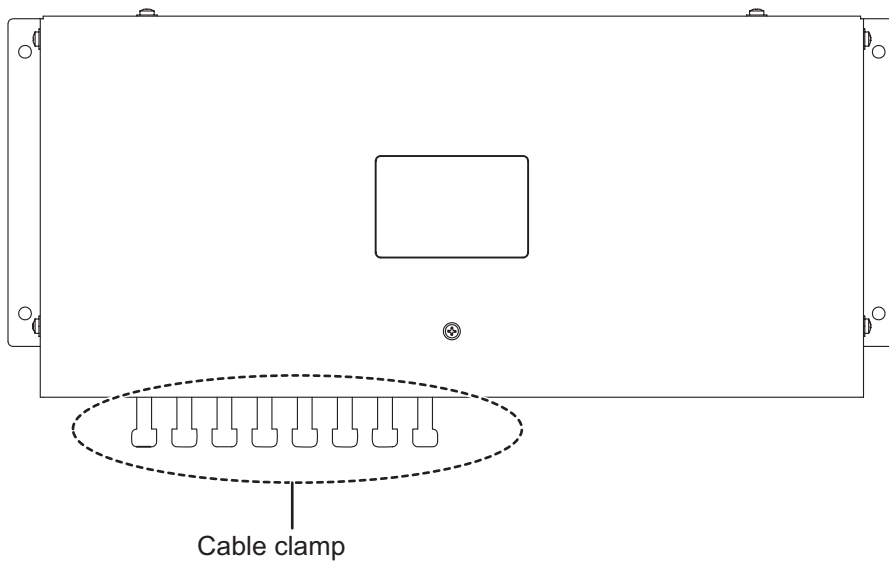


2.7 Intelligent HUB HUB-3000 (option)

Fix the LAN cable connected to the cable clamp using the cable ties (supplied).



Attach the LAN cap (supplied) to the unused connector holes to provide waterproofing standard IPX2.



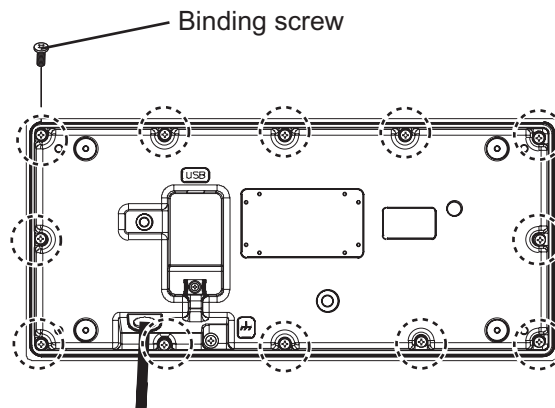
2.8 How to Extend the Control Unit Cable (option)

To extend the length of the cable between the control unit and the processor unit, use the optional cable assy 6TPSH-XH12X2-LxxSP1 (for RCU-024) or 6TPSH-XH12X2-LxxSP2 (for RCU-026). You can select the cable length from among 10, 20 and 30 m.

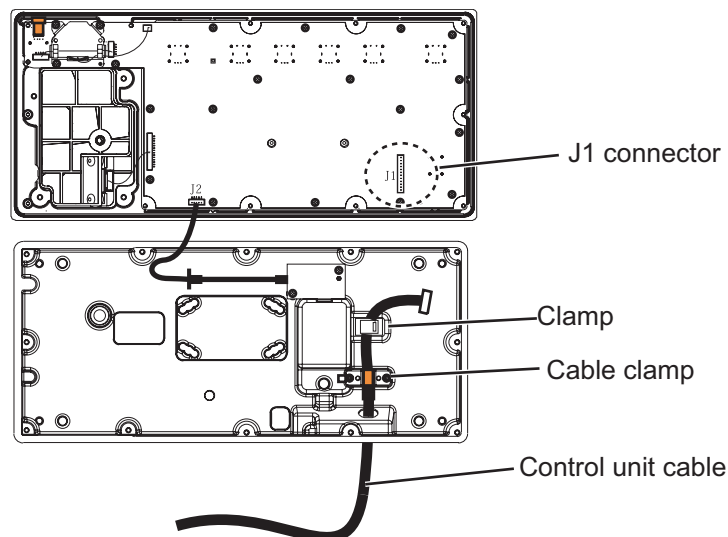
2.8.1 RADAR control unit (RCU-025)

1. Unfasten 12 binding screws (M3x8) from the bottom of the control unit to remove the cover.

Note: Do not add stress to the cables connected to the control unit board when removing the cover.



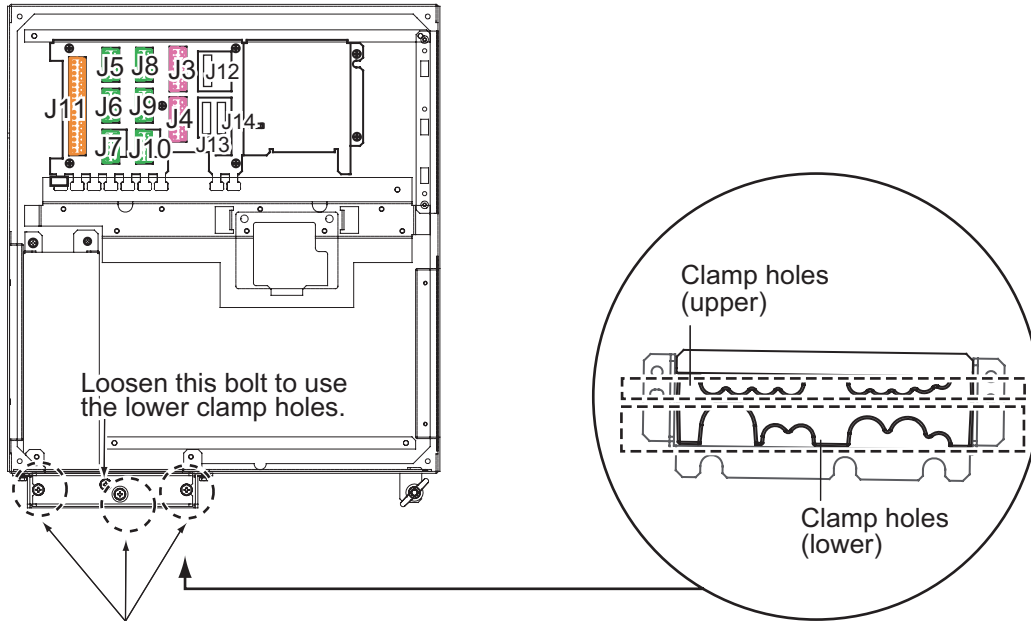
2. Unfasten two pan head screws (M3x12) to remove the clamp and cable clamp from the control unit, then disconnect the control unit cable from the J1 connector.



3. Pull out the control unit cable from the cover.
4. Pass the optional cable assy (6TPSH-XH12X2-LxxSP1) through the cable hole on the control unit.
5. Fasten the shield part of the cable assy with the cable clamp (removed at step 2), then connect the connector at the end of the cable assy to the J1 on the control unit board.
6. Reattach the control unit cover.
7. Unfasten four screws (M4x8) to remove the processor unit cover.

2. WIRING

8. Unfasten three bolts to remove the cable clamp (upper) as shown below.



Loosen these three bolts to remove the upper plate.

9. Disconnect the control unit cable from the processor unit, then connect the cable assy (6TPSH-XH12X2-LxxSP1).
10. Set the shield part of cables under the cable clamp then tighten the cable clamp.



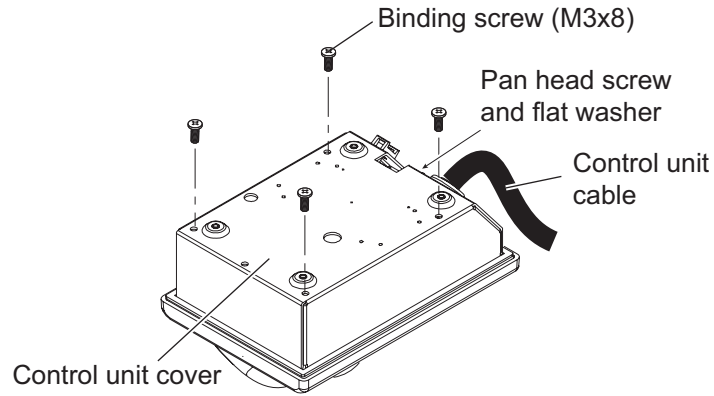
Lay shields of cables under this clamp then tighten the clamp.

11. Attach the processor unit cover.

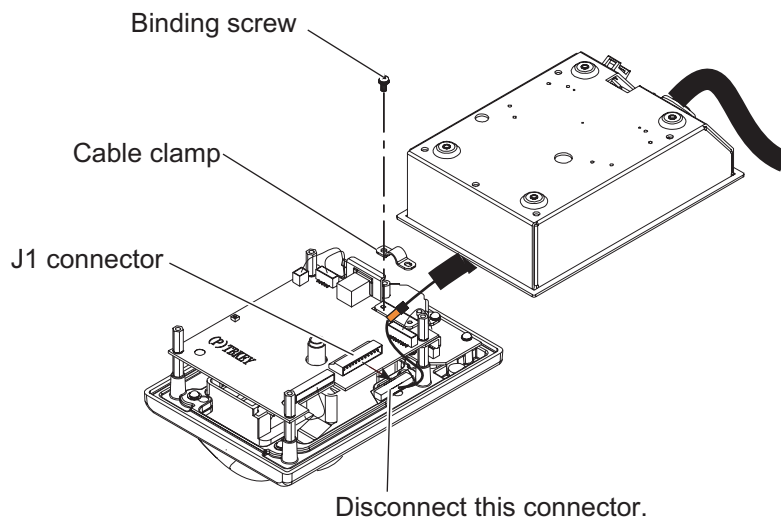
2.8.2 Trackball control unit (RCU-026)

1. Unfasten four binding screws (M3x8) from the bottom of the control unit, and a pan head screw (M3x8) and flat washer from the back of the control unit to remove the cover.

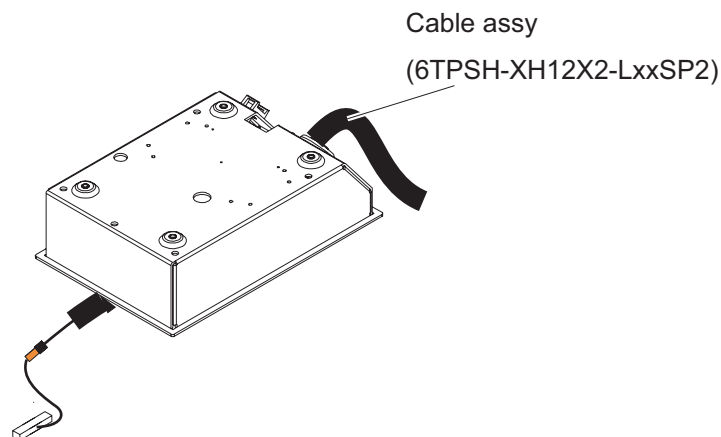
Note: Be careful not to add stress to the cables connected to the control unit board when removing the cover.



2. Remove the cable clamp from the control unit, then disconnect the control unit cable from the J1 connector.



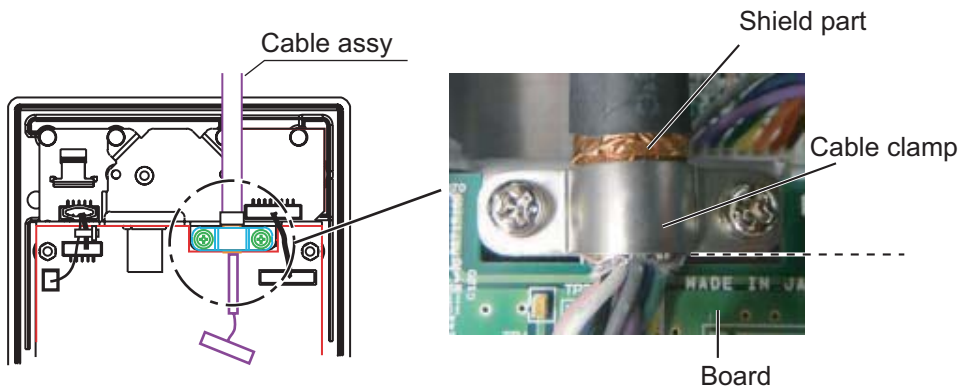
3. Pull out the control unit cable from the cover.
4. Pass the optional cable assy (6TPSH-XH12X2-LxxSP2) through the cable hole on the cover.



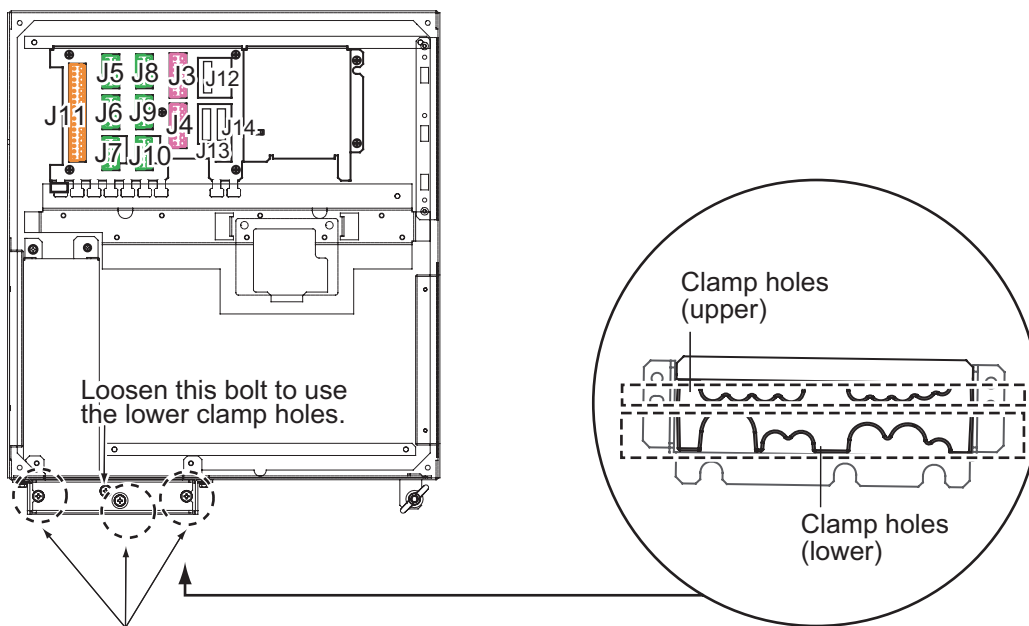
5. Fasten the shield part of the cable assy with the cable clamp (removed at step 2), then connect the connector at the end of the cable assy to the J1 on the control unit board.

Note: When clamping, the shield part of the cable must not touch the circuit board.

2. WIRING



6. Reattach the control unit cover.
7. Unfasten four screws (M4x8) to remove the processor unit cover.
8. Unfasten three bolts to remove the cable clamp (upper) as shown below.



Loosen these three bolts to remove the upper plate.

9. Disconnect the control unit cable from the processor unit, then connect the cable assy (6TPSH-XH12X2-LxxSP2).
10. Set the shields of cables under the cable clamp then tighten the cable clamp.



11. Remount the processor unit cover.

3. SETTING AND ADJUSTMENTS

Note: After completing the settings and adjustments, copy the setting data to a USB flash memory, referring to the Operator's Manual.

3.1 Radar Setting

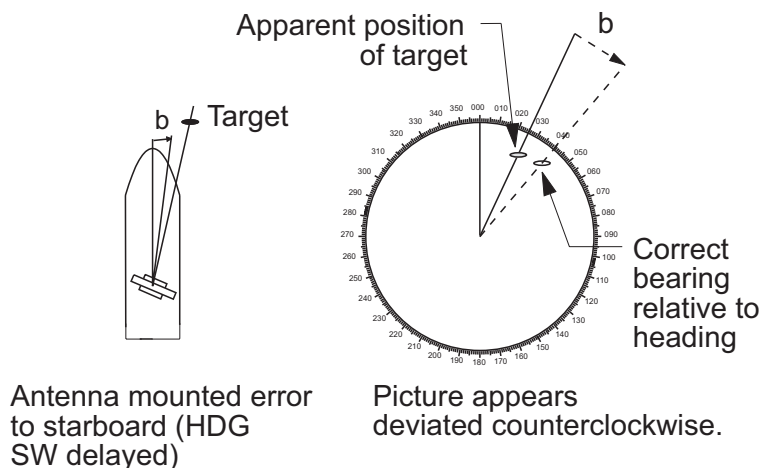
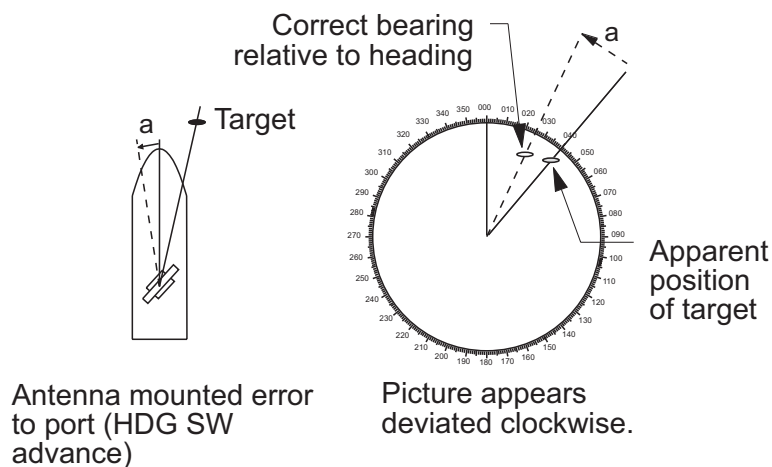
3.1.1 How to access to the installation menu

After completing the installation, press the **MENU** key five times while pressing the **1 HL OFF** key down to show the [RADAR INSTALLATION] on the main menu.

3.1.2 Heading alignment

You have mounted the antenna unit facing straight ahead in the direction of the bow. Therefore, a small but conspicuous target dead ahead visually should appear on the heading line (zero degrees).

In practice, you will probably observe some small bearing error on the display because of the difficulty in achieving accurate initial positioning of the antenna unit. The following adjustment will compensate for this error.



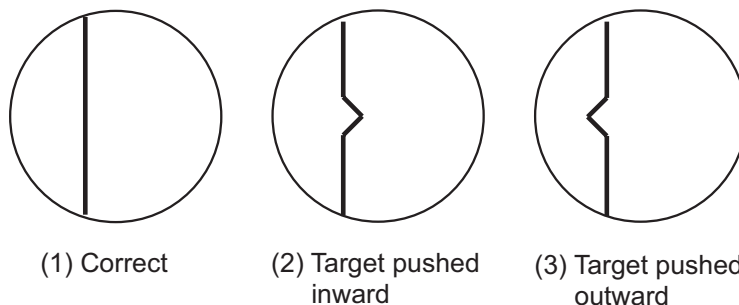
3. SETTING AND ADJUSTMENTS

1. Select a stationary target echo at a range between 0.125 and 0.25 nm, preferably near the heading line.
2. Operate the EBL control to bisect the target echo.
3. Read the target bearing.
4. Measure the bearing of the stationary target on the navigation chart and calculate the difference between actual bearing and apparent bearing on the radar screen.
5. Show the [RADAR INSTALLTION] menu.
6. Select [1 ECHO ADJ] and [2 HD ALIGN] in that order.
7. Key in the bearing difference. The setting range is 0 to 359.9°.
8. Confirm that the target echo is displayed at correct bearing on the screen.

3.1.3 Adjustment sweep timing

Sweep timing differs with respect to the length of the signal cable between the antenna unit and the processor unit. Adjust sweep timing at installation to prevent the following symptoms:

- The echo of a “straight” target (for example, pier), on the 0.25 m range, will appear on the display as being pulled inward or pushed outward. See Figure below.
- The range of target echoes will also be incorrectly shown.



1. Transmit on the 0.25 nm range.
2. Adjust radar picture controls to display picture properly.
3. Select a target echo which should be displayed straightly.
4. Show the [RADAR INSTALLATION] menu, then select [1 ECHO ADJ] and [3 TIMING ADJ] in that order.
5. Set a suitable value which causes the target to be displayed straightly. The setting range is 0 to 4095.

3.1.4 Suppressing main bang

If main bang appears at the screen center, suppress it as follows.

1. Transmit the radar on a long range and then wait ten minutes.
2. Adjust gain to show a slight amount of noise on the display.
3. Select the 0.25 nm range. Suppress sea clutter.
4. Show the [RADAR INSTALLATION] menu, then select [1 ECHO ADJ] and [4 MBS] in that order.
5. Set a suitable value so that the main bang disappears. The setting range is 0 to 255.

3.1.5 Other settings

ECHO ADJ menu setting

CABLE ATT ADJ

Before adjusting, set the radar as follows:

IR: 2, ES: off, EAV: off, 24 nm range, long pulse

To adjust the cable attenuation manually, select MANUAL. Then, rotate the wheel so that noise just appears on the screen when the gain is set to 80. Default setting is 30 for the antenna cable length of 15 m. The setting range is 0 to 73. To adjust automatically, select AUTO. The message "CABLE ATT ADJ" appears in red at the bottom of the screen. It takes about five minutes to complete the adjustment, after which the radar goes into stand-by.

NEAR STC CURVE, MID STC CURVE and FAR STC CURVE

Use the default setting. Change the setting if desired according to sea condition.

RING SUPPRESSION

This is mainly used to remove "ring" noise which appears in the waveguide-type radar. Adjust so the rings disappear at the range of 0.125 nm. The setting range is 0 to 255.

SCANNER menu settings

BLIND SECTOR 1 and BLIND SECTOR 2

Set area (up to 2) where no radar pulses will be transmitted, and heading should be adjusted before setting any blind sector. For example, set the area where an interfering object at the rear of the scanner would produce a dead sector (area where no echoes appear) on the display. To enter an area, enter start bearing relative the heading and dead sector angle. To erase the area, enter 0 for both the START and ANGLE sections. The setting range of START is 0 to 359° and ANGLE is 0 to 180°.

ANT REVOLUTION

This menu item is used for 42 rpm antenna unit. The default is AUTO, where antenna revolution speed is high for short range setting and low speed for long range setting. When LO is selected, the antenna always rotate in 36 rpm, and HI, 42 rpm.

ANT SW and ANT STOPPED

This is used for antenna maintenance by serviceman.

Note: Select OFF at ANT SW to prevent the antenna rotation. As for ANT SPEED, select STBY to prevent transmission while the antenna is stopped.

3. SETTING AND ADJUSTMENTS

INSTALLATION menu setting

RANGE UNIT

Select NM*, SM, km or kyd (kilo yard) as appropriate.

*IMO type: NM only

MODEL

Confirm the model of your radar. If the setting of this item is different from your model (combination of the antenna unit), the radar functions abnormally.

TYPE

Select type of radar: IMO, A or B.

ON TIME and TX TIME

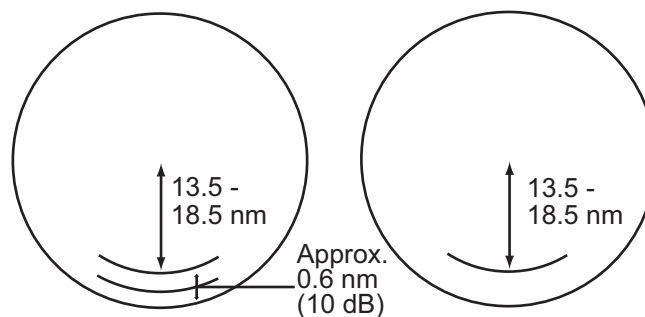
These items show number of hours the radar has been turned on and transmitted, respectively. Value can be changed; for example, after replacing magnetron TX Time can be reset to 0.

PM GAIN ADJ

When you choose this item, the radar setting changes as follows.

RANGE: 24 NM, PULSE* LONG, BLIND SECTOR: OFF, STC: OFF, by Manual, RAIN: OFF by Manual, ECHO AVERAGE: OFF, VIDEO CONTRAST: 2-B

1. Adjust the GAIN control so that a slight amount of white noise appears on the screen. Arcs for performance monitor appear on the screen (Fig. 1).
2. Adjust PM FGAIN ADJ so that outer arc just disappears (Fig. 2). The setting range is 0 to 255.



TT PRESET menu setting

TTM/TTD REFERENCE

Set the output format (bearing) of tracked targets.

- Bearing: REL (Target bearing from own ship, degree relative, target course, degree relative), TRUE (Target bearing, degree true, target course, degree true)

MAX RANGE

Select the target tracking range, 24 or 32 nm.

QV DISPLAY

OFF: Normal picture, ON: Quantized picture; always off at power on

QV ECHO LEVEL

Set the detection level of echoes. The setting range is 1 to 31.

TT W/O GYRO

If a gyrocompass is not connected, select the TT function, ON (working) or OFF (no working).

ACQ PRESET

Show the ACQ PRESET menu.

- LAND SIZE: Set the land size in units of 100 m. The setting range is 100 to 3000 m.
- ANT SELECT: Set the antenna radiator type of your radar.
- AUTO ACQ CORRE: Set the correlation count of automatic acquisition. The setting range is 3 to 10.
- AUTO ACQ WEED: Set the cancel count of automatic acquisition. The setting range is 1 to 5.

TRACK PRESET

Show the TRACK PRESET menu.

- GATE SIZE: Set the gate size among S, M, L or LL.
- FILTER RESPONSE: Set the filter response function. The setting range is 1 to 4.
- LOST COUNT: Set the lost count. The setting range is 1 to 20.
- MAX SPEED: No use.
- TRACKING MODE: Set the tracking mode among 1 to 4.
- START TIME TGT VECT: Choose time which a vector appears after acquisition, TIME or SCAN and set seconds or scan counts.

TT SENSOR DATA

Show the TT status.

TT DETAIL DATA

Show the information for TT target.

DEFAULT

Restore the TT setting to the default setting.

3. SETTING AND ADJUSTMENTS

OTHER menu setting

DEMO ECHO

Turn the demonstration echo on of EG (Echo Generator), TT, TEST or PC.

EAV W/O GYRO

If a gyrocompass is not connected, select the echo average function, ON (working) or OFF (no working).

TT CATEGORY SELECT

Select CAT 1 or CAT 2/3 depending on your ship's size.

- CAT 1: All ships over than 10,000 GT
- CAT 2: All ships between 500 and 10,000 GT
- CAT 3: All ships less than 500 GT

4. INSTALLING OPTIONAL EQUIPMENT (for RADAR)

4.1 Gyro Converter GC-10

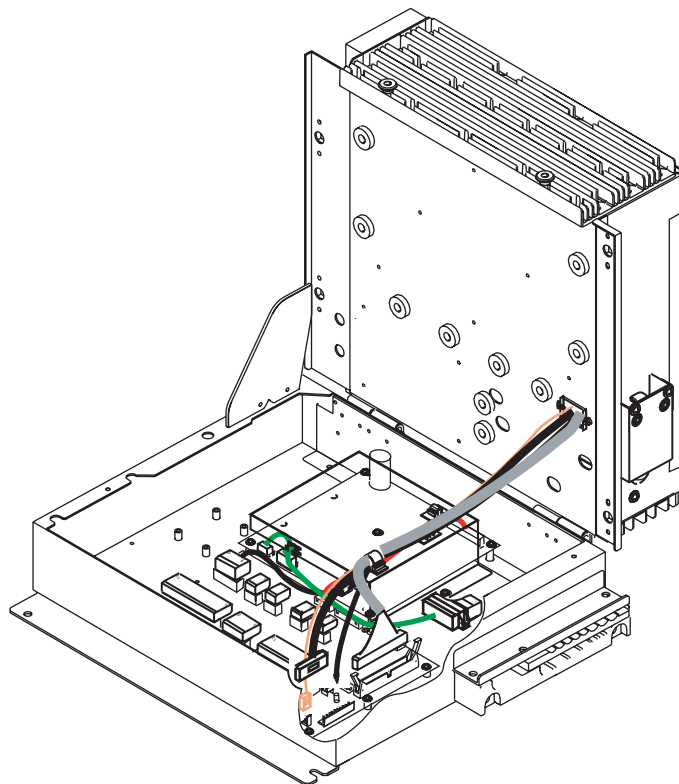
The Gyro Converter GC-10, incorporated inside the radar processor unit, converts analog gyrocompass reading into digital coded bearing data for display on the radar screen.

This section explains how to install the GC-10 (mainly consisting of the GYRO CONVERTER board) and set it up according to gyrocompass connected.

4.1.1 Installing the GYRO CONVERTER board

Necessary parts: GC-10-2 (Code number: 000-080-440)

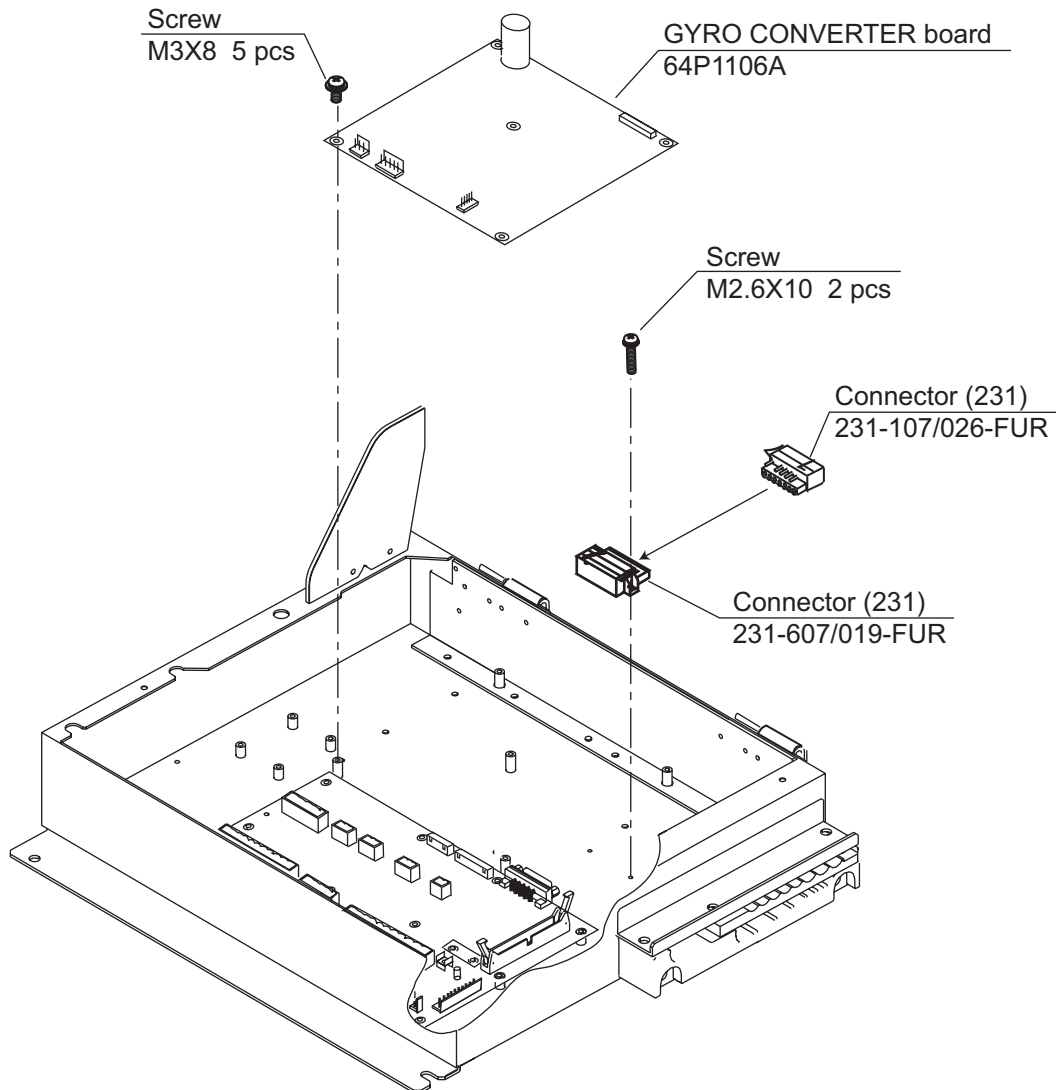
1. Open the processor unit.



Radar processor unit (opened)

4. INSTALLING OPTIONAL EQUIPMENT (for RADAR)

2. Fasten the GYRO CONVERTER board in the radar processor unit with five washer head screws and male connector 231-607/019-FUR (called J602) with two screws.

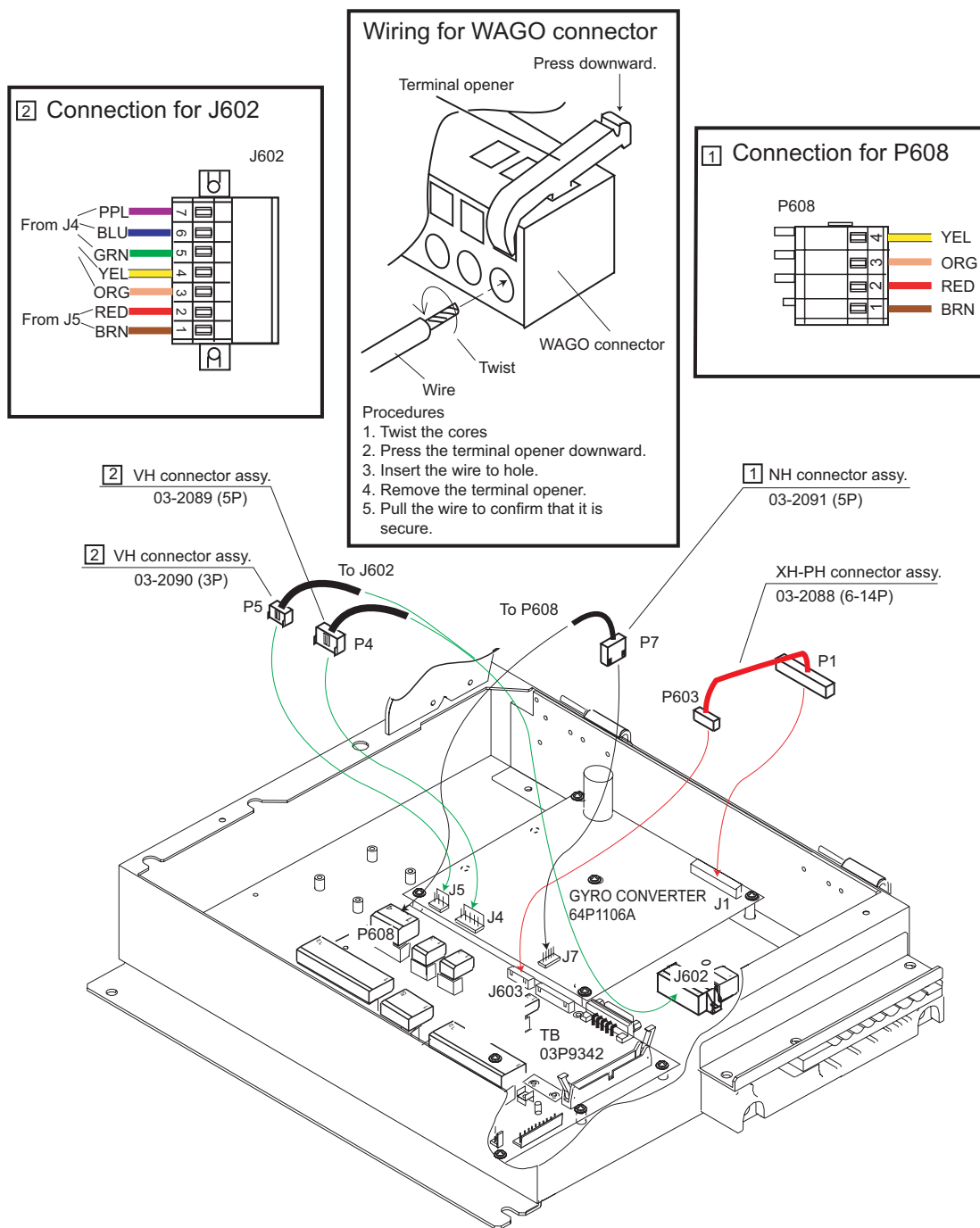


Attaching the GYRO CONVERTER board in the radar processor unit

3. Connect the GYRO CONVERTER board and the 03P9342 board with connector assemblies 03-2088 and 03-2091.

4. INSTALLING OPTIONAL EQUIPMENT (for RADAR)

- Connect the GYRO CONVERTER board and J602 with two connector assemblies 03-2089 and 03-2090.

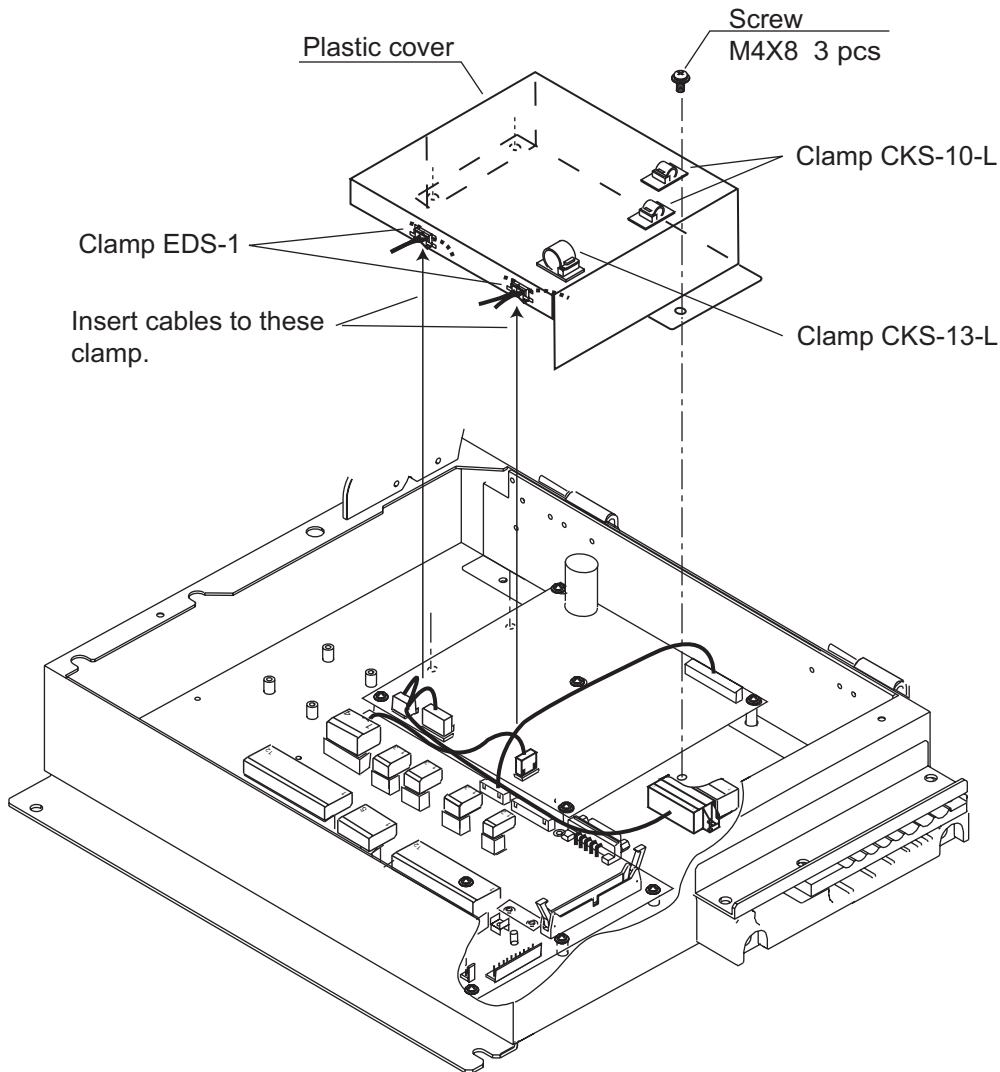


Connecting connector assemblies

- Confirm gyrocompass specifications and set up the DIP switches and jumper wires on the GYRO CONVERTER board according to gyrocompass connected:
 - Setting jumper wires and DIP switches by gyrocompass specifications: page 4-5
 - Setting jumper wires and DIP switches by make and model of gyrocompass: page 4-7
 - Location of jumper wires and DIP switches: page 4-8
- Pass gyrocompass cable through the cable clamp and connect it to connector J602 as shown in the figure on page 4-3.

4. INSTALLING OPTIONAL EQUIPMENT (for RADAR)

7. Attach the clamps on the plastic cover and then attach the cover to the GYRO CONVERTER board as shown in the figure below. Insert cables to the clamp EDS-1, respectively.



Attaching plastic cover for GYRO CONVERTER board

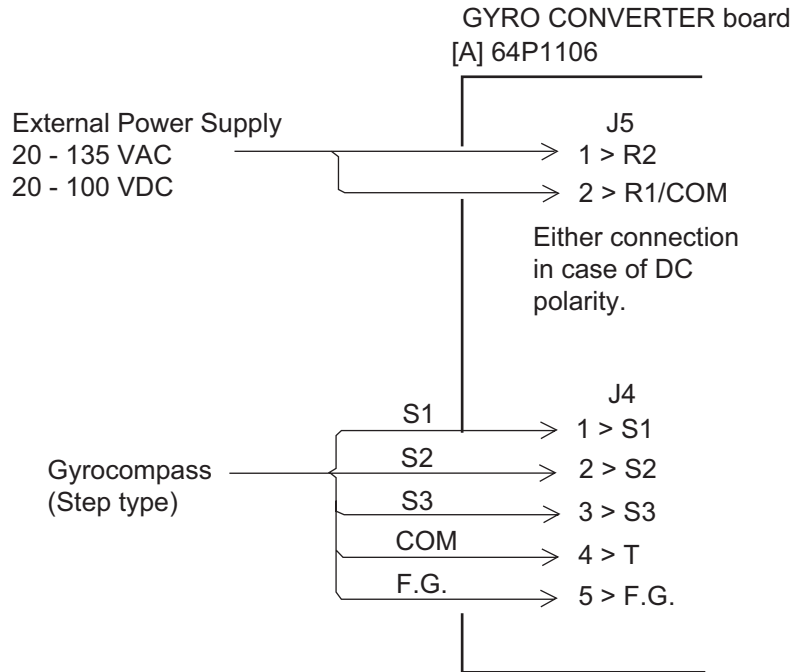
8. Close the radar processor unit.

4.1.2 Connection of external power supply

An external power supply is necessary when the repeater signal is step-by-step type and the step voltage is below 20V or output voltage is less than 5W.

1. Cut jumper wire JP1 on the GYRO CONVERTER board when an external power supply is used.

2. Connect gyro cable and power cable as shown below.



Connection of external power supply to GYRO CONVERTER board

4.1.3 DIP switch, jumper wire settings

Default setting

The gyro converter GC-10 is set at the factory for connection with the gyrocompass specifications below.

- AC synchronous signal: 50/60 Hz
- Rotor voltage: 60V to 135VAC
- Stator voltage: 60V to 135VAC
- Gear ratio: 360x
- Supply voltage: 30V to 135VAC

If the specifications of the gyrocompass differ from those mentioned above, change jumper wire and DIP switch settings on the GYRO CONVERTER board. Settings may be changed according to gyrocompass specifications or make and model of gyrocompass.

Note: If you change the setting with power supplied, set #8 of SW2 from OFF to ON, then OFF again.

4. INSTALLING OPTIONAL EQUIPMENT (for RADAR)

Setting method 1: DIP switch settings and gyrocompass specifications

1) Gyrocompass type

Gyrocompass type	SW1-4	SW1-5	SW1-6	JP1
AC synchronous	OFF	OFF	OFF	#1, #2, #3
DC synchronous	OFF	OFF	OFF	#2, #3, #4
DC step	ON	OFF	OFF	#4, #5, #6
Full-wave pulsating current	OFF	ON	OFF	#4, #5, #6
Half-wave pulsating current	ON	ON	OFF	#4, #5, #6

2) Frequency

Frequency	SW1-7	SW1-8	Remarks
50/60 Hz	OFF	OFF	AC synchronous pulsating current
400 Hz	ON	OFF	AC synchronous pulsating current
500 Hz	OFF	ON	AC synchronous pulsating current
DC	ON	ON	DC synchronous DC step

3) Rotor Voltage (between R1 & R2)

Rotor Voltage	SW2-1	JP3
20 to 45 VAC	ON	#2
30 to 70 VAC	OFF	#2
40 to 90 VAC	ON	#1
60 to 135 VAC	OFF	#1

4) Stator Voltage (between S1 & S2)

Stator Voltage	SW2-2	SW2-3	JP2
20 to 45 VAC, or 20 to 60 VDC	ON	OFF	#2
30 to 70 VAC, or 40 to 100 VDC	OFF	OFF	#2
40 to 90 VAC	ON	OFF	#1
60 to 135 VAC	OFF	OFF	#1

5) Ratio

Ratio	SW1-1	SW1-2	SW1-3
360X	OFF	OFF	OFF
180X	ON	OFF	OFF
90X	OFF	ON	OFF
36X	ON	ON	OFF

6) Supply Voltage

Stator Voltage	JP4	JP5
20 to 45 VAC, or 20 to 60 VDC	#2	#2
30 to 70 VAC, or 40 to 100 VDC	#1	#1

7) AD-10 format data (Tx interval)

Select data transmitting interval for ports 1 to 6 with jumper wires JP6 and JP7: #25 for 25 ms, #200 for 200 ms.

Note: The Tx interval is available in 25 msec or 200 msec. Use 25 msec for radar.

8) NMEA-0183 (Tx interval and Output sentence)

Tx interval	SW2-5	SW2-6	Output sentence
1 s	OFF	OFF	HDT+VHW
200 ms	ON	OFF	HDT
100 ms	OFF	ON	HDT
25 ms	ON	ON	HDT

4. INSTALLING OPTIONAL EQUIPMENT (for RADAR)

9) NMEA-0183
Version no.

Version no.	SW3-1
1.5	OFF
2.0	ON

10) NMEA-0183
Baud rate

Band rate	SW3-2
4860bps	OFF
38400bps	ON

11) Power fail
detection

Talker.	SW3-3
Disable	OFF
Enable	ON

12) Stator signal
breaking detection

Detection	SW2-7
Execute	OFF
No execute	ON

(Use OFF for radar.) SW2-4: factory use only
SW3-4: not used

Setting method 2: by maker and model of gyrocompass

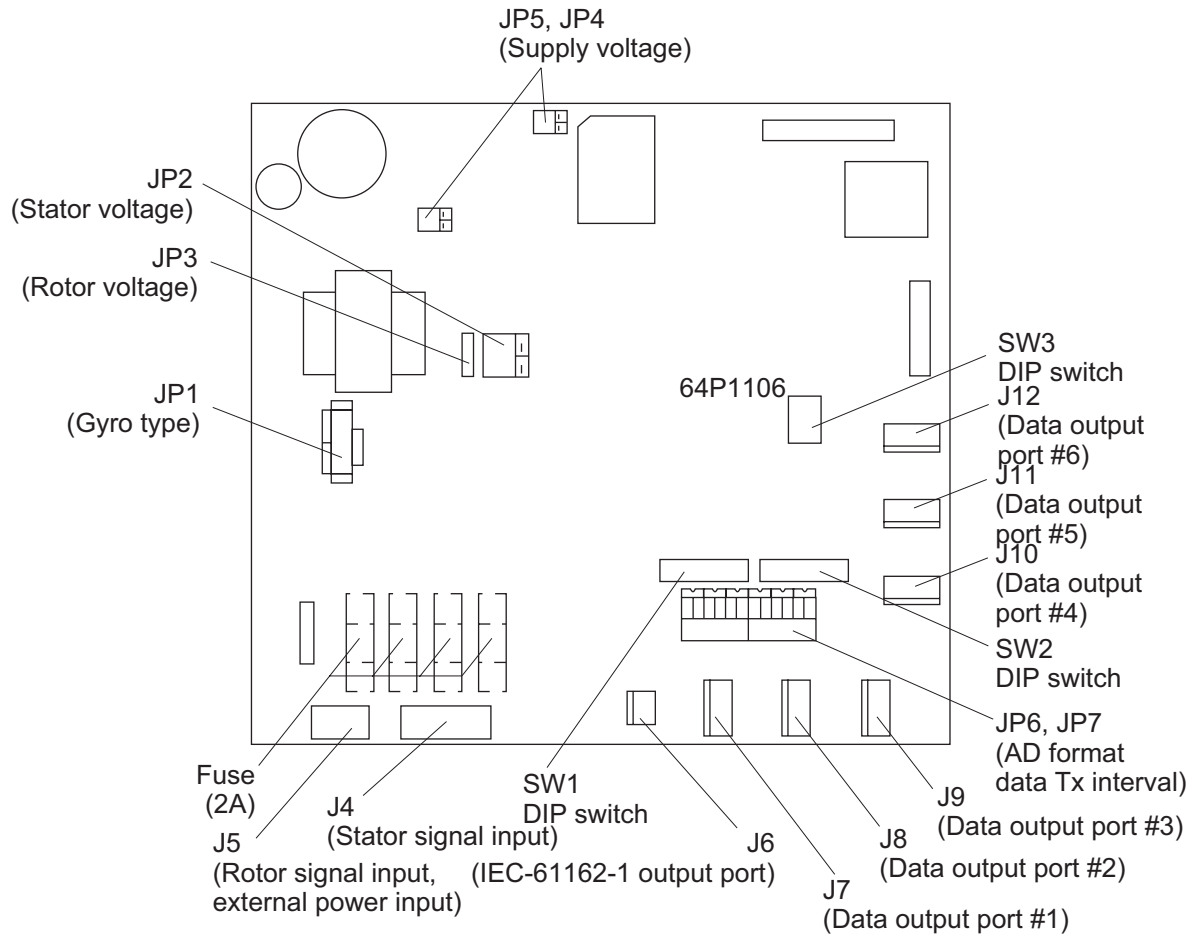
Maker	Models	Specification	SW 1-1	SW 1-2	SW 1-3	SW 1-4	SW 1-5	SW 1-6	SW 1-7	SW 1-8	SW 2-1	SW 2-2	SW 2-3	JP1	JP2	JP3	JP4	JP5	
Anschutz	Standard 2,3	AC synchronous 50/60Hz Rotor voltage: 50/60V Stator voltage: 22V 360x	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	ON	OFF	#1, #2,#3	#2	#2	#1	#	
	Standard 4,6	AC synchronous 50/60Hz Rotor voltage: 50/60V Stator voltage: 90V 360x	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	#1, #2,#3	#2	#1	#1	#	
	Standard 20	DC step 35V 180x COM(-), 3-wire(+)	ON	OFF	OFF	ON	OFF	OFF	ON	ON	-	ON	OFF	#4, #5,#6	#2	-	#2	#	
Yokogawa Navtec (Plath type)	C-1/1A/2/3 A-55, B-55	AC synchronous 50/60Hz Rotor voltage: 50/60V Stator voltage: 22V 360x	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	ON	OFF	#1, #2,#3	#2	#2	#1	#	
	CMZ-700	DC step 24V 180x COM(+), 3-wire(-)	ON	OFF	OFF	ON	OFF	OFF	ON	ON	-	ON	OFF	Remove	#2	-	*	*	
	CMZ-250X/ 300X/500	DC synchronous 360x	OFF	OFF	OFF	OFF	OFF	OFF	ON	ON	-	ON	OFF	Remove	#2	-	*	*	
		DC step 35V 180x COM(+), 3-wire(-)	ON	OFF	OFF	ON	OFF	OFF	ON	ON	-	ON	OFF	#4, #5,#6	#2	-	#2	#2	
	CMZ-100/200/ 300 C-1Jr,D-1Z/1/3 IPS-2/3	AC synchronous 50/60Hz Rotor voltage: 100V Stator voltage: 90V 360x	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	#1, #2,#3	#1	#1	#1	#1
CMZ-50 See note below.	step 35V 180x COM(+), 3-wire(-)	ON	OFF	OFF	ON	OFF	OFF	ON	ON	-	ON	OFF	Remove	#2	-	*	*		
Plath	NAV GAT IIIII	AC synchronous 50/60Hz Rotor voltage: 50/60V Stator voltage: 68V 360x	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	#1, #2,#3	#2	#2	#1	#1	
Tokimec (Sperry type)	ES-1/2/11 GLT-101/102/ 103/106K/107	AC synchronous 50/60Hz Rotor voltage: 100/110V Stator voltage: 90V 36x	ON	ON	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	#1, #2,#3	#1	#1	#1	#1	
	ES-11A/110 TG-200 PR222R/2000 PR237L/H GM 21	AC synchronous 50/60Hz Rotor voltage: 100/110V Stator voltage: 22V 90x	OFF	ON	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	#1, #2,#3	#1	#1	#1	#1
	MK-14 MOD-1/2/T NK-EN,NK-EI	DC step 70V 180x COM(-), 3-wire(+)	ON	OFF	OFF	ON	OFF	OFF	ON	ON	-	OFF	OFF	#4, #5,#6	#2	-	#1	#1	
	SR-130/140	DC step 70V 180x 5-wire, open collector	ON	OFF	OFF	OFF	ON	OFF	OFF	OFF	-	OFF	OFF	#4, #5,#6	#2	-	#1	#1	
	TG-100/5000 PR-357/130/ 140, ES-17 GLT-201/202 /203	DC step 70V 180x COM(+), 3-wire(-)	ON	OFF	OFF	ON	OFF	OFF	ON	ON	-	OFF	OFF	#4, #5,#6	#2	-	#1	#1	
	TG-6000	DC step 24V 180x	ON	OFF	OFF	ON	OFF	OFF	ON	ON	-	ON	OFF	#4, #5,#6	#2	-	#2	#2	
	GM-11	AC synchronous 50/60Hz Rotor voltage: 100V Stator voltage: 90V 90x	OFF	ON	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	#1, #2,#3	#1	#1	#1	#1
	SR-120,ES-16 MK-10/20/30	DC step 35V 180x	ON	OFF	OFF	ON	OFF	OFF	ON	ON	-	ON	OFF	#4, #5,#6	#2	-	#2	#2	
Kawasaki	GX-81	AC synchronous 50/60Hz Rotor voltage: 100/110V Stator voltage: 90V 90x	OFF	ON	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	#1, #2,#3	#1	#1	#1	#1	
Armabrown	MK-10,MKL-1 SERIES1351, MOD-4	DC step 50V 180x COM(+), 3-wire(-)	ON	OFF	OFF	ON	OFF	OFF	ON	ON	-	OFF	OFF	#4, #5,#6	#2	-	#1	#1	
Robertson	SKR-80	DC step 35V 180x COM(-), 3-wire(+)	ON	OFF	OFF	ON	OFF	OFF	ON	ON	-	ON	OFF	#4, #5,#6	#2	-	#2	#2	

*: Set JP4 and JP5 according to the voltage of the external power supply.

Note: If CMZ-50 has 35VDC, set JP1 to #4, #5, #6.

4. INSTALLING OPTIONAL EQUIPMENT (for RADAR)

Location of DIP switches, jumper wires on the GYRO CONVERTER board

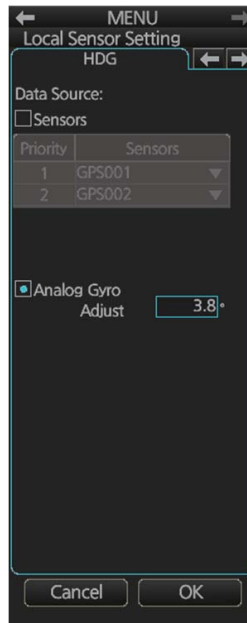


GYRO CONVERTER board

4.1.4 Setting the heading readout on the radar display

Confirm that the gyrocompass is giving a reliable readout. Then, set the heading readout on the radar display with the gyrocompass readout.

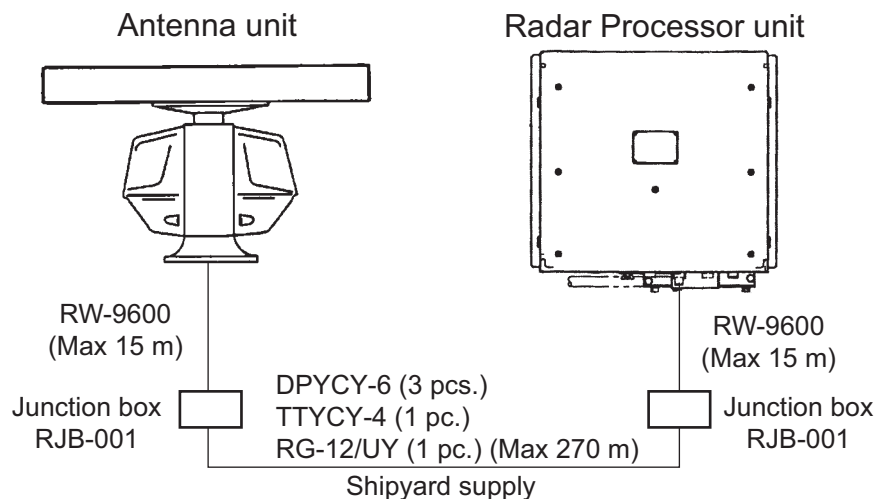
1. Open the main menu.
2. Press the **7** key to select the [OWN SHIP INFO] menu.
3. Press the **3** key to select the [LOCAL SENSOR SETTING] menu



4. Check [Analog Gyro].
5. Roll the wheel to set gyrocompass reading.
6. Click the [OK] on the screen to close the menu.

4.2 Junction Box

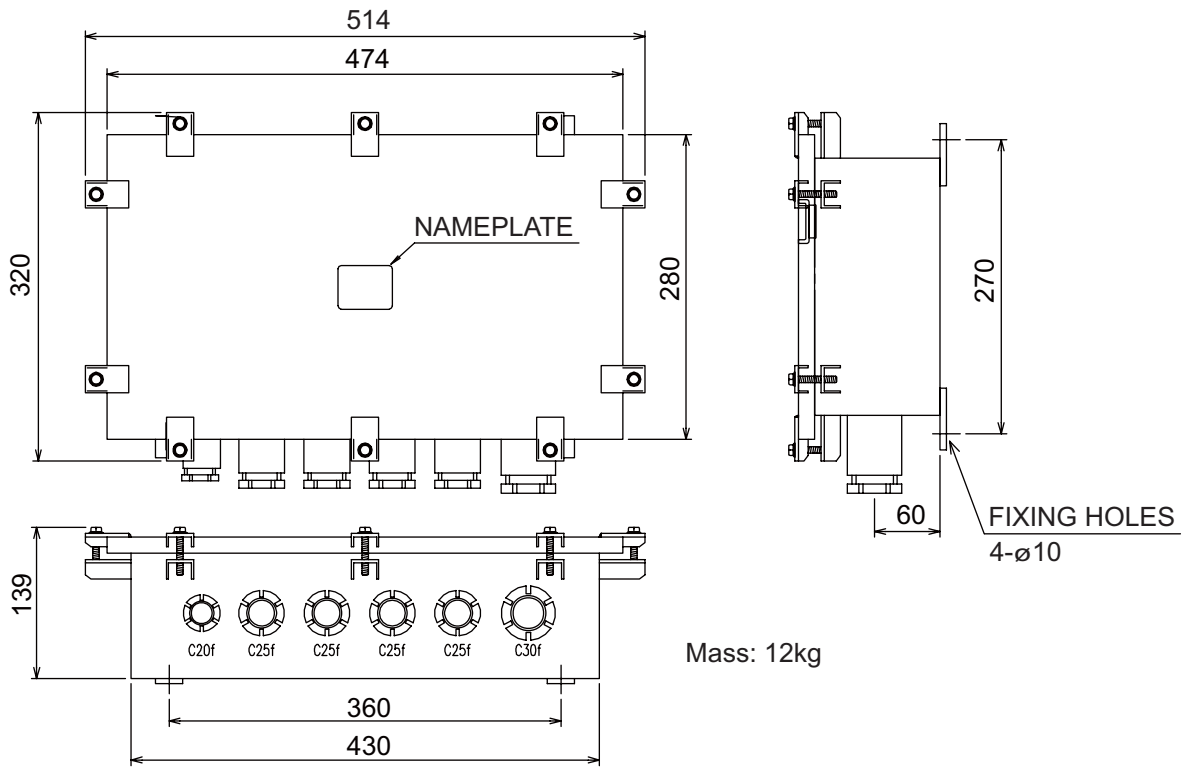
If the length of the antenna cable is more than 100 m, the optional junction boxes are required. These boxes should be mounted at the location protected because its waterproofing is IPX3.



4. INSTALLING OPTIONAL EQUIPMENT (for RADAR)

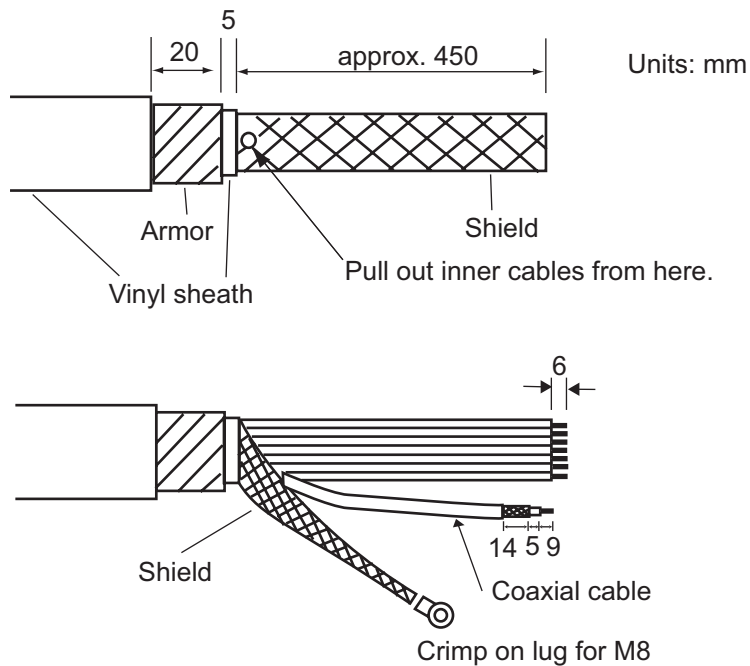
4.2.1 Mounting

Fasten the junction boxes to the mounting location with four sets of M8 bolt and nut.



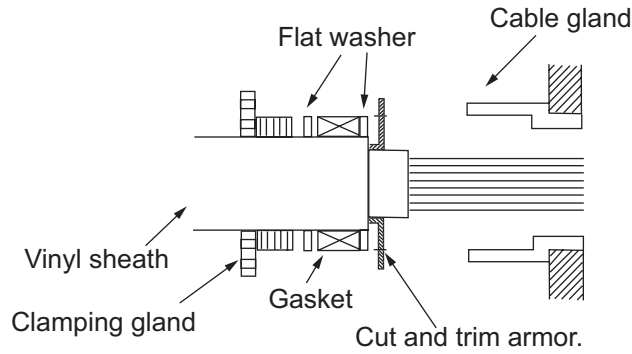
4.2.2 Cable fabrication

RW-9600

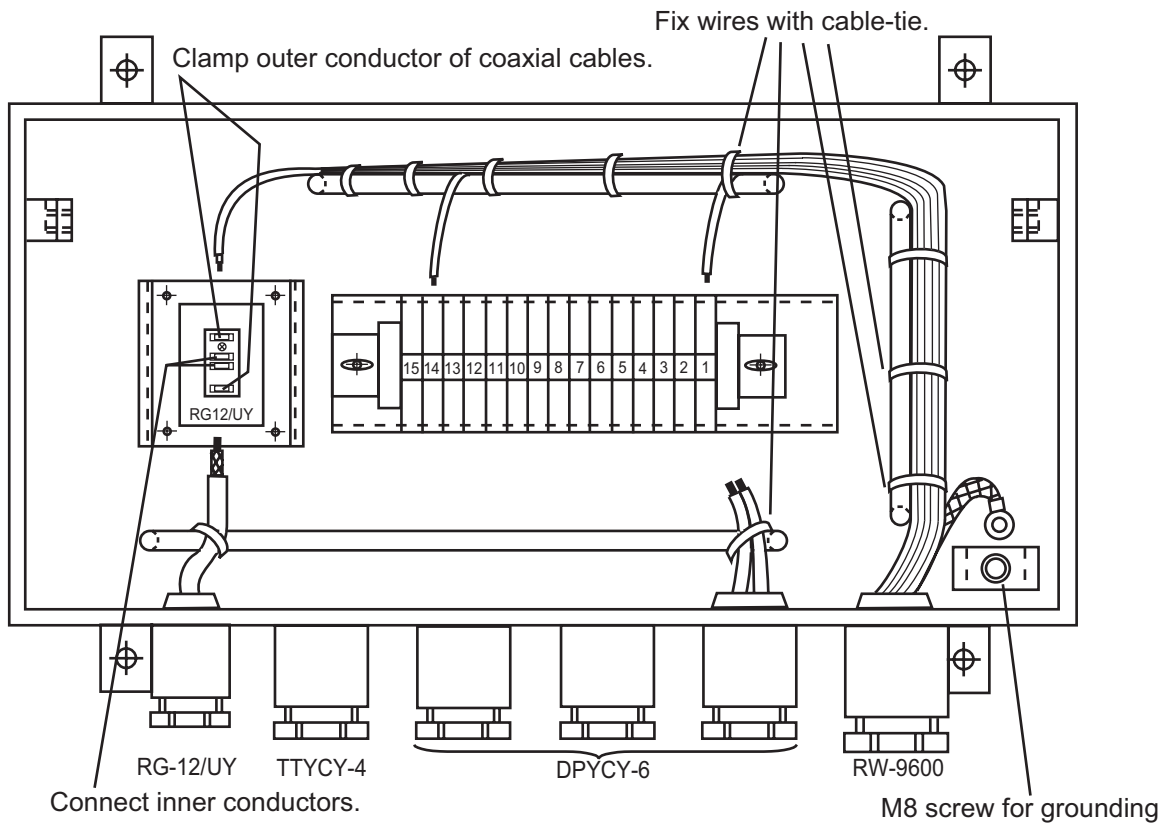


4.2.3 Connection

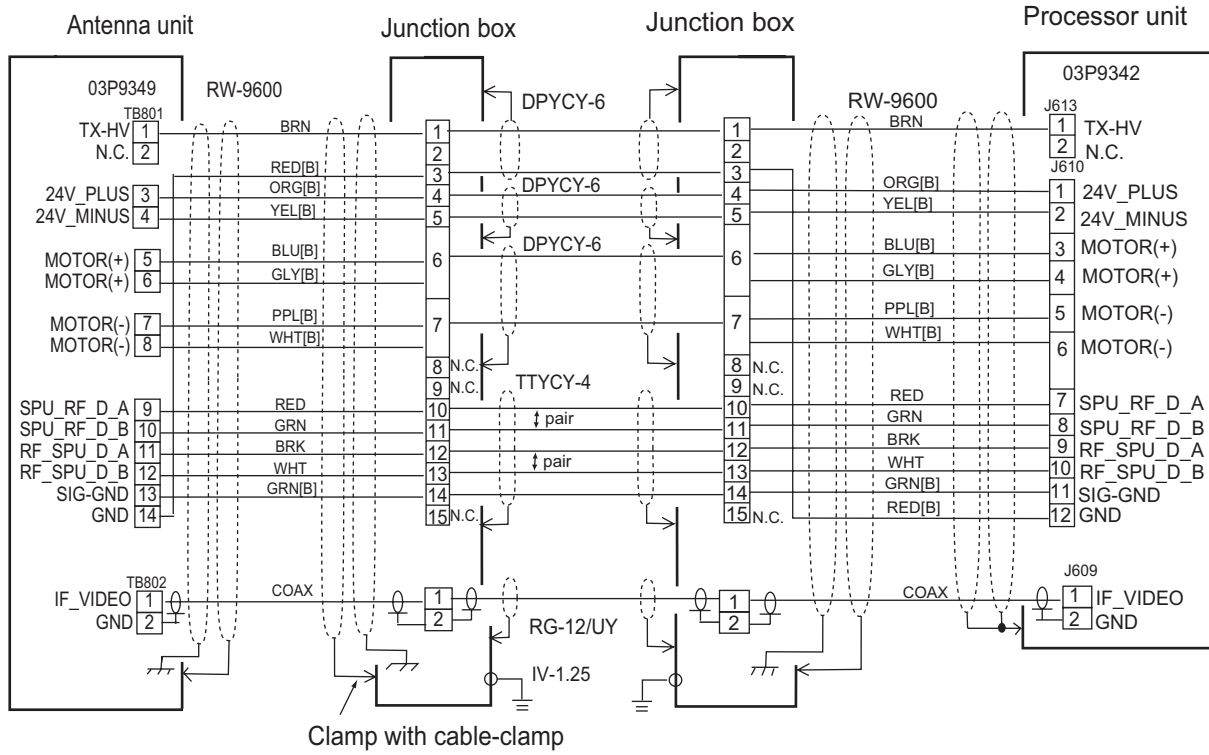
Insert each cable to the cable gland as follows.



Connect each cable cores to the terminal board, referring to the interconnection diagram on next page.



4. INSTALLING OPTIONAL EQUIPMENT (for RADAR)



5. INPUT/OUTPUT DATA

5.1 Radar Processor Unit

Input and output data are shown in the table below.

Input

Data	Specification	Contents	Remarks
Heading signal	syncro or step	GC-10 required	
	AD-10 format	External AD-100	

Output

Data	Specification	Contents	Remarks
Remote display signal	HD, BP Trigger, Video		2 ports

5.2 Processor Unit

Input and output data are shown in the table below.

Input

Data	Specification	Contents	Remarks
Heading signal	IEC61162-2*		
Speed signal	IEC 61162-1 Ed.4		
Navaid data	IEC 61162-1 Ed.4	Position, time and date, datum, course, speed, wind, current, depth, temperature, NAVTEX, etc.	
AIS signal	IEC 61162-2		
Alarm handling signal	Contact closure		Input from alarm system
	IEC 61162-1 Ed.4		Input from alarm system

*: Data input cycle should be more than 40 Hz (HSC) or 20 Hz (normal ship speed).

Output

Data	Specification	Contents	Remarks
Radar system data	IEC 61162-1 Ed.4	RSD, OSD	
TT data**	IEC 61162-1 Ed.4	TTD, TTM, TLB	
Alarm signal	IEC 61162-1 Ed.4		4 systems, Output contents are selected by menu.
	Contact closure		

** : The output sentence, mode and baud rate can be set at the TT Preset menu.

5.3 IEC 61162 Sentences

Input sentence and priority

Data	Format priority
Position	GNS>GGA>RMC>GLL
Speed (STW)	VBW>VHW
Speed (SOG)	VBW
Speed (position)	VTG>RMC
Heading (True)	THS>HDT
Time and Date	ZDA
Datum	DTM
Acknowledge alarm	ACK
UAIS VHF Data-link Message	VDM
UAIS VHF data-link Own-vessel report	VDO
AIS addressed and binary broadcast acknowledgement	ABK
Wind Speed and Angle (True)	MWV (T)
Wind Speed and Angle (Relative)	MWV (R)
Depth	DPT>DBT
Water Temperature	MTW
Set and Drift	CUR>VDR
Set alarm state	ALR

Output sentences

Data	Format
Own ship data	OSD
Radar system data	RSD
Set alarm state	ALR
TT target data	TTD, TLB, TTM
Addressed Binary and safety related Message	ABM
AIS Broadcast binary message	BBM
Voyage Static Data	VSD
General event message	EVE
Acknowledge alarm	ACK

APPENDIX 1 JIS CABLE GUIDE

Cables listed in the manual are usually shown as Japanese Industrial Standard (JIS). Use the following guide to locate an equivalent cable locally.

JIS cable names may have up to 6 alphabetical characters, followed by a dash and a numerical value (example: DPYC-2.5).

For core types D and T, the numerical designation indicates the *cross-sectional Area (mm²)* of the core wire(s) in the cable.

For core types M and TT, the numerical designation indicates the *number of core wires* in the cable.

1. Core Type

D: Double core power line

T: Triple core power line

M: Multi core

TT: Twisted pair communications
(1Q=quad cable)

2. Insulation Type

P: Ethylene Propylene

Rubber

3. Sheath Type

Y: PVC (Vinyl)

4. Armor Type

C: Steel

5. Sheath Type

Y: Anticorrosive vinyl sheath

6. Shielding Type

S: All cores in one sheath

-S: Individually sheathed cores

SLA: All cores in one shield, plastic tape w/aluminum tape

-SLA: Individually shielded cores, plastic tape w/aluminum tape



EX: ^{1 2 3 4 5 6} TTYCYSLA - 4
 Designation type | Core Area (mm²)

EX: ^{1 2 3 4} MPYC - 4
 Designation type | # of cores

The following reference table lists gives the measurements of JIS cables commonly used with Furuno products:

Type	Core		Cable Diameter	Type	Core		Cable Diameter
	Area	Diameter			Area	Diameter	
DPYC-1.5	1.5mm ²	1.56mm	11.7mm	TTYCS-1	0.75mm ²	1.11mm	10.1mm
DPYC-2.5	2.5mm ²	2.01mm	12.8mm	TTYCS-1T	0.75mm ²	1.11mm	10.6mm
DPYC-4	4.0mm ²	2.55mm	13.9mm	TTYCS-1Q	0.75mm ²	1.11mm	11.3mm
DPYC-6	6.0mm ²	3.12mm	15.2mm	TTYCS-4	0.75mm ²	1.11mm	16.3mm
DPYC-10	10.0mm ²	4.05mm	17.1mm	TTYCSLA-1	0.75mm ²	1.11mm	9.4mm
DPYCY-1.5	1.5mm ²	1.56mm	13.7mm	TTYCSLA-1T	0.75mm ²	1.11mm	10.1mm
DPYCY-2.5	2.5mm ²	2.01mm	14.8mm	TTYCSLA-1Q	0.75mm ²	1.11mm	10.8mm
DPYCY-4	4.0mm ²	2.55mm	15.9mm	TTYCSLA-4	0.75mm ²	1.11mm	15.7mm
MPYC-2	1.0mm ²	1.29mm	10.0mm	TTYCY-1	0.75mm ²	1.11mm	11.0mm
MPYC-4	1.0mm ²	1.29mm	11.2mm	TTYCY-1T	0.75mm ²	1.11mm	11.7mm
MPYC-7	1.0mm ²	1.29mm	13.2mm	TTYCY-1Q	0.75mm ²	1.11mm	12.6mm
MPYC-12	1.0mm ²	1.29mm	16.8mm	TTYCY-4	0.75mm ²	1.11mm	17.7mm
TPYC-1.5	1.5mm ²	1.56mm	12.5mm	TTYCY-4S	0.75mm ²	1.11mm	21.1mm
TPYC-2.5	2.5mm ²	2.01mm	13.5mm	TTYCY-4SLA	0.75mm ²	1.11mm	19.5mm
TPYC-4	4.0mm ²	2.55mm	14.7mm	TTYCYS-1	0.75mm ²	1.11mm	12.1mm
TPYCY-1.5	1.5mm ²	1.56mm	14.5mm	TTYCYS-4	0.75mm ²	1.11mm	18.5mm
TPYCY-2.5	2.5mm ²	2.01mm	15.5mm	TTYCYSLA-1	0.75mm ²	1.11mm	11.2mm
TPYCY-4	4.0mm ²	2.55mm	16.9mm	TTYCYSLA-4	0.75mm ²	1.11mm	17.9mm

APPENDIX 2 ROD TERMINALS

MC-3000S, MC-CS Board (24P0114)

Connector #	Pin #	Signal name	Rod terminal to use	Connected cable
J1	1	24V_VOUT	AI 0.34-6 TQ (blue)	MC1.5-W-Lxxx
	2	24V_GND		
	3	MODBUS-A	AI 0.14-8 GY (gray)	
	4	MODBUS-B		
	5	GND		

Connector #	Pin #	Signal name	Rod terminal to use	Connected cable
J2	1	24V_IN	AI 1.5-6 BK (black)	DPYC-1.5
	2	24V_OUT		
	3	PWR_FAIL-A	AI 0.75-6 GY (Gray)	TTYCS-4 TTYCSLA-4
	4	PWR_FAIL-COM		
	5	PWR_FAIL-B		
	6	NC	-	-

Connector #	Pin #	Signal name	Rod terminal to use	Connected cable
J4	1	TD1-A	AI 0.75-6 GY (Gray)	TTYCS-4 TTYCSLA-4
	2	TD1-B		
	3	RD1-A		
	4	RD1-B		
	5	ISOGND1		
	6	RD1-H		
	7	RD1-C		

Connector #	Pin #	Signal name	Rod terminal to use	Connected cable
J5	1	TD2-A	AI 0.75-6 GY (gray)	TTYCS-4 TTYCSLA-4
	2	TD2-B		
	3	RD2-A		
	4	RD2-B		
	5	ISOGND2		
	6	RD2-H		
	7	RD2-C		

Connector #	Pin #	Signal name	Rod terminal to use	Connected cable
J6	1	TD3-A	AI 0.75-6 GY (gray)	TTYCS-4 TTYCSLA-4
	2	TD3-B		
	3	RD3-A		
	4	RD3-B		
	5	ISOGND3		
	6	RD3-H		
	7	RD3-C		

Connector #	Pin #	Signal name	Rod terminal to use	Connected cable
J7	1	TD4-A	AI 0.75-6 GY (gray)	TTYCS-4 TTYCSLA-4
	2	TD4-B		
	3	RD4-A		
	4	RD4-B		
	5	ISOGND4		
	6	RD4-H		
	7	RD4-C		
Connector #	Pin #	Signal name	Rod terminal to use	Connected cable
J8	1	TD5-A	AI 0.75-6 GY (gray)	TTYCS-1Q TTYCSLA-1Q
	2	TD5-B		
	3	RD5-H		
	4	RD5-C		
	5	TD6-A		TTYCS-1Q TTYCSLA-1Q
	6	TD6-B		
	7	RD6-H		
	8	RD6-C		
Connector #	Pin #	Signal name	Rod terminal to use	Connected cable
J9	1	TD7-A	AI 0.75-6 GY (gray)	TTYCS-1Q TTYCSLA-1Q
	2	TD7-B		
	3	RD7-H		
	4	RD7-C		
	5	TD8-A		TTYCS-1Q TTYCSLA-1Q
	6	TD8-B		
	7	RD8-H		
	8	RD8-C		

MC-3010A MC-ANALG Board (24P0115)

Connector #	Pin #	Signal name	Rod terminal to use	Connected cable
J1	1	24V_IN	AI 0.34-6 TQ (blue)	MC1.5-W-Lxxx
	2	24V_GND		
	3	MODBUS-A	AI 0.14-8 GY (gray)	
	4	MODBUS-B		
	5	GND		
Connector #	Pin #	Signal name	Rod terminal to use	Connected cable
J2	1	24V_OUT	AI 0.34-6 TQ (blue)	MC1.5-W-Lxxx
	2	24V_GND	AI 0.14-8 GY (gray)	
	3	MODBUS-A		
	4	MODBUS-B		
	5	GND		
Connector #	Pin #	Signal name	Rod terminal to use	Connected cable
J3*	1	AN1_IN	AI 0.75-6 GY (gray)	TTYCS-1 TTYCSLA-1
	2	AN1_GND		
	3	CURR1_JP1		
	4	CURR1_JP2		
Connector #	Pin #	Signal name	Rod terminal to use	Connected cable
J4*	1	AN2_IN	AI 0.75-6 GY (gray)	TTYCS-1 TTYCSLA-1
	2	AN2_GND		
	3	CURR2_JP1		
	4	CURR2_JP2		
Connector #	Pin #	Signal name	Rod terminal to use	Connected cable
J5*	1	AN3_IN	AI 0.75-6 GY (gray)	TTYCS-1 TTYCSLA-1
	2	AN3_GND		
	3	CURR3_JP1		
	4	CURR3_JP2		

*: For pin #3 and 4, no cable is connected. However the jumper connection is necessary depending on the input specification.

MC-3020D, MC-DIN Board (24P0116)

Connector #	Pin #	Signal name	Rod terminal to use	Connected cable
J1	1	24V_IN	AI 0.34-6 TQ (blue)	MC1.5-W-Lxxx
	2	24V_GND		
	3	MODBUS-A	AI 0.14-8 GY (gray)	
	4	MODBUS-B		
	5	GND		
Connector #	Pin #	Signal name	Rod terminal to use	Connected cable
J2	1	24V_OUT	AI 0.34-6 TQ (blue)	MC1.5-W-Lxxx
	2	24V_GND		
	3	MODBUS-A	AI 0.14-8 GY (gray)	
	4	MODBUS-B		
	5	GND		
Connector #	Pin #	Signal name	Rod terminal to use	Connected cable
J3*	1	DV12V_OUT1	AI 1-6 RD (red)	MPYC-12
	2	DIGI_IN1		
	3	DIGI_RTN1		
	4	GND		
	5	DC12V_OUT2		
	6	DIGI_IN2		
	7	DIGI_RTN2		
	8	GND		
Connector #	Pin #	Signal name	Rod terminal to use	Connected cable
J4*	1	DV12V_OUT3	AI 1-6 RD (red)	MPYC-12
	2	DIGI_IN3		
	3	DIGI_RTN3		
	4	GND		
	5	DC12V_OUT4		
	6	DIGI_IN4		
	7	DIGI_RTN4		
	8	GND		
Connector #	Pin #	Signal name	Rod terminal to use	Connected cable
J5*	1	DV12V_OUT5	AI 1-6 RD (red)	MPYC-12
	2	DIGI_IN5		
	3	DIGI_RTN5		
	4	GND		
	5	DC12V_OUT6		
	6	DIGI_IN6		
	7	DIGI_RTN6		
	8	GND		

*: Pin #1 and 5: no cable connection. However the jumper connection is necessary between #1 and 2 and #5 and 6 depending on the input specification.

APPENDIX 2 ROD TERMINALS

Connector #	Pin #	Signal name	Rod terminal to use	Connected cable
J6*	1	DV12V_OUT7	AI 1-6 RD (red)	MPYC-12
	2	DIGI_IN7		
	3	DIGI_RTN7		
	4	GND		
	5	DC12V_OUT8		
	6	DIGI_IN8		
	7	DIGI_RTN8		
	8	GND		

*: Pin #1 and 5: no cable connection. However the jumper connection is necessary between #1 and 2 and #5 and 6 depending on the input specification.

MC-3030D, MC-DOUT Board (24P0117)

Connector #	Pin #	Signal name	Rod terminal to use	Connected cable
J1	1	24V_IN	AI 0.34-6 TQ (blue)	MC1.5-W-Lxxx
	2	24V_GND		
	3	MODBUS-A	AI 0.14-8 GY (gray)	
	4	MODBUS-B		
	5	GND		
Connector #	Pin #	Signal name	Rod terminal to use	Connected cable
J2	1	24V_OUT	AI 0.34-6 TQ (blue)	MC1.5-W-Lxxx
	2	24V_GND		
	3	MODBUS-A	AI 0.14-8 GY (gray)	
	4	MODBUS-B		
	5	GND		
Connector #	Pin #	Signal name	Rod terminal to use	Connected cable
J3	1	A1	AI 1-6 RD (red)	MPYC-12
	2	COM1		
	3	B1		
	4	A2		
	5	COM2		
	6	B2		
Connector #	Pin #	Signal name	Rod terminal to use	Connected cable
J4	1	A3	AI 1-6 RD (red)	MPYC-12
	2	COM3		
	3	B3		
	4	A4		
	5	COM4		
	6	B4		
Connector #	Pin #	Signal name	Rod terminal to use	Connected cable
J5	1	A5	AI 1-6 RD (red)	MPYC-12
	2	COM5		
	3	B5		
	4	A6		
	5	COM6		
	6	B6		
Connector #	Pin #	Signal name	Rod terminal to use	Connected cable
J6	1	A7	AI 1-6 RD (red)	MPYC-12
	2	COM7		
	3	B7		
	4	A8		
	5	COM8		
	6	B8		

PACKING LIST EC-3000

A-2

NAME	OUTLINE	DESCRIPTION/CODE No.	Q'TY
ユニット UNIT			
制御部 PROCESSOR UNIT		EC-3000-* 000-020-737-00**	1
予備品 SPARE PARTS			
予備品 SPARE PARTS		SP24-00601 001-170-660-00	1 (*1)
予備品 SPARE PARTS		SP24-00602 001-170-670-00	1 (*1)
付属品 ACCESSORIES			
付属品 ACCESSORIES		FP24-00601 001-170-650-00	1
工事材料 INSTALLATION MATERIALS			
ケーブル(クミン) CABLE ASSEMBLY		DSUB9P-X2-L5M 000-176-663-11	1
工事材料 INSTALLATION MATERIALS		CP24-02101 001-170-630-00	1
電源ケーブル AC CABLE		IFG60320-C13-L5M 000-176-023-11	1
図書 DOCUMENT			
ドングルインフォメーションシート DONGLE INFORMATION SHEET		000-999-085-0*	1 (*5)

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.
2.(*1)(*2)(*3)(*4)は、それぞれ仕様選択品を表します。
(*1)(*2)(*3)(*4)INDICATE SPECIFICATION SELECTIVE ITEM.

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

NAME	OUTLINE	DESCRIPTION/CODE No.	Q'TY
装備設定要領 INSTRUCTION MANUAL		*42-01204-* 000-177-029-1*	1
取扱説明CD OPERATOR'S MANUAL CD		FMD3X00 O/M *CDROM*J 000-176-720-1*	1 (*2)
取扱説明CD OPERATOR'S MANUAL CD		FMD3X00 O/M *CDROM*E 000-176-721-1*	1 (*2)
取扱説明CD OPERATOR'S MANUAL CD		FCR2XX9 O/M *CDROM*E 000-176-722-1*	1 (*2)
操作要領書 OPERATOR'S GUIDE		OS*-44730-* 000-176-127-1**	1 (*3)
操作要領書 OPERATOR'S GUIDE		OSF-36040-* 000-176-133-1*	1 (*3)
装備要領書 INSTALLATION MANUAL		IM*-44730-* 000-176-129-1**	1 (*4)
装備要領書 INSTALLATION MANUAL		IME-36040-* 000-176-135-1*	1 (*4)
装備要領書 INSTALLATION MANUAL		IME-36060-* 000-176-137-1*	1 (*4)
装備要領書 INSTALLATION MANUAL		IME-36100-* 000-176-139-1*	1 (*4)

3.(*5)は、ダミーコードに付き、注文できません。
3.(*5)THIS CODE CANNOT BE ORDERED.

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

C4473-Z01-H

03GL-X-9892 -1 1/1

PACKING LIST

A-1

XN20AFRSB096*/XN24AFRSB097*/XN20AFRSB096*/XN24AFRSB097*

NAME	OUTLINE	DESCRIPTION/CODE No.	Q'TY
ユニット UNIT			
空中線部 ANTENNA UNIT		XN2*AFRSB096*/XN2*AFRSB097* 000-086-114-00**	1
予備品 SPARE PARTS			
予備品 SPARE PARTS		SP03-12501 008-485-360-00	1
工事材料 INSTALLATION MATERIALS			
工事材料 INSTALLATION MATERIALS		CP03-25601 008-551-440-00	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.

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

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

C3519-Z42-B

PACKING LIST

A-4

RCU-025-*

NAME UNIT	OUTLINE	DESCRIPTION/CODE No.	Q'TY
ユニット レーダ-操作部 RADAR CONTROL UNIT		RCU-025-* 000-020-614-00 **	1
付属品 付属品 ACCESSORIES		FP24-00701 001-170-820-00	1
工事材料 ケーブル(ウレタン)USB CABLE ASSEMBLY		TS-20-071-1 L=5000 000-176-700-11	1
工事材料 INSTALLATION MATERIALS		OP24-02201 001-170-810-00	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.

型式/コード番号が2段の場合、下段より上段に代わる過渡期品であり、どちらが入っています。なお、品質は変わりません。
TWO TYPES AND CODES MAY BE LISTED FOR AN ITEM. THE LOWER PRODUCT MAY BE SHIPPED IN PLACE OF THE UPPER PRODUCT. QUALITY IS THE SAME.
(略図の寸法は、参考値です。DIMENSIONS IN DRAWING FOR REFERENCE ONLY.)

04473-Z03-C

PACKING LIST RPU-013

03GL-X-9858-10 1/1

A-3

NAME UNIT	OUTLINE	DESCRIPTION/CODE No.	Q'TY
ユニット 制御部 PROCESSOR UNIT		RPU-013* 000-081-381-00 **	1
予備品 SPARE PARTS		SP03-14404 *AC100* 001-175-920-00	1 (*1)
予備品 SPARE PARTS		SP03-14405 008-535-920-00	1 (*1)
予備品 SPARE PARTS		SP03-14406 008-535-930-00	1 (*1)
工事材料 INSTALLATION MATERIALS		OP03-25602 008-535-940-00	1 (*2)
工事材料 INSTALLATION MATERIALS		OP03-25603 008-535-950-00	1 (*2)
図書 取扱説明書 OPERATOR'S MANUAL		OM*-35190-* 000-175-536-1*	1 (*3)
図書 取扱説明書 OPERATOR'S MANUAL		OM*-35220-* 000-170-835-1*	1 (*3)

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.
2.(*)1)(*)2)(*)3)は、それぞれ仕様選択品を表します。
(*)1)(*)2)(*)3)INDICATE SPECIFICATION SELECTIVE ITEM.

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

NAME	OUTLINE	DESCRIPTION/CODE No.	Q'TY
取扱説明書 OPERATOR'S MANUAL		OM*-35221-* 000-164-285-1*	1 (*3)
装備要領書 INSTALLATION MANUAL		IM*-35190-* 000-175-544-1*	1 (*3)
装備要領書 INSTALLATION MANUAL		IM*-35210-* 000-148-687-1*	1 (*3)
装備要領書 INSTALLATION MANUAL		IM*-35220-* 000-148-691-1*	1 (*3)
装備要領書 INSTALLATION MANUAL		IM*-35222-* 000-176-947-1*	1 (*3)
装備要領書 INSTALLATION MANUAL		IM*-35230-* 000-148-690-1*	1 (*3)
装備要領書 INSTALLATION MANUAL		IM*-35270-* 000-148-693-1*	1 (*3)
操作要領書 OPERATOR'S GUIDE		OS*-35190-* 000-153-046-1*	1 (*3)
操作要領書 OPERATOR'S GUIDE		OS*-35220-* 000-170-838-1*	1 (*3)

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

C3519-Z07-L

PACKING LIST

03H1-X-9859 -1 1/1

CP03-35001

A-6

NAME	OUTLINE	DESCRIPTION/CODE No.	QTY
工事材料			
ケーブル(ワシビ)		XH10P-XH2P-2000	1
CABLE ASSEMBLY		000-176-631-11	
ケーブル(組品)LAN		MOD-Z072-020+	1
LAN CABLE ASSEMBLY		001-167-880-10	

PACKING LIST

24AL-X-9856 -2 1/1

RCU-026-*

A-5

NAME	UNIT	OUTLINE	DESCRIPTION/CODE No.	QTY
ユニット				
トラックボール操作部			RCU-026-*	1
TRACKBALL CONTROL UNIT			000-020-619-00 **	
付属品				
付属品			FP24-00801	1
ACCESSORIES			001-170-920-00	
工事材料				
ケーブル(ワシビ)USB			TS-20-071-1 L=5000	1
CABLE ASSEMBLY			000-176-700-11	
工事材料			CP24-02301	1
INSTALLATION MATERIALS			001-170-910-00	


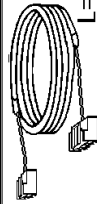

コード番号末尾の「*」は、選択品の代表コードを表します。
CODE NUMBER ENDING WITH "*" INDICATES THE CODE NUMBER OF REPRESENTATIVE MATERIAL.

型式コード番号が2段の場合、下段より上段に代わる過渡期品であり、どちらが入っています。なお、品質は変わりません。
TWO TYPES AND CODES MAY BE LISTED FOR AN ITEM. THE LOWER PRODUCT MAY BE SHIPPED IN PLACE OF THE UPPER PRODUCT. QUALITY IS THE SAME.
(縮図の寸法は、参考値です。DIMENSIONS IN DRAWING FOR REFERENCE ONLY.)

型式コード番号が2段の場合、下段より上段に代わる過渡期品であり、どちらが入っています。なお、品質は変わりません。
TWO TYPES AND CODES MAY BE LISTED FOR AN ITEM. THE LOWER PRODUCT MAY BE SHIPPED IN PLACE OF THE UPPER PRODUCT. QUALITY IS THE SAME.
(縮図の寸法は、参考値です。DIMENSIONS IN DRAWING FOR REFERENCE ONLY.)

C4473-Z04-C

C3607-Z01-D

NAME	OUTLINE	DESCRIPTION/CODE No.	QTY
工事材料 ケーブル(クミセ)			
CABLE ASSEMBLY	 L=10M	DSUB9P-X2-L10M 000-176-682-11	1
ケーブル(クミセ)			
CABLE ASSEMBLY	 L=2M	XH10P-XH2P-2000 000-176-631-11	1
ケーブル(組品)LAN			
LAN CABLE ASSEMBLY	 L=2M	MOD-2072-020+ 001-167-880-10	1





型式/コード番号が2段の場合、下段より上段に代わる通達部品であり、どちらが入っています。なお、品質は変わりません。
TWO TYPES AND CODES MAY BE LISTED FOR AN ITEM. THE LOWER PRODUCT MAY BE SHIPPED IN PLACE OF THE UPPER PRODUCT. QUALITY IS THE SAME.
(略図の寸法は、参考値です。DIMENSIONS IN DRAWING FOR REFERENCE ONLY.)

FURUNO

工事材料表

INSTALLATION MATERIALS

FAR-21**/28**, FOR-21**/28**

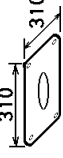


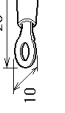



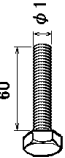


番号 NO.	名称 NAME	略図 OUTLINE	型名/規格 DESCRIPTIONS		数量 QTY	用途/備考 REMARKS
			型名	規格		
1	ケーブル(14C) 14-CORE CABLE	 L=15M	RW-9600 *15M*	001-078-400-10	1	選択 TO BE SELECTED 番号ケーブル SIGNAL CABLE
2	ケーブル(14C) 14-CORE CABLE	 L=30M	RW-9600 *30M*	001-078-410-10	1	選択 TO BE SELECTED 番号ケーブル SIGNAL CABLE
3	ケーブル(14C) 14-CORE CABLE	 L=40M	RW-9600 *40M*	001-078-420-10	1	選択 TO BE SELECTED 番号ケーブル SIGNAL CABLE
4	ケーブル(14C) 14-CORE CABLE	 L=50M	RW-9600 *50M*	001-078-430-10	1	選択 TO BE SELECTED 番号ケーブル SIGNAL CABLE

型式/コード番号が2段の場合、下段より上段に代わる通達部品であり、どちらが入っています。なお、品質は変わりません。
TWO TYPES AND CODES MAY BE LISTED FOR AN ITEM. THE LOWER PRODUCT MAY BE SHIPPED IN PLACE OF THE UPPER PRODUCT. QUALITY IS THE SAME.
(略図の寸法は、参考値です。DIMENSIONS IN DRAWING FOR REFERENCE ONLY.)

CODE NO.	008-551-440-00	036L-X-9403-10
TYPE	CP03-25601	1/2

工事材料表

INSTALLATION MATERIALS


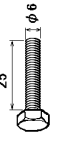

番号 NO.	名称 NAME	略図 OUTLINE	型名/規格 DESCRIPTIONS	数量 Q'TY	用途/備考 REMARKS
1	防蝕ゴム, 1. CORROSION-PROOF RUBBER		03-001-3001-0 ROHS CODE NO. 300-130-010-10	1	
2	シールパッキン SEAL WASHER		03-001-3002-0 ROHS CODE NO. 300-130-020-10	4	
3	操作パイプ TERMINAL OPENER		231-131 CODE NO. 300-165-800-11 300-165-800-10	1	
4	圧着端子 CRIMP-ON LUG		FV5.5-4(LF) YEL CODE NO. 1000-166-744-10	1	
5	六角ナット HEXAGONAL NUT		M12 SUS304 CODE NO. 1000-167-491-10	4	
6	flat 平座金 FLAT WASHER		M12 SUS304 CODE NO. 1000-167-446-10	4	
7	平座金 SPRING WASHER		M12 SUS304 CODE NO. 1000-167-397-10	4	
8	六角ナット 全ネジ HEXAGON HEAD SCREW		M12X60 SUS304 CODE NO. 1000-162-813-10	4	
9	六角ナット HEXAGONAL NUT		M6 SUS304 CODE NO. 1000-158-856-10	1	
10	flat 平座金 FLAT WASHER		M6 SUS304 CODE NO. 1000-158-854-10	3	

型式/コード番号が2取の場合、下段より上段に代わる標準部品であり、どちらかが入っています。なお、品質は変わりません。
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CODE NO.	008-551-440-00	036L-X-9403-10
TYPE	CP03-25601	2/2

工事材料表

INSTALLATION MATERIALS

番号 NO.	名称 NAME	略図 OUTLINE	型名/規格 DESCRIPTIONS	数量 Q'TY	用途/備考 REMARKS
11	平座金 SPRING WASHER		M6 SUS304 CODE NO. 1000-158-855-10	1	
12	六角ナット HEXAGONAL HEAD BOLT		M6X25 SUS304 CODE NO. 1000-162-871-10	1	
13	ケーブル組品 CABLE ASSY.		RW-4747 CODE NO. 1000-566-000-12 1000-566-000-01	1	

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


FURUNO

CODE NO.	008-535-940-00	03GL-X-9405-3	1/1
TYPE	CP03-25602		

工事材料表

INSTALLATION MATERIALS

AC用

番号 NO.	名称 NAME	略図 OUTLINE	型名/規格 DESCRIPTIONS	数量 Q'TY	用途/備考 REMARKS
1	操作バネ TERMINAL OPENER		231-131 231-131 CODE NO. 000-165-800-11 000-165-800-10	1	制御部用 FOR PROCESSOR UNIT
2	操作バネ TERMINAL OPENER		734-230 734-230 CODE NO. 000-147-417-10	1	制御部用 FOR PROCESSOR UNIT
3	圧着端子 CRIMP-ON LUG		FV2-4 BLU FV2-4 BLU CODE NO. 000-157-247-10	2	制御部用 FOR PROCESSOR UNIT

型式/コード番号が2段の場合、下段より上段に代わる通達部品であり、どちらかが入っています。なお、品質は変わりません。
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FURUNO ELECTRIC CO., LTD.

C3519-M05-D




FURUNO

CODE NO.	008-535-950-00	03GL-X-9406-3	1/1
TYPE	CP03-25603		

工事材料表

INSTALLATION MATERIALS

DC用

番号 NO.	名称 NAME	略図 OUTLINE	型名/規格 DESCRIPTIONS	数量 Q'TY	用途/備考 REMARKS
1	操作バネ TERMINAL OPENER		231-131 231-131 CODE NO. 000-165-800-11 000-165-800-10	1	制御部用 FOR PROCESSOR UNIT
2	操作バネ TERMINAL OPENER		734-230 734-230 CODE NO. 000-147-417-10	1	制御部用 FOR PROCESSOR UNIT
3	圧着端子 CRIMP-ON LUG		FV5.5-4(LF) YEL FV5.5-4(LF) YEL CODE NO. 000-166-744-10	2	制御部用 FOR PROCESSOR UNIT

型式/コード番号が2段の場合、下段より上段に代わる通達部品であり、どちらかが入っています。なお、品質は変わりません。
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(略図の寸法は、参考値です。DIMENSIONS IN DRAWING FOR REFERENCE ONLY.)

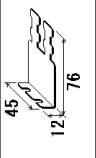
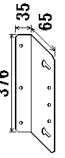

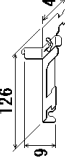
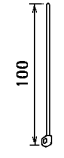
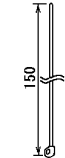
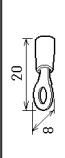
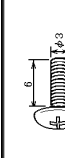
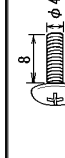
FURUNO ELECTRIC CO., LTD.

C3519-M06-D

CODE NO.	001-170-630-00	24AL-X-9401-1
TYPE	CP24-02101	1/1

工事材料表

INSTALLATION MATERIALS

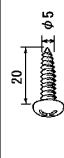
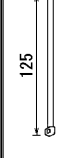
番号 NO.	名称 NAME	略図 OUTLINE	型名/規格 DESCRIPTIONS	数量 Q'TY	用途/備考 REMARKS
1	配線板1 WIRING PLATE 1		24-014-0104-1 CODE NO. 100-366-811-10	1	
2	筐体足1 CHASSIS BASE 1		24-014-0121-0 CODE NO. 100-367-720-10	1	
3	筐体足2 CHASSIS BASE 2		24-014-0122-0 CODE NO. 100-372-170-10	1	
4	配線板2組立品 WIRING PLATE 2 ASSY		CP24-02102 CODE NO. 101-186-200-00	1	
5	コンパッタ CABLE TIE		CV-100N CODE NO. 000-162-167-10	10	
6	コンパッタ CABLE TIE		CV-150N CODE NO. 000-162-168-10	30	
7	圧着端子 CRIMP-ON LUG		FV1.25-4(LF) RED CODE NO. 000-166-666-10	9	
8	「ハ」付ド「小ネジ」 BINDING HEAD SCREW		M3X6 SUS304 CODE NO. 000-162-664-10	5	
9	「ハ」付ド「小ネジ」 BINDING HEAD SCREW		M4X8 SUS304 CODE NO. 000-162-669-10	10	

型式/コード番号が2段の場合、下段より上段に代わる通達部品であり、どちらが入っています。なお、品質は変わりません。
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CODE NO.	001-170-810-00	24AL-X-9402-2
TYPE	CP24-02201	1/1

工事材料表

INSTALLATION MATERIALS

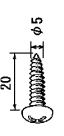
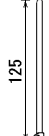
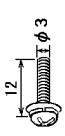
番号 NO.	名称 NAME	略図 OUTLINE	型名/規格 DESCRIPTIONS	数量 Q'TY	用途/備考 REMARKS
1	「ト」付ド「小ネジ」 SELF-TAPPING SCREW		SX20 SUS304 CODE NO. 000-162-608-10	2	
2	コンパッタ CONVEX		CV-125N CODE NO. 000-172-164-10	2	

型式/コード番号が2段の場合、下段より上段に代わる通達部品であり、どちらが入っています。なお、品質は変わりません。
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CODE NO.	001-170-910-00	24AL-X-9403-2	1/1
TYPE	CP24-02301		

工事材料表

INSTALLATION MATERIALS

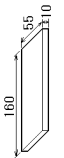
番号 NO.	名称 NAME	略図 OUTLINE	型名/規格 DESCRIPTIONS	数量 Q'TY	用途/備考 REMARKS
1	+15757767 1ヶ SELF-TAPPING SCREW		5X20 SUS304 CODE NO. 000-162-608-10	2	
2	コンベックス CONVEX		CV-125N CODE NO. 000-172-164-10	2	
3	+4* 4.6B WASHER HEAD SCREW *B*		M3X12 SUS304 CODE NO. 000-162-648-10	4	

型式/コード番号が2図の場合、下図より上図に代わる標準部品であり、どちらかが入っています。なお、品質は変わりません。
TWO TYPES AND CODES MAY BE LISTED FOR AN ITEM. THE LOWER PRODUCT MAY BE SHIPPED IN PLACE OF THE UPPER PRODUCT.
QUALITY IS THE SAME. DIMENSIONS IN DRAWING FOR REFERENCE ONLY.)
(略図の寸法は、参考値です。)

CODE NO.	001-170-650-00	24AL-X-9506-0	1/1
TYPE	FP24-00601		

付属品表

ACCESSORIES

番号 NO.	名称 NAME	略図 OUTLINE	型名/規格 DESCRIPTIONS	数量 Q'TY	用途/備考 REMARKS
1	防振マット DUST-PROOF SPONGE		24-014-0105-1 CODE NO. 100-366-821-10	1	

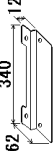

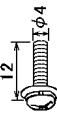
型式/コード番号が2図の場合、下図より上図に代わる標準部品であり、どちらかが入っています。なお、品質は変わりません。
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FURUNO

CODE NO.	001-170-820-00	24AL-X-9501-0	1/1
TYPE	FP24-00701		

付属品表

ACCESSORIES

番号 NO.	名称 NAME	略図 OUTLINE	型名/規格 DESCRIPTIONS	数量 Q'TY	用途/備考 REMARKS
1	卓上取付板 DESK FIXING PLATE	62 340 	24-014-1401-0 CODE NO. 100-367-460-10	1	
2	USBシート USB SHEET	15 	24-014-1411-0 CODE NO. 100-372-000-10	1	
3	ワッシャー WASHER HEAD SCREW *B*	12 	MAX12 G2700W MBN12 CODE NO. 000-163-192-10	4	

型式/ノド番号が2段の場合、下段より上段に代わる通達部品であり、どちらが入っています。なお、品質は変わりません。
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FURUNO ELECTRIC CO., LTD.




C4473-F01-A

FURUNO

CODE NO.	001-170-920-00	24AL-X-9502-0	1/1
TYPE	FP24-00801		

付属品表

ACCESSORIES

番号 NO.	名称 NAME	略図 OUTLINE	型名/規格 DESCRIPTIONS	数量 Q'TY	用途/備考 REMARKS
1	卓上取付板 DESKTOP FIXING PLATE	100 60 	14-078-2311-0 CODE NO. 100-364-730-10	1	
2	USBシート USB SHEET	15 7 	24-014-1411-0 CODE NO. 100-372-000-10	1	
3	ワッシャー WASHER HEAD SCREW *B*	8 	M3X8 SUS304 CODE NO. 000-162-649-10	2	

型式/ノド番号が2段の場合、下段より上段に代わる通達部品であり、どちらが入っています。なお、品質は変わりません。
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QUALITY IS THE SAME.
(略図の寸法は、参考値です。DIMENSIONS IN DRAWING FOR REFERENCE ONLY.)

FURUNO ELECTRIC CO., LTD.

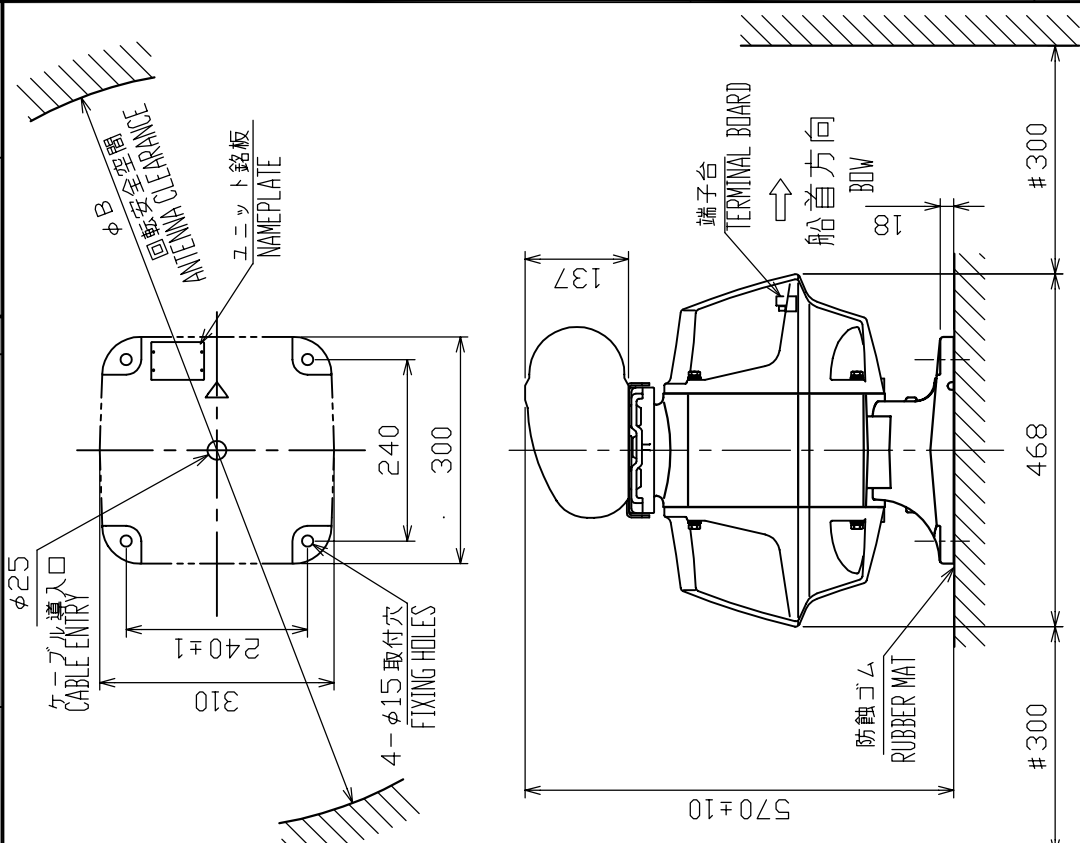
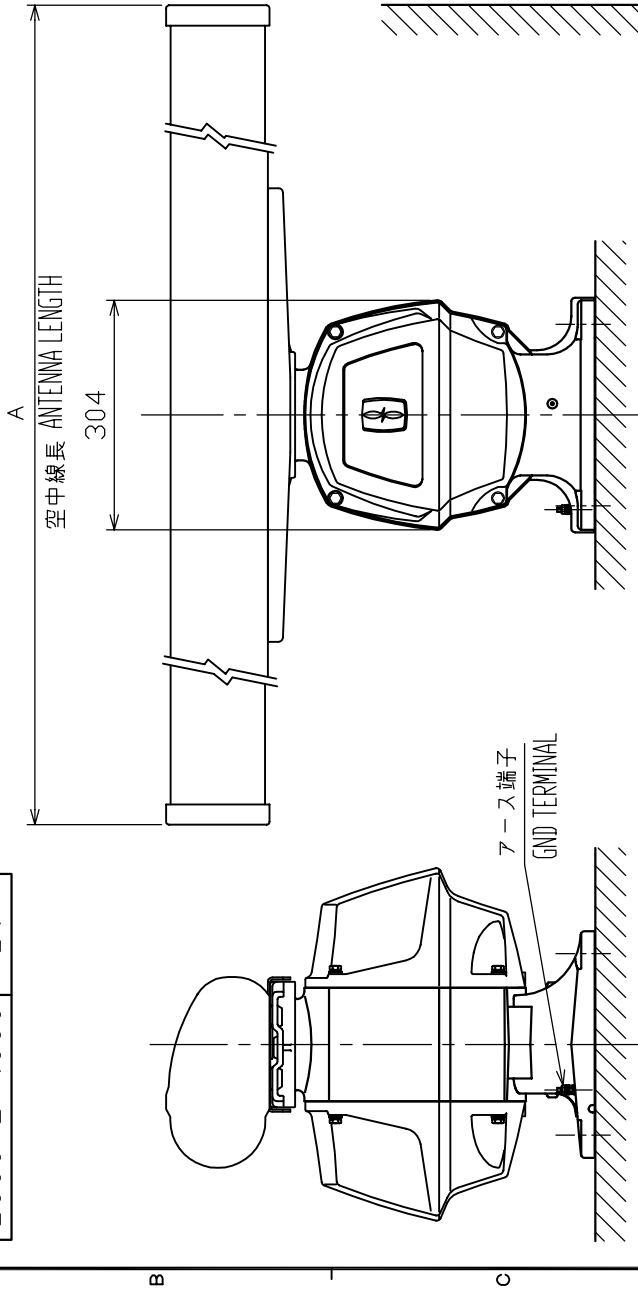
C4473-F02-A

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
2000 < L ≤ 4000	± 7

表 2 TABLE 2

アンテナ型式 ANTENNA TYPE	XN-20AF (200cm型)	XN-24AF (240cm型)
A: 空中線長 ANTENNA LENGTH (mm)	2040 ± 10	2550 ± 10
B: 回転安全空間 ANT. CLEARANCE (mm)	2200	2700
質量 MASS (kg±10%)	39	42



- 注 記 1) #印寸法は最小サービス空間寸法とする。
 2) A, B寸法、及び質量は表2による。
 3) 指定外の寸法公差は表1による。
 4) 取付用ネジはM12ボルトを使用のこと。
- NOTE 1. # MINIMUM SERVICE CLEARANCE.
 2. TABLE 2 INDICATES MASS AND DIMENSIONS A & B.
 3. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS WHICH IS NOT SPECIFIED.
 4. USE M12 BOLTS FOR FIXING THE UNIT.

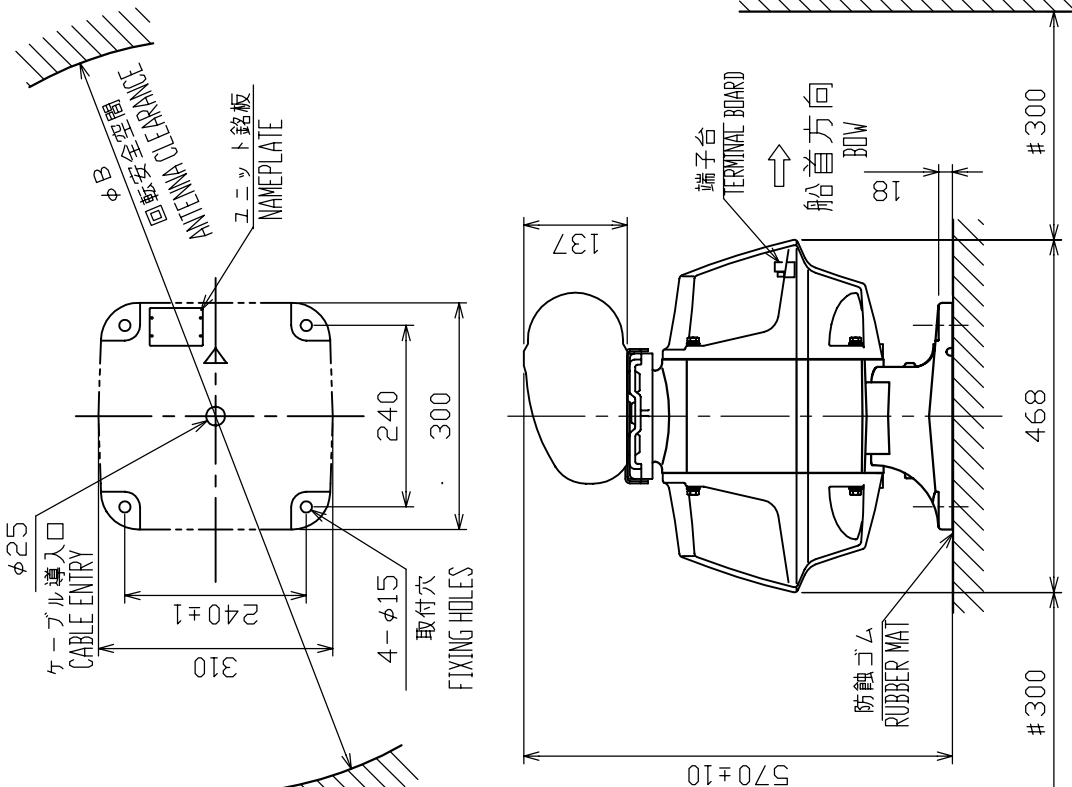
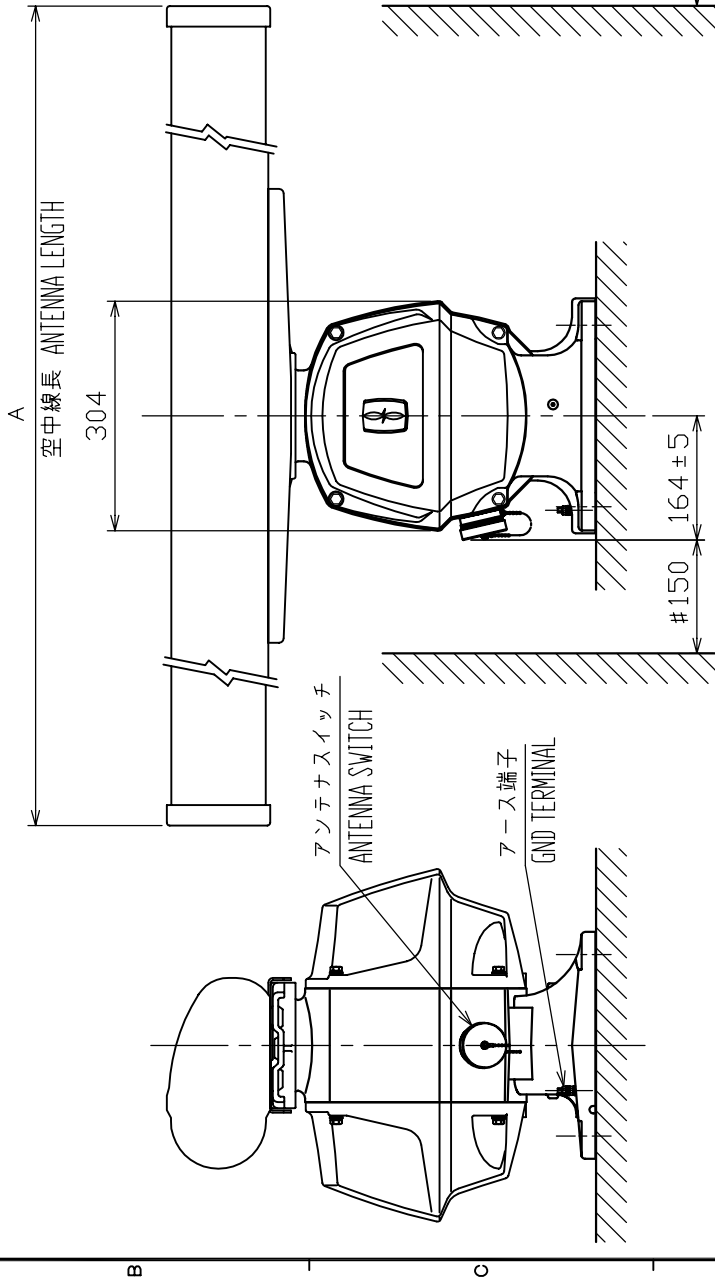
DRAWN DEC 25 '03 E. MIYOSHI CHECKED Takahashi T.	TITLE RSB-096/097 名称 空中線部
APPROVED Y. Hatai SCALE 1/10 WAS 表2参照	外寸図 ANTENNA UNIT
FIG No C3519-002-B	03-154-301G-2 OUTLINE DRAWING

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
2000 < L ≤ 4000	± 7

表 2 TABLE 2

アンテナ型式 ANTENNA TYPE	XN-20AF (200cm型)	XN-24AF (240cm型)
A: 空中線長 ANTENNA LENGTH (mm)	2040 ± 10	2550 ± 10
B: 回転安全空間 ANT. CLEARANCE (mm)	2200	2700
質量 MASS (kg ± 10%)	39	42



- 注 記
- 1) #印寸法は最小サービス空間寸法とする。
 - 2) A, B寸法、及び質量は表2による。
 - 3) 指定外の寸法公差は表1による。
 - 4) 取付用ネジはM12ボルトを使用のこと。
- NOTE
1. # MINIMUM SERVICE CLEARANCE.
 2. TABLE 2 INDICATES MASS AND DIMENSIONS A & B.
 3. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS WHICH IS NOT SPECIFIED.
 4. USE M12 BOLTS FOR FIXING THE UNIT.

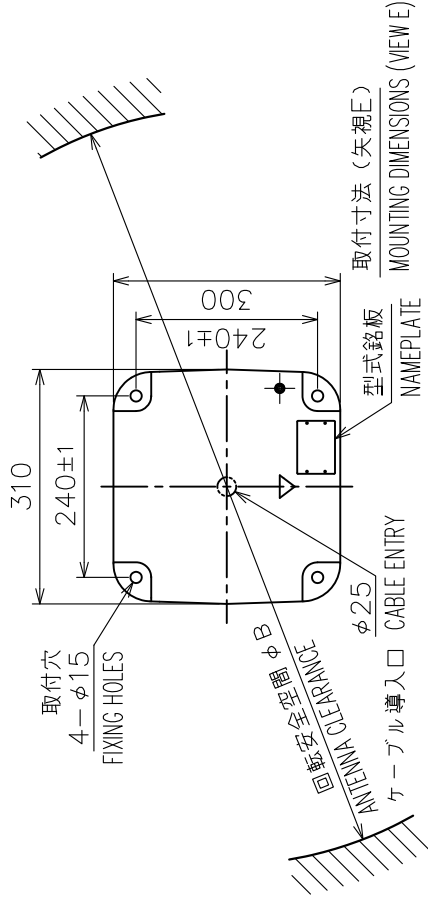
DRAWN Jan 5 '04	E. MIYOSHI Takahashi T.	TITLE RSB-096/097	名称 空中線部
CHECKED		APPROVED Y. Hatai WAS TABLE 2 表2参照	外寸図
SCALE 1/10		DWG No C3519-G20-A	ANTENNA UNIT
			OUTLINE DRAWING

表 1 TABLE 1

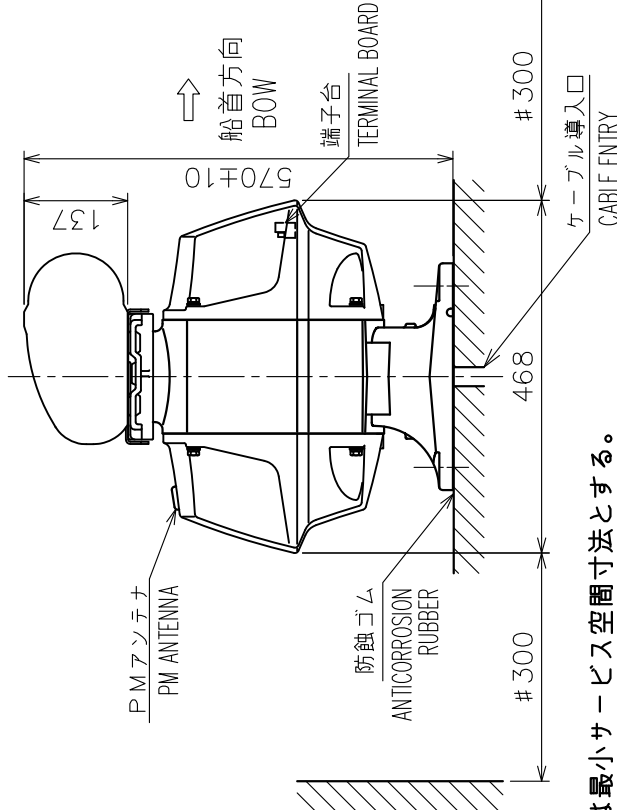
寸法区分 (mm) DIMENSION	公差 (mm) TOLERANCE
L ≤ 50	±1.5
50 < L ≤ 100	±2.5
100 < L ≤ 500	±3
500 < L ≤ 1000	±4
1000 < L ≤ 2000	±5
2000 < L ≤ 4000	±7

表 2 TABLE 2

アンテナ型式 ANTENNA TYPE	XN-20AF	XN-24AF
A : 空中線長 ANTENNA LENGTH (mm)	2,040±10	2,550±10
B : 回転安全空間 ANTENNA CLEARANCE (mm)	2,200	2,700
質量 MASS (kg±10%)	39	42



空中線長 A ANTENNA LENGTH



- 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 M12 ボルトを使用のこと。

NOTE 1. # MINIMUM SERVICE CLEARANCE.

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

3. USE M12 BOLTS FOR FIXING THE UNIT.

DRAWN Feb. 15 '08 I. YAMASAKI	TITLE RSB-096/097 (w/PM)
CHECKED Feb. 15 '08 I. TAKENO	名称 空中線部
APPROVED Jun. 11 '08 R. Esumi	外寸図
SCALE 1/10 MASS 表之参照 SEE TABLE 2	NAME ANTENNA UNIT
DWG.No. C3519-001-C	03-154-300G-2
OUTLINE DRAWING	

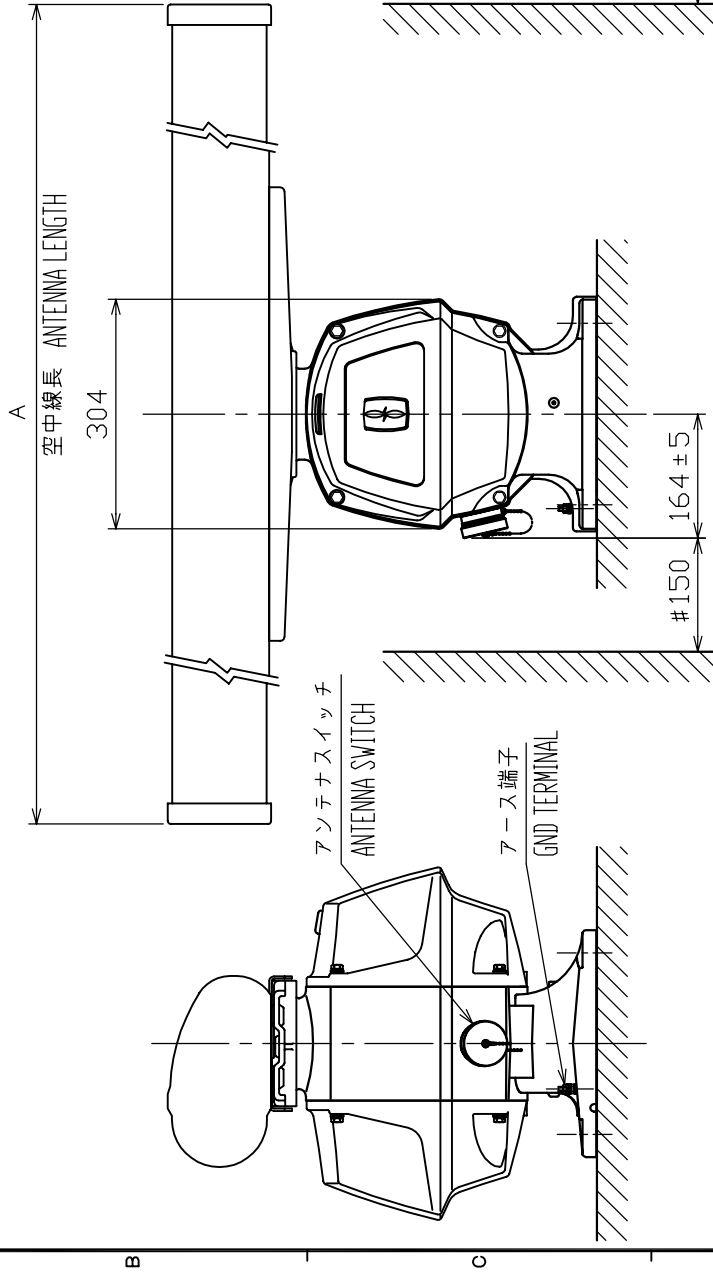
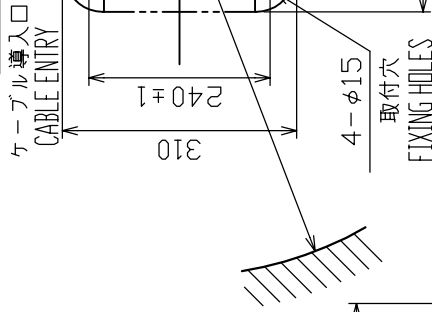
表 1 TABLE 1

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
2000 < L ≤ 4000	± 7

表 2 TABLE 2

アンテナ型式 ANTENNA TYPE	XN-20AF (200cm型)	XN-24AF (240cm型)
A: 空中線長 ANTENNA LENGTH (mm)	2040 ± 10	2550 ± 10
B: 回航安全空間 ANT. CLEARANCE (mm)	2200	2700
質量 MASS (kg ± 10%)	39	42

表 3 TABLE 3



- 注 記
- 1) #印寸法は最小サービス空間寸法とする。
 - 2) A, B寸法、及び質量は表2による。
 - 3) 指定外の寸法公差は表1による。
 - 4) 取付用ネジはM12ボルトを使用のこと。
- NOTE
1. # MINIMUM SERVICE CLEARANCE.
 2. TABLE 2 INDICATES MASS AND DIMENSIONS A & B.
 3. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS WHICH IS NOT SPECIFIED.
 4. USE M12 BOLTS FOR FIXING THE UNIT.

DRAWN	Jan 5 '04	E. MIYOSHI	TITLE	RSB-096/097 (PM-31)
CHECKED		Takahashi T.	名称	空中線部
APPROVED		Y. Hatai	外寸図	
SCALE	1/10	表 2 参照	NAME	ANTENNA UNIT
DATE		C3519-G19-A		OUTLINE DRAWING

表 1 TABLE 1

寸法区分 (mm) DIMENSIONS	公差 (mm) TOLERANCE
$L \leq 50$	± 1.5
$50 < L \leq 100$	± 2.5
$100 < L \leq 500$	± 3
$500 < L \leq 1000$	± 4
$1000 < L \leq 2000$	± 5
$2000 < L \leq 4000$	± 7

表 2 TABLE 2

アンテナ型式 ANTENNA TYPE	XN-20AF (200cm型)	XN-24AF (240cm型)
A: 空中線長 ANTENNA LENGTH (mm)	2040±10	2550±10
B: 回転安全空間 ANT. CLEARANCE (mm)	2200	2700
質量 MASS (kg±10%)	39	42

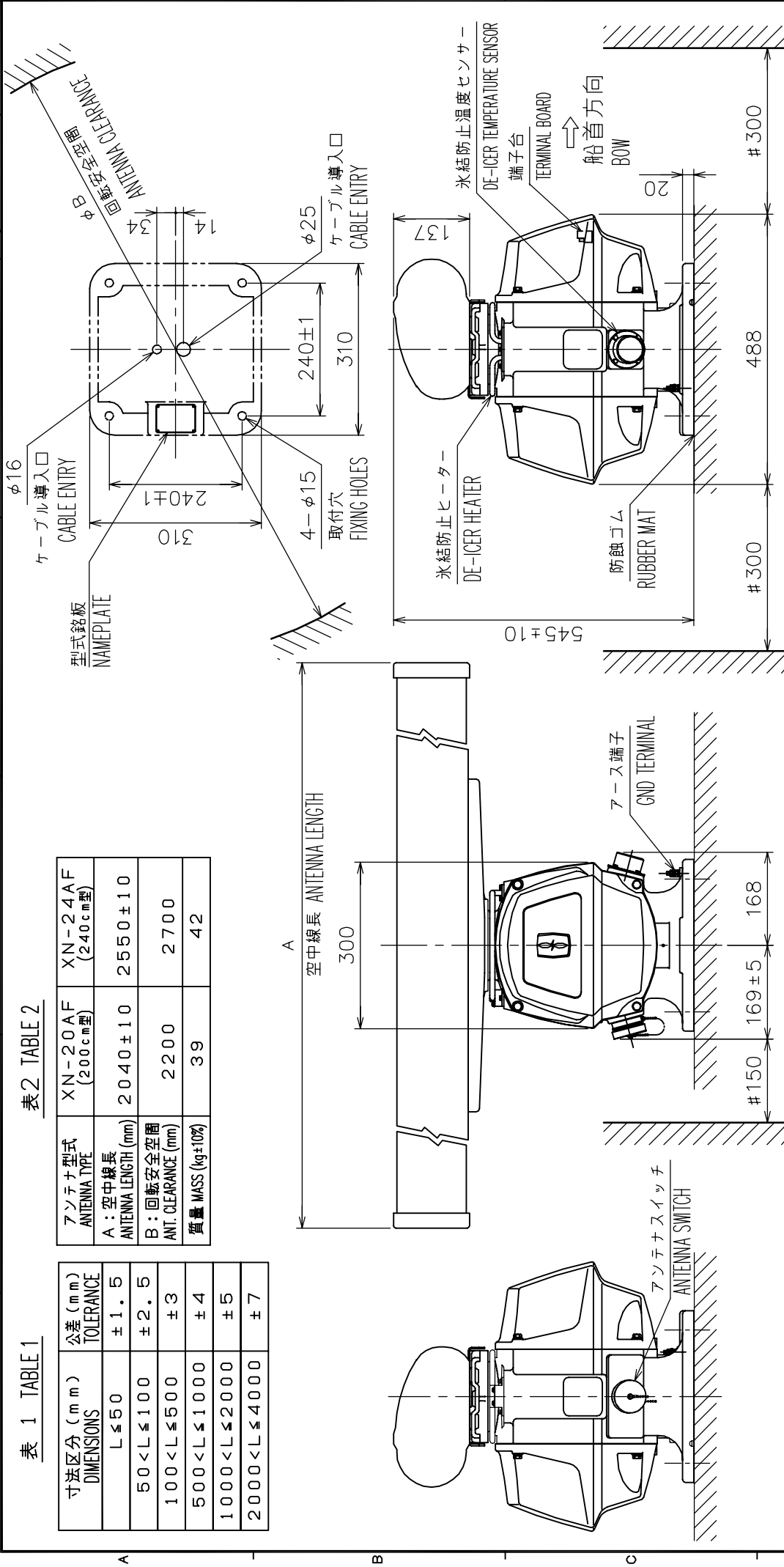
5

4

3

2

1



- 注 記
- 1) #印寸法は最小サービスクリアランスとする。
 - 2) 指定外の寸法公差は表1による。
 - 3) 取付用ネジはM12ボルトを使用のこと。
 - 4) A, B寸法は表2による。

- NOTE
1. # MINIMUM SERVICE CLEARANCE.
 2. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS WHICH IS NOT SPECIFIED.
 3. USE M12 BOLTS FOR FIXING THE UNIT.
 4. TABLE 2 INDICATES DIMENSIONS A & B.

DRAWN	Jun-27_06	E. MIYOSHI	TITLE	RSB-096/097
CHECKED		TAKAHASHI, T	名称	空中線部 (氷結防止付き)
APPROVED		Y. Hatatai	外寸図	
SCALE	1/10	表2参照	NAME	ANTENNA UNIT (W/DE-ICER)
DWG. No.	C3519-G24-B			OUTLINE DRAWING

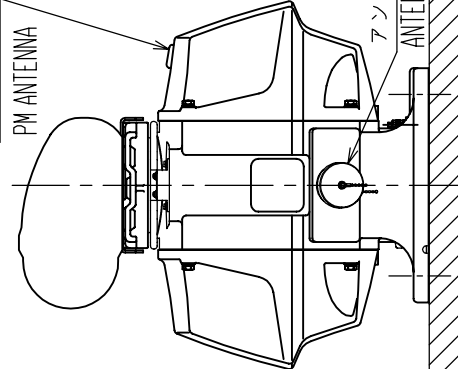
表 1 TABLE 1

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
2000 < L ≤ 4000	± 7

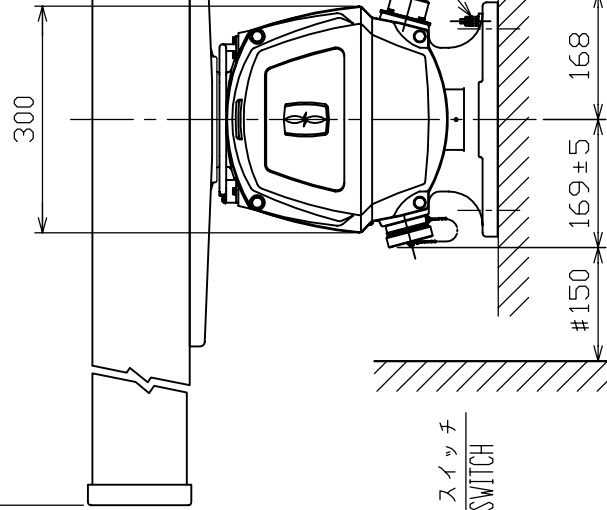
表 2 TABLE 2

アンテナ型式 ANTENNA TYPE	XN-20AF (200cm型)	XN-24AF (240cm型)
A: 空中線長 ANTENNA LENGTH (mm)	2040 ± 10	2550 ± 10
B: 回転安全空間 ANT. CLEARANCE (mm)	2200	2700
質量 MASS (kg ± 10%)	39	42

PMアンテナ



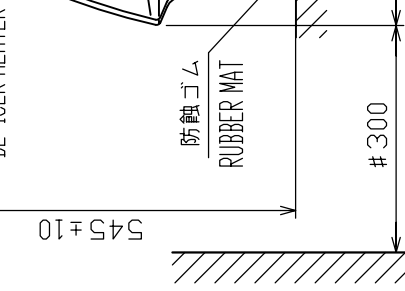
A
空中線長 ANTENNA LENGTH



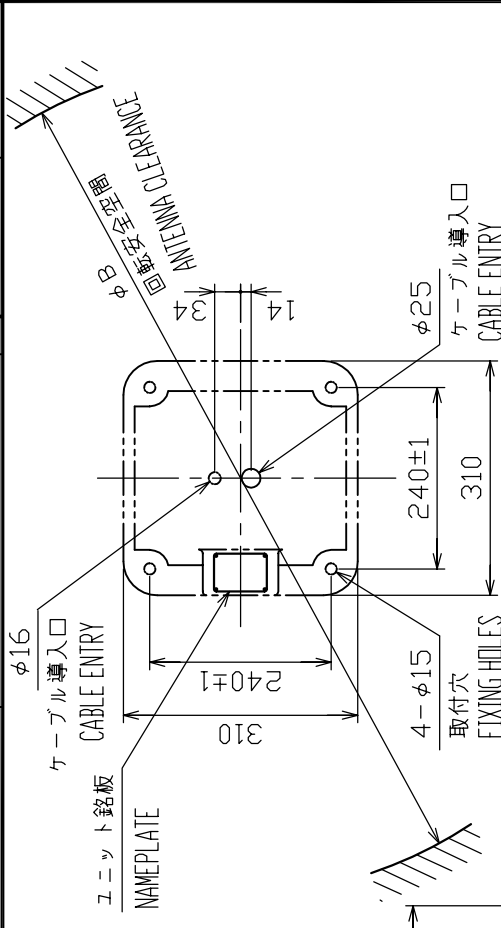
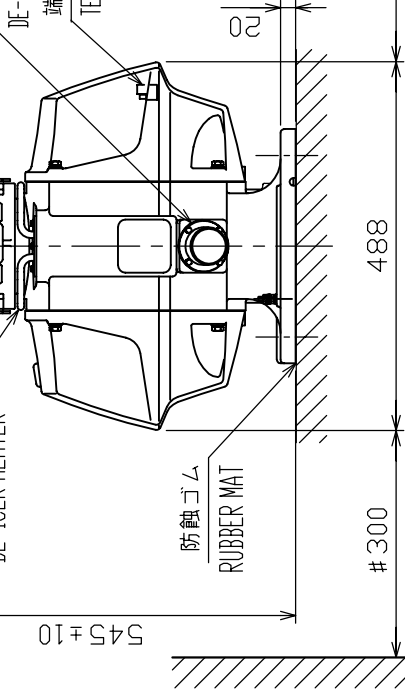
B
545 ± 10



C
氷結防止ヒーター



D
氷結防止温度センサー



- 注 記 1) #印寸法は最小サービス空間寸法とする。
 2) A, B寸法、及び質量は表2による。
 3) 指定外の寸法公差は表1による。
 4) 取付用ネジはM12ボルトを使用のこと。

NOTE 1. #: MINIMUM SERVICE CLEARANCE.

2. TABLE 2 INDICATES MASS AND DIMENSIONS A & B.

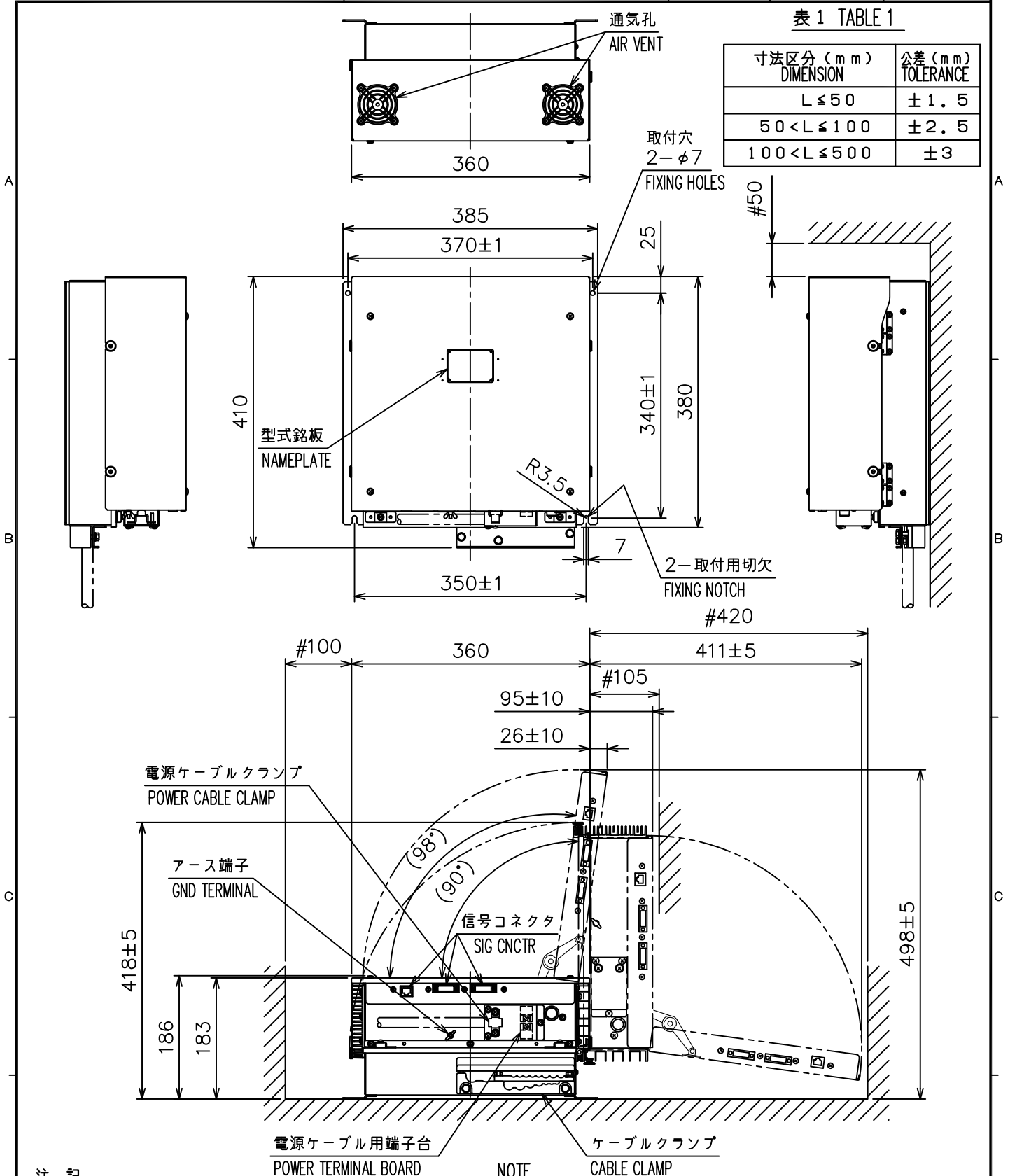
3. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS WHICH IS NOT SPECIFIED.

4. USE M12 BOLTS FOR FIXING THE UNIT.

DRAWN Jun 5 '04 CHECKED Takahashi T.	TITLE RSB-096/097 (PM-31)
APPROVED Y. Hatai	名称 空中線部 (氷結防止付き)
SCALE 1/10	外寸図
FIG. No. C3519-G23-A	NAME ANTENNA UNIT (W/DE-ICER)
	OUTLINE DRAWING

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



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 M6 ボルト、またはコーチボルト 呼び径 6 を使用のこと。

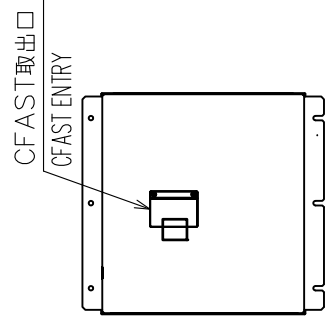
NOTE

1. #: MINIMUM SERVICE CLEARANCE.
2. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS WHICH IS NOT SPECIFIED.
3. USE M6 BOLTS OR COACH SCREWS φ6 FOR FIXING THE UNIT.

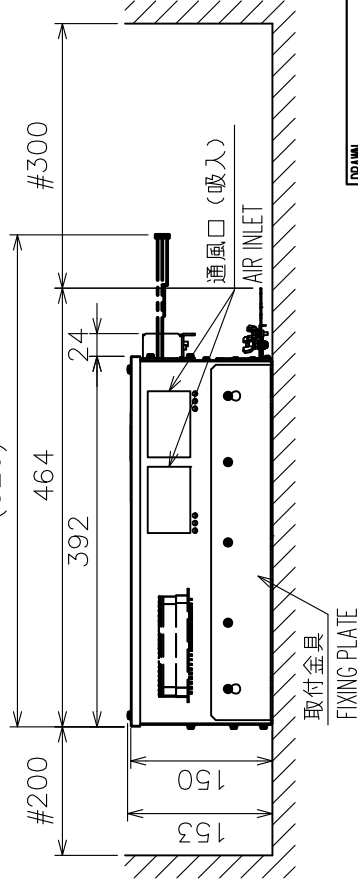
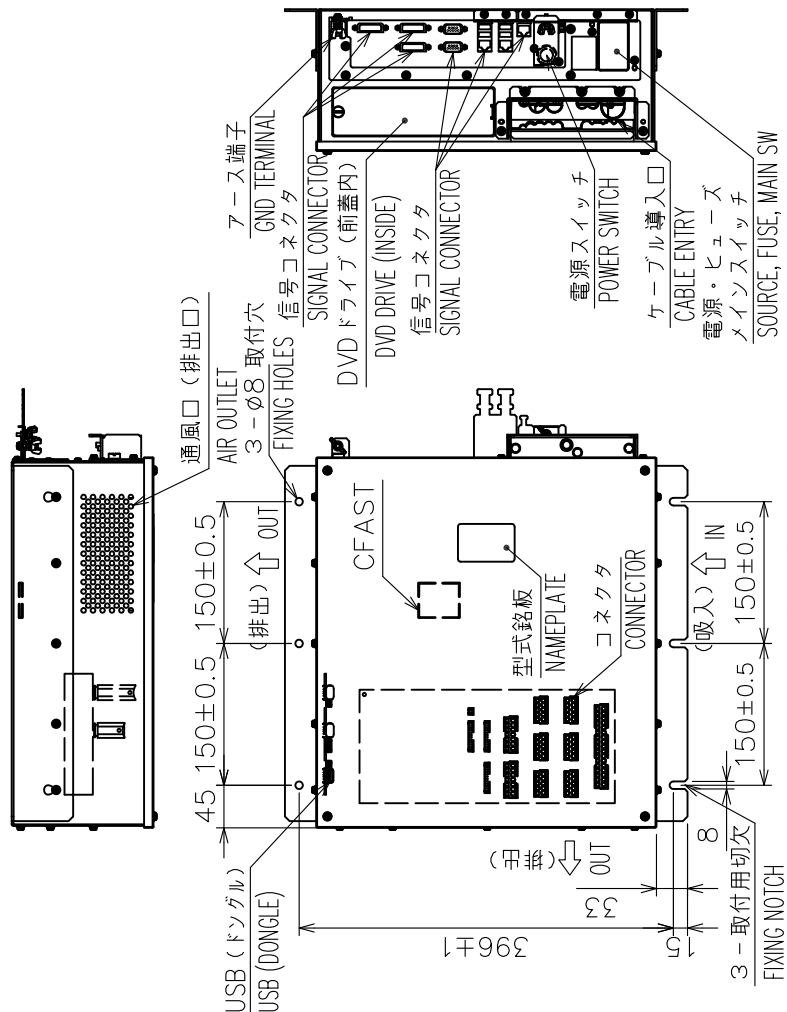
DRAWN	May 15 '07 T. YAMASAKI	TITLE	RPU-013/016
CHECKED	May 15 '07 T. TAKENO	名称	制御部
APPROVED	May 17 '07 R. Esumi	FCR-2117 SER. FAR-2117 SER.	外寸図
SCALE	1/8 MASS 10 ±10% kg	NAME	PROCESSOR UNIT
DWG. No.	C3519-G03-D	REF. No.	03-163-800G-3
		OUTLINE DRAWING	

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



背面 (尺度: 1/12)
REAR VIEW (SCALE: 1/12)



注 記

- 1) 指定外の寸法公差は表1による。
- 2) #印寸法は最小サービスイ間寸法とする。
- 3) 取付用ネジはM6ボルトまたはコーチボルト呼び径6を使用のこと。
- 4) DVDドライブの向きは左右いずれかとする。切欠きが下向きとなるよう取付金具(工材)を本体に取り付ける。

NOTE

1. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS WHICH IS NOT SPECIFIED.
2. #: MINIMUM SERVICE CLEARANCE.
3. USE M6 BOLTS OR COACH SCREWS Ø6 FOR FIXING THE UNIT.
4. ORIENT DVD DRIVE RIGHT OR LEFT SIDE EITHER. MOUNT THE FIXING PLATES (SUPPLIED) TO THE CHASSIS AS THE FIXING NOTCH FACES TO BOTTOM.

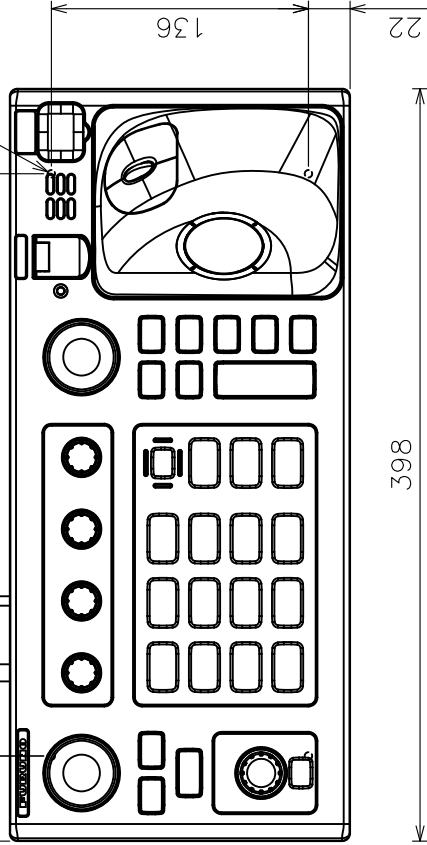
DRAWN	30/Oct/2012 T.YAMASAKI	TITLE	EC-3000
CHECKED	30/Oct/2012 H.MAKI	名称	制御部 (壁掛装備)
APPROVED	27/Nov/2012 Y.NISHIYAMA	外寸図	
SCALE	1/8	NAME	PROCESSOR UNIT (BULKHEAD MOUNT)
DWG.No.	C4473-G01-B	REF.No.	24-014-011G-2
			OUTLINE DRAWING

電源・信号ケーブル (オプション)
POWER/SIGNAL CABLE (OPTION)

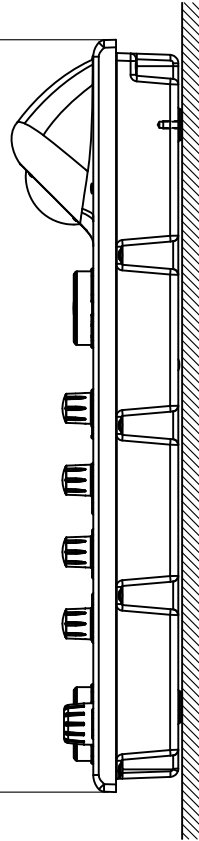
4.5

308

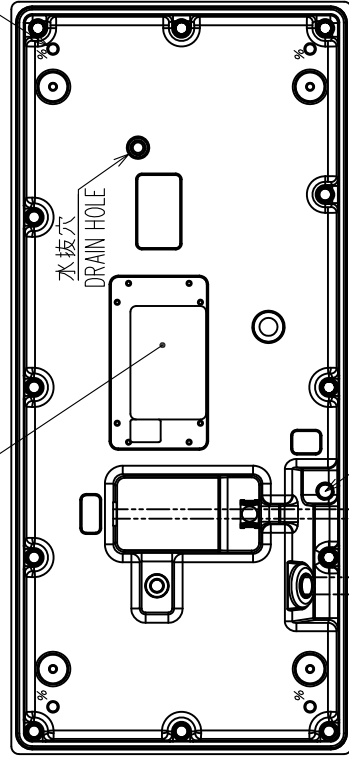
取付穴
4-M4
FIXING HOLES



398



型式銘板
NAMEPLATE

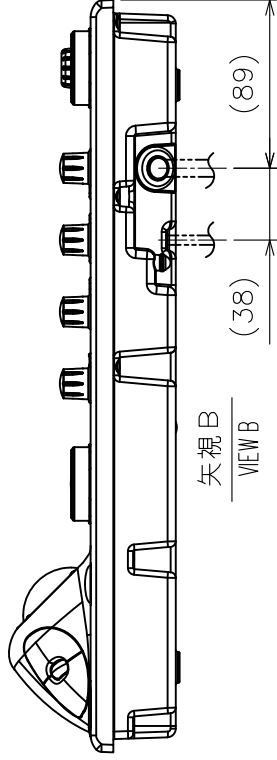


4-水抜穴 (%部)
DRAIN HOLES

グランド端子
GND TERMINAL

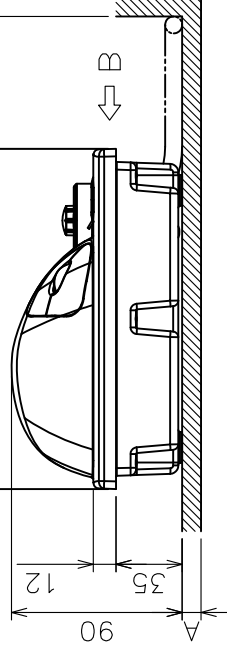
表1 TABLE 1

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



180

#70



注 記 1)

指定外の寸法公差は表1による。

2) #印寸法は最小サービス空間寸法とする。

3) 取付ネジはセムスネジ B M4×12を使用のこと。

壁の厚さ(A)は最小2、最大4とする。

または、ねじ長さを(A+8±2)とする。

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

2. #: MINIMUM SERVICE CLEARANCE.

3. USE SEMS B SCREWS M4×12 FOR FIXING THE UNIT.

BULKHEAD THICKNESS (A): $2 \leq A \leq 4$ OR SCREW LENGTH: $A+8 \pm 2$.

DRAWN	TITLE	RCU-025
21/May/2012 T.YAMASAKI	名称	レーダー操作部 (卓上装備)
CHECKED 21/May/2012 H.MAKI	外寸図	
APPROVED 24/May/2012 Y.NISHIYAMA	NAME	RADAR CONTROL UNIT (TABLETOP MOUNT)
SCALE 1/4	質量は5mmケーブルを含む。 MASS INCLUDES 5m CABLE.	OUTLINE DRAWING
DWG.No. C3607-G01-A	REF.No. 03-179-100G-2	

電源・信号ケーブル
POWER/SIGNAL CABLE

信号ケーブル (オプション)
SIGNAL CABLE (OPTION)

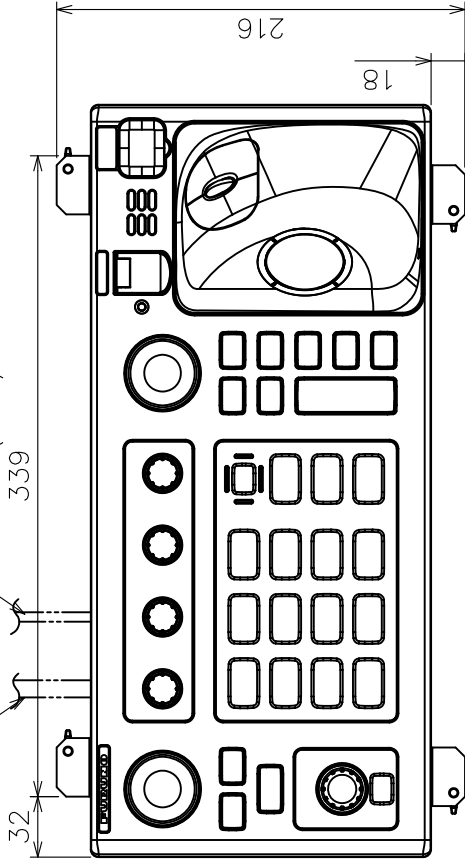
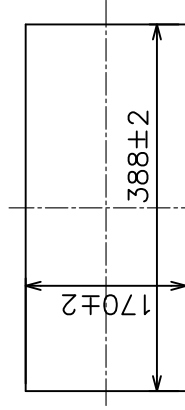
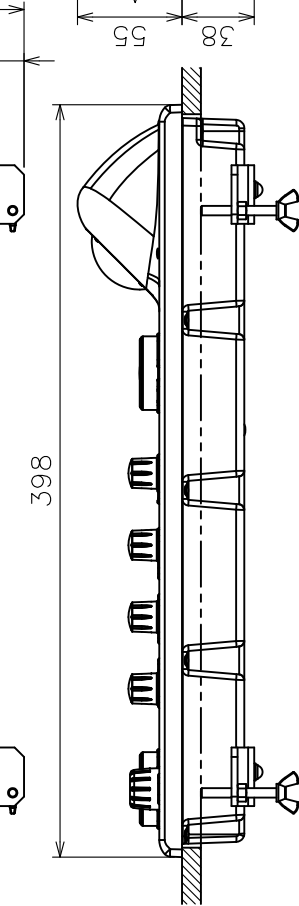
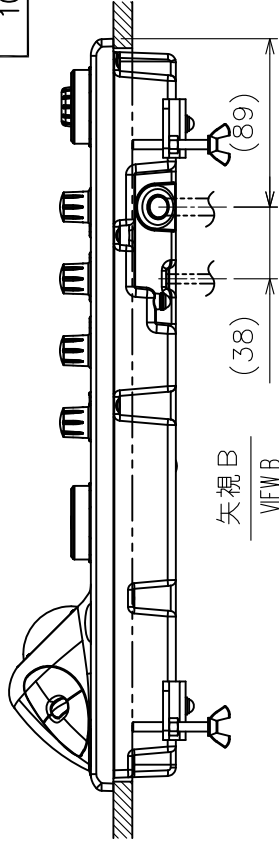


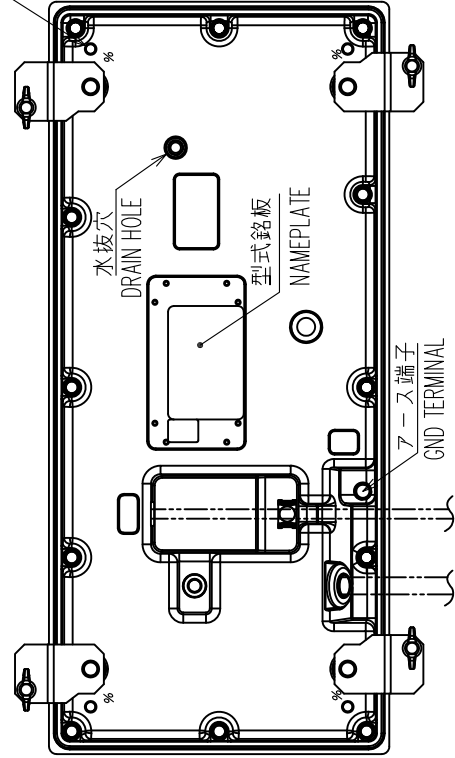
表1 TABLE 1

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



取付寸法 (尺度: 1/8)
CUTOUT DIMENSIONS (SCALE: 1/8)

4-水抜き (% 部)
DRAIN HOLES



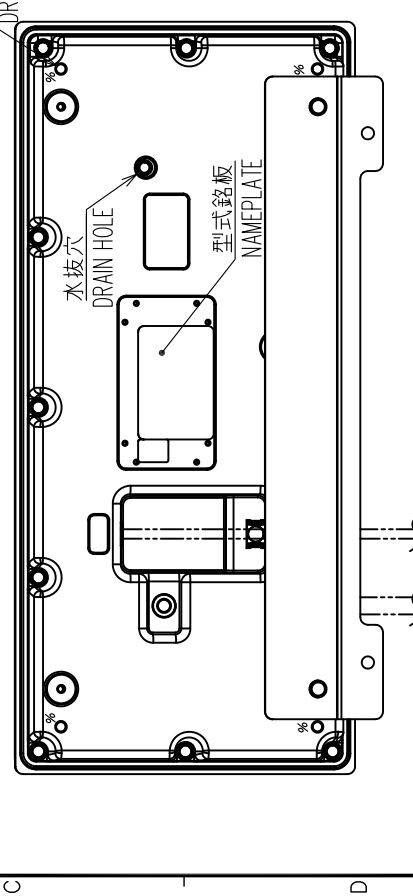
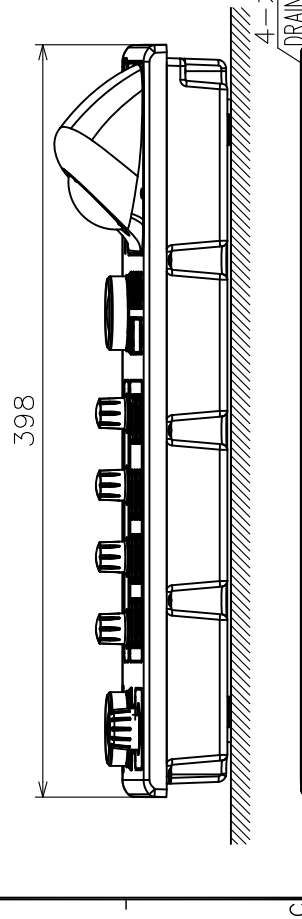
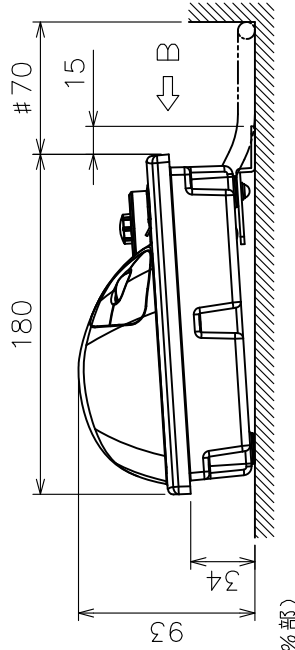
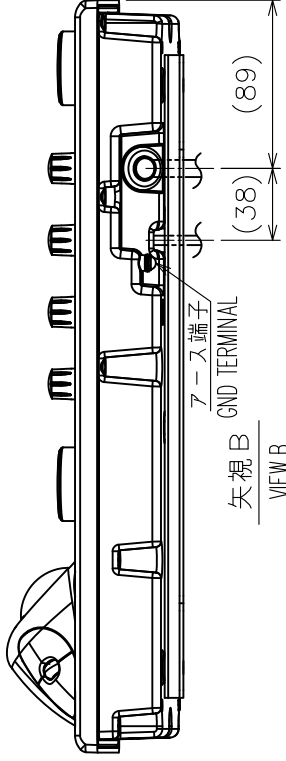
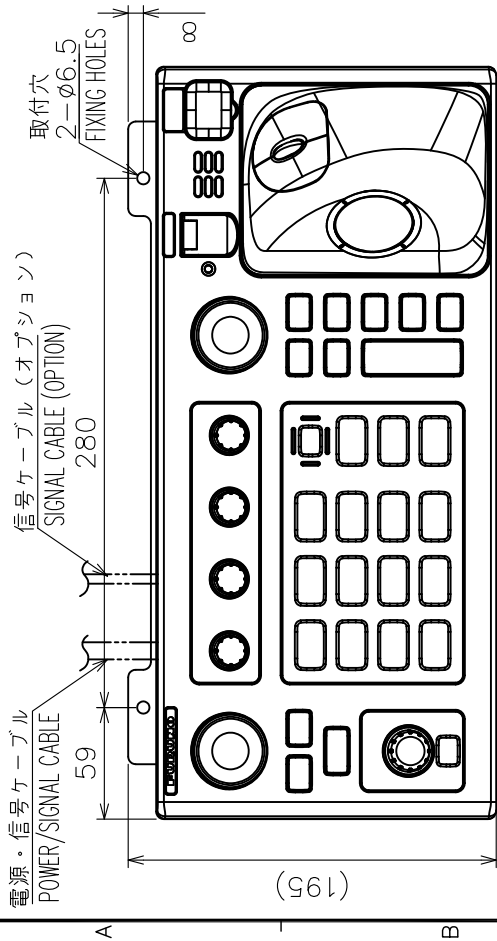
- 注記 1) 指定外の寸法公差は表1による。
2) #印寸法は最小サービス空間寸法とする。
3) 壁の厚さ (A) は最小10、最大20とする。

- NOTE 1. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS WHICH IS NOT SPECIFIED.
2. # : MINIMUM SERVICE CLEARANCE.
3. BULKHEAD THICKNESS (A): $10 \leq A \leq 20$.

DRAWN	21/May/2012 T.YAMASAKI	TITLE	RCU-025
CHECKED	21/May/2012 H.MAKI	名称	レーダー操作部 (埋込装備)
APPROVED	24/May/2012 Y.NISHIYAMA	外寸図	
SCALE	1/4 MASS 3.1	NAME	RADAR CONTROL UNIT (FLUSH MOUNT)
DWG.No.	C3607-G02-A	REF.No.	03-179-110G-2

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



- 注 記
- 1) 指定外の寸法公差は表1による。
 - 2) #印寸法は最小サージ空間寸法とする。
 - 3) 取付ネジはトラスターピンネジ[®]呼び径5×20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 $\phi 5 \times 20$ FOR FIXING THE UNIT.

DRAWN	21/May/2012 I.YAMASAKI	TITLE	RCU-025
CHECKED	21/May/2012 H.MAKI	名称	レーダー操作部 (取付金具)
APPROVED	24/May/2012 Y.NISHIYAMA	外寸図	
SCALE	1/4 MASS 3.3 kg	NAME	RADAR CONTROL UNIT (FIXTURE MOUNT)
DWG.No.	C3607-G03-A	REF.No.	03-179-120G-2
			OUTLINE DRAWING

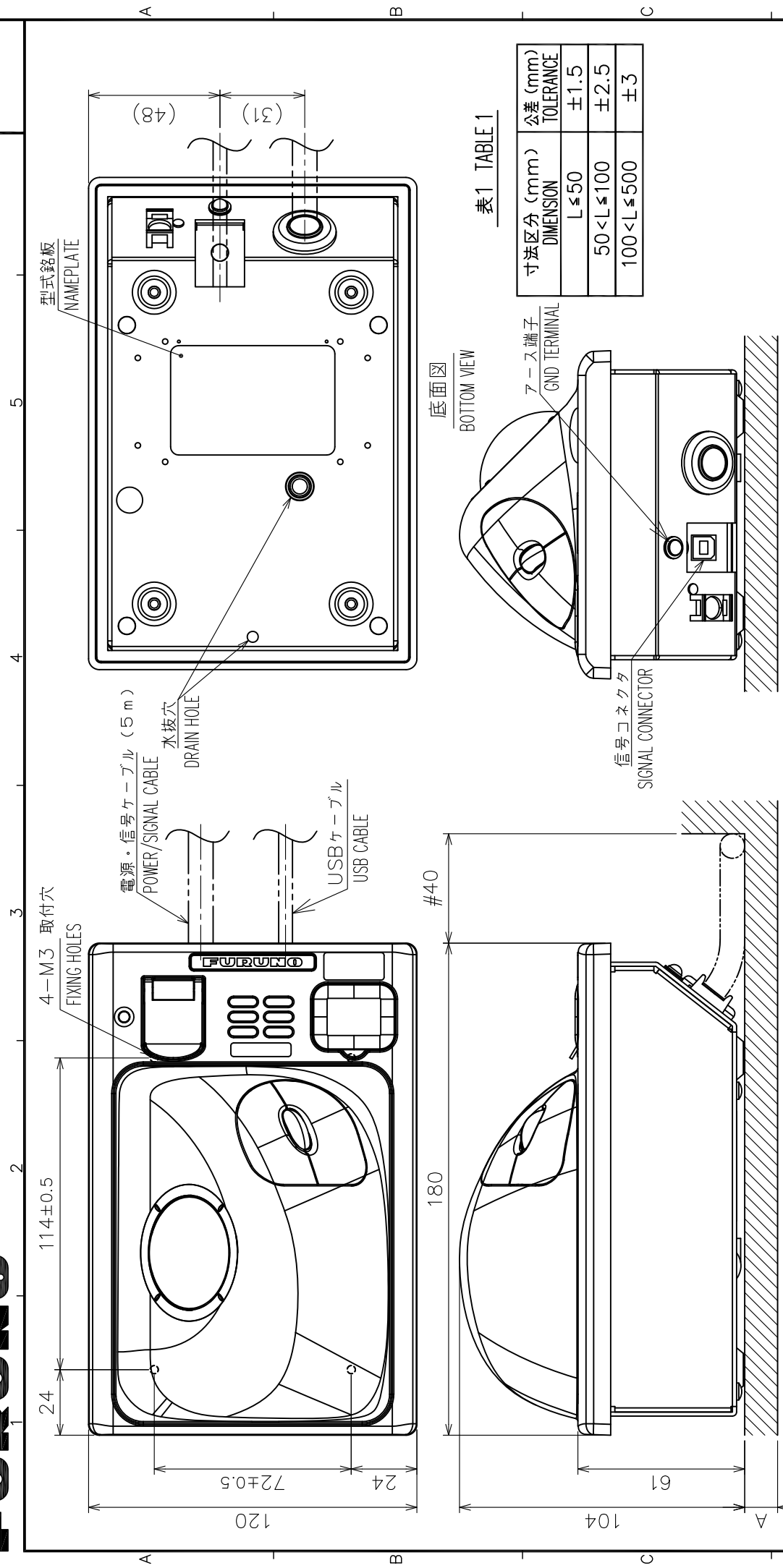


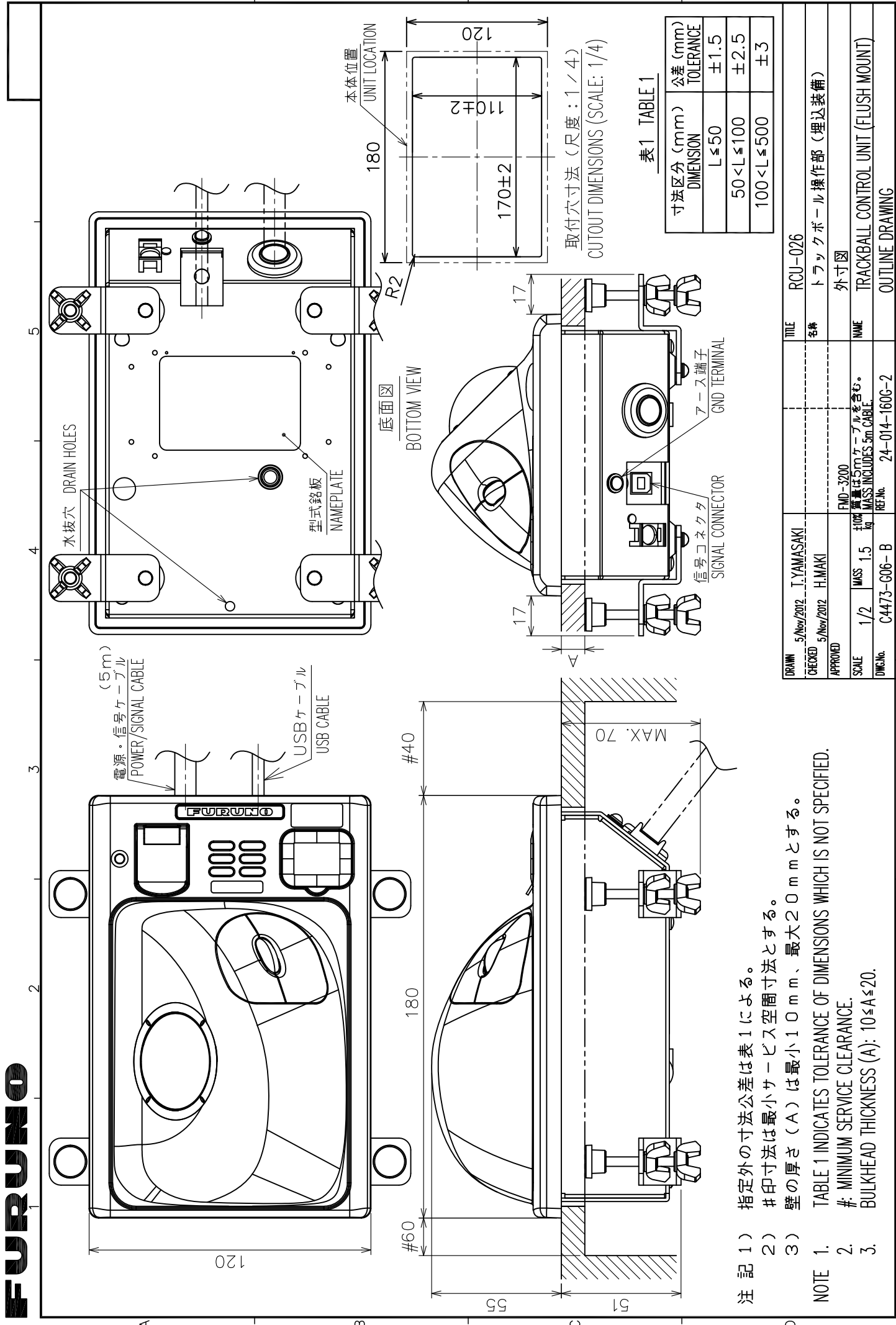
表1 TABLE 1

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

注記 1) 指定外の寸法公差は表1による。
 2) #印寸法は最小サービスイテラを使用のこと。壁の厚さ(A)は最小2、最大4とする。それ以外はねじ長さをA+8±2とする。
 3) 取付ネジはセムスネジB M3x12を使用のこと。壁の厚さ(A)は最小2、最大4とする。それ以外はねじ長さをA+8±2とする。

NOTE 1. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS WHICH IS NOT SPECIFIED.
 2. # MINIMUM SERVICE CLEARANCE.
 3. USE SEMS B SCREWS M3x12 FOR BULKHEAD THICKNESS (A); 2 ≤ A ≤ 4. OR SCREW LENGTH: A+8±2.

DRAWN	5/Nov/2012	T.YAMASAKI	TITLE	RCU-026
CHECKED	5/Nov/2012	H.MAKI	名称	トラックボール操作部 (卓上装備)
APPROVED			外寸図	
SCALE	1/2	質量 1.4 kg #104質量は5mケーブルを含む。 MASS INCLUDES 5m CABLE.	NAME	TRACKBALL CONTROL UNIT (TABLETOP MOUNT)
DWG.No.	C4473-G05-B	REF.No.	24-014-150G-2	OUTLINE DRAWING



- 注記 1) 指定外の寸法公差は表1による。
 2) #印寸法は最小サージス空間寸法とする。
 3) 壁の厚さ(A)は最小10mm、最大20mmとする。
- NOTE 1. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS WHICH IS NOT SPECIFIED.
 2. #: MINIMUM SERVICE CLEARANCE.
 3. BULKHEAD THICKNESS (A): $10 \leq A \leq 20$.

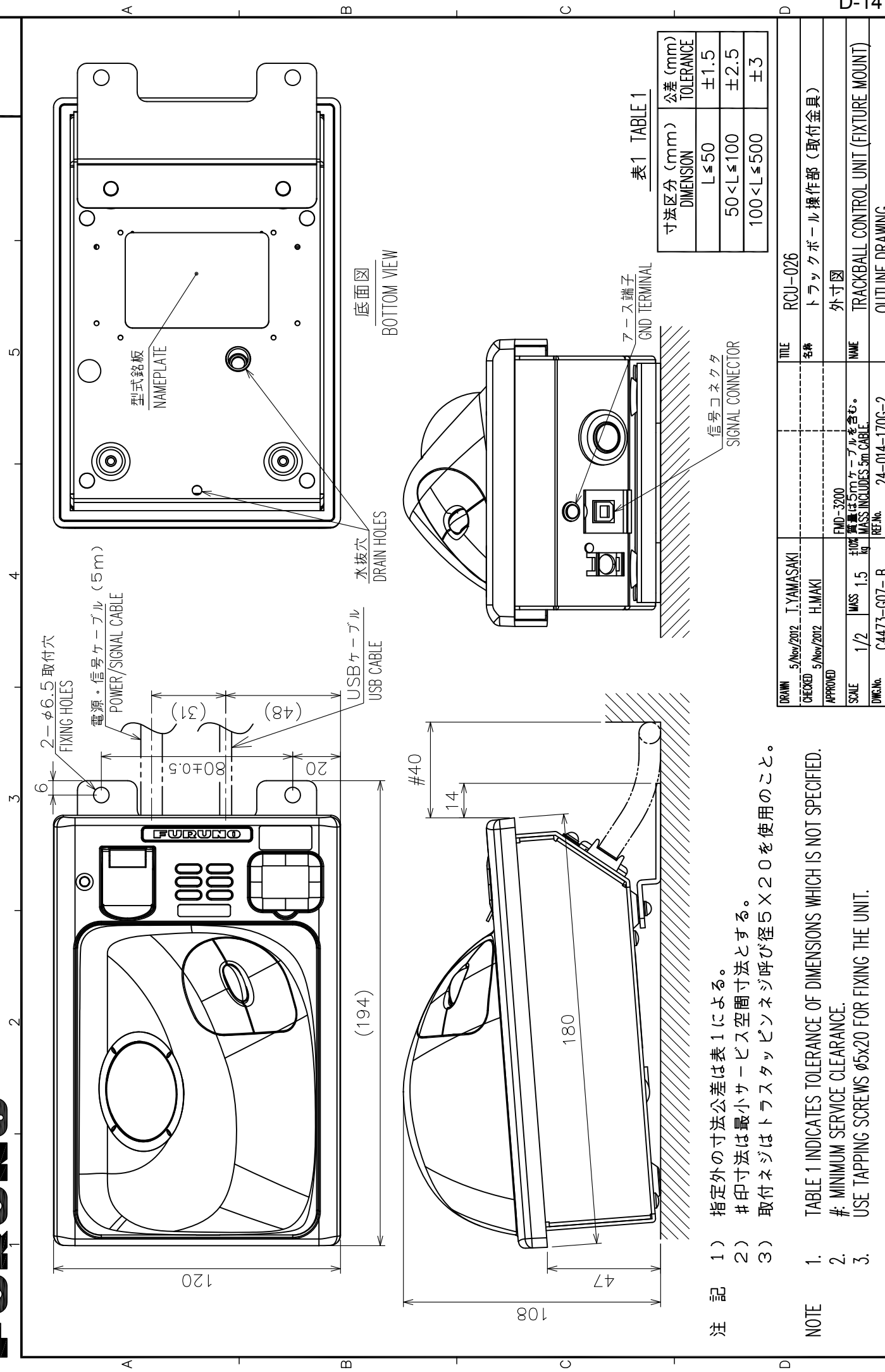


表1 TABLE 1

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

DRAWN	5/Nov/2012	T.YAMASAKI	TITLE	RCU-026
CHECKED	5/Nov/2012	H.MAKI	名称	トラックボール操作部 (取付金具)
APPROVED			外寸図	
SCALE	1/2	WSS 1.5	質量	質量は5mケーブルを含む。 MASS INCLUDES 5m CABLE.
DMC No.	C4473-G07-B		REF.No.	24-014-170G-2

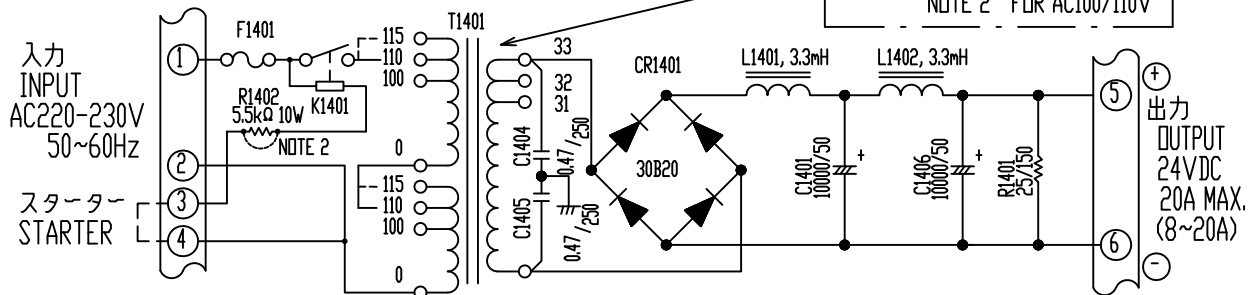
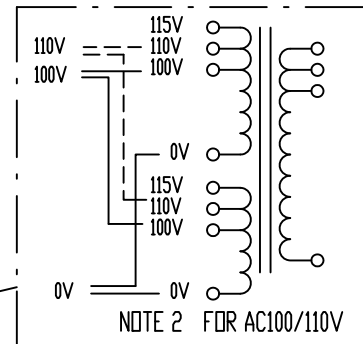
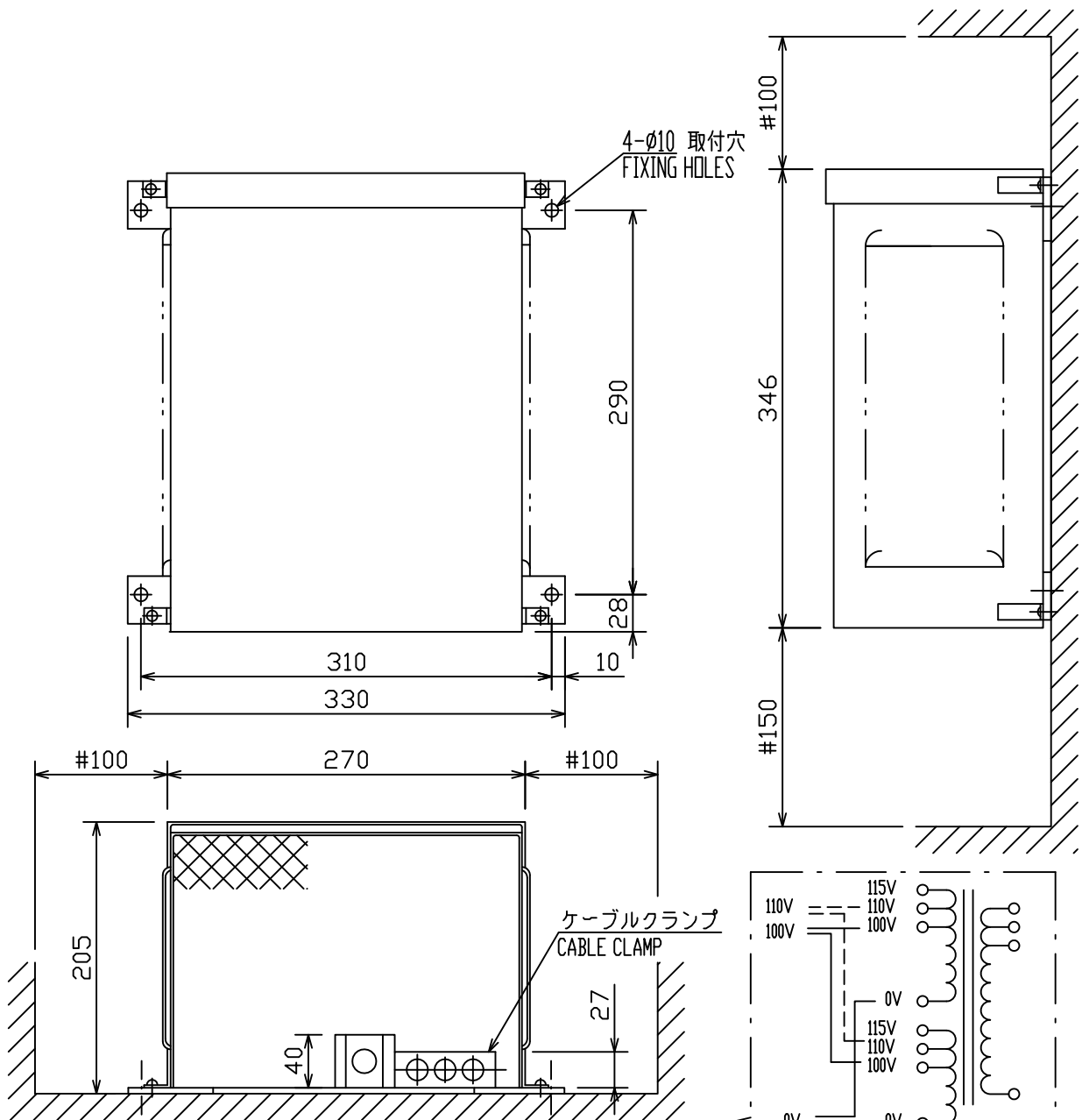
- 注記
- 1) 指定外の寸法公差は表1による。
 - 2) #印寸法は最小サービス空間寸法とする。
 - 3) 取付ネジはトラスタスピネジ呼び径5×20を使用のこと。
- NOTE
1. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS WHICH IS NOT SPECIFIED.
 2. #: MINIMUM SERVICE CLEARANCE.
 3. USE TAPPING SCREWS φ5x20 FOR FIXING THE UNIT.

A

B

C

D



- 注記 1) #印寸法は最小サービス空間寸法とする。
 2) AC100/110V入力に対しては、T1401の一次巻線の接続を変更し、リレー抵抗R1402の両端をジャンパーする。
- NOTE 1. #: MINIMUM SERVICE CLEARANCE.
 2. FOR 100/110VAC INPUT, CHANGE T1401 PRIMARY WINDINGS CONNECTION AND PUT JUMPER ACROSS R1402.

DRAWN	10/Feb/09 I.YAMASAKI	TITLE	RU-3424
CHECKED	10/Feb/09 T.TAKENO	名称	整流器
APPROVED	18/Feb/09 R.Esumi		外寸図
SCALE	1/5 MASS 25 ±10% kg	NAME	RECTIFIER UNIT
DWG. No.	C3002-004-J	REF. No.	OUTLINE DRAWING

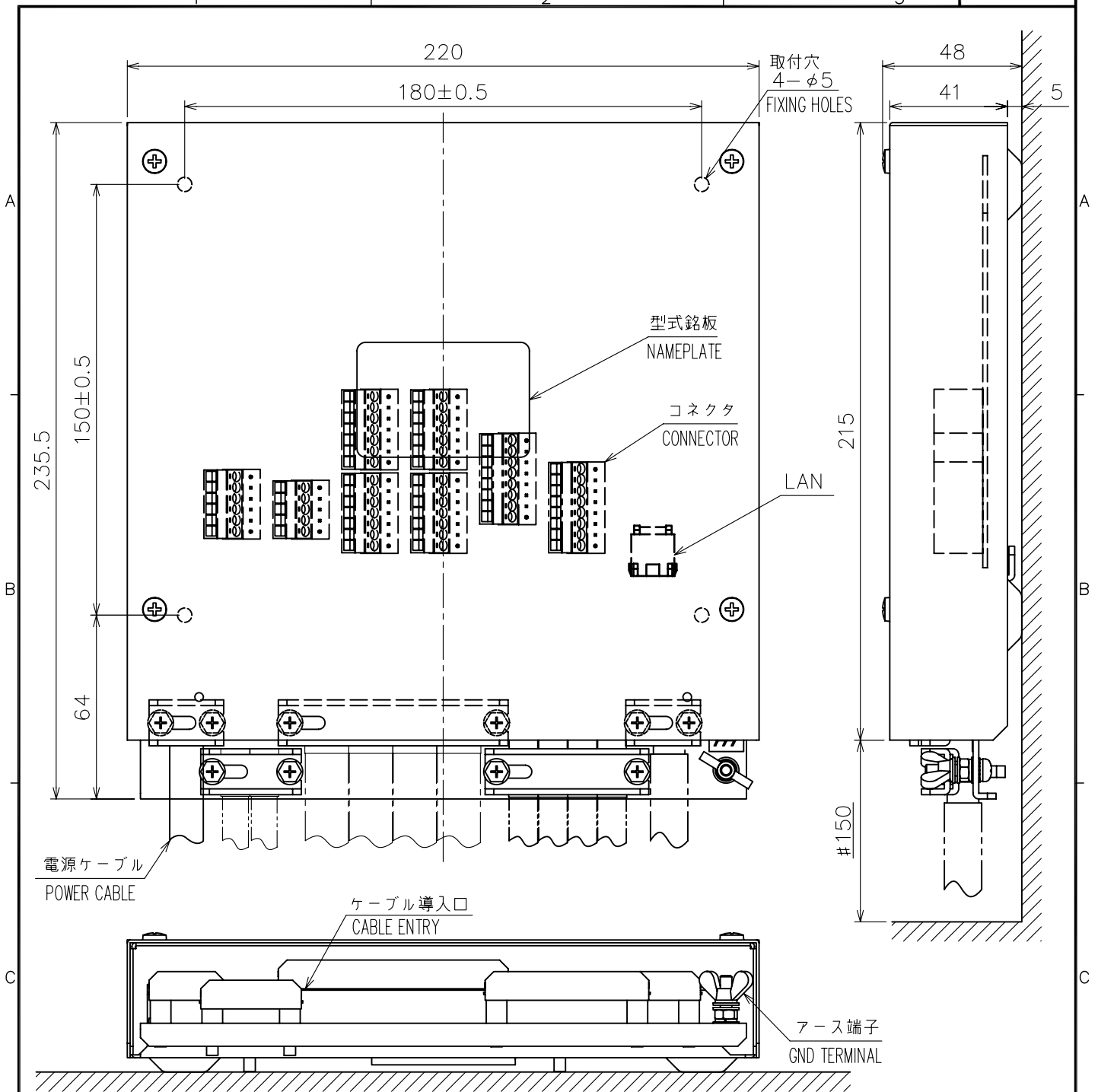


表1 TABLE 1

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

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

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

DRAWN 11/Jan/2012 T.YAMASAKI	TITLE MC-3000S
CHECKED 11/Jan/2012 H.MAKI	名称 センサーアダプター (シリアル)
APPROVED 13/Jan/2012 Y.NISHIYAMA	FMD-3200 外寸図
SCALE 1/2	MASS 1.5 ±10% kg
質量はケーブルを含まず。 MASS DOES NOT INCLUDE CABLE.	
DWG. No. C4473-G08-A	NAME SENSOR ADAPTER (SERIAL)
REF. No. 24-014-200G-1	OUTLINE DRAWING

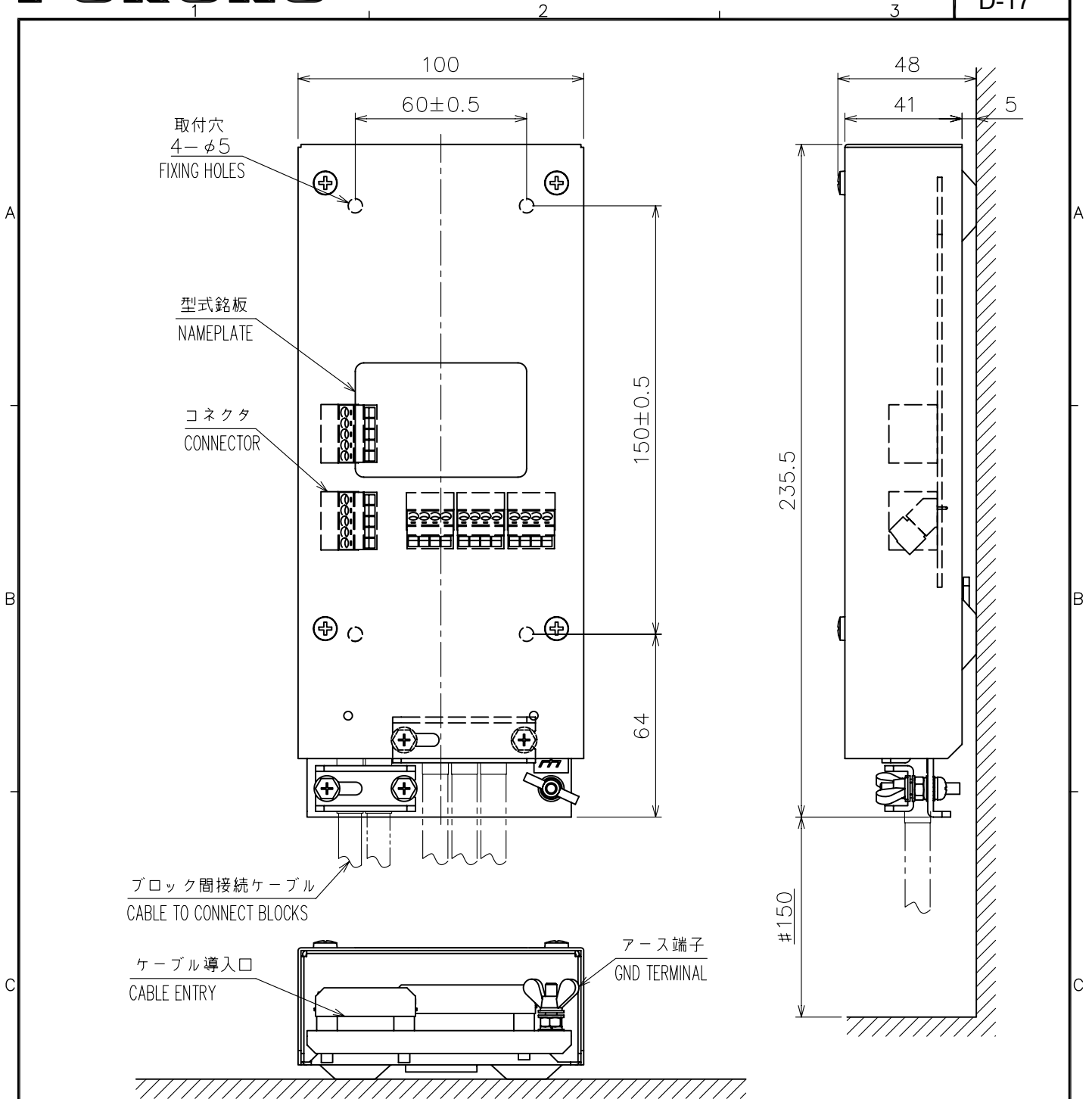


表1 TABLE 1

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

- 注記 1) 指定外の寸法公差は表1による。
 2) #印寸法は最小サービス空間寸法とする。
 3) 取付用ネジはトラスタップピンネジ呼び径4×20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 $\phi 4 \times 20$ FOR FIXING THE UNIT.

DRAWN 11/Jan/2012 T.YAMASAKI	TITLE MC-3010A
CHECKED 11/Jan/2012 H.MAKI	名称 センサーアダプター (アナログ)
APPROVED 13/Jan/2012 Y.NISHIYAMA	FMD-3200 外寸図
SCALE 1/2	MASS 0.8 ±10% kg
質量はケーブルを含まず。 MASS DOES NOT INCLUDE CABLE.	
DWG. No. C4473-G09-A	NAME SENSOR ADAPTER (ANALOG)
REF. No. 24-014-210G-1	OUTLINE DRAWING

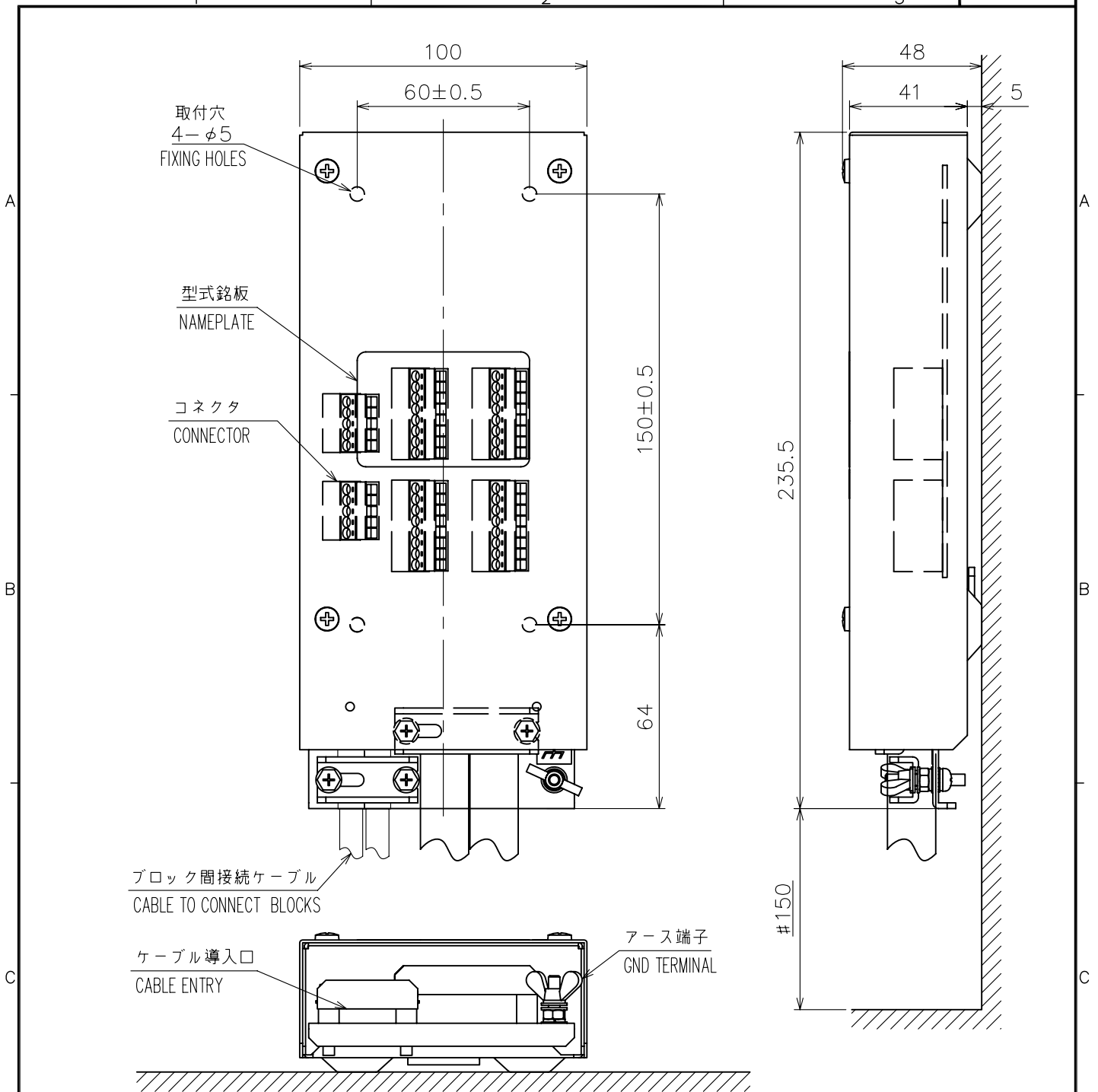


表1 TABLE 1

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

- 注記 1) 指定外の寸法公差は表1による。
 2) #印寸法は最小サービス空間寸法とする。
 3) 取付用ネジはトラスタップピンネジ呼び径4×20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 φ4x20 FOR FIXING THE UNIT.

DRAWN 11/Jan/2012 I.YAMASAKI	TITLE MC-3020
CHECKED 11/Jan/2012 H.MAKI	名称 センサーアダプター (デジタルイン)
APPROVED 13/Jan/2012 Y.NISHIYAMA	FMD-3200 外寸図
SCALE 1/2	MASS 0.8 ±10% kg
質量はケーブルを含まず。 MASS DOES NOT INCLUDE CABLE.	
DWG. No. C4473-G10-A	REF. No. 24-014-220G-1
NAME SENSOR ADAPTER (DIGITAL IN) OUTLINE DRAWING	

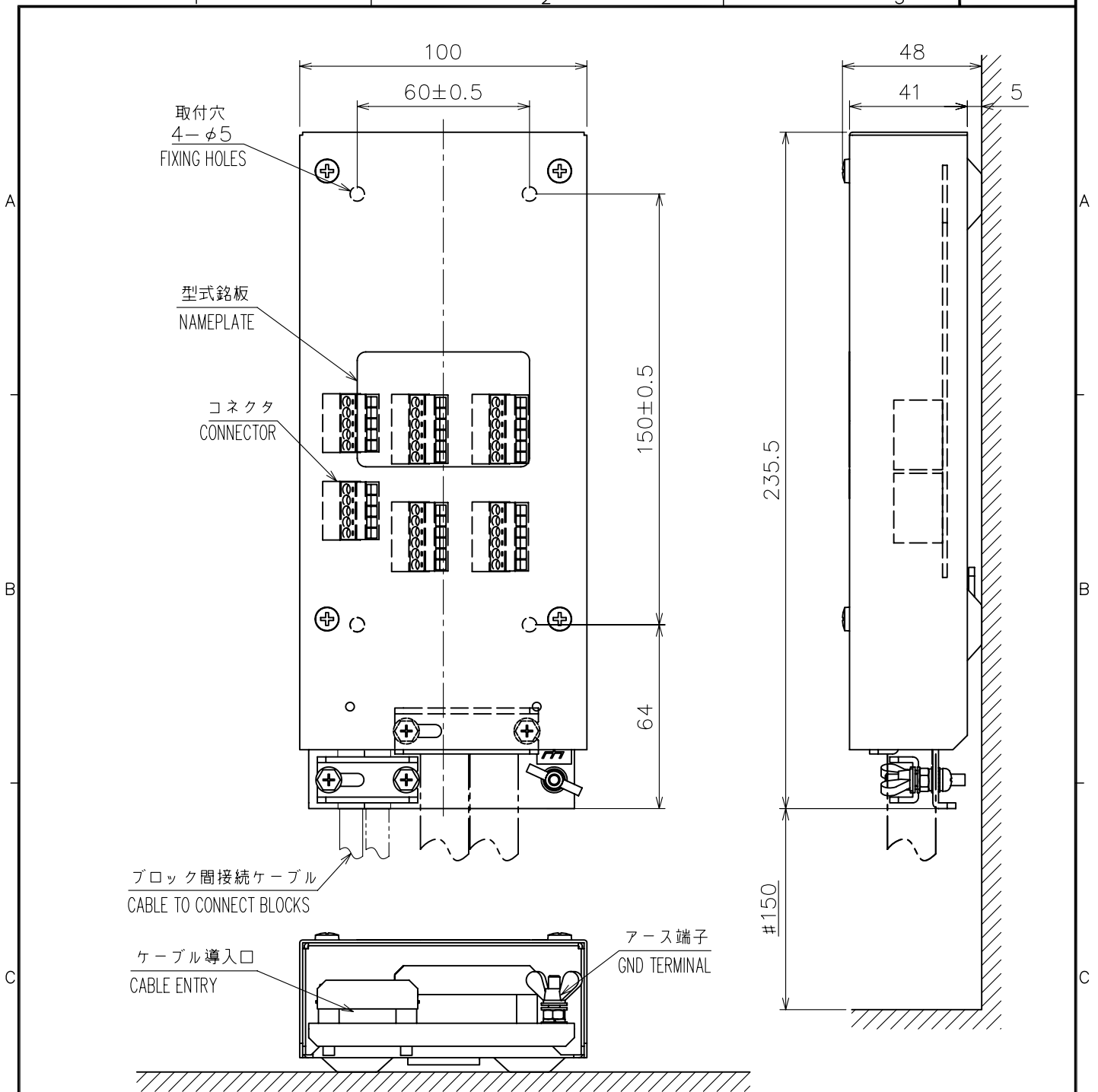


表1 TABLE 1

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

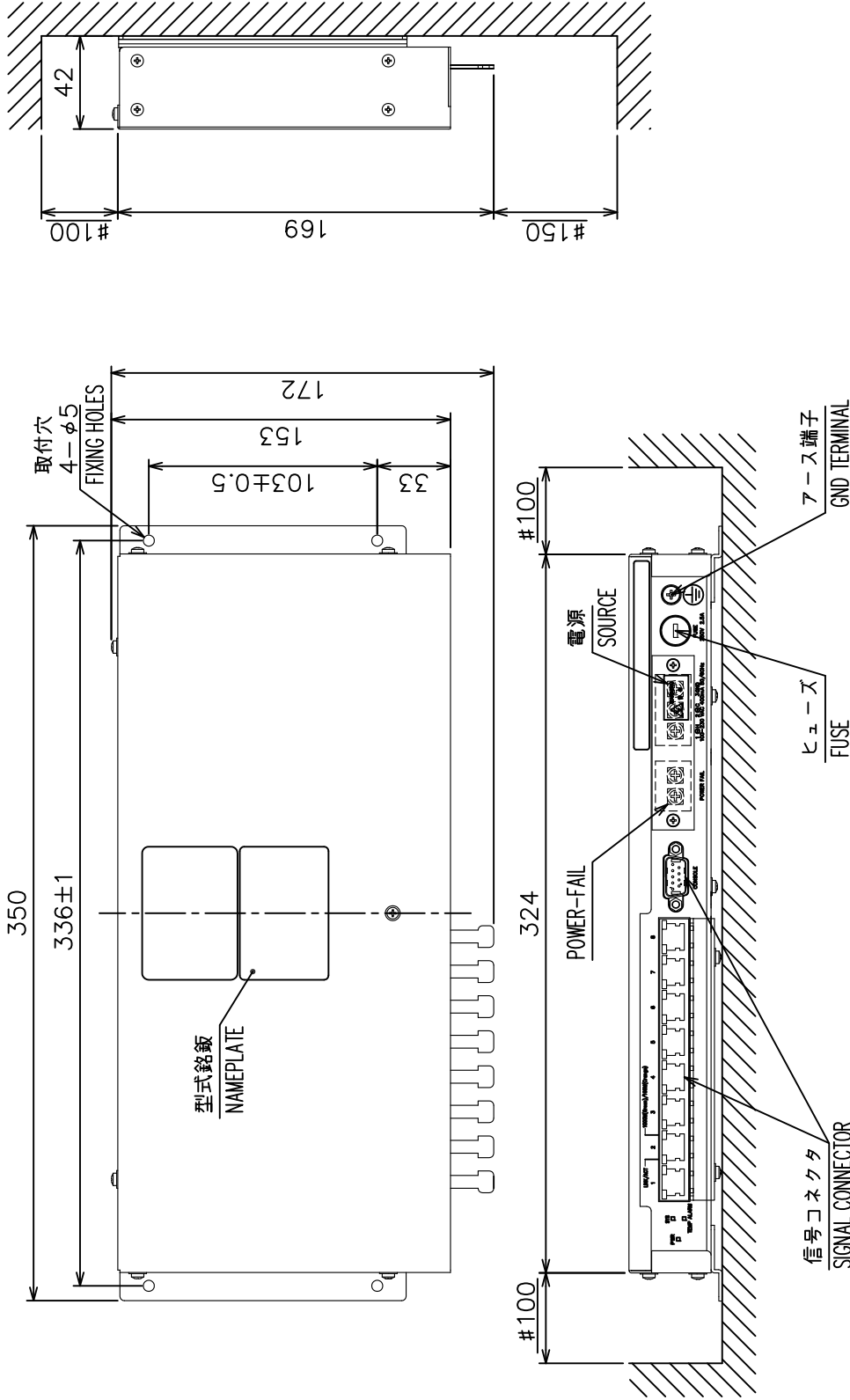
- 注記 1) 指定外の寸法公差は表1による。
 2) #印寸法は最小サービス空間寸法とする。
 3) 取付用ネジはトラスタップピンネジ呼び径4×20を使用のこと。

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

DRAWN 11/Jan/2012 T.YAMASAKI	TITLE MC-3030D
CHECKED 11/Jan/2012 H.MAKI	名称 センサーアダプター (デジタルアウト)
APPROVED 13/Jan/2012 Y.NISHIYAMA	FMD-3200 外寸図
SCALE 1/2	MASS 0.8 ±10% kg
質量はケーブルを含まず。 MASS DOES NOT INCLUDE CABLE.	
DWG. No. C4473-G11-A	REF. No. 24-014-230G-1
NAME SENSOR ADAPTER (DIGITAL OUT) OUTLINE DRAWING	

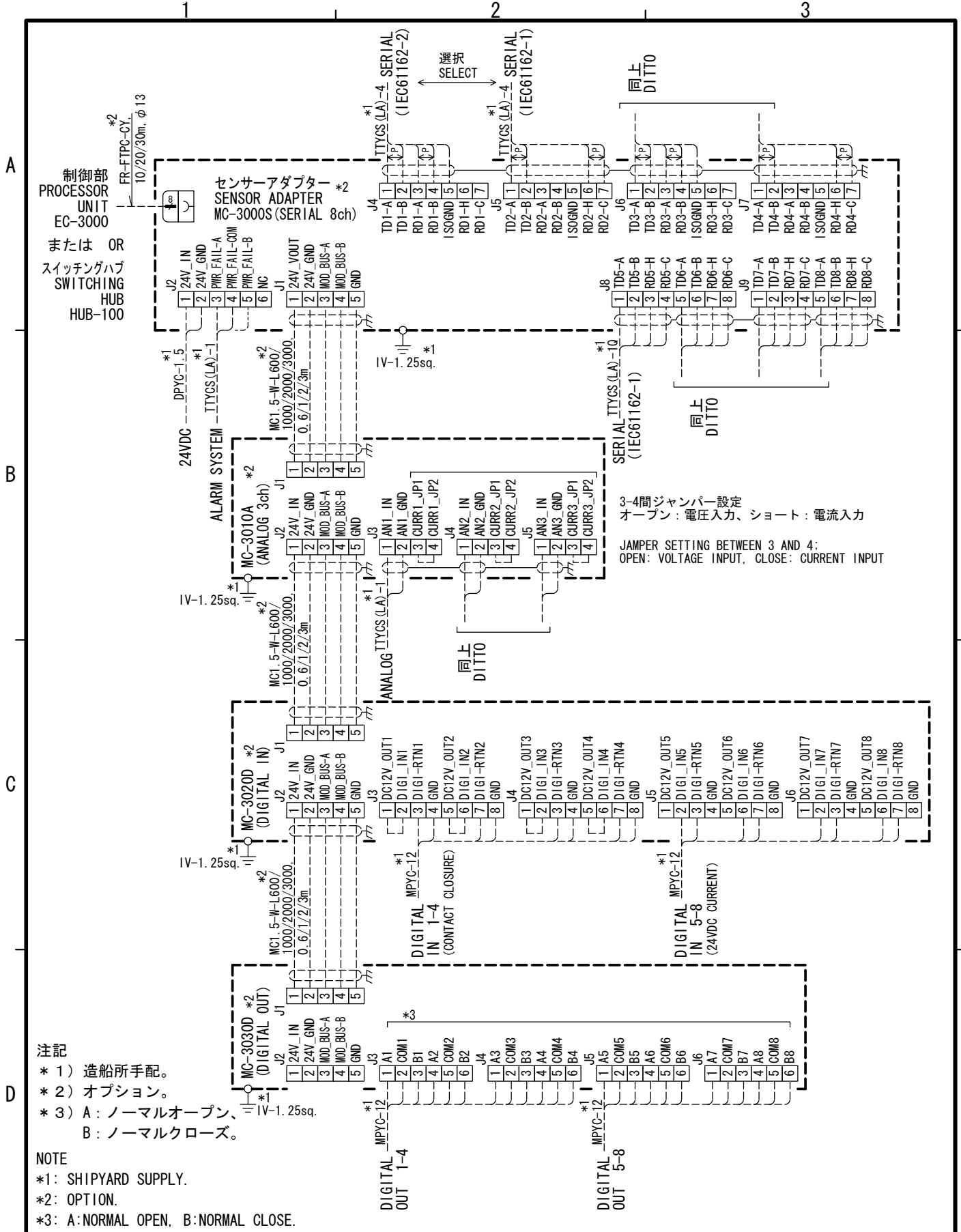
表1 TABLE 1

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



- 注記
- 1) 指定外の寸法公差は表1による。
 - 2) #印寸法は最小サービス空間寸法とする。
 - 3) 取付用ネジはトラスタックピンネジ呼び径4×20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 φ4x20 FOR FIXING THE UNIT.

DRAWN	5/Nov/2012	T.YAMASAKI	TITLE	HUB-3000
CHECKED	5/Nov/2012	H.MAKI	名称	インテリジェントハブ
APPROVED			外寸図	
SCALE	1/3	WSS 1.5 #104質量はケーブルを含まず。 kg MASS DOES NOT INCLUDE CABLE.	NAME	INTELLIGENT HUB
DWG.No.	C4473-G12-B	REF.No.	24-014-350G-2	OUTLINE DRAWING



DRAWN 1/Nov/2012 T. YAMASAKI	TITLE MC-3000S/3010A/3020D/3030D
CHECKED 1/Nov/2012 H. MAKI	名称 センサーアダプター
APPROVED 5/Nov/2012 Y. NISHIYAMA	FGR-2819 SER. FMD-3200/3300
SCALE MASS kg	相互結線図
DWG. No. C4473-C02-C	NAME SENSOR ADAPTER
REF. No. 24-014-6003-1	INTERCONNECTION DIAGRAM