

INSTALLATION MANUAL

Compact Dual Polarimetric X-band
Doppler Weather Radar

MODEL **WR-2100**



FURUNO

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(TAHA) WR-2100

IMPORTANT NOTICES

General

- This manual has been authored with simplified grammar, to meet the needs of international users.
- The operator of this equipment must read and follow the descriptions in this manual. Wrong operation or maintenance can cancel the warranty or cause injury.
- Do not copy any part of this manual without written permission from FURUNO.
- If this manual is lost or worn, contact your dealer about replacement.
- The contents of this manual and equipment specifications can change without notice.
- The example screens (or illustrations) shown in this manual can be different from the screens you see on your display. The screens you see depend on your system configuration and equipment settings.
- Save this manual for future reference.
- Any modification of the equipment (including software) by persons not authorized by FURUNO will cancel the warranty.
- All brand and product names are trademarks, registered trademarks or service marks of their respective holders.

How to discard this product

Discard this product according to local regulations for the disposal of industrial waste. For disposal in the USA, see the homepage of the Electronics Industries Alliance (<http://www.eiae.org/>) for the correct method of disposal.

SAFETY INSTRUCTIONS

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

 DANGER	Indicates a 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



Radio Frequency Radiation Hazard

The radar antenna sends the electromagnetic radio frequency (RF) energy. This energy can be dangerous to you, especially on your eyes. Do not look at the radiator or near the antenna when the antenna is rotating.

The distances at which RF radiation levels of 100 W/m^2 , 50 W/m^2 and 10 W/m^2 exist are shown in the table.

DO NOT go near more than 5.9m (Safety standard is 10 W/m^2).

Distance from Antenna	1.1m	2.8m	5.9m
Power flux density	100 W/m^2	50 W/m^2	10 W/m^2

WARNING



Do not open the radome.

Electrical shock can occur. Only qualified personnel should work inside the equipment.



Wear a hard hat and safety belt when mounting the antenna unit.

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



Do not use any other power except 100 to 240 VAC.

Connection of an incorrect power supply can cause fire or damage the equipment.



Turn off the power immediately if water leaks into the equipment or smoke or fire is coming from the equipment.

Failure to turn off the equipment can cause fire or electrical shock.



Do not operate the equipment with wet hands.

Electrical shock can occur.



Do not disassemble or modify the equipment.

Fire or electrical shock can occur.

	Use only the specified power cable. Fire or damage to the equipment can result if a different cable is used.
	Use the power supply grounded certainly. Electrical shock or defect of operation can occur.
	When a thunderbolt is expected, do not approach a system or do not touch a hand. There is a possibility of receiving an electric shock. A worker's safety is guaranteed although the measures which protect apparatus from indirect lightning stroke surge are taken against this machine. It is not a thing. Moreover, if a direct stroke is impressed, it may break down.
	Attach securely protective earth to the unit. The protective earth (grounding) is required to the AC power supply to prevent electrical shock.

 CAUTION	
	Do not put liquid-filled containers on the top of the equipment. Fire or electrical shock can occur if a liquid spills into the equipment.
	Establish space in the surroundings of apparatus as much as possible. It becomes a cause of performance degradation and failure.
	Do not put any strong impact to LCD because of glass. Serious injury may cause by broken glass.

WARNING LABEL

Warning labels are attached to the equipment. Do not remove any label.
If a label is missing or damaged, contact us for the replacement.



Antenna Unit (radome)

Name: Radiation Warning Label
Type : 03-142-3201-0
number : 100-266-890-10



Compact Dual Polarimetric X-band Doppler Weather Radar

WR-2100

Installation manual

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System Configuration

The observation system consists of an Antenna Unit (Radome), a Signal Processing Unit (storage box), and a Display Unit (indoor unit) are shown below.

(1) Antenna Unit (radome)

An antenna is stored in the radome, is turned, and radiates the radio waves.

The radiated waves are backscattered by precipitation particles on the propagation path, return to the antenna, and are processed by RF converter to transfer the signals to the Signal Processing Unit

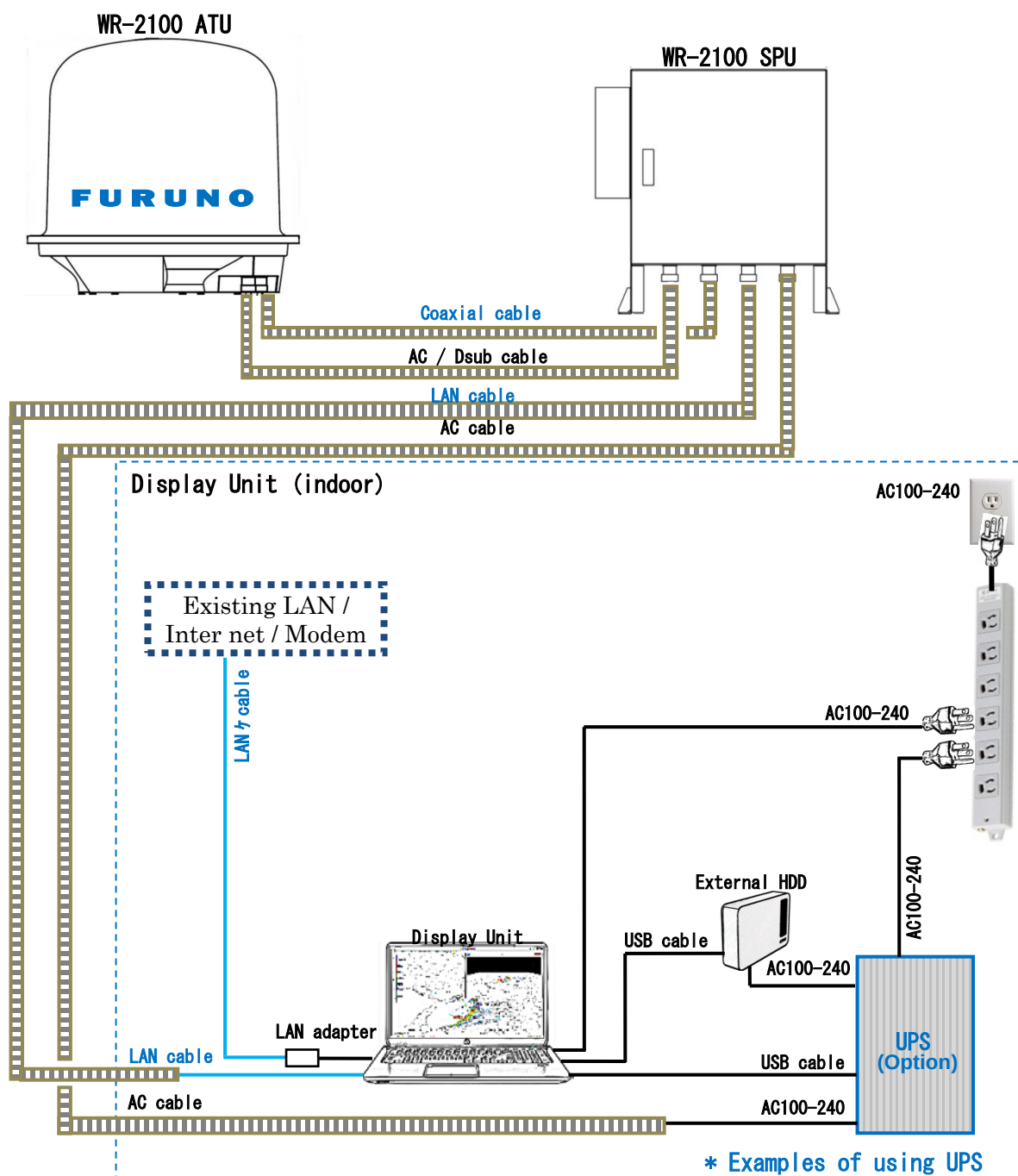
(2) Signal Processing Unit (storage box)

Signal Processing Unit is stored in the storage box, and processes received signals digitally.

The digitally-processed signals are transferred to the display unit via 1000Base-T (LAN) .

(3) Display Unit (indoor unit)

The data is displayed graphically and stored with a general-purpose personal computer (PC) .

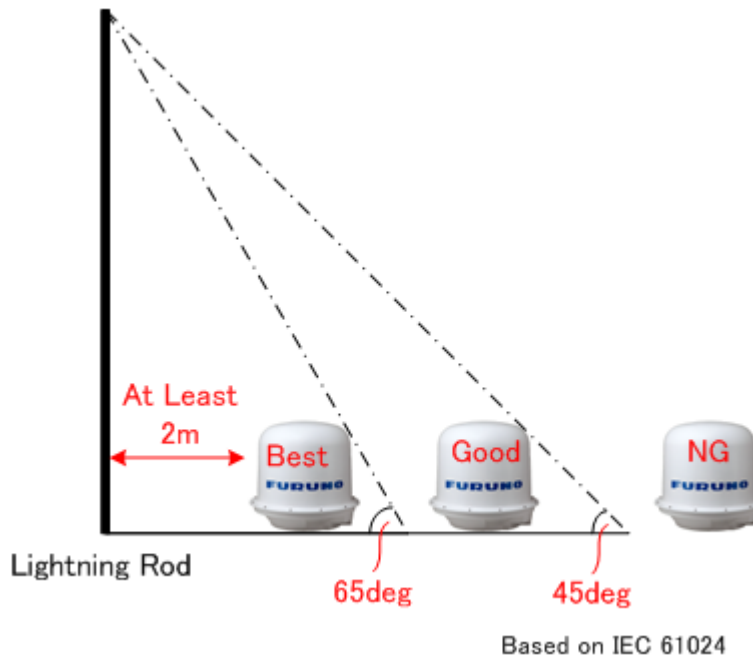


1. System Summary

This system observes the development of rain clouds, outputs the strength of precipitation and the speed of rain clouds (Doppler speed) , and observes phenomena of rainfall.

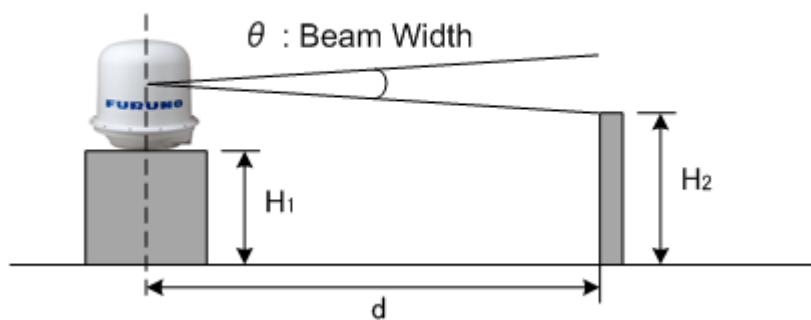
Features :

1. Installation to building roof in Urban area.
 - Antenna must install in the safety area of lightning rod.



- Nothing should be surrounded around the antenna area.

$$H_2 [m] < (H_1 + 0.6) - d \cdot \tan (\theta / 2)$$



2. High Resolution Rain Observation, Rain Cloud, Density and Speed Observation.
3. Solid-state Transmitter replaces an aging device such as a magnetron.



2. Equipment Configuration

2.1. Equipment List

PRODUCT NAME	MODEL
Compact Dual Polarimetric X-band Doppler Weather Radar	WR-2100

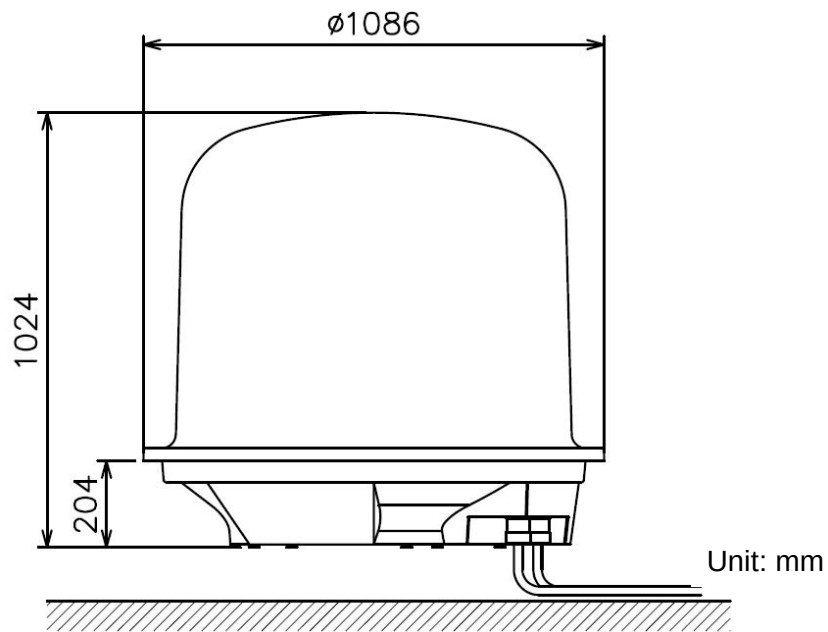
Items	Units	Descriptions	Qty
Antenna Unit	WR-2100-ATU	Size : $\Phi 1086\text{mm} \times H1024\text{mm}$ (include radome) Weight : 70Kg Weight of radome only: Upper 17kg, Bottom 9kg	1
Signal Processing Unit	WR-2100-SPU	Size : $W725 \times D300 \times H750\text{mm}$ (include storage box) Weight : 60kg	1
Display Unit	WR-2100-DPU	General PC (ex. HP envy dv7)	1
Mounting Kit for Radome	Type A	Size : $900\text{mm} \times 800\text{mm} \times t 10\text{mm}$, Weight : 15kg	1
	Type B	Size : $950\text{mm} \times 920\text{mm} \times t 10\text{mm}$, Weight : 18kg	

2.2. Cable List

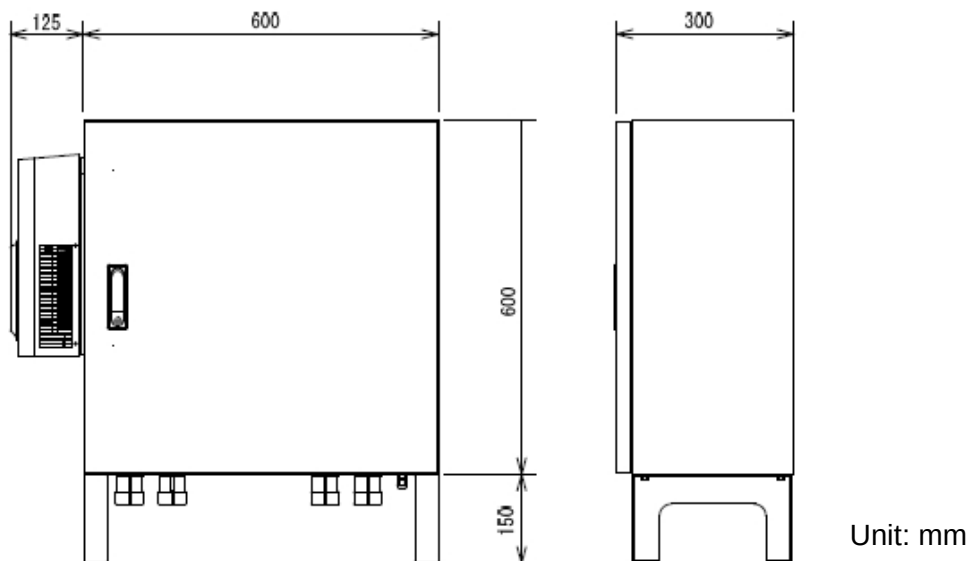
Antenna Unit (radome) <-> Signal Processing Unit (storage box) cable			
Items	Descriptions	Length	Qty
Signal cable	25pin cable (Both Dsub-25pin)	5m	1
Com cable	9pin cable (Both Dsub-9pin)	5m	1
RF cable	3D-2W (Both SMA-P Connector)	5m	3
AC Power cable	VCTF Power cable 3core 1.25sq	5m	1
Signal processing unit (storage box) <-> Display unit (storage box) cable			
LAN cable	For outdoor 1000 Base-T Cat5e or better	by measure	1
AC power cable	VCTF Power cable 3core 1.25sq	by measure	1
Protective tube for cable			
Protective tube	Flexible conduit Inner diameter : 28 mm radome --- storage box	by measure	2
Protective tube	Flexible conduit Inner diameter : 28 mm storage box --- indoor	by measure	2
Earth wire	To protection against electric shock	by measure	1

3. Overall appearance

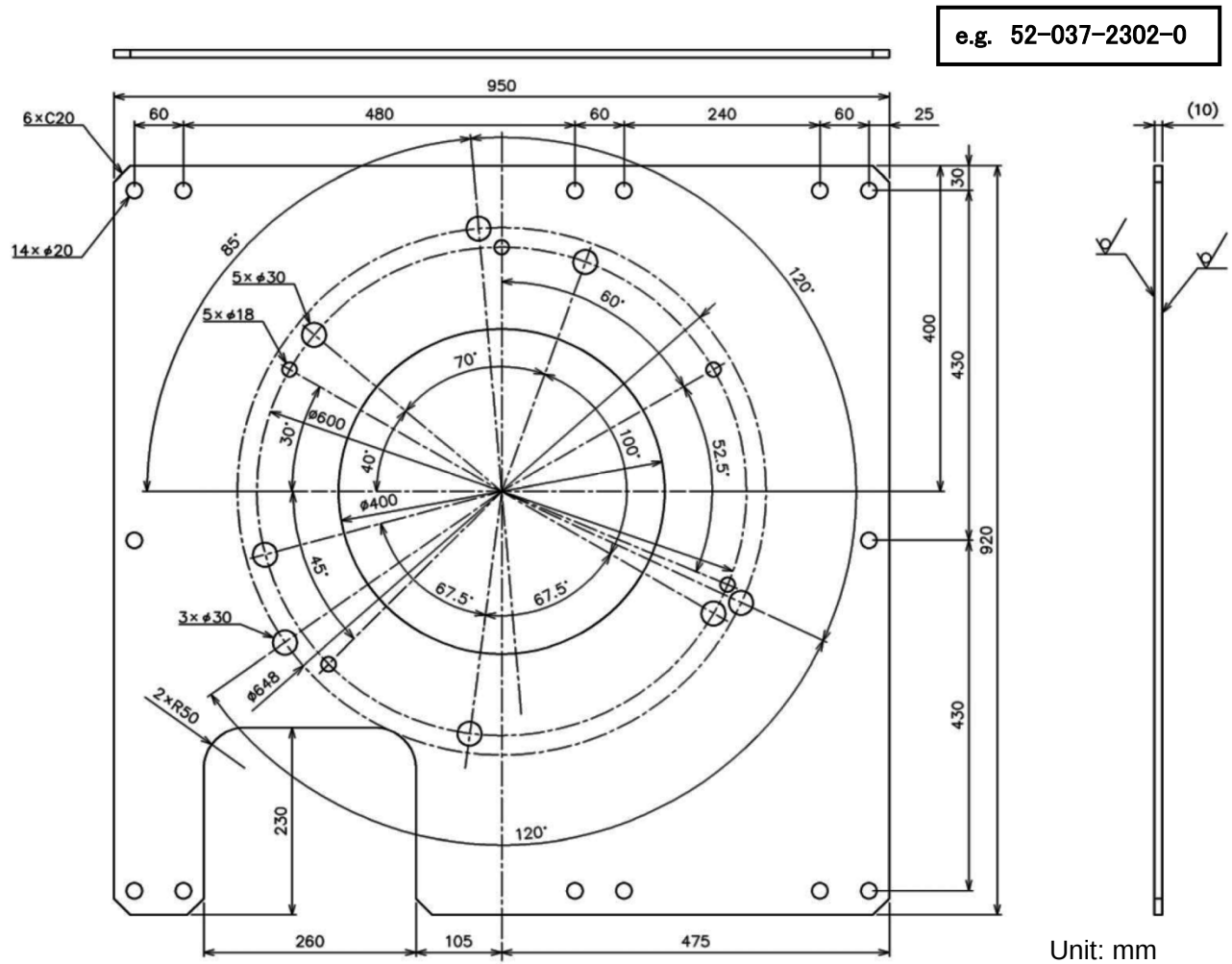
1) Antenna Unit (radome)



2) Signal Processing Unit (storage box) .



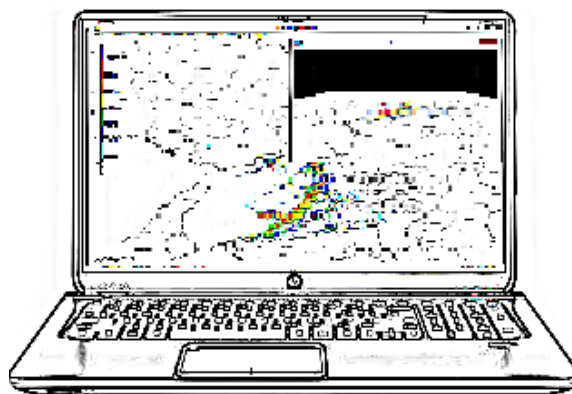
3) Mount plate of Radome



Specification List of draw (Refer to 12.1. Outline drawing)

No	Items	Drawing Number
1	Antenna Unit (Radome)	52-037-200G-2
2	Signal Processing Unit (storage box)	52-037-202G-0
3	Mount plate of Radome	52-037-2301-1 52-037-2302-0

4) Display Unit (General Laptop PC)



Reference dimension :
418mm x 278mm x 37mm

4. Prior confirmation

4.1. Confirmation Items

1. The mount kit must be installed properly for Antenna Unit (radome).
 2. Power cable (AC100V-240V) must be laid safely.
 3. Power cable thickness should be selected depends on its length.
 4. Frequency of AC power source must be 50Hz or 60Hz sin wave and single-phase current.
 5. All engineers must wear the safety appliances such as a helmet, and safety shoes during an installation of antenna unit. It is very dangerous that Antenna might hit a head by turning.
 6. DO NOT look the antenna closer while radar is in operation. This energy can extremely damage to the human body and especially to the eyes. Furthermore, DO NOT point the antenna to the people closer while transmitting.
- * The following table is shown the distance of Transmit radio wave to be 100W/m², 50W/m², 10W/m². The value of Safe standard is 10W/ m², do not go closer than 5.9m.

4.2. Construction materials

(include equipments in "2. Equipment Configuration")

Items	Descriptions	Qty
M10x35 Hexagon Bolt	Material : SUS304 (Fix for up/down parts of radome)	12
M10 Spring Washers	Material : SUS304 (Fix for up/down parts of radome)	12
M10 Flat Washers	Material : SUS304 (Fix for up/down parts of radome)	12
M12x40 Hexagon Bolt	Material : SUS304 (Fix for radome and mount plate)	5
M12 Spring Washers	Material : SUS304 (Fix for radome and mount plate)	5
M12 Flat washers	Material : SUS304 (Fix for radome and mount plate)	5
M16x40 Hexagon Bolt (*1)	Material : SUS304 (Fixed for mount plate and a base)	12
M16 Nut	Material : SUS304 (Fixed for mount plate and a base)	12
M16 Spring Washer	Material : SUS304 (Fixed for mount plate and a base)	12
M16 Flat Washer	Material : SUS304 (Fixed for mount plate and a base)	24
FV2-M4 Round Crimping Terminal	For electric cables	6
Putty for pipe	Non-hardening, Electric insulation	qs
Multi Plug Outlet Power strip	(3-core) 4-Outlets minimum w/ surge protector	1
Heavy Duty Cable Tie (2 types)	Nylon 6/6 w/ weather resistance 140mm, 300mm	100
M10 Anker Bolt	Fixed for SPU	4
Earth wire 2sq green	To protection against electric shock	1

*1: Length of Hexagon Bolt will depend on a thickness of a base.

4.3. Others

Items	Descriptions	Qty
Key of storage box	No.200	2

4.4. Power equipment

This equipment must need 1KVA x1 line of power, with ground outlet (3 pin type)

4.5. Construction tools

Items	Descriptions
SMA Torque wrench 74Z-0-0-21	SMA connector conclusion Substitute : Caliber 5/16 inch or 8mm wrench
Socket Wrench (4 types)	M8 (13mm), M10 (17mm), M12 (19 mm), M16 (24mm) hexagon bolt (Substitute : Monkey wrench)
Hexagon Wrench (3 types of Ball-point)	M3 (2.5mm), M4 (3mm), M5 (4mm) Bolt with Hexagon hole
[+] Driver No.1	Dsub-9pin
[+] Driver No.2	M3, M4, M5, Dsub-25pin, for Electric Filter
[+] Driver No.2 (Long type)	Length 30cm minimum fixed for PXI
[-] Driver M8	Multiuse
Box Driver (2 types)	5mm, 5.5mm fixed for Dsub connector
Flat Ratchet (3 types)	M10 (17mm), M12 (19mm), M16 (24mm)
Nipper	For wiring work
Wire Strippers	For wiring work
Electrical workers knives	For wiring work
Crimped Terminal tool 1.25sq	Power cable (M4), GND wire (M8) for wiring work
Tape Measures (5m minimum)	Measure length of outdoor power cable and LAN cable
Self-fusing Tape (Black)	Fit Tape insulation / protect (Length 10m)
Electrical Tape (Black)	Heat & Fire proof (L19m x W20mm x D0.18mm)
Curing Tape	Multiuse
Chemiseal	S-8400W Aluminum Tube 50G
Silicone grease	Temperature range -30 to +200 °C
Safety belt	For high place work

4.6. Measurement

Items	Descriptions			Remarks
Digital Multi Meter	<u>Voltage</u> AC : 85 to 240 V DC : 1 to 50V	<u>Current</u> AC : 1 to 10 A DC : 1mA to 1A	<u>Resistor</u> 0.1 to 10M ohm	Tester Lead Cables
Angle Meter	Measurement range : $\geq 45\text{deg}$ Accuracy : within $\pm 0.2\text{deg}$			Zero adjustment vertical angle of RADAR

4.7. LAN equipment

- 1) Use Cat5e (or better grade) of 1000Base-Tx LAN cable for transferring the data from display unit to output equipment.
- 2) Be prepared High speed broadband (approx.100Mbps) for using remote maintenance.

*Low speed broadband may cause slow access on remote to support a system.

5. Precautionary item

- 1) Use only the commercial power supply of single phase 100-240VAC.
- 2) DO NOT overhaul or remodel.
- 3) DO NOT work during the thunder is occurring.
- 4) DO NOT scratch, cut, forcedly bend, pull, twist, bundle, or damage the power cable. Also, not to put a heavy thing on top or interpose.
- 5) DO NOT touch inside equipment with a wet hand.
- 6) Connect the ground conductor for protecting equipment and electric shock prevention from lightning induction and ground leakage.
- 7) Cleaning instruction: Use dried soft cloth to wipe the surface. If it is difficult to remove stains, use the cloth soak with a neutral detergent to clean it. Please DO NOT use an alcohol or an organic solvent (e.g.: thinner) to clean it.

For optional equipment:

Please refer to attached documents of UPS, Router, and other equipments separately.

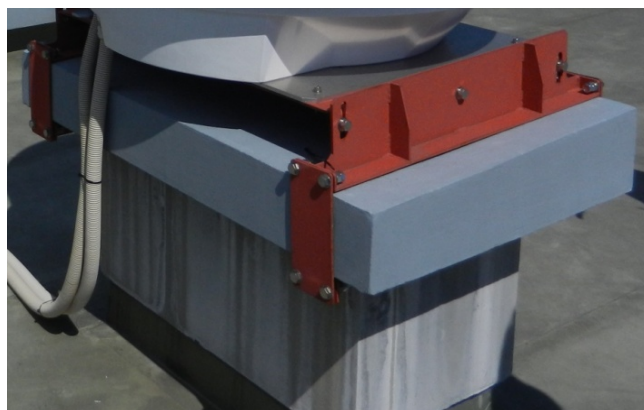
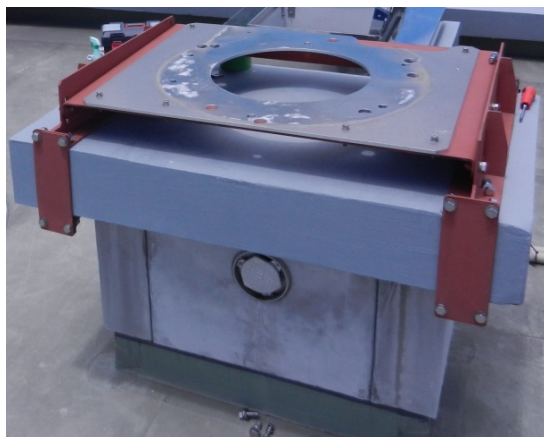
6. Construction

All installation places will be considered for installing PC, cables, pipes, and mount kit during the environmental survey.

6.1. Mount kit

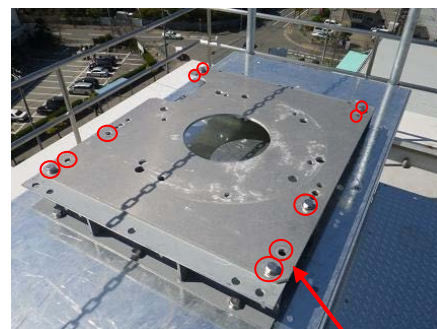
<Case 1>

The case of not able to make a hole on pedestal.

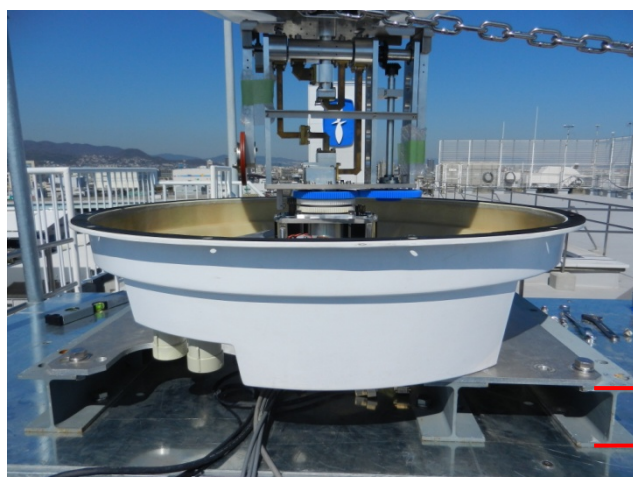


<Case 2>

The way of using steel frames.



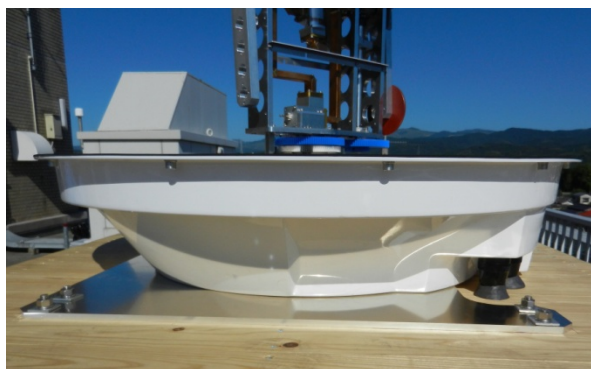
Adjust the hole (10 holes [○]) with the mount plate and the steel frames. Make holes to the steel frames with 20Φ for M16 hexagon bolt to join with the mount plate.



Open more than 100mm of space.

<Case 3>

The way to put the mount plate directly on to a wooden pedestal.

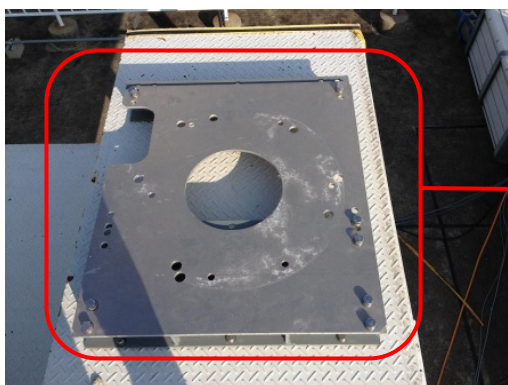


Make 10 holes [○] to a wooden pedestal with 20Φ for M16 hexagon bolt to join with the mount plate.

In this case, it may need to make 2 big holes for Protecting Tube to get through.

6.2. Antenna Unit (Radome)

1. Set up the base.



The mount plate
(900mm×800mm×10mm)

2. Set the bottom of radome to the base.

- (1) Adjust the cable introduction of under radome to notch of the base.
- (2) To fit the bottom of radome with five salient into the base hole
- (3) To fix 5 pcs of M12x35 hexagon bolt (with M12 spring washer, M12 flat washer) to join the base and radome.



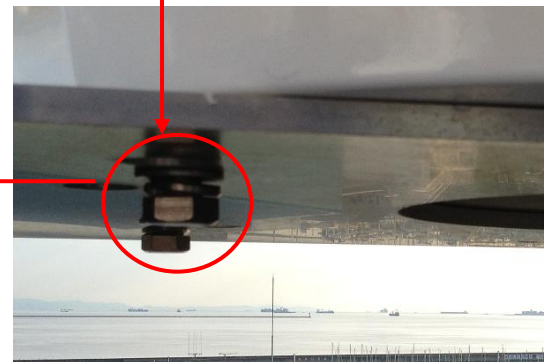
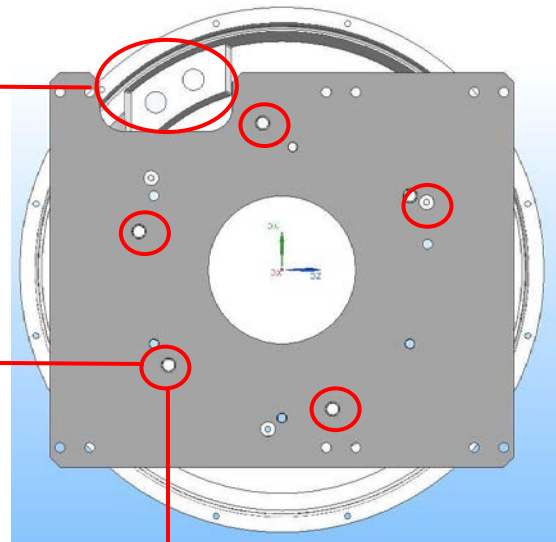
Bottom of
radome

Under view:

Notch & Cable
instruction of the
mount plate

Hole of the mount
plate & Salient of
the bottom of
radome

M12x35 hexagon bolt
M12 spring washer
M12 flat washer



Antenna

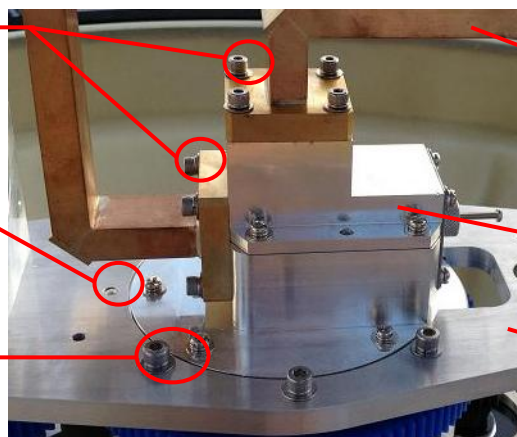
3. In case to reinstall the antenna

- (1) Fit the pin of Rotary waveguide
- (2) Fix the rotary pedestal by 6 pcs of M5x15 with hexagon bolt hole SEMS B.
- (3) Fix the waveguide by 2 pcs of M4x15 with hexagon bolt hole SEMS B.

M4x15 with
hexagon bolt
hole SEMS B

Pin

M5x15 with
hexagon bolt
hole SEMS B

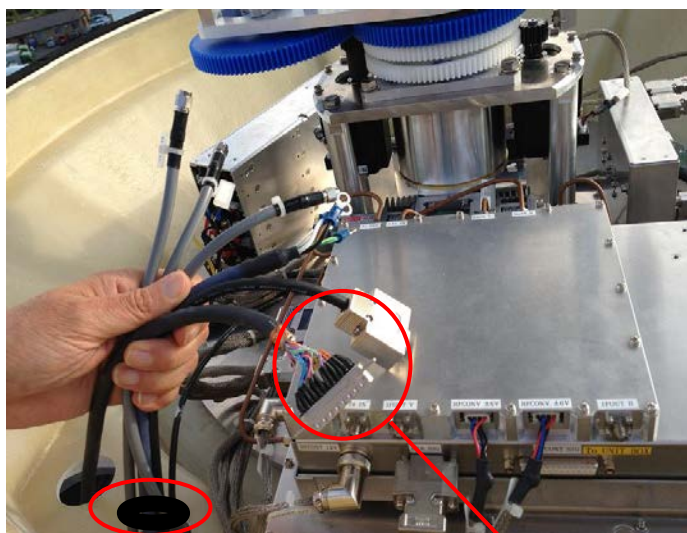
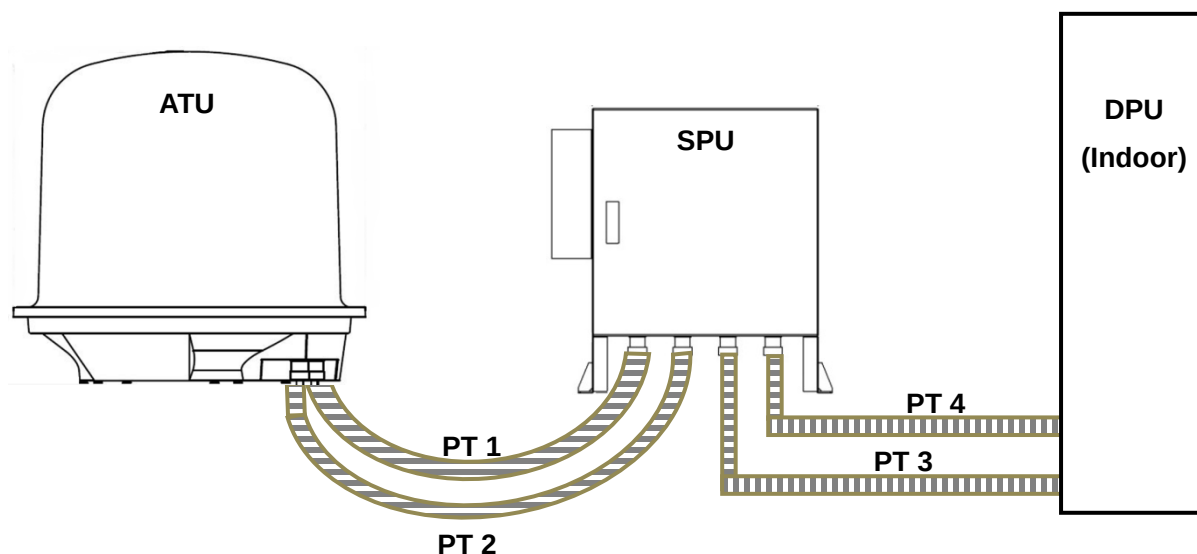


Waveguide

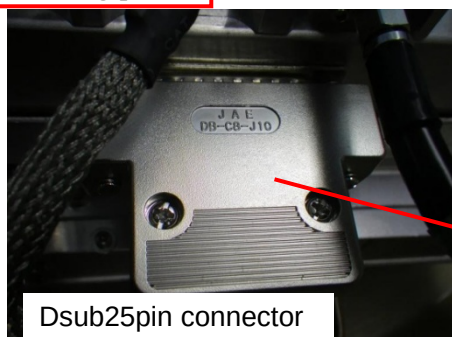
Rotary waveguide

Rotary pedestal

4. Every location must have to measure a length in between ATU ⇔ SPU ⇔ DPU for adjustment. And to lay the Protecting Tube.



Fix by fastening plate



Dsub25pin connector

5. Insert the outdoor cable into the cable waveguide (6 pcs).

Protecting Tube 1 :

- AC Power cable (3cores)

Protecting Tube 2 :

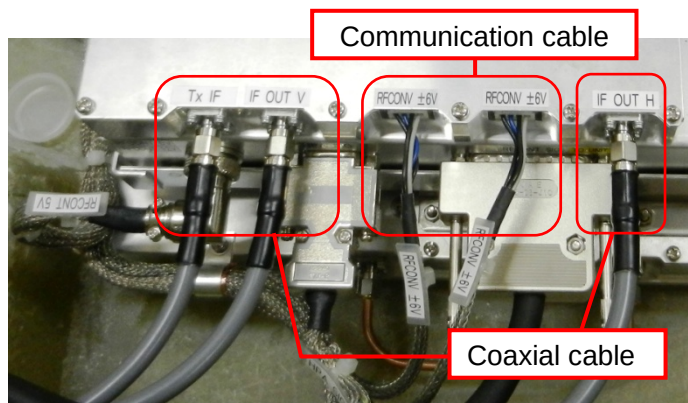
- Coaxial Cable (3 pcs)
- Communication cable (both end Dsub-25pin connector)
- Signal cable (both end Dsub-9pin connector)

✧ Remove the connector cover of Dsub-25pin and 9pin while sending through the Protecting Tube to the other side.

✧ Basically Coaxial cable is up to 5m. (15m maximum)

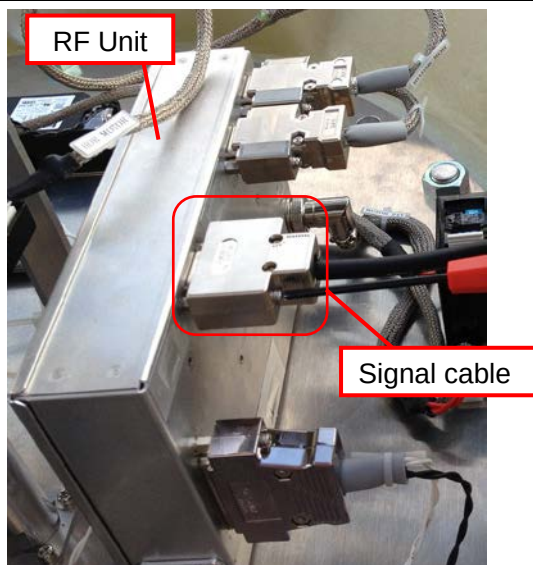
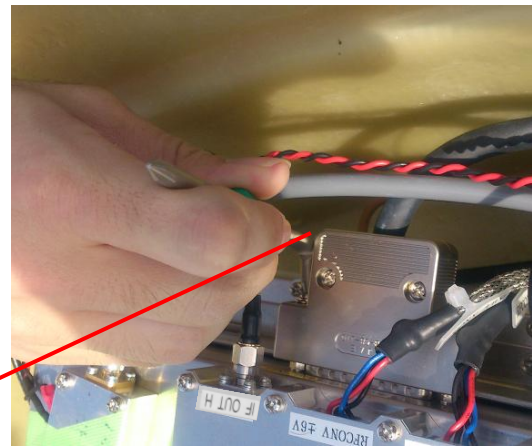
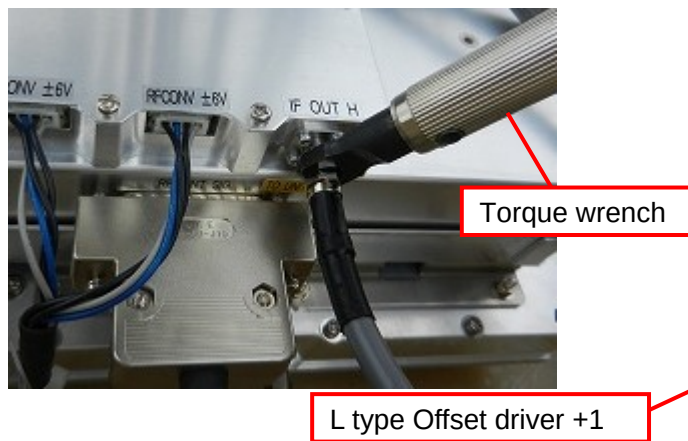
Dsub25pin connector

Connector cover



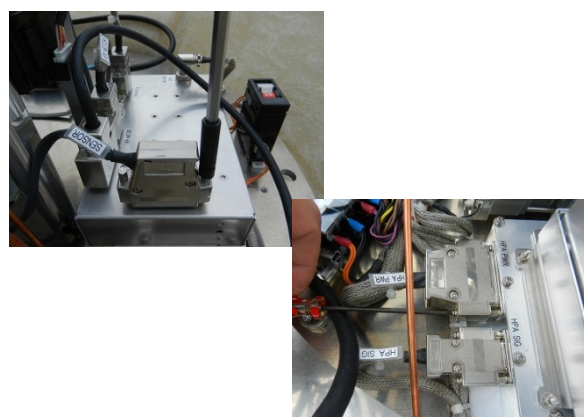
6. Wire the RF Unit

- (1) Connect all cable with following the name of tag on cable and label on the unit.
- (2) Connect / Fix coaxial cable (3 pcs) with torque wrench (74Z-0-0-21).
- (3) Connect / Fix communication cable (both end Dsub-25pin connector) with L type Offset driver +1 (TD-61).

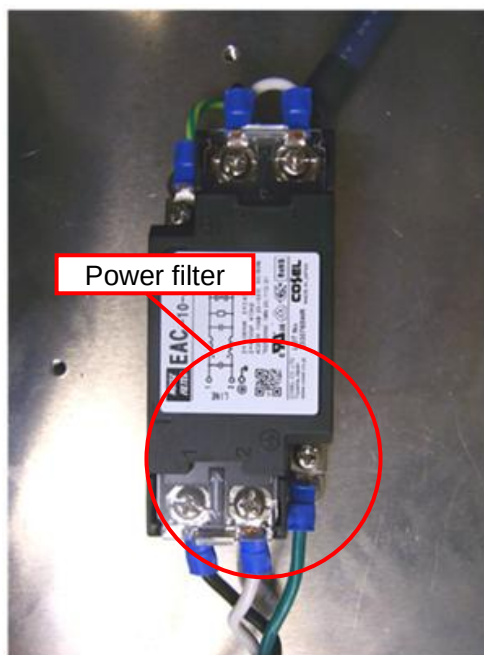


7. Wire the MTR Unit

- (1) Connect the Signal cable (both end Dsub-9pin connector)
- (2) Tighten 2 screws of connector fix by (+) driver



8. Tighten all screws of Dsub connector by (+) driver or socket wrench.



9. Wire the power filter

Caution: Make sure an electric current is not flow

- (1) Fix / Connect AC power cable (3pin)
- (2) Confirm the circuit diagram of power filter label before connecting.
- (3) Connect the LINE side to match with the line color of LOAD side and LINE side.

<Wire color>

Type		JIS	IWR	US	EU
P/L	+	Black	Black	Black	Brown
N	-	White	White	White or Gray	Blue
GND	FG	Green/Yellow	Red (Terminal Green)	Green	Green/Yellow



Antenna rotary motor switch "OFF"



Antenna rotary motor switch "ON"

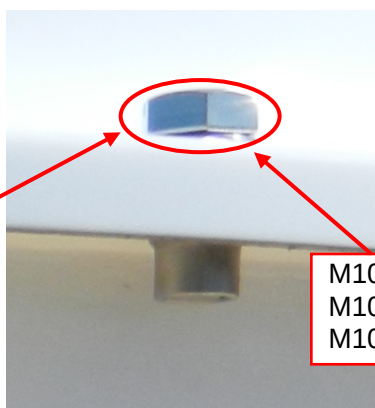
10. Activation test

- Turn "ON" the switch of Antenna rotary motor.



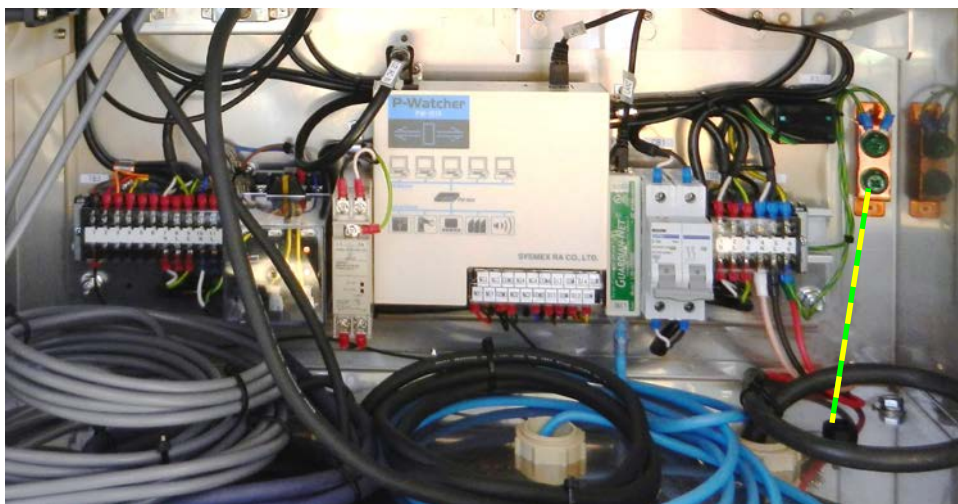
11. Cover the top of radome

- Make sure the switch of antenna rotary motor is "ON" before put on the top part of radome
- Fix the upper part of radome and the bottom part of radome by 10 pcs of M10x35 bolt.



M10x35
M10 spring washers
M10 flat washers

6.3. Signal Processing Unit (Store into storage box)



1. Insert outdoor cable into cable waveguide (10 pcs)

Cables run between SPU and Display Unit

Protecting Tube 4 : AC power cable (3pin)

Protecting Tube 3 : LAN cable

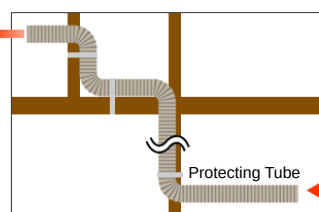
Cables run between SPU and Antenna Unit (radome)

Protecting Tube 2 : Coaxial cable (3 pcs)

Protecting Tube 1 : AC power cable (3pin)
Communication cable
(both end Dsub-25pin connector)
Signal cable
(both end Dsub-9pin connector)

- ✧ Remove the connector cover and run Dsub-25pin connector and Dsub-9pin connector through Protecting Tube. Reinstall the cover after passed through the Protecting Tube.

- Insert the GND wire through the GND/Cable ground.



*Taping it with coaxial cables



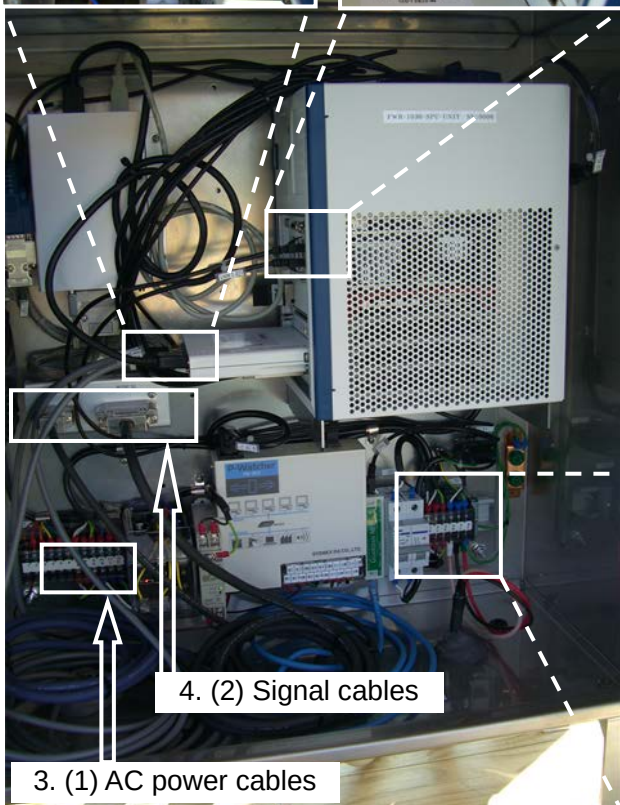
2. Connect FG cable

- Crimp the crimped terminal (M8) to the cable
- Screw up the cable to the FG terminal.
- This FG terminal should be connected with the building grounding electrode system.

4. (3) Coaxial cable



3. (2)(3) LAN cables



3. (1) AC power cables

4. (2) Signal cables

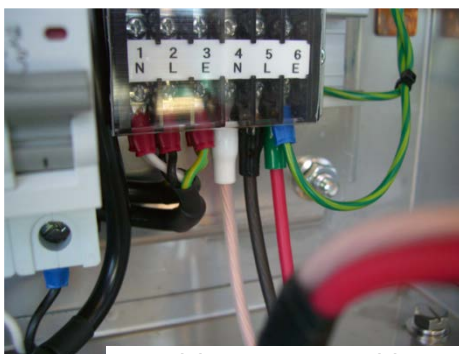
3. Connect the cable from Display Unit

*Caution: Make sure an electric current is not flow

- (1) Connect the AC power cables (3pin) to the terminal base (TB1)
- (2) Connect SPU ⇄ Unit LAN cable to the connector F3-LINE
- (3) Connect LAN cable (for the Power switch) to the connector F2-LINE

4. Connect the cable of the Antenna Unit (radome)

- (1) Connect the AC power cables (3pin) to the terminal base (TB3)
- (2) Connect and fix the signal cable (Dsub-9pin connector) to each S-COM connector, and communication cable (Dsub-25pin connector) to RF-CONT SIG connector.
- (3) Fix with the torque wrench (74Z-0-0-21) after connecting 3 coaxial cables (TX IF, RX IF V, RX IF H) to SPU – UNIT connector.



4. (1) AC power cables



5. Fix the wire

- Fix the cable tie with slacking the cable without making a tension to the connector of communication cable (Dsub-25pin connector), signal cable, and coaxial cables (3 pcs).



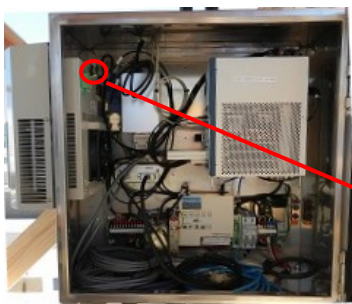
6. Make the power plug (beside Display Unit)

- Make 3 pin earthed power plug that running through the SPU.
- Place an outlet



7. Activation test

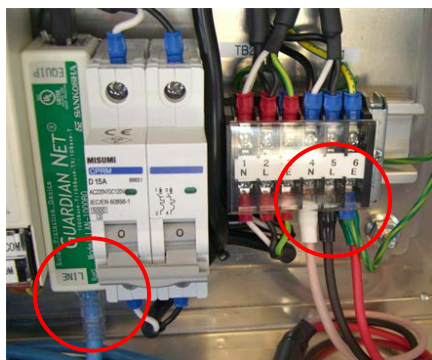
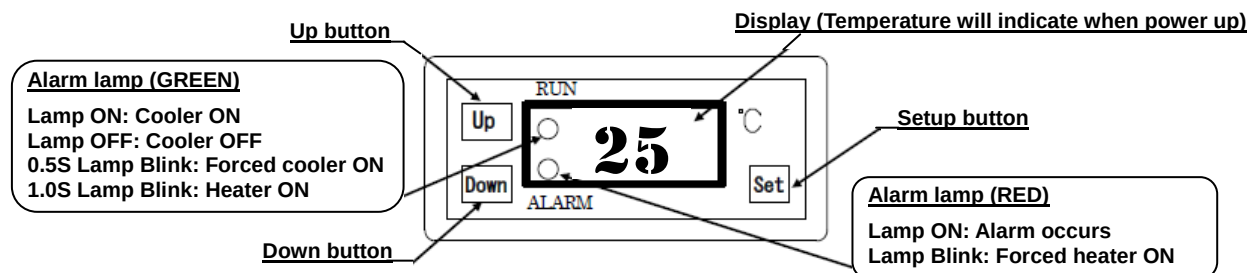
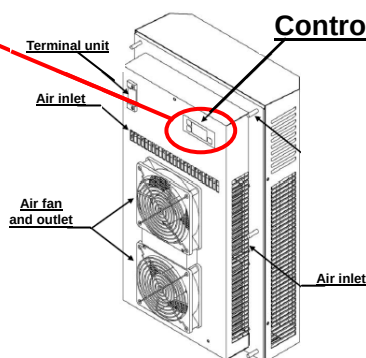
- Turn on the power breaker.
- Follow the instruction to test it.



8. Cooler setting

Setup temperature of cooler to **25** Celsius degrees .

- (1) Press [Set] button to indicate a temperature of setting.
- (2) Press [Up], [Down] button to setup a temperature to 25 Celsius degree.
- (3) Press [Set] button to indicate a current temperature.

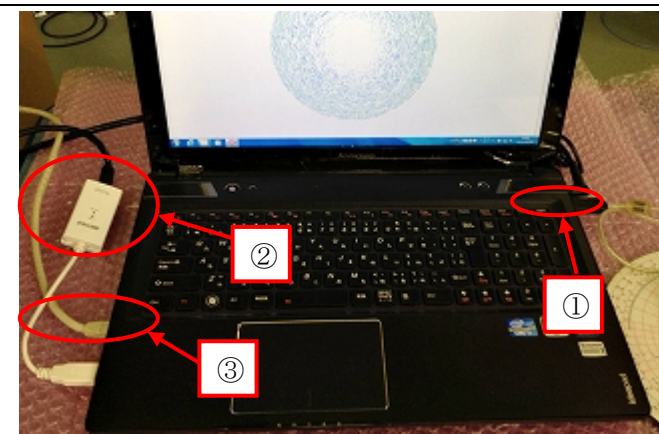


9. Measure the AC power

- Measure the value of AC power that comes into SPU from the main outlet.
- Reference range: -10% to +10%

10. Connect LAN cable to connect with display unit.

6.4. Display Unit (General laptop PC)

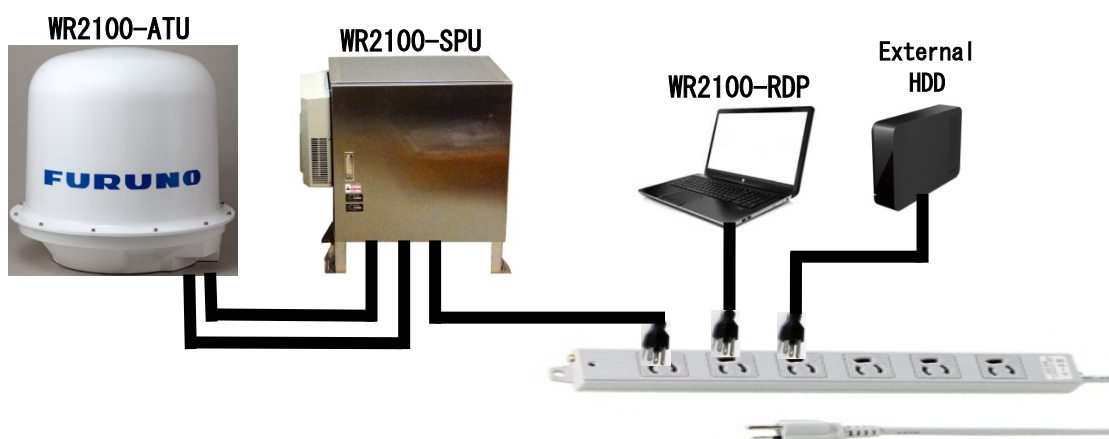


1. Setup Display Unit (PC)
 - (1) Connect LAN cable from SPU to PC
 - (2) Connect AC power cable
 - (3) Connect LAN cable from modem to USB LAN adaptor for PC

6.5. AC Power strip

Setup 4 or more outlet of AC power strip (3 core) beside display unit for display unit, HDD, and radar unit. UPS and Switching Hub / Router may be used(that depends on an order).

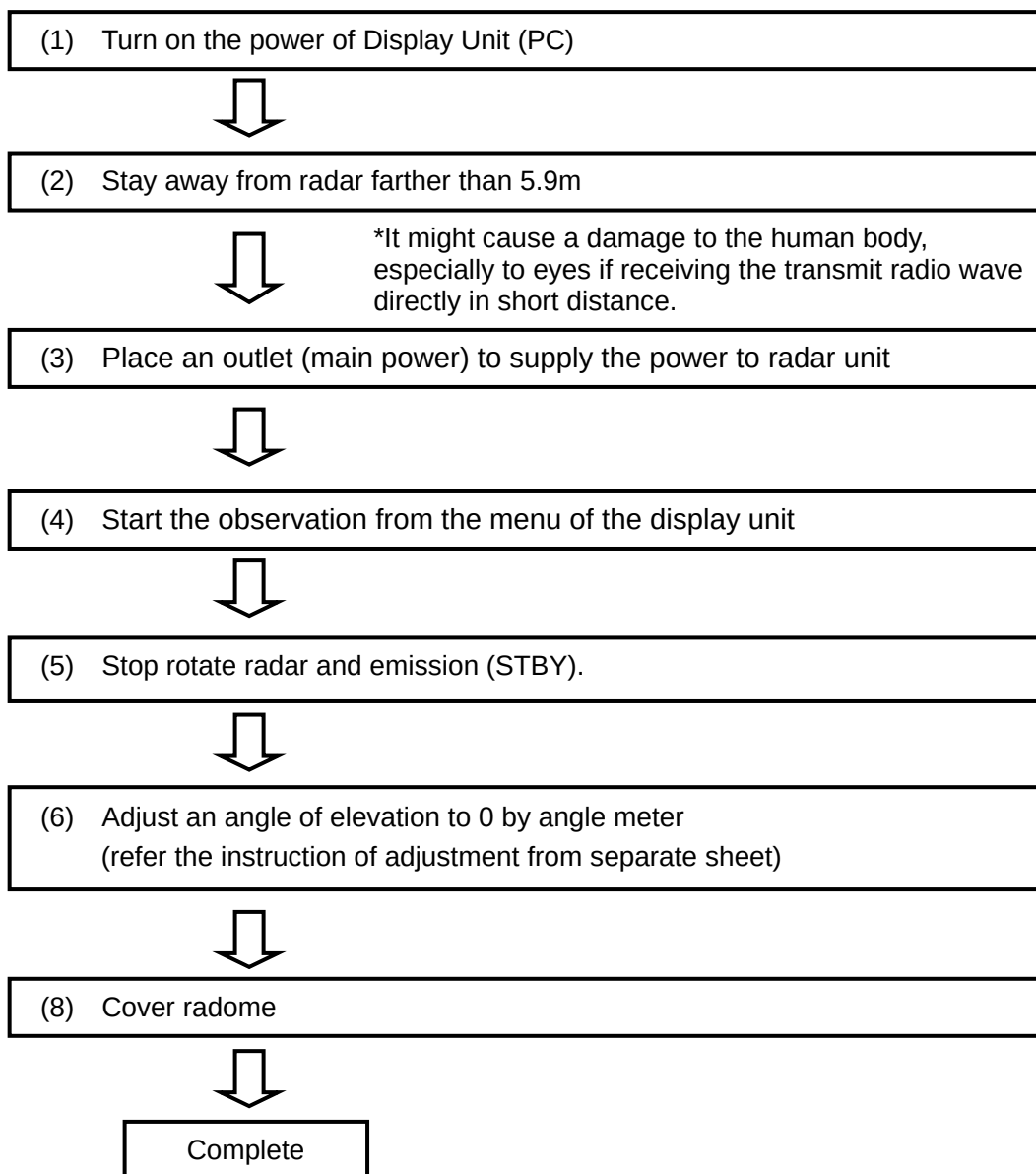
Notice: To lay LAN cable between PC and modem/router during installation when customer prepare an internet environment with modem/router for using remote control.



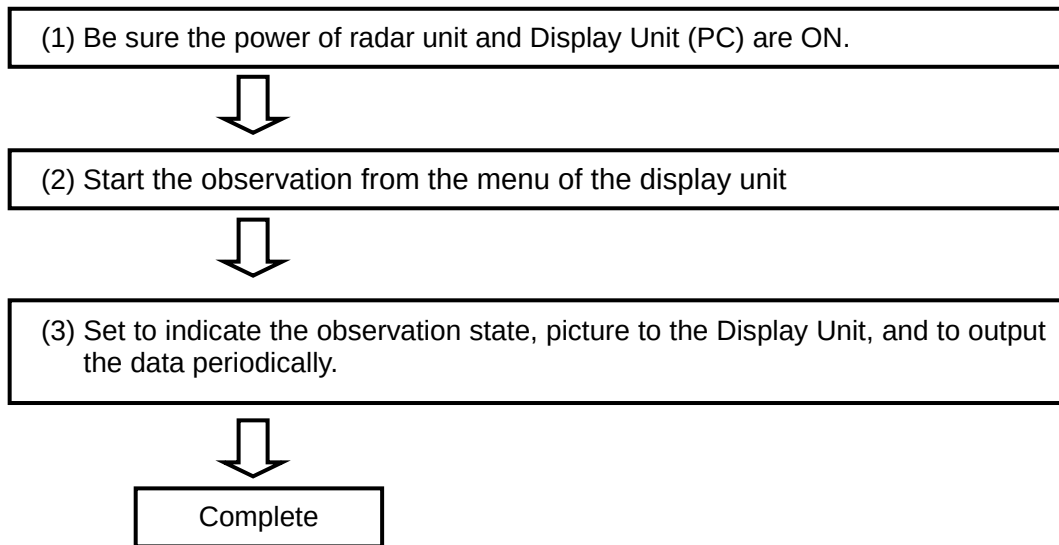
7. Operation Test

Follow the step as below :

7.1. Before cover (Upper part of radome)



7.2. After cover (Upper part of radome)



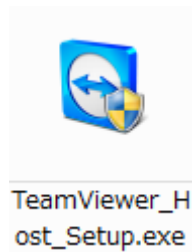
8. Install TeamViewer (Remote control management tool)

1. Download the software of TeamViewer Host (For remote server) from the following web site:

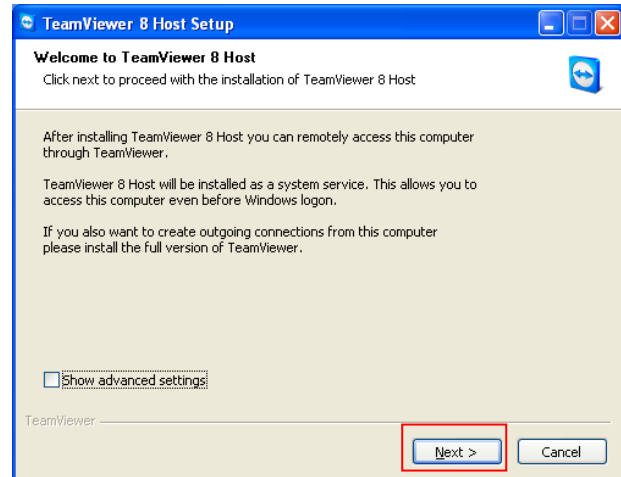
<http://www.teamviewer.com/ja/download/windows.aspx>

2. Double click "TeamViewer_Host_Setup.exe" to install the software.

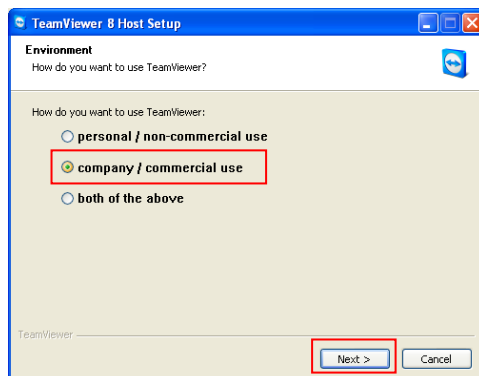
(1) Double click the icon



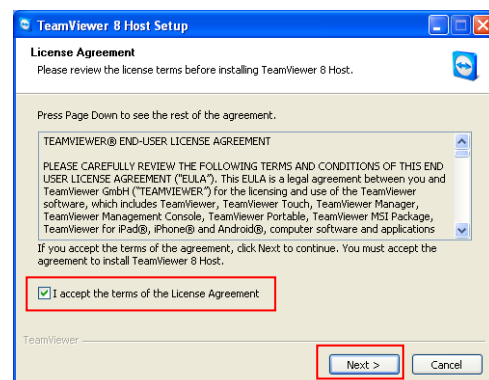
(2) Click [Next]



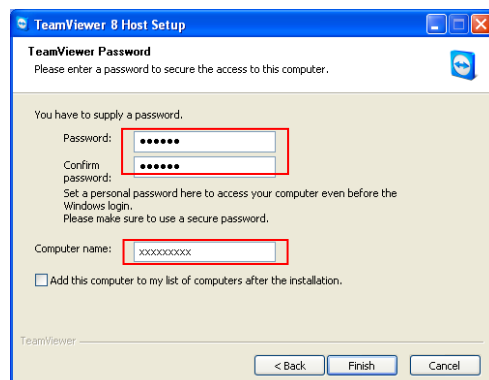
(3) Select "company / commercial use", and then click [Next]



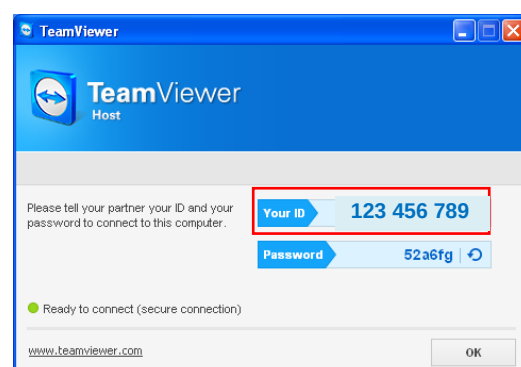
(4) Check on "License Agreement", and then click [Next]



(5) Make password and computer name
Password: rmsrms (enter this password)
Computer name: Enter location's name
And then click [Exit]



(6) "Your ID" will be issued automatically.
(* Remember this ID)
And then click [OK]



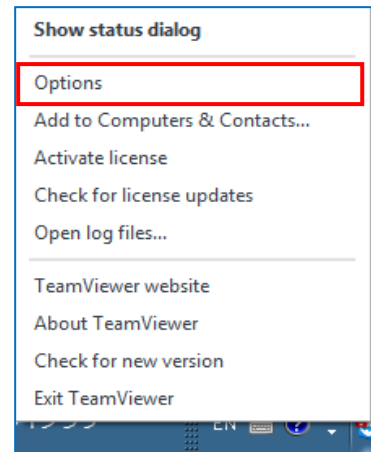
3. After installed software, please inform "Your ID" to the headquarter of Furuno who is in charge.
4. Use other PC to confirm remote access by TeamViewer.

5. The following instruction is to setup security on TeamViewer Host if necessary.

* Please confirm to a customer and Furuno Headquarter before setup.

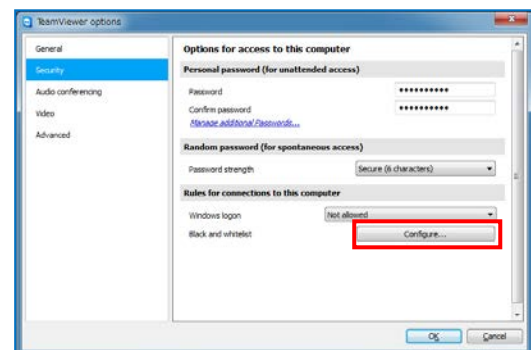
(1) Right click to the icon of TeamViewer in task bar.

(2) [TeamViewer options] will indicate a Popup menu on a screen after clicked [Option] from dropdown list of TeamViewer.



(3) Click [Security] on the right list of [TeamViewer options]

(4) Click [Configure] of [Black and whitelist] under a menu of [Rules for connections to this computer].



(5) It could register an opponent ID on the list to whether [Deny access for the following IDs and partners] or [Allow access only for the following IDs and partners] from Popup menu of [Black and whitelist].

