2. WIRING

2.1 Overview

Cabling considerations

To lessen the chance of picking up electrical interference, avoid where possible routing the antenna cable (power and LAN lines) near other onboard electrical equipment (radars, TX radio antennas, etc.). Also avoid running the cable in parallel with power cables. When crossing with other cable, the angle must be 90° to minimize the magnetic field coupling.

The antenna cable between the antenna and processor units is available in lengths of 15 m, 30 m, 40 m, and 50 m. Whatever length is used, it must be unbroken; namely, no splicing allowed. Use the antenna cable as short as possible to minimize attenuation of the signal.

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

About 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 ship's LAN network to the optional HUBs. Also, commercial PCs cannot be connected to the gateway network, other than for maintenance.
- To connect the FEA-2xx7, FMD-32xx, FAR-2xx7, FCR-2xx9 via LAN network, use the INS network.

About wiring

- Use the optional USB cable (type: OP24-32) to connect to the USB port on the control unit.
- The length of the USB cable must be within 5 m to prevent equipment trouble.
- The length of LAN cables must be within 50 m.
- Use the Cat5e or Cat6 LAN cable 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 RGB cables is necessary, use the dividers shown below.
  - DVI cable divider: DVI-12A (maker: IMAGENICS)
  - RGB divider: CIF-12H, DD-106 or WBD-14F (maker: IMAGENICS)
- 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.
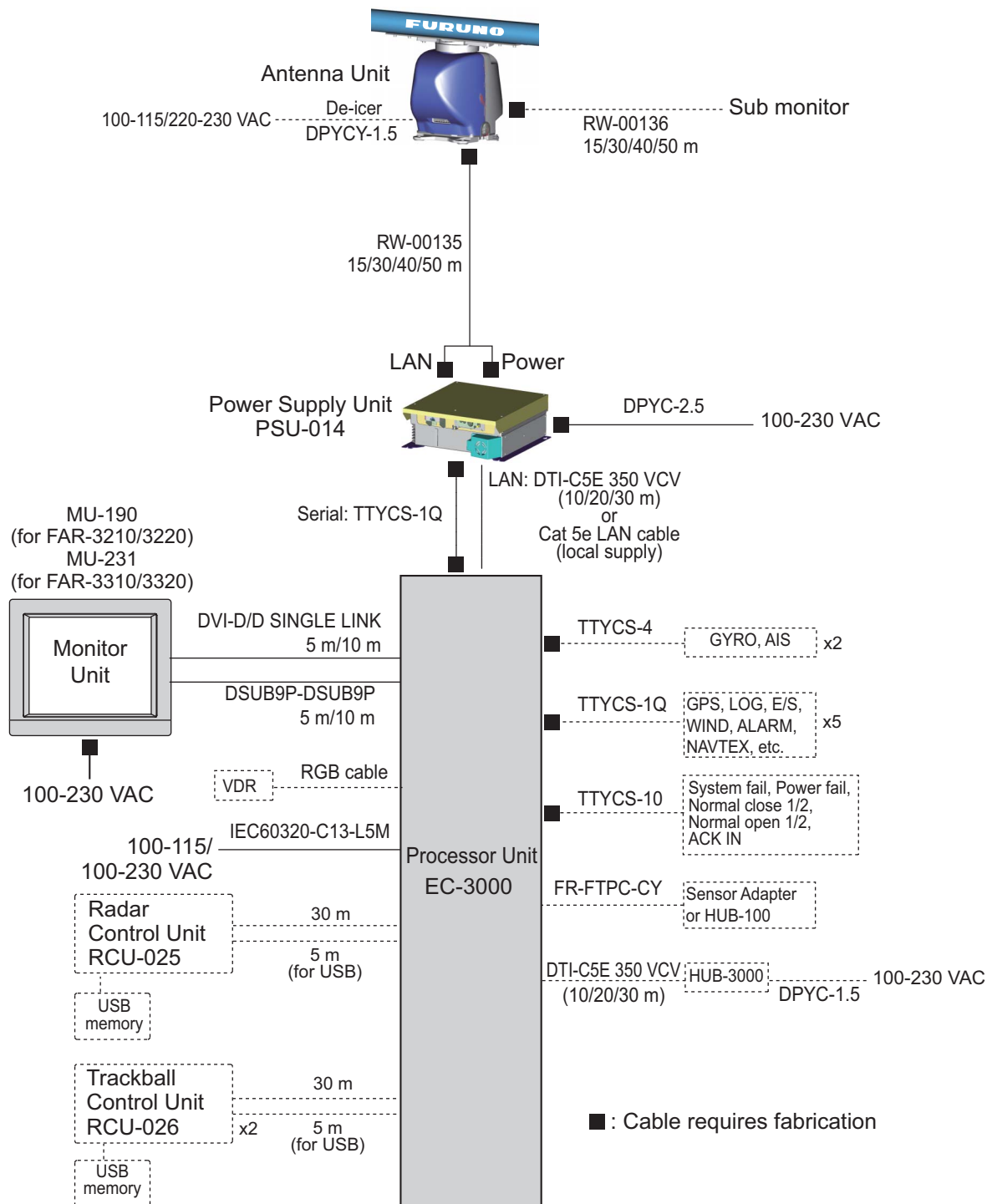- The output from the UPS must be a sine wave, as in the right figure.
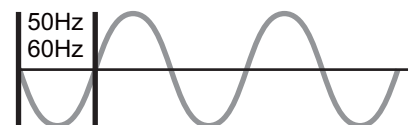
Standard wiring

A Cat 5e LAN cable (RW-00135) connects between the antenna unit and the PSU. The maximum length of the cabling between the Processor Unit and the antenna unit is 80 m.

Retrofit (using antenna cable RW-4873/6896/9600) or foremast installation is also possible, with the installation of a pair of LAN Signal Converters, one in the antenna unit, the other in the PSU. See section 2.7.

Antenna Unit

De-icer

100-115/220-230 VAC ········ DPYCY-1.5

Sub monitor

RW-00136
15/30/40/50 m

RW-00135
15/30/40/50 m

LAN   Power

Power Supply Unit
PSU-014

DPYC-2.5
100-230 VAC

LAN: DTI-C5E 350 VCV
(10/20/30 m)
or
Cat 5e LAN cable
(local supply)

Serial: TTYCS-1Q

MU-190
(for FAR-3210/3220)
MU-231
(for FAR-3310/3320)

Monitor
Unit

DVI-D/D SINGLE LINK
5 m/10 m

TTYCS-4   GYRO, AIS   x2

DSUB9P-DSUB9P
5 m/10 m

TTYCS-1Q   GPS, LOG, E/S,   x5
WIND, ALARM,
NAVTEX, etc.

100-230 VAC

RGB cable
VDR

TTYCS-10   System fail, Power fail,
Normal close 1/2,
Normal open 1/2,
ACK IN

IEC60320-C13-L5M

100-115/
100-230 VAC

Processor Unit
EC-3000

FR-FTPC-CY   Sensor Adapter
or HUB-100

Radar
Control Unit
RCU-025

30 m

5 m
(for USB)

DTI-C5E 350 VCV   HUB-3000   100-230 VAC
(10/20/30 m)   DPYC-1.5

USB
memory

Trackball
Control Unit
RCU-026   30 m

x2   5 m
(for USB)

■ : Cable requires fabrication

USB
memory

2.2 Antenna Unit

Three cables are connected to the antenna unit: antenna cable, cable for the sub monitor (option) and power cable for the deicer (option). The procedure shows how to connect all cables. Disregard the descriptions for the optional equipment if not applicable.

2.2.1 How to fabricate the cables

Antenna cable RW-00135

The end of the antenna cable RW-00135 which connects to the antenna unit is prefabricated.

Antenna cable RW-9600/6895/4873 (for retrofit or foremast installation)
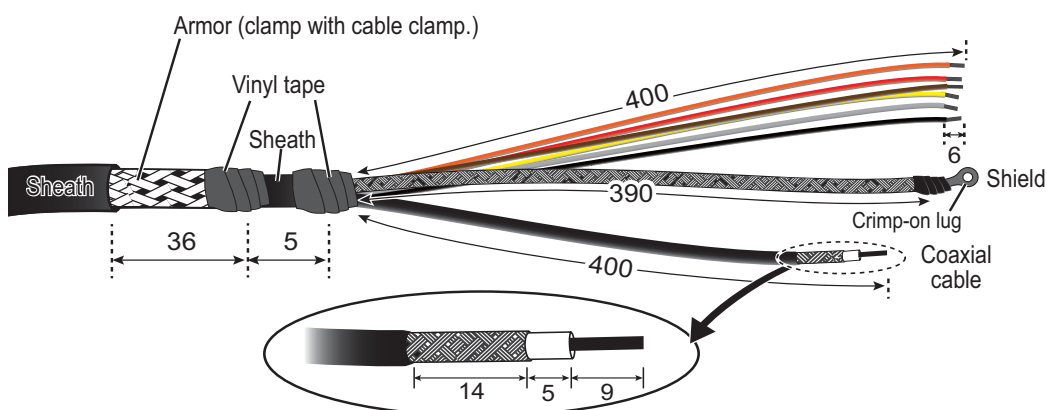
RW-9600 (foremast or retrofit):The white, red, and green wires are not used. Attach a single crimp-on lug (FV5.5-S4(LF), yellow) locally to the wires. (These wires will be connected together with the shield of the power line, in the next section.)

RW-6895/4873 (retrofit only): Fifteen wires are not used. Cut the wires and bind them with vinyl tape. Do not connect the wires to ground.

Cable RW-00136 (for a sub monitor)
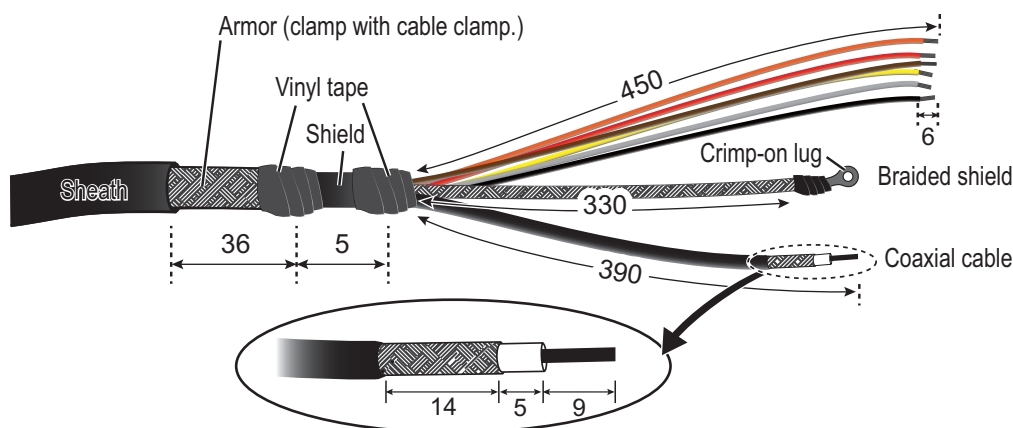
Cable DPYCY-1.5 (for the optional deicer)
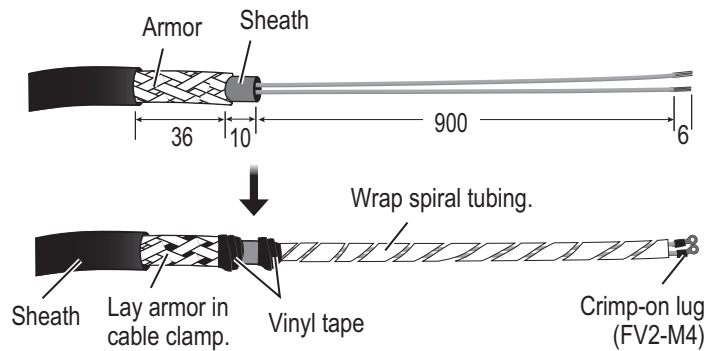

2.2.2 How to connect the cables

<div>

NOTICE

If there is a chance of inclement weather when the transceiver unit is removed, cover the intake on both covers with packing tape. Be sure to remove the tape after completing the installation.

Intake

</div>

Some parts or wiring have been omitted from the illustrations for clarity.

1. Unfasten four bolts from the rear cover to remove the rear cover. If the deicer is already installed or will be installed, remove two bolts inside the antenna to enable removal of the front cover. See Note 2.
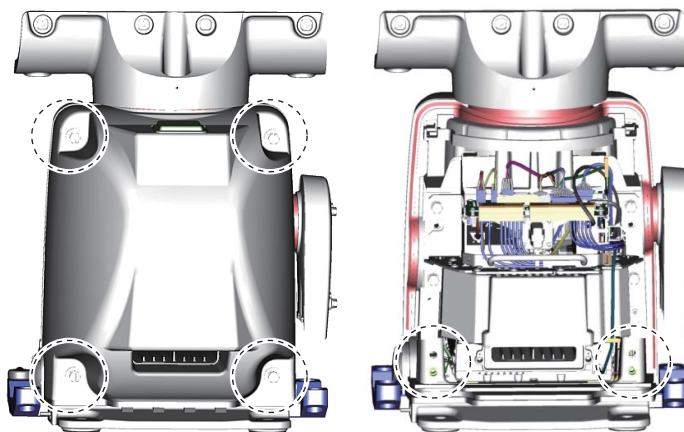

Note 1: The cable for the performance monitor is connected between the rear cover and the RF-TB Board in the antenna unit. Open the cover slowly to prevent damage to the cable and connector.

Note 2: If the deicer is to be installed, spread open the right and left heater elements on the cover, then remove the front cover, being careful not to hit the elements on the radiator or chassis.

Note 3: If this a retrofit or foremast installation, a LAN Signal Converter is required, in both the antenna unit and the power supply unit. See section 2.7.

2.   Disconnect the performance monitor connector (J807) and the motor drive connectors (J803, J804 and J808) from the RF-TB Board.

J803 (motor)
J808 (motor)
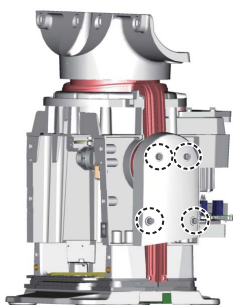J807 (performance monitor)
J804 (motor)
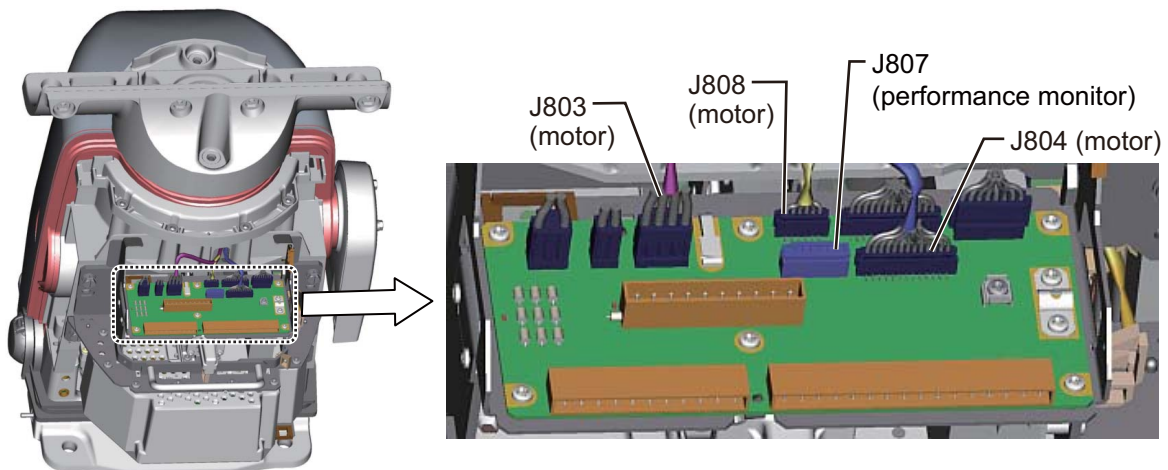
3.   Unfasten the six bolts circled in the figure below to enable removal of the transceiver unit.
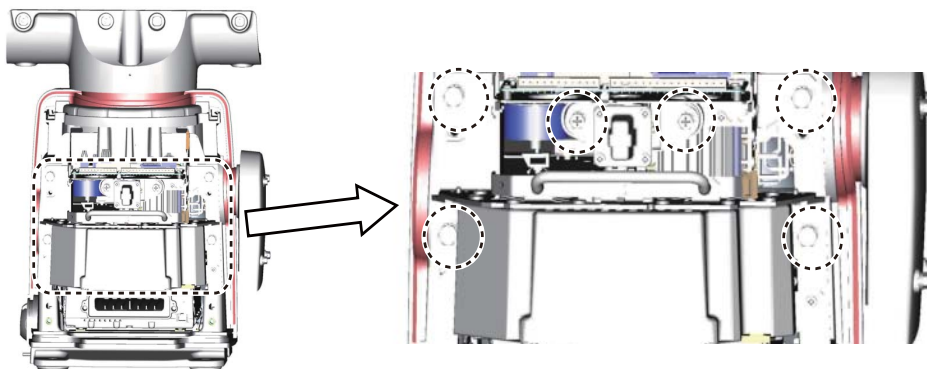
4.   Pull the handle on the transceiver unit to remove the unit. **Lay the unit on its side or on top of non-ferrous material, to prevent demagnetization of the magnetron**.
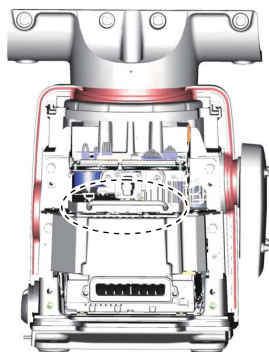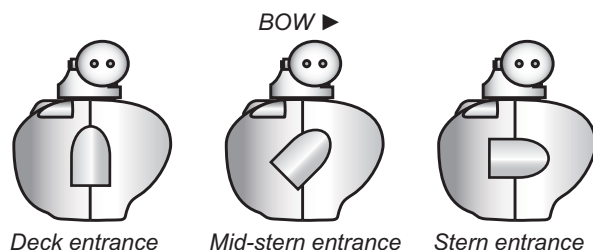

5.   Unfasten four screws to open the cable entrance cover.

Note: The orientation of the cable entrance assy. can be changed, in one of the three orientations shown in the figure below. **No other orientation is allowed, to maintain watertight integrity.** The default orientation is "deck". To change the entrance, unfasten the four screws circled in the figure below, then orient the cable entrance assy. in the required direction. Refasten the screws.

BOW ▶

Deck entrance   Mid-stern entrance   Stern entrance
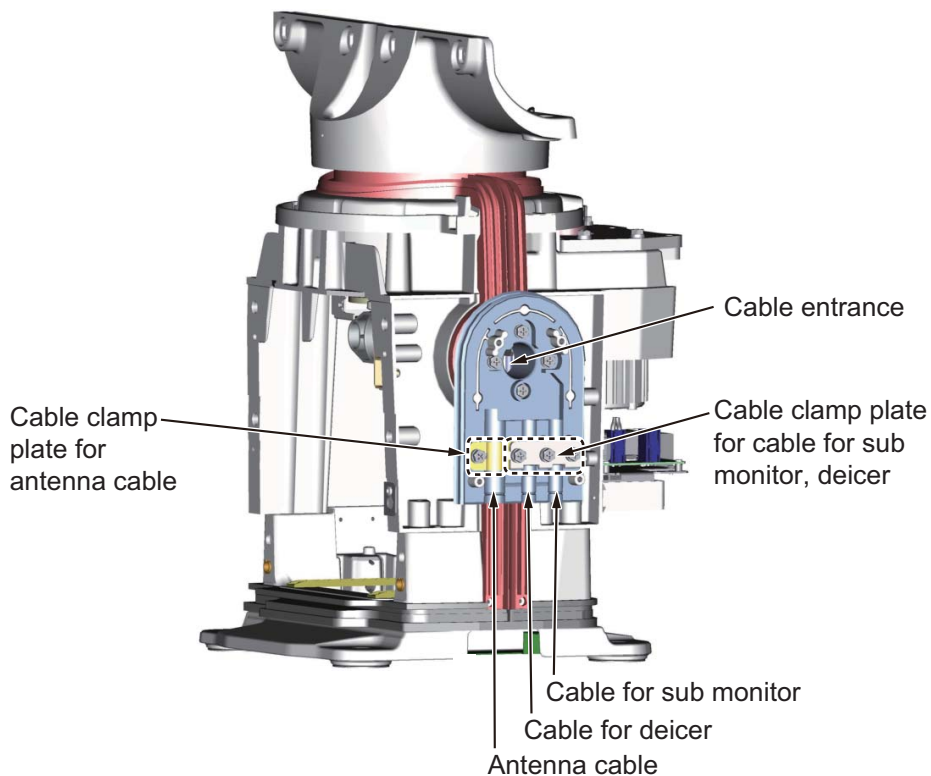
TO CHANGE THE ORIENTATION:

Unfasten these screws to change the orientation of the cable entrance assy.

6.   Unfasten the four screws fixing the cable clamp plates (2 pcs.).

Cable entrance

Cable clamp plate for antenna cable

Cable clamp plate for cable for sub monitor, deicer

Cable for sub monitor

Cable for deicer

Antenna cable

7. Pass the antenna cable through the cable entrance. If applicable, also pass the cable for the sub monitor and the power cable for the deicer through the cable entrance. Pass the cables through their respective locking wire saddles.

Locking wire saddle for power cable for deicer

Cable entrance

Locking wire saddle for antenna cable, cable for sub montior
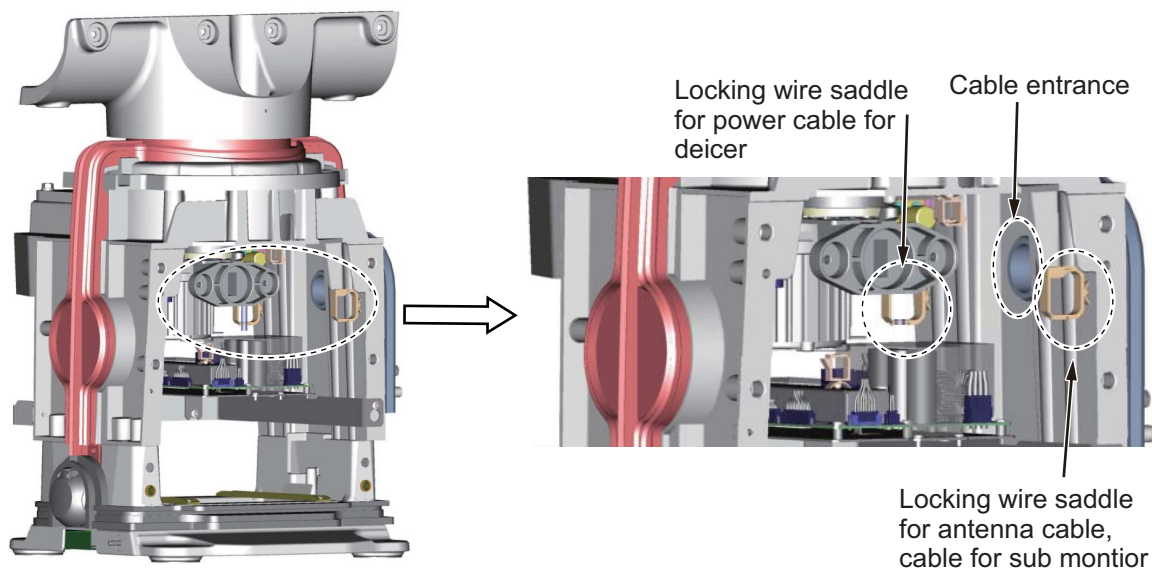
8. Re-mount the transceiver unit then reconnect the connectors for the motor (J803, J804 and J808). Pass the LAN cable through the locking wire saddle at the bottom of the transceiver unit.

Locking wire saddle for LAN cable
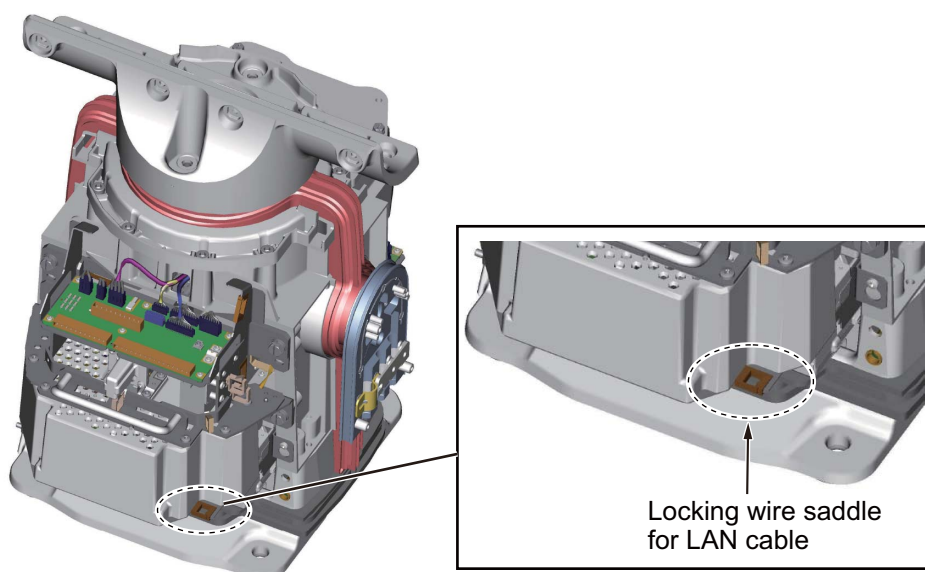
9. Connect the antenna cable and the cable for the sub monitor as shown below. See the illustration on the next page for parts location.

• Attach appropriate WAGO connector (supplied) to both the antenna cable and the cable for the sub monitor. Connect the antenna cable and the cable for the sub monitor to the RF-TB Board as shown below.
Antenna cable
Power line: TB801
LAN cable: J821

Shield of power line: Screw on fixing plate. See *[1] in illustration on next page.
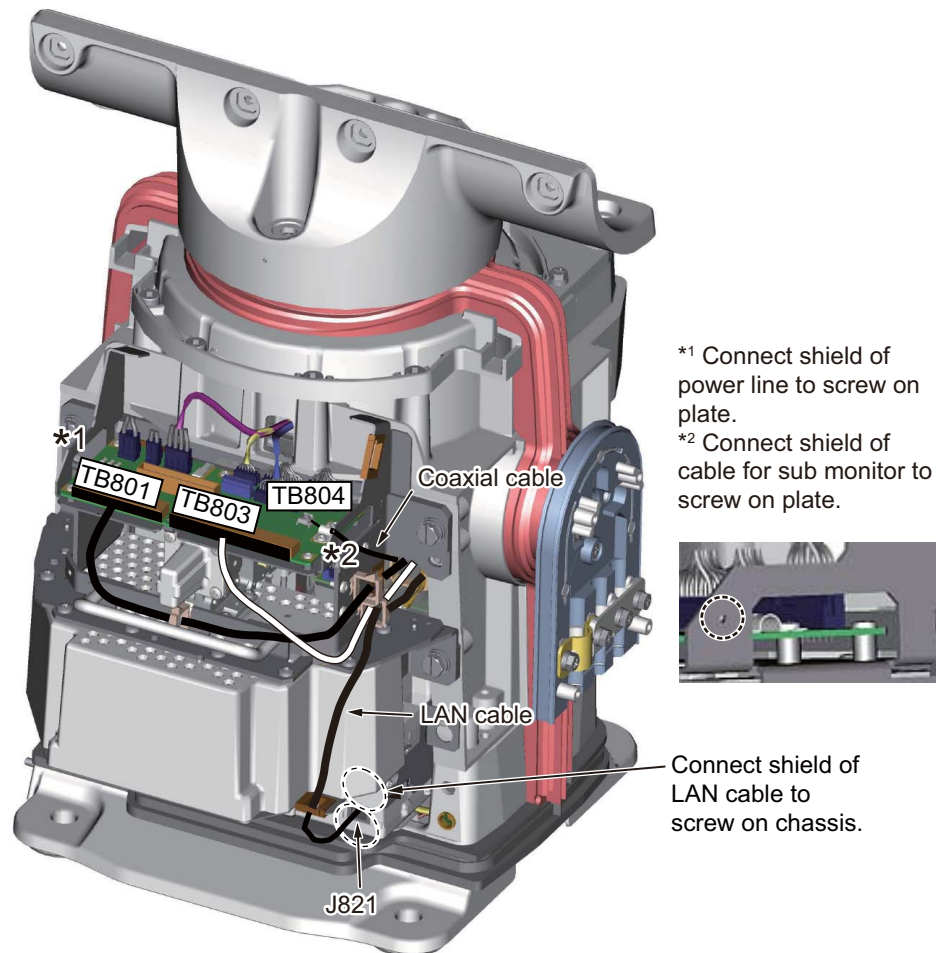**Shield of LAN cable**: Screw above LAN cable port.
Cable for sub monitor
Signal line: TB803

Shield: Screw on fixing plate. See *[2] in illustration on next page.
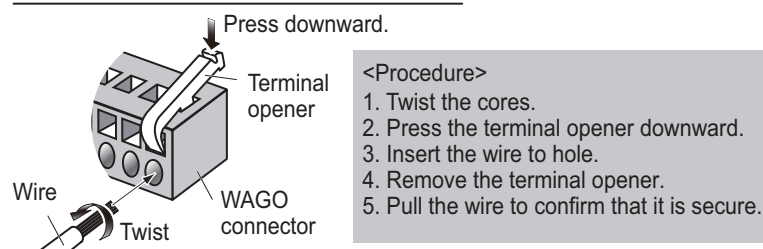**Coaxial cable**: TB804

*1 Connect shield of power line to screw on plate.
*2 Connect shield of cable for sub monitor to screw on plate.

Connect shield of LAN cable to screw on chassis.

POWER: TB801 on RF-TB Board (03P9570)

Pin	1	2	3	4	5	6	7	8	9	10	11
Color	BRN		RED			ORG	YEL	GRN	BLU	PPL	WHT

SIGNAL: TB803 on RF-TB board

Pin	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Color											BRN	RED	ORG	YEL	WHT	BLK

How to connect wires to WAGO connector

Press downward.

Terminal opener

Wire

Twist

WAGO connector

<Procedure>
1. Twist the cores.
2. Press the terminal opener downward.
3. Insert the wire to hole.
4. Remove the terminal opener.
5. Pull the wire to confirm that it is secure.

COAXIAL CABLE: TB804 on RF-TB board

How to fasten the coaxial cable

Fasten shield with clamp.

NOTICE

Do not use crimp-on lug, to prevent contact resistance from increasing.

Fasten conductor with screw.
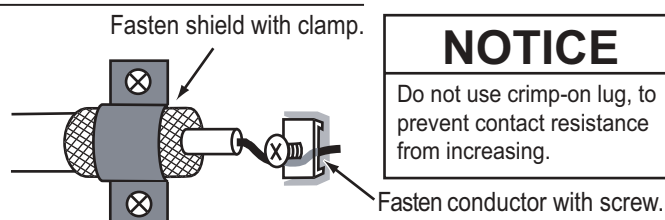
**Note 1:** A terminal opener is provided on the RF-TB Board.

Note 2: For the antenna cable RW-9600, connect the crimp-on lug (that binds unused wires) together with the shield of the power line. See *1 on page 2-8 for the location.

10. **DE-ICER INSTALLATION**. If the de-icer is not provided, go to step 12.
See also "X-band De-icer Kit Installation Instructions", issued separately, for the de-icer not fitted at the factory.


Front cover, inside view
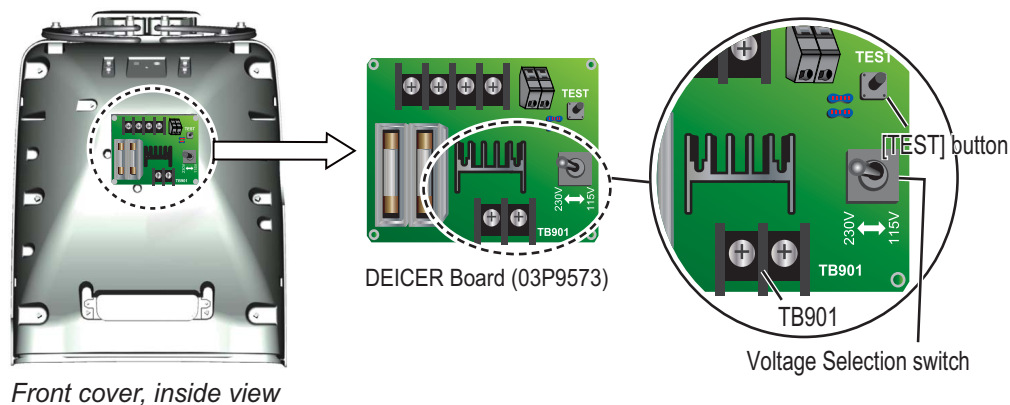
1) Set a locking wire saddle (supplied) at locations (2) and (3) shown below. Pass the power cable through the locking wire saddles (1), (2) and (3) and pull it to the front side.
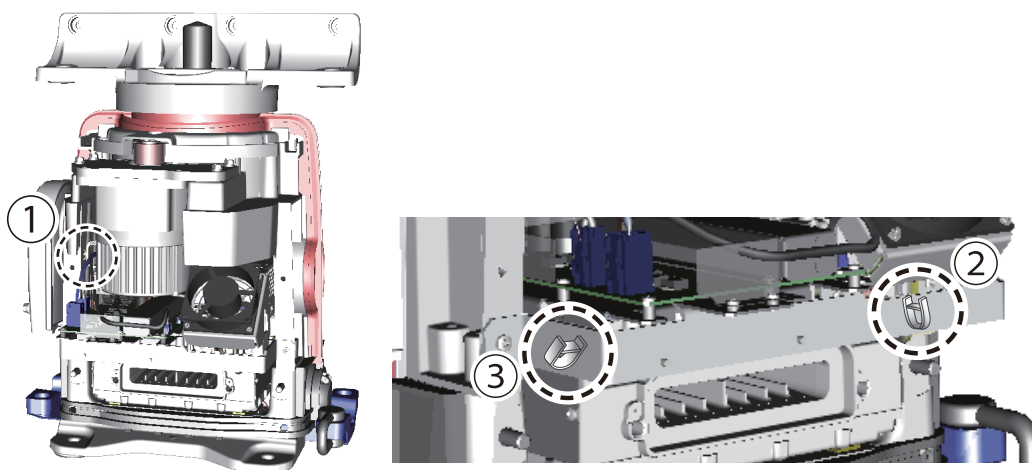
2) Unfasten the cable band*. Pass the cable for the de-icer through the band then fasten the band. Connect the cable to TB901 on the DE-ICER board, using the crimp-on lugs supplied.
* For the DE-ICER installation kit, unfasten the cable band on the cover supplied. (The original cover can be discarded.)

3) Set the Voltage Selection switch according to the power source for the de-icer; 115 V or 230 V.

4) Apply power to the deicer then press the [TEST] button about ten seconds. Check that the heater gets hot.

Cable band
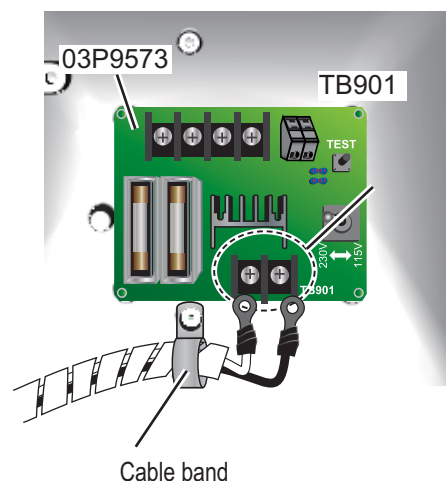
5) Coat the gasket (all brims) of the intake with the supplied oil compound. Be sure to coat the gasket completely.

Intake

Hatch: Oil compound

Brim
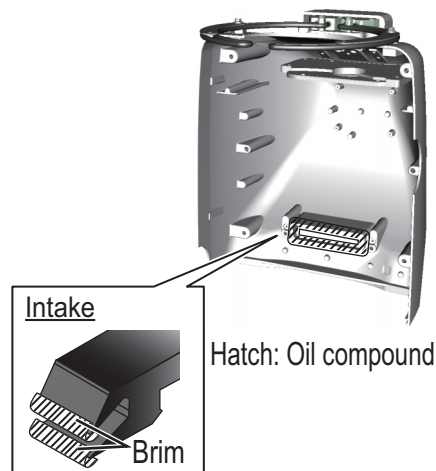
6) Set the front cover to the antenna unit. Take care not to hit the heater elements on the chassis or radiator.

7) Coat two M5 screws (supplied) with marine sealant then use them to fasten the base of the heater. Fasten the installation materials shown below to each of the cover bolts.

M5 screw coated with marine sealant

M5 screw coated with marine sealant

Fixing shaft

Cover bolt
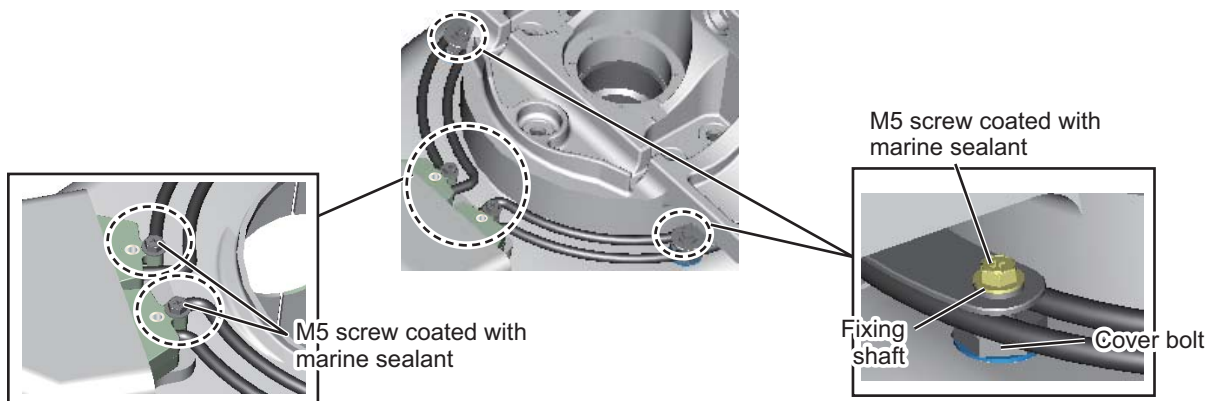
8) Attach the supplied earth label over the earth label currently attached near the grounding terminal.

Grounding terminal

Earth label
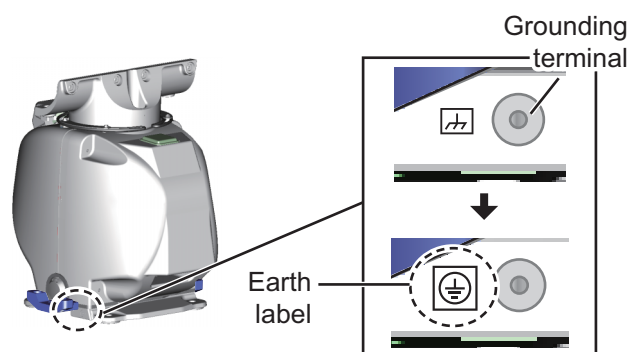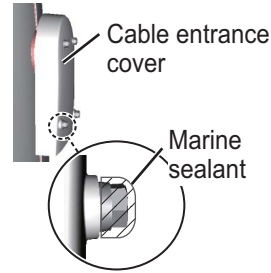
11. Position the cables so their armors lie beneath their respective cable clamp plates in the cable entrance. Fasten the plates.

2. WIRING

12. Close the cable entrance cover as shown in the figure below.

① Coat this part of gasket with marine sealant.   ② Close cover then coat screw heads with marine sealant.

13. Connect the performance monitor connector (J807) to the rear cover.

14. **Check that the gasket on the front and rear covers is seated properly**, then close the covers. The torque for the fixing bolts is 10.0 N•m.

Note: If it is necessary to open the front cover after installing the de-icer kit, remove the power cable from the locking wire saddle shown in the right figure then detach the cover slowly to prevent damage to the heater element.
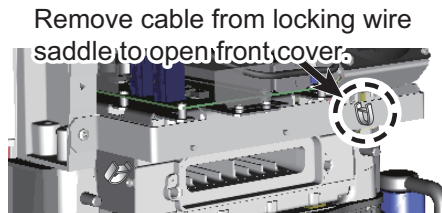
Remove cable from locking wire saddle to open front cover.

2.3 Processor Unit

Note: The interface ports approved for interconnecting navigation equipment are shown in the figure below. For details, see section 2.3.3 "How to select the serial input/output format".

J3, J4
For IEC 61162-2 or
IEC 61162-1

J5, J6, J7, J8, J9, J10
For IEC 61162-1
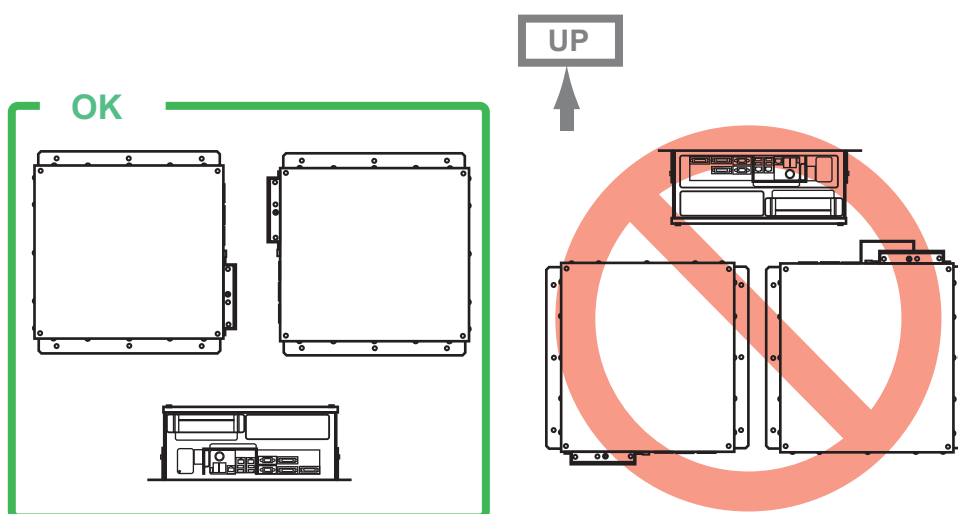
Top view of EC-3000
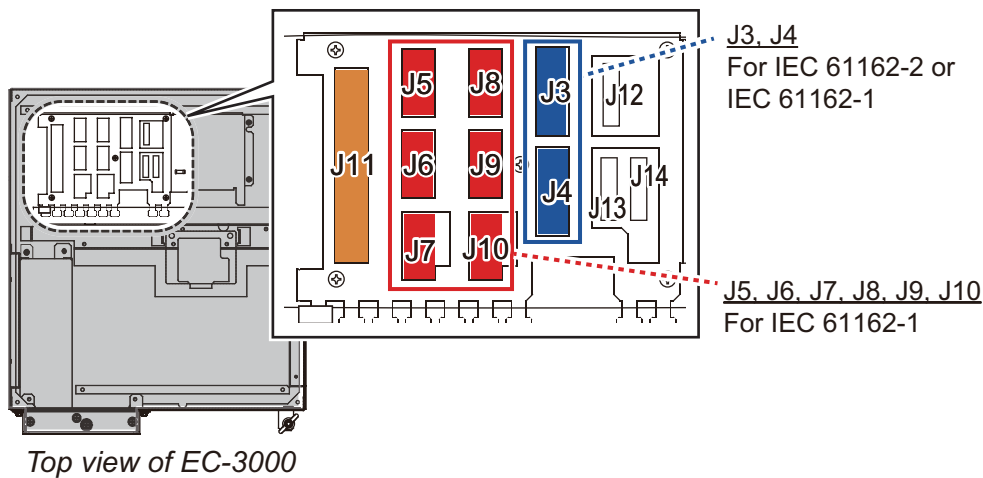
2.3.1 How to connect cables to terminals in the processor unit

Use screws (M3×6, supplied) to attach the wiring plate 1 and wiring plate 2 to the processor unit. Connect the cables shown below to the connectors at the front of the processor unit. 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.

Cable clamp
(See the next page.)

DVI3 VDR
(DVI3: BNCX5-L2000)

COM2 DVI2
MU-190/231
(COM2: DSUB9P-X2-L cable
DVI2: DVI-D/D S-LINK cable)

LAN1
HUB-3000
(DTI-C5E350 VCV cable)

Power cable
(IEC60320-C13-L5M cable)

LAN2
HUB-100/MC-3000S
(FR-FTPC-CY cable, within 50m)

LAN3
MOD-Z072-005+

USB1
RCU-025/026
(TS-20-071-1 cable)

USB2/3
Optional control unit
RCU-024/025/026
(TS-20-071-1 cable)

USB4
For USB printer

Ground wire
(IV-2sq., local supply)

COM1 DVI1
MU-190/231
(DVI1: DVI-D/D S-LINK cable,
COM1: DSUB9P-X2-L cable)

Cables connected at wiring plate 1

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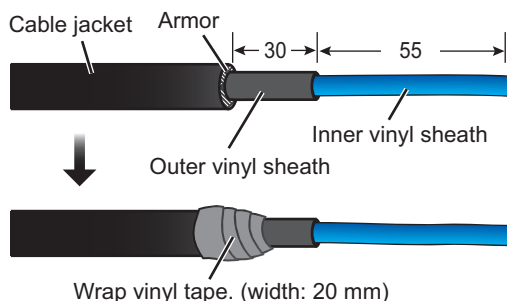- LAN cable (type: FR-FTPC-CY) from the HUB-100/MC-3000S

Cables connected at the wiring plate 2

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

How to fabricate the LAN cable

Fabricate the LAN cable (FR-FTPC-CY, DTI-C5E350 VCV), as shown below. (Wrap both edges of the armor with vinyl tape.) Make sure the shield of the cable contacts the shell of the modular plug.
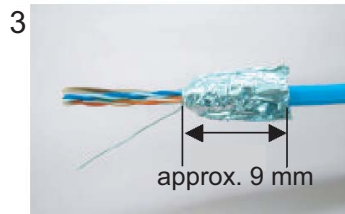
Note: For a locally supplied LAN cable, expose the armor and clamp the armor with the cable clamp.
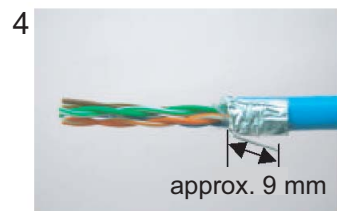
Cable jacket   Armor
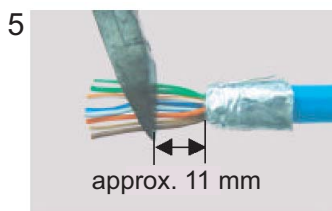
|← 30 →|←   55   →|

Inner vinyl sheath

Outer vinyl sheath

Wrap vinyl tape. (width: 20 mm)

1

Expose inner vinyl sheath.

2

25 mm

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

3

approx. 9 mm

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

4

approx. 9 mm

Fold back drain wire and cut it, leaving 9 mm.
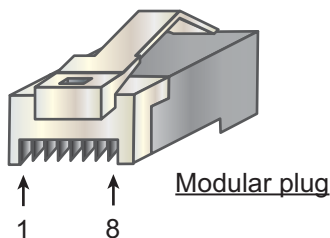
5

approx. 11 mm

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

6

Drain wire

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

7

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

Modular plug

1   8

[Crossover cable]

①WHT/GRN ————— WHT/ORG①
② GRN   ⤬   ORG ②
③WHT/ORG ————— WHT/GRN③
④ BLU   ⤬   BLU ④
⑤WHT/BLE —————— WHT/BLE⑤
⑥ ORG   ⤬   GRN ⑥
⑦WHT/BRN ————— WHT/BRN⑦
⑧ BRN ————————— BRN ⑧

[Straight cable]

①WHT/ORG ————— WHT/ORG①
② ORG ————————— ORG ②
③WHT/GRN ————— WHT/GRN③
④ BLU ————————— BLU ④
⑤WHT/BLE —————— WHT/BLE⑤
⑥ GRN ————————— GRN ⑥
⑦WHT/BRN ————— WHT/BRN⑦
⑧ BRN ————————— BRN ⑧
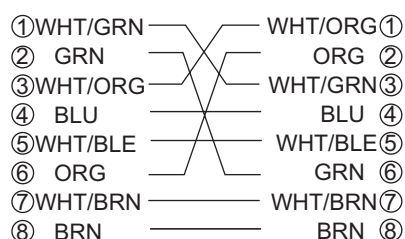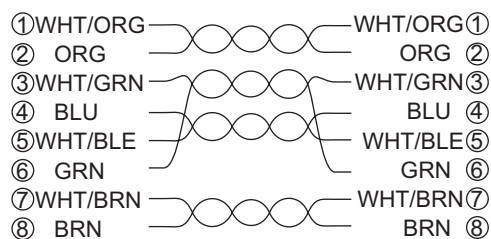
IPX2 kit

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.

Gasket clamping plate   Connector gasket
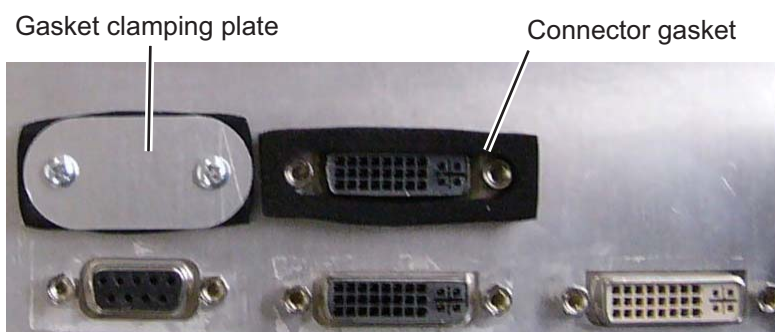
3. Peel the paper from the double-sided tape on the rainproof cover, then attach the cover to the position shown below by using four screws pre-attached to the processor unit.
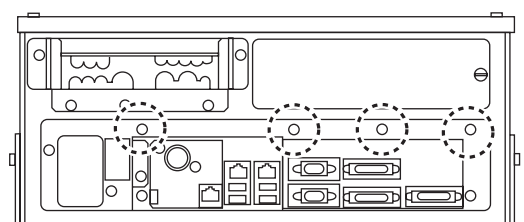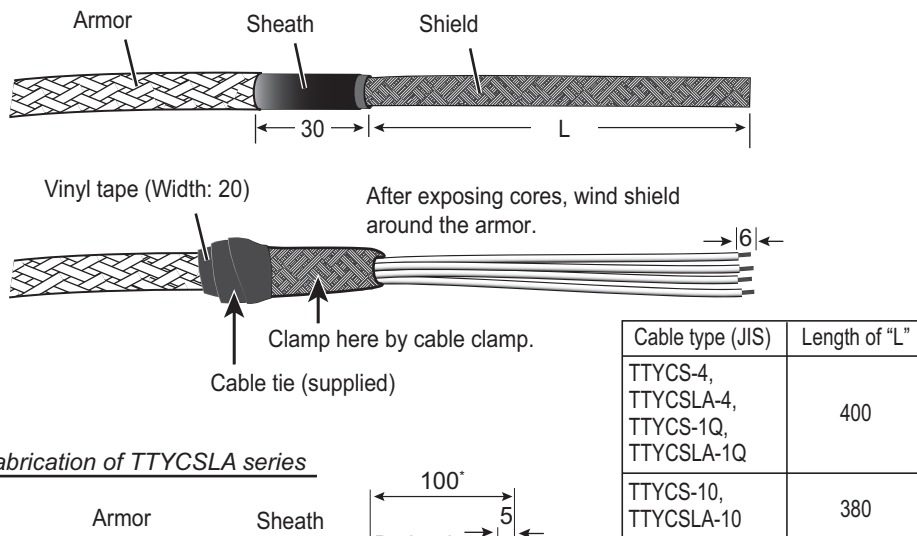
Screws to fix the rainproof cover

Rainproof cover

Processor unit

2-15
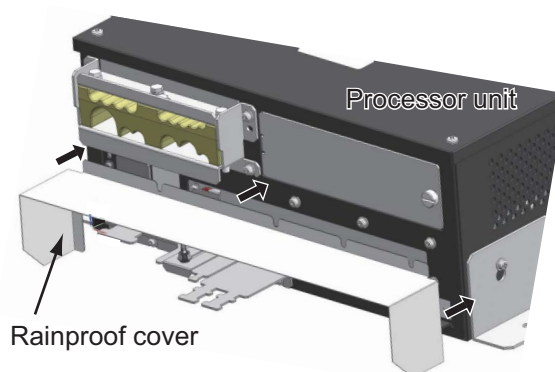
2.3.2 How to connect cables inside the processor unit

How to fabricate the cables

Fabricate the JIS cables (see the Appendix for equivalent cables if not available locally) as shown below. Connect the cables 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
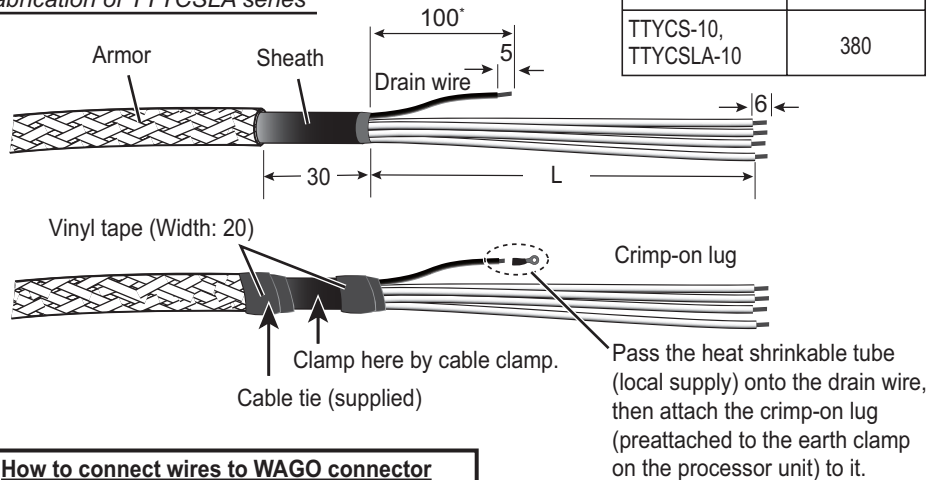
How to connect wires to WAGO connector
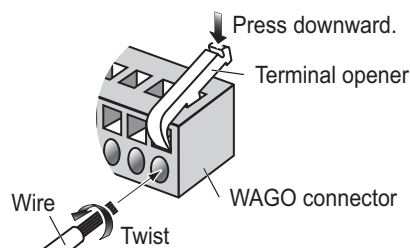
<Procedure>
1. Twist the cores.
2. Press the terminal opener downward.
3. Insert the wire to hole.
4. Remove the terminal opener.
5. Pull the wire to confirm that it is secure.

Crimp-on lugs for drain wires
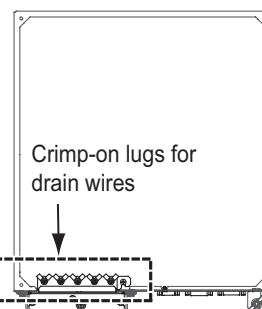
Processor unit, cover removed

How to connect the cables

1. Unfasten four screws (M4×8) to remove the top cover from the processor unit.

2. Unfasten the three bolts circled below to remove the upper plate of the cable clamp.

Unfasten this bolt to use the lower clamp holes.

Clamp holes (upper)

Clamp holes (lower)

Unfasten these three bolts to remove the upper plate.
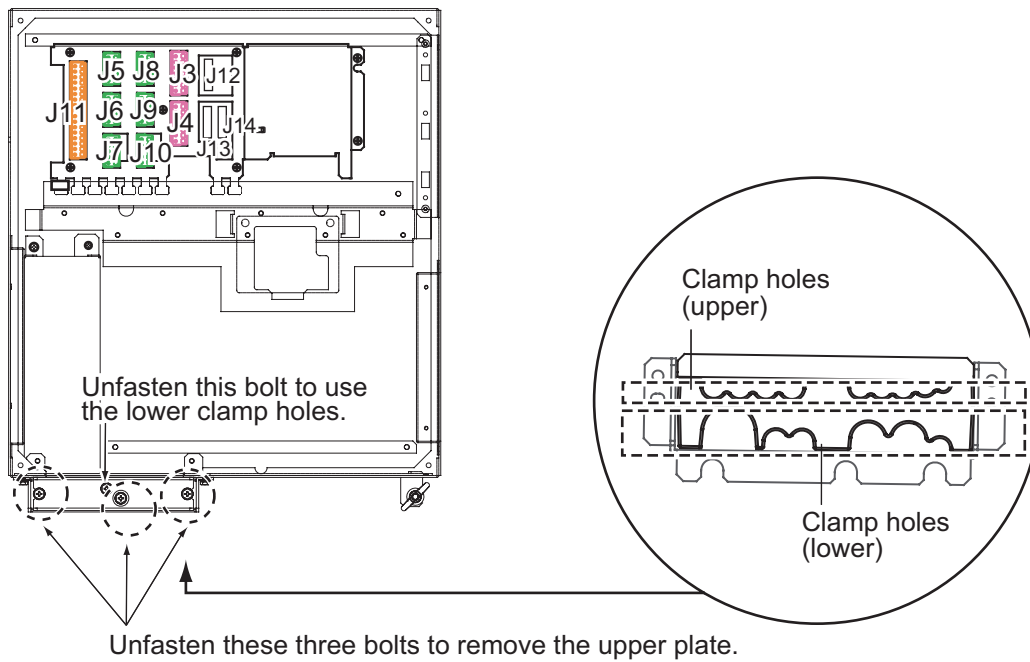
Processor unit, top view

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.

4. Connect the WAGO connectors to the I/O Board, referring to the interconnection diagram.
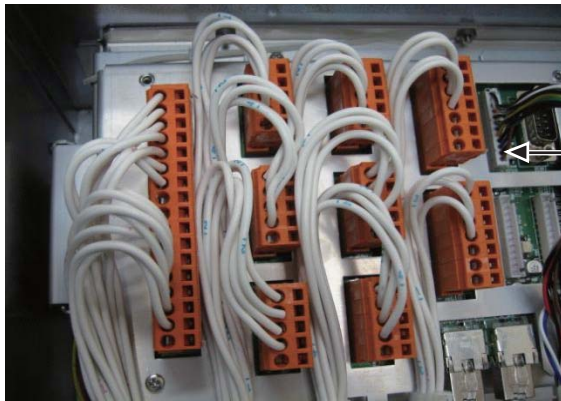
J12 (main control unit)

For J13 and J14 (sub control units), see the figure at step 2 in this procedure.

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

Fixing metal

Screws for drain wires of TTYCSLA cables
Pass drain wire through shrink tubing (local supply), attach a crimp-on lug (preattached) to drain wire and fasten wire here.
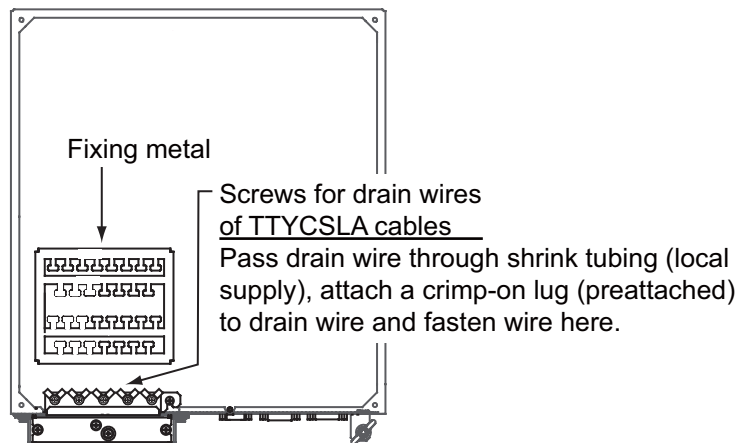
6. For the drain wire of the TTYCSLA series cable, attach shrink tubing (local supply) to drain wire, fasten a crimp-on lug (pre-attached at location shown below) to drain wire then fasten the wire with a screw.
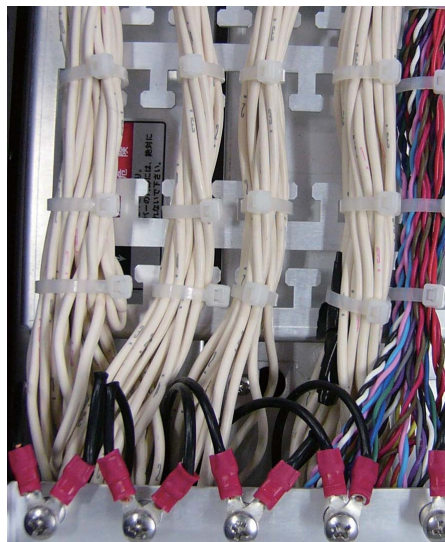
Example of wiring inside the processor unit

2.3.3   How to select the serial input/output format

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 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
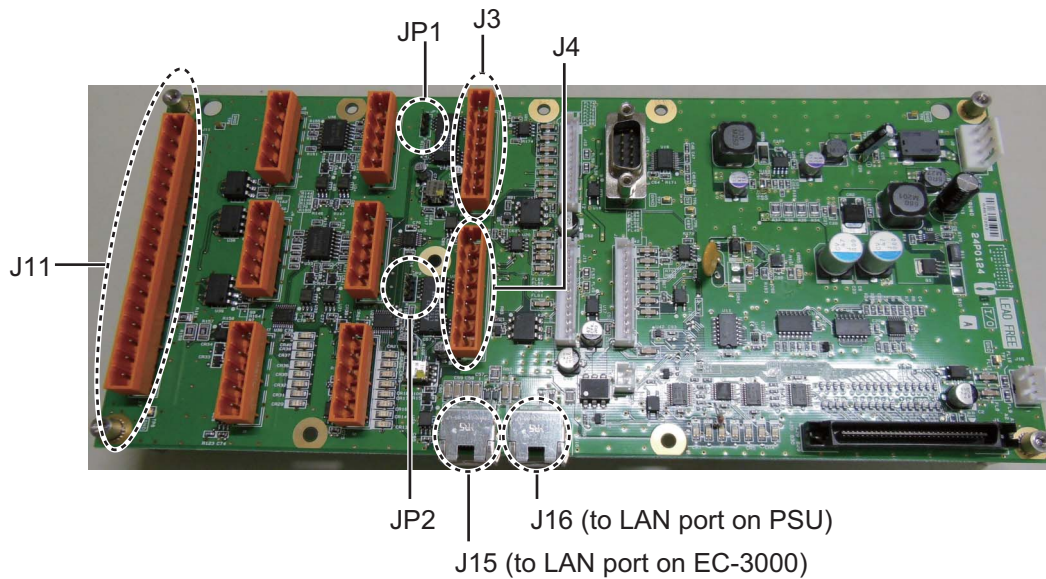
Processor unit, I/O Board (24P0124)

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	

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 the TTYCS-1Q or TTYC-SLA-1Q cable.

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, IEC 61162-1 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, IEC 61162-1 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, IEC 61162-1 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, IEC61162-1 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

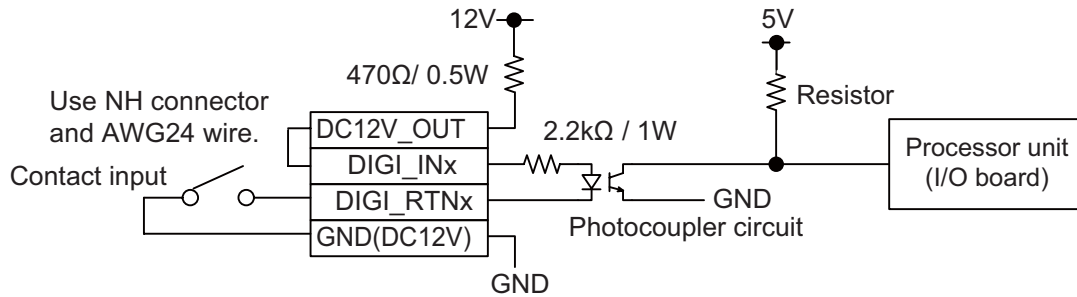| Pin#	Signal	In/Out	Description	Remarks
1	TD8-A	Out	Serial CH8, output IEC61162-1	Use TTYCS(LA)-1Q, IEC61162-1 only, For PSU
2	TD8-B	Out	Serial CH8, output IEC61162-1	
3	RD8-H	In	Serial CH8, input IEC61162-1	
4	RD8-C	In	Serial CH8, input IEC61162-1	
5	GND	-	GND	

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.

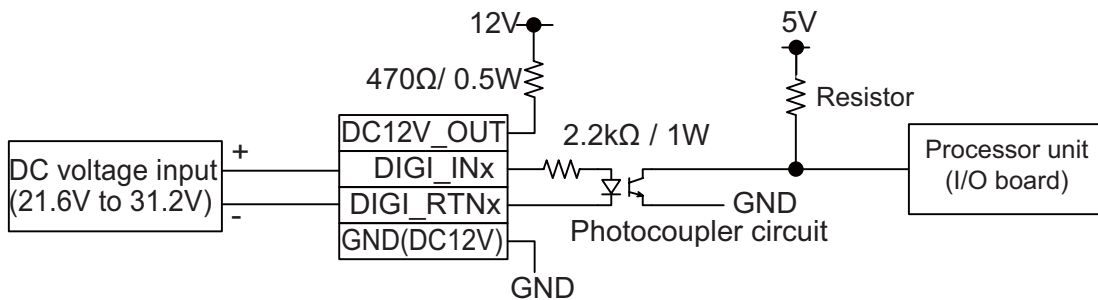**Note:** The input must not exceed the range of the input voltage, to prevent malfunction.
-Setting for voltage input: 21.6V to 31.2V
-Setting for contact input: Voltage cannot be input (contact signal only).

• (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	
16	GND (DC12V)	In	ACK input		No connection
17	GND	-	GND	NO connection	

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