INSTALLATION MANUAL

Compact Dual Polarimetric X-band Doppler Weather Radar

MODEL WR-2100



www.furuno.com Date of Printing Feb. 01, 2014



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·FURUNO Authorized Distributor/Dealer

A : FEB. 2014

(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.

| Indicates a hazardous situation which, if not avoided, will result in death or serious injury. |
|---|
| Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury. |
| 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/m², 50 W/m² and 10 W/m² exist are shown in the table.

DO NOT go near more than 5.9m (Safety standard is 10 W/m²).

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



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 serge 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.



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.



<u>Antenna Unit (radome)</u>

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

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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.



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



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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 : Φ1086mm×H1024mm (include radome) Weight : 70Kg Weight of radome only: Upper 17kg, Bottom 9kg | 1 |
| Signal Processing Unit | WR-2100-SPU | Size : W725×D300×H750mm (include storage box) Weight : 60kg | 1 |
| Display Unit | WR-2100-DPU | General PC (ex. HP envy dv7) | 1 |
| Mounting Kit | Туре А | Size : 900mm×800mm×t 10mm, Weight : 15kg | 1 |
| for Radome | Туре В | Size : 950mm×920mm×t 10mm, Weight : 18kg | I |

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 (storag | e 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)



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 $100W/m^2$, $50W/m^2$, $10W/m^2$. The value of Safe standard is $10W/m^2$, 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 | Voltage AC : 85 to 240 V DC : 1 to 50V | Current AC : 1 to 10 A DC : 1mA to 1A | Resistor 0.1 to 10M ohm | Tester Lead Cables |
| Angle Meter | Measurement range : \geq 45deg Accuracy : within ±0.2deg | | | 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.



<Case 3>

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





Make 10 holes $[\bigcirc]$ to a wooden pedestal with 20 Φ 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)











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>

10. Activation test

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

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





Antenna rotary motor switch "OFF"

Antenna rotary motor switch "ON"





6.3. Signal Processing Unit (Store into storage box)

- Screw up the cable to the FG terminal.
- This FG terminal should be connected with the building grounding electrode system.



- 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
 - (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).



6.4. 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: <u>http://www.teamviewer.com/ja/download/windows.aspx</u>
- 2. Double click "TeamViewer_Host_Setup.exe" to install the software.
 - (1) Double click the icon

TeamViewer_H

ost_Setup.exe





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

| TeamViewer 8 Host Setup | |
|---|---------------|
| Environment How do you want to use TeamViewer? | 0 |
| How do you want to use TeamViewer: O personal / non-commercial use | |
| company / commercial use both of the above | |
| | |
| | |
| TeamViewer | |
| | Next > Cancel |

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



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



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

| TeamViewer | | | |
|--|----------|-------------|--|
| TeamViewer | | | |
| | | | |
| Please tell your partner your ID and your password to connect to this computer. | Your ID | 123 456 789 | |
| | Password | 52a6fg 🖸 | |
| Ready to connect (secure connection) | | | |
| www.teamviewer.com | | ок | |

- 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.
 - 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].



| General | Options for access to this o | computer | | |
|---|---|------------------------|--------|--|
| Security | Personal password (for unatter | nded access) | | |
| Audio conferencing Video Advanced | Paseword Confirm pastword Minage additional Pasewords Random password (for spontar | ********* ********* | | |
| | Password strength | Secure (6 characters) | • | |
| | Rules for connections to this computer | | | |
| | Windows logon Black and whitelist | (Not allowed Configure | 2 | |
| | | os (| Çancel | |
| | | | | |
| Black and whitelist | | lack- and whitelist | _ | |

| lackisted IDs and partners: | | Whitelisted IDs and partners | |
|-----------------------------|--------|------------------------------|--------|
| 0000000 | Bemove | XXXXXX | Bemove |
| | | | |
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