

# **ONWA RADAR ANTENNA OPERATOR'S MANUAL**

**KRA-1006, KRA-1007\_N, KRA-1007W, KRA-1009,  
KRA-4001\_N, KRA-3002\_N, KRA-5002\_N**



# SAFETY INSTRUCTIONS

"DANGER", "WARNING" and "CAUTION" notices throughout this manual. It is the responsibility of the operator and the installer of the equipment to read, understand and follow these notices. If you have any questions regarding these safety instructions, please contact an ONWA agent or dealer.

## WARNING



**Do not open the equipment.**

Hazardous voltage which can cause electrical shock, burn or serious injury exists inside the equipment. Only qualified personnel should work inside the equipment.



**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.



**Stay away from transmitting antenna.**

The radar antenna emits microwave radiation which can be harmful to the human body, particularly the eyes. Never look directly into the antenna radiator from a distance of less than 1 m when the radar is in operation.



**Turn off the radar power switch before servicing the antenna unit. Post a warning sign near the switch indicating it should not be turned on while the antenna unit is being serviced.**

Prevent the potential risk of someone being struck by the rotating antenna and exposure to the RF radiation hazard.

**Do not disassemble or modify the equipment.**

Fire, electrical shock or serious injury can result.

**Turn off the power immediately if water leaks into the equipment or the equipment is emitting smoke or fire.**

Continued use of the equipment can cause fire or electrical shock.

**Do not place liquid-filled containers on top of the equipment.**

Fire or electrical shock can result if liquid spills into the equipment.

# CAUTION

**Use the proper fuse.**

Use of a wrong fuse can result in fire or permanent equipment damage.

**Do not use the equipment for other than its intended purpose.**

Personal injury can result if the equipment is used as a chair or stepping stool, for example.

**Do not place objects on top of the equipment.**

The equipment can overheat or personal injury can result if the object falls.



# CONTENTS

---

<b>FOREWORD</b>	<b>1</b>
<b>FEATURES</b>	<b>1</b>
<b>KRA-1006, KRA-1007_N AND KRA-1007W SPECIFICATIONS</b>	<b>2</b>
<b>KRA-1009 SPECIFICATIONS</b>	<b>4</b>
<b>KRA-4001_N SPECIFICATIONS</b>	<b>6</b>
<b>KRA-3002_N SPECIFICATIONS</b>	<b>8</b>
<b>KRA-5002_N SPECIFICATIONS</b>	<b>10</b>
<b>1. INSTALLATION</b>	<b>12</b>
1.1 Antenna Unit Installation Sitting, handling considerations	12
Mounting of KRA-1006, KRA-1007_N and KRA-1007W and KRA-1009	13
Mounting of KRA-4001_N, KRA-3002_N and KRA-5002_N	16
<b>2. CONNECTIONS</b>	<b>19</b>
Connection of KRA-1006	20
Connection of KRA-1007_N	21
Connection of KRA-1007W	22
Connection of KRA-1009	23
Connection of KRA-4001_N, KRA-3002_N and KRA-5002_N	24
<b>3. DRAWINGS AND DIMENSIONS</b>	<b>25</b>
3.1 KRA-1006, KRA-1007_N, KRA-1007W	25
3.2 KRA-1009	26
3.3 KRA-4001_N, KRA-3002_N	27
3.4 KRA-5002_N	28

# FOREWORD

---

Thank you for choosing ONWA marine radar antenna. The radar antenna is designed and constructed to meet the rigorous demands of the marine environment. However, no machine can perform its intended function unless properly installed and maintained. Please carefully read and follow the recommended procedures for installation, operation and maintenance. While this unit can be installed by the purchaser, any purchaser who has doubts about his or her technical abilities may wish to have the unit installed by an ONWA representative or other qualified technician.

We want to Hear from you!

Your suggestions and comments are highly important to us, to further develop our equipment let us know if we are achieving our purpose. Please send us your feedback at [sales@onwamarine.com](mailto:sales@onwamarine.com).

Again, Thank you for purchasing an Onwa Equipment.

## Features

The main features of the ONWA marine radar antenna:

- Traditional ONWA quality and reliability in a compact, lightweight and low-cost radar antenna.
- Digital radar target technology.
- Share the same protocol between all ONWA magnetron pulse radar antennas.
- Can be connected to PC directly or through home router.
- Built-in excellent sea and rain clutter algorithm.
- Fully digital signal processing.
- High performance microwave front end.

## KRA-1006, KRA-1007\_N AND KRA-1007W SPECIFICATION

### ANTENNA UNIT

1. Radiator: Slotted waveguide array
2. Radiator length: 55 cm
3. Horizontal beamwidth: 4°
4. Vertical beamwidth: 25°
5. Sidelobe:  
Within  $\pm 20^\circ$  off mainlobe; less than -18 dB  
Outside  $\pm 20^\circ$  off mainlobe; less than -23 dB
6. Polarization: Horizontal
7. Antenna rotation speed: 24 rpm ( $\pm 2$ )
8. Wind resistance: Relative wind speed 100 knots (51.5 m/s)

### TRANSCEIVER MODULE (contained in radome)

1. Transmitting tube: MSF1421B or MAF1421B
2. Frequency: 9410 MHz  $\pm$  30MHz
3. Peak output power: 4kW nominal
4. Pulselength & pulse repetition rate:  
0.08  $\mu$  S, 2100 Hz (0.125, 0.25, 0.5, 0.75, 1.5nm)  
0.3  $\mu$  S, 1200 Hz (1.5, 2, 3nm)  
0.8  $\mu$  S, 600 Hz (3, 4, 6, 8, 12, 16, 24, 36nm)
5. Warm up time: 1:30 minutes
6. Modulator: FET switching method
7. I.F.: 60MHz
8. Tuning: Automatic or manual
9. Receiver front end: MIC (Microwave IC)
10. Bandwidth:  
Tx pulselength 0.3  $\mu$  S and 0.08  $\mu$  S: 25MHz  
Tx pulselength 0.8  $\mu$  S: 3MHz
11. Duplexer: Circulator with diode limiter
12. WIFI module (For KRA-1007W only)

Standard	IEEE802.11n, IEEE802.11g, IEEE802.11b
Channels	1-11
Frequency range	2.4-2.4835G
Transmit power	15~20dBm

## POWER SUPPLY UNIT

1. For KRA-1006: +/-12VDC external regulated power supply
2. For KRA-1007\_N and KRA-1007W: 10.5VDC to 40VDC built-in power supply

## ENVIRONMENT

1. Temperature:  
Antenna unit; -25°C to + 70°C
2. Humidity:  
Relative humidity 93% or less at + 40°C
3. Compass safe distance:

	Standard Compass	Steering Compass
Antenna unit	130cm	95cm

# KRA-1009 SPECIFICATION

---

## ANTENNA UNIT

1. Radiator: Slotted waveguide array
2. Radiator length: 46 cm
3. Horizontal beamwidth:  $5^{\circ}$
4. Vertical beamwidth:  $25^{\circ}$
5. Sidelobe:
  - Within  $\pm 20^{\circ}$  off mainlobe; less than -18 dB
  - Outside  $\pm 20^{\circ}$  off mainlobe; less than -23 dB
6. Polarization: Horizontal
7. Antenna rotation speed:
  - Long range (3~36NM): 24RPM ( $\pm 2$ )
  - Medium range (1.5~3NM): 36RPM ( $\pm 2$ )
  - Short range (0.125~1.5NM): 48RPM ( $\pm 2$ )
8. Wind resistance: Relative wind speed 100 knots(51.5 m/s)

## TRANSCEIVER MODULE (contained in antenna)

1. Transmitting tube: MSF1421B or MAF1421B
2. Frequency:  $9410\text{MHz} \pm 30\text{MHz}$
3. Peak output power: 4KW nominal
3. Pulselength & pulse repetition rate:
  - $0.08 \mu\text{S}$ , 2100 Hz (0.125, 0.25, 0.5, 0.75, 1.5nm)
  - $0.3 \mu\text{S}$ , 1200 Hz (1.5, 2, 3nm)
  - $0.8 \mu\text{S}$ , 600 Hz (3, 4, 6, 8, 12, 16, 24, 36nm)
5. Warm up time: 1:30 minutes
6. Modulator: FET switching method
7. I.F.: 60MHz
8. Tuning: Automatic or manual
9. Receiver front end: MIC (Microwave IC)
10. Bandwidth:
  - Tx pulselength  $0.3 \mu\text{S}$  and  $0.08 \mu\text{S}$ : 25MHz
  - Tx pulselength  $0.8 \mu\text{S}$ : 3MHz
11. Duplexer: Circulator with diode limiter

## POWER SUPPLY UNIT

1. 10.5VDC to 40VDC built-in power supply

## ENVIRONMENT

1. Temperature:  
Antenna unit; -25°C to + 70°C
2. Humidity:  
Relative humidity 93% or less at + 40°C
3. Compass safe distance:

	Standard Compass	Steering Compass
Antenna unit	130cm	95cm

# KRA-4001\_N SPECIFICATION

---

## ANTENNA UNIT

1. Radiator: Slotted waveguide array
2. Radiator length: 120 cm
3. Horizontal beamwidth:  $1.9^{\circ}$
4. Vertical beamwidth:  $22^{\circ}$
5. Sidelobe:  
    Within  $\pm 20^{\circ}$  off mainlobe; less than -24 dB  
    Outside  $\pm 20^{\circ}$  off mainlobe; less than -30 dB
6. Polarization: Horizontal
7. Antenna rotation speed: 24rpm
8. Wind resistance: Relative wind speed 100 knots(51.5 m/s)

## TRANSCEIVER MODULE (contained in antenna)

1. Transmitting tube: MAF1422 or MSF1422
2. Peak output power: 6KW nominal
3. Pulselength & pulse repetition rate:  
    0.08  $\mu$  S, 2100 Hz (0.125, 0.25, 0.5, 0.75, 1.5nm)  
    0.3  $\mu$  S, 1200 Hz (1.5, 2, 3nm)  
    0.8  $\mu$  S, 600 Hz (3, 4, 6, 8, 12, 16, 24, 36, 48, 64nm)
4. Bandwidth:  
    Tx pulselength 0.3  $\mu$  S and 0.08  $\mu$  S: 25MHz  
    Tx pulselength 0.8  $\mu$  S: 3MHz
5. Warm up time: 1:30 minutes
6. Modulator: FET switching method
7. I.F.: 60MHz
8. Tuning: Automatic or manual
9. Receiver front end: MIC (Microwave IC)
10. Bandwidth:  
    Tx pulselength 0.3  $\mu$  S and 0.08  $\mu$  S: 25MHz  
    Tx pulselength 0.8  $\mu$  S: 3MHz
11. Duplexer: Circulator with diode limiter

## POWER SUPPLY UNIT

1. 10.5V ~ 40VDC with external power supply

## ENVIRONMENT

1. Temperature:  
Antenna unit; -25°C to + 70°C
2. Humidity:  
Relative humidity 93% or less at + 40°C
3. Compass safe distance:

	Standard Compass	Steering Compass
Antenna unit	130cm	95cm



# KRA-3002\_N SPECIFICATION

---

## ANTENNA UNIT

1. Radiator: Slotted waveguide array
2. Radiator length: 180 cm
3. Horizontal beamwidth:  $1.2^\circ$
4. Vertical beamwidth:  $22^\circ$
5. Sidelobe:  
Within  $\pm 20^\circ$  off mainlobe; less than -24 dB  
Outside  $\pm 20^\circ$  off mainlobe; less than -30 dB
6. Polarization: Horizontal
7. Antenna rotation speed: 24 rpm

## TRANSCEIVER MODULE

1. Transmitting tube: MSF1425
2. Frequency:  $9410\text{MHz} \pm 30\text{MHz}$
3. Peak output power: 12.5KW nominal
4. Pulselength & pulse repetition rate:  
0.08  $\mu\text{S}$ , 2100 Hz (0.125, 0.25, 0.5, 0.75, 1.5nm)  
0.3  $\mu\text{S}$ , 1200 Hz (1.5, 2, 3nm)  
0.8  $\mu\text{S}$ , 600 Hz (3, 4, 6, 8, 12, 16, 24, 36, 48, 64, 72nm)
5. Warm up time: 1:30 minutes
6. Modulator: FET switching method
7. I.F.: 60MHz
8. Tuning: Automatic or manual
9. Receiver front end: MIC (Microwave IC)
10. Bandwidth:  
Tx pulselength 0.3  $\mu\text{S}$  and 0.08  $\mu\text{S}$ : 25MHz  
Tx pulselength 0.8  $\mu\text{S}$ : 3MHz
11. Duplexer: Circulator with diode limiter

## POWER SUPPLY UNIT

1. 10.5V ~ 40VDC with external power supply

## ENVIRONMENT

1. Temperature:  
Antenna unit; -25°C to + 70°C
2. Humidity:  
Relative humidity 93% or less at + 40°C
3. Compass safe distance:

	Standard Compass	Steering Compass
Antenna unit	130cm	95cm

# KRA-5002\_N SPECIFICATION

---

## ANTENNA UNIT

1. Radiator: Slotted waveguide array
2. Radiator length: 200 cm
3. Horizontal beamwidth:  $1.23^\circ$
4. Vertical beamwidth:  $22^\circ$
5. Sidelobe:  
    Within  $\pm 20^\circ$  off mainlobe; less than -28 dB  
    Outside  $\pm 20^\circ$  off mainlobe; less than -32 dB
6. Polarization: Horizontal
7. Antenna rotation speed: 24 rpm

## TRANSCEIVER MODULE

1. Transmitting tube: M1458A
2. Frequency:  $9410\text{MHz} \pm 30\text{MHz}$
3. Peak output power: 25KW nominal
4. Pulselength & pulse repetition rate:  
    0.1  $\mu\text{S}$ , 2100 Hz (0.125, 0.25, 0.5nm)  
    0.12  $\mu\text{S}$ , 2100 Hz (0.75, 1.5nm)  
    0.3  $\mu\text{S}$ , 1200 Hz (1.5, 2, 3nm)  
    0.7  $\mu\text{S}$ , 600 Hz (3, 4nm)  
    0.8  $\mu\text{S}$ , 600 Hz (6, 8, 12, 16, 24, 36nm)  
    1.2  $\mu\text{S}$ , 600 Hz (48, 64, 72, 96, 120nm)
5. Warm up time: 3:00 minutes
6. Modulator: FET switching method
7. I.F.: 60MHz
8. Tuning: Automatic or manual
9. Receiver front end: MIC (Microwave IC)
10. Bandwidth:  
    Tx pulselength 0.3  $\mu\text{S}$  and 0.12  $\mu\text{S}$ , 0.1  $\mu\text{S}$ : 25MHz  
    Tx pulselength 0.7  $\mu\text{S}$ , 0.8  $\mu\text{S}$  and 1.2  $\mu\text{S}$ : 3MHz
11. Duplexer: Circulator with diode limiter

## POWER SUPPLY UNIT

1. 10.5V ~ 40VDC with external power supply

## ENVIRONMENT

1. Temperature:

Antenna unit; -25°C to + 70°C

2. Humidity:

Relative humidity 93% or less at + 40°C

3. Compass safe distance:

	Standard Compass	Steering Compass
Antenna unit	130cm	95cm

# 1. INSTALLATION

---

This chapter provides the procedures necessary for installation.

Installation mainly consists of the following:

- sitting and mounting the display unit and antenna unit
- connection of the signal cable and the power cable
- establishing the ground
- checking the installation, and
- adjustments.

## 1.1 Antenna Unit Installation Sitting, handling considerations

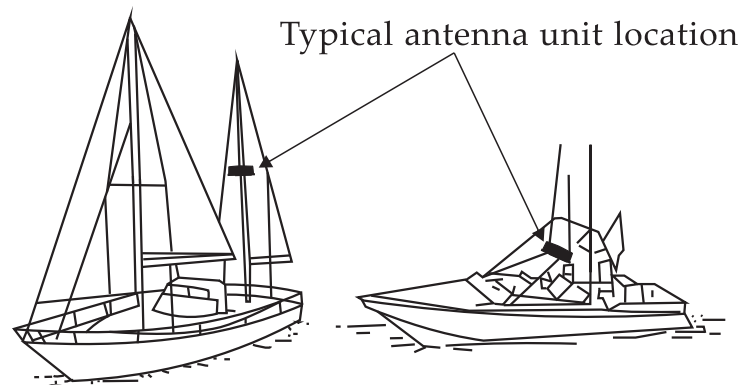
- The antenna unit is generally installed either on top of the wheelhouse or on the radar mast on a suitable platform. Locate the antenna unit where there is a good all-round view as far as possible, no part of the ship's superstructure or rigging intercepting the scanning beam. Any obstruction will cause shadow and blind sectors. A mast for instance, with a diameter considerably less than the width of the radiator, will cause only a small blind sector, but a horizontal spreader or crosstrees in the same horizontal plane as the antenna unit would be a much more serious obstruction; you would need to place the antenna unit well above or below it.
- It is rarely possible to place the antenna unit where a completely clear view in all direction 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. (The method of determining blind and shadow sectors appears later in this chapter.)
- If you have a radio direction finder on your boat, locate its antenna. Clear the antenna unit, to prevent interference to the direction finder. A separation of more than two meters is recommended.
- To lessen the chance of picking up electrical interference, avoid routing the signal cable near other onboard electrical equipment. Also avoid running the cable in parallel with power cables.
- The compass safe distance should be observed to prevent deviation of the magnetic compass.

Standard compass	Steering compass
1.3m	0.7m

- For the KRA-1007W, be sure to position your WIFI antenna and control display at a minimum distance of 1.5m and a maximum distance of 20m, limiting as much as possible interference by metal barriers, walls and other WIFI or strong electronic transmissions.

## Mounting of KRA-1006, KRA-1007\_N, KRA-1007W and KRA-1009

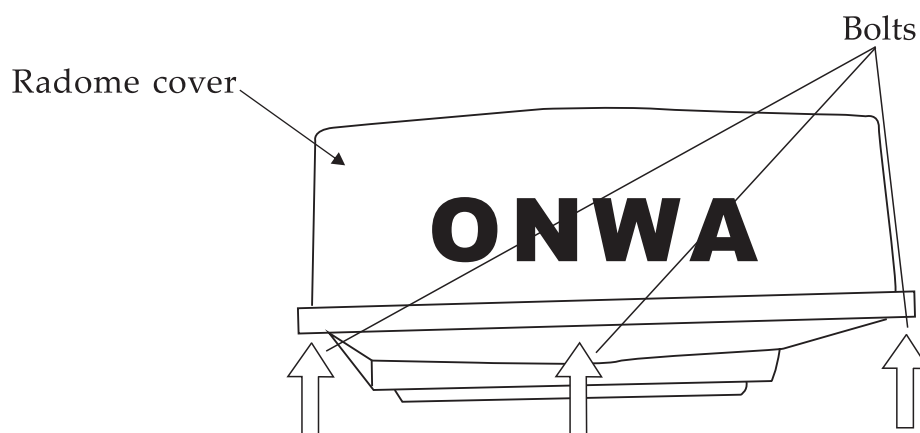
---



*Figure 1-1 Typical antenna unit location*

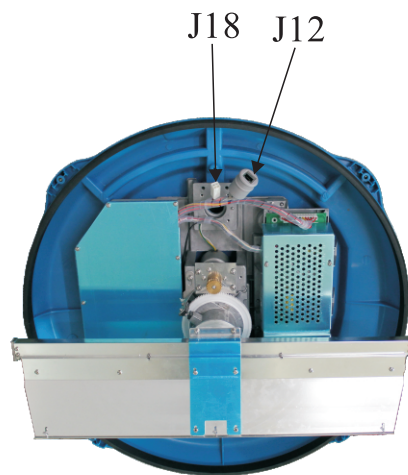
### Unpacking the antenna unit

1. Open the antenna unit packing box carefully.
2. Unbolt the four bolts at the base of the radome to remove the radome cover.



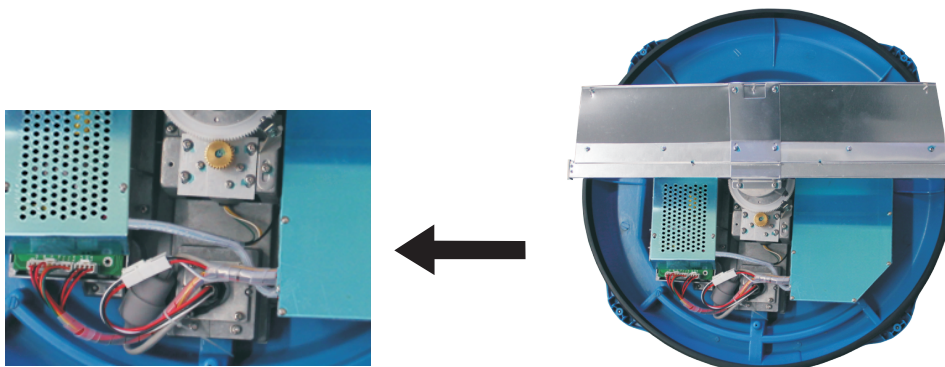
*Figure 1-2 Antenna unit*

3. Drill holes in the antenna mounting platform in accordance with the previous removal of the base mounting map.  
**Note: the hole is arranged in parallel with the center line of the ship.**
4. Loosen the antenna cover and the base of the 4 screws, carefully remove the cover.
5. Remove the cable clamping plate by unfastening four screws and removing a gasket.
6. Pass the cable through the hole at the bottom of the radome base.
7. Secure the cable with the cable clamping plate and gasket. Ground the shield and vinyl wire by one of the screws of the cable clamping plate.
8. Connect the wire to the Video Processing unit.
  - (1) 4-pin connector to J18
  - (2) RJ45 connector to J12



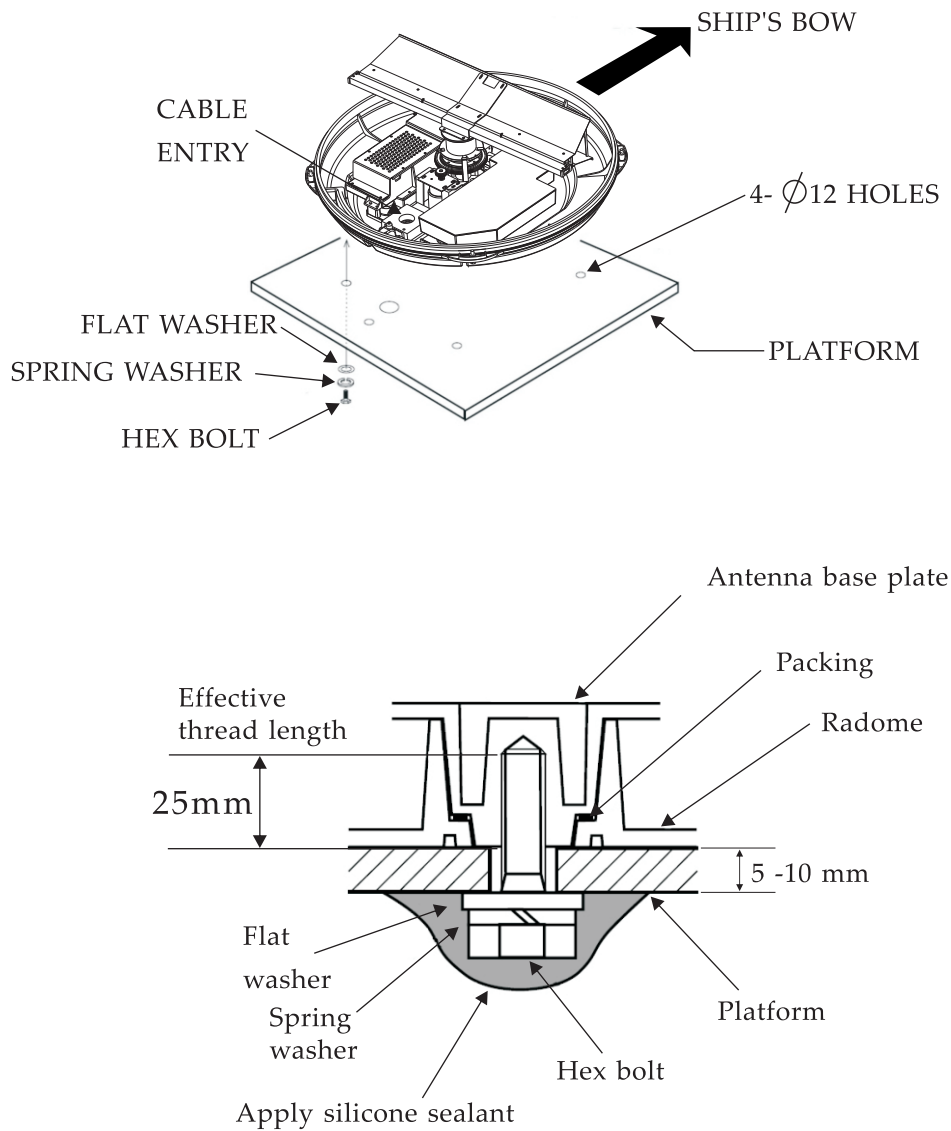
*Figure 1-3 Location of J18/J12*

10. Fix the shield cover. Do not pinch the cable.



*Figure 1-4 Antenna Cable Wiring*

11. Loosely fasten the radome fixing bolts. You will tighten them after confirming the unit is working normally.

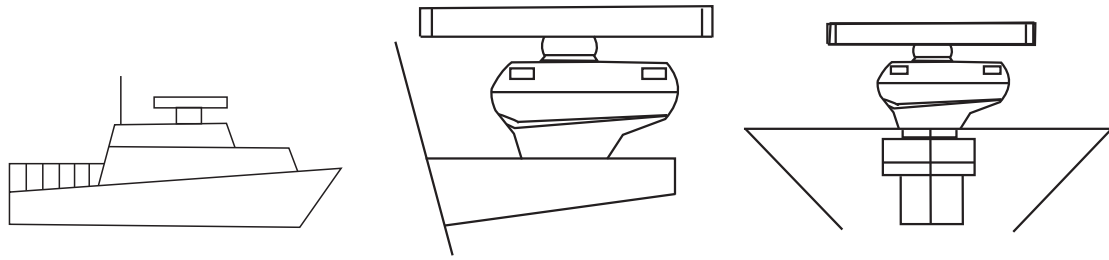


*Figure 1-5 How to fasten the radome base to the mounting platform*



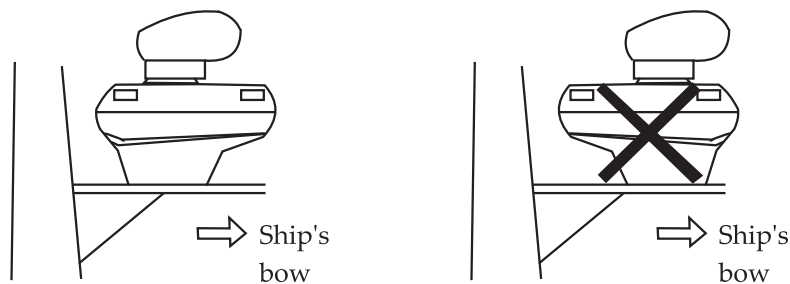
## Mounting of KRA-4001\_N, KRA-3002\_N and KRA-5002\_N

---



*Figure 1-6 Typical antenna unit mounting locations*

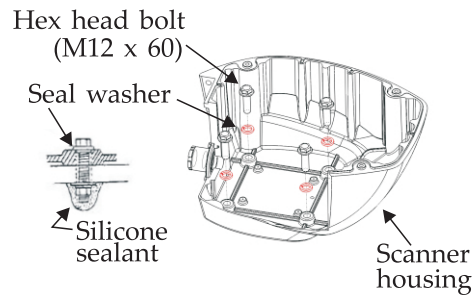
1. Drill four fixing bolt holes (13 millimeters dia.), In the mounting platform. See the outline drawing.
2. Detach the antenna housing cover from the antenna housing by loosening four fixing bolts. The antenna housing cover fitted with the transceiver module can be stored in a convenient place until the wiring to the antenna unit is done.
3. Place the antenna housing on the mounting platform and orient it as shown in Figure 1-7.



*Figure 1-7 How to orient the antenna unit*

4. Insert four M12× 60 hex head bolts with the seal washers from inside the antenna housing, to prevent the bolts from contacting the transceiver module. Install the seal washer with the larger diameter next to the head of the bolt. Coat flat and spring washers and nuts and then use them to fasten the antenna housing to the mounting platform. Finally, coat exposed parts of nuts, bolts and Flat and spring washers as shown in Figure 1 -8.

Note: Tighten the bolts by their nuts to prevent damage to the seal washer.  
Do not turn the bolts to secure the antenna housing.



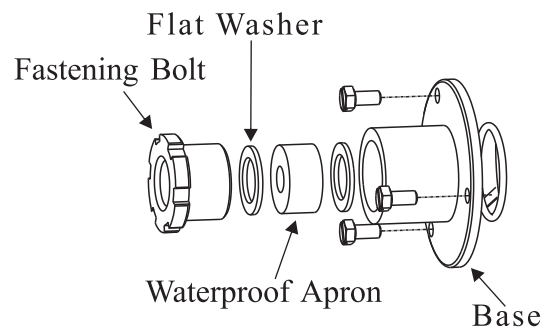
*Figure 1-8 How to mount the antenna housing*

## Connections

Only one signal cable runs from the display unit to the antenna unit. Make the hole for passing the cable through the bulkhead or deck at least 20 millimeters diameter. In order to minimize the chance of picking up electrical interference, avoid routing the signal cable near other onboard electrical equipment. Also, avoid running the cable in parallel with power cables. Pass the cable through the hole and apply sealing compound around the hole for waterproofing.

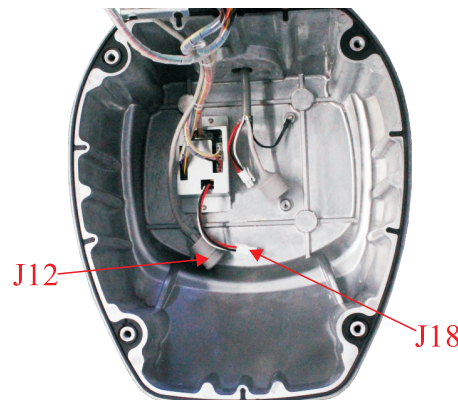
The procedure for connecting the signal cable to the antenna unit is as follows:

1. Through a pipe or waterproof cable gland fitted on the wheelhouse top or bulkhead.
2. Unfasten fastening bolts at rear of the scanner tail to remove the cable gland assembly.
3. Pass the signal cable sequentially through the fastening bolt, the washer, waterproof apron, under the washer, and then through the mounting hole into the base of the antenna inside (removed in step 2.)



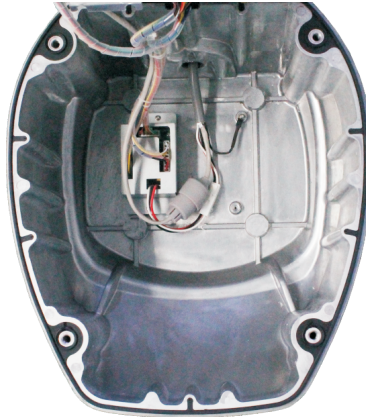
*Figure 1-9 Passing the signal cable through the antenna housing*

4. Tighten the screws



*Figure 1-10 Antenna Cable Wiring*

5. Plug in the RJ45 network of the signal cable to the corresponding RJ45 socket J12;
6. Connect the 4 core plug of the signal cable to the corresponding 4 core socket J18, as shown in figure 1-11;

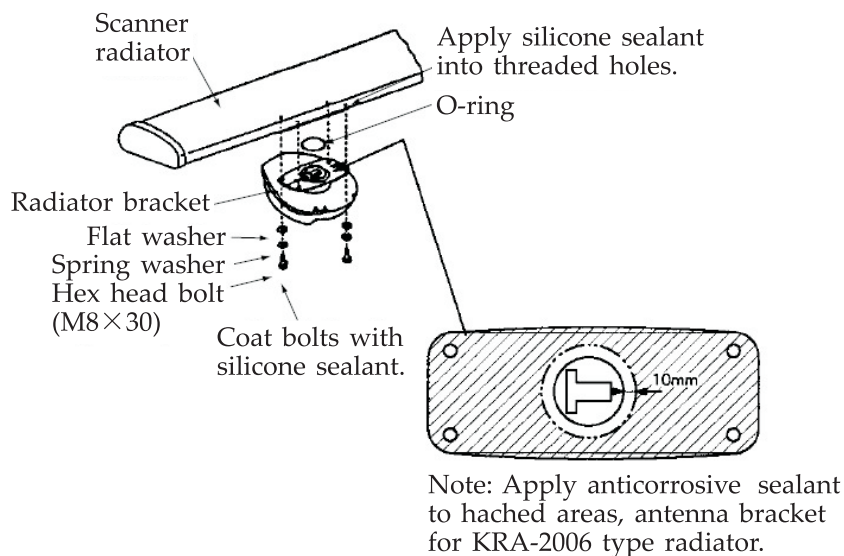


*Figure 1-11 Connection in the antenna housing*

7. Cover the antenna cover, check the waterproof apron.

### **Installation of Waveguide:**

8. The antenna is placed in the arm, and the packing of the antenna is opened;
9. Take out the antenna base waveguide filler;
10. Install the waterproof rubber ring.
11. To check the position of the antenna base guide, and to load the antenna waveguide port with the alignment. As shown below:



*Figure 1-12 Fastening the radiator to the radiator bracket*

12. Open antenna cover;
13. Check the internal connection of signal cable is correct;
14. The grounding of the earth wire in the signal cable to the chassis;
15. Loosely fasten the cover screws. You will tighten them after confirming the unit is working normally.

## 2. CONNECTIONS

---

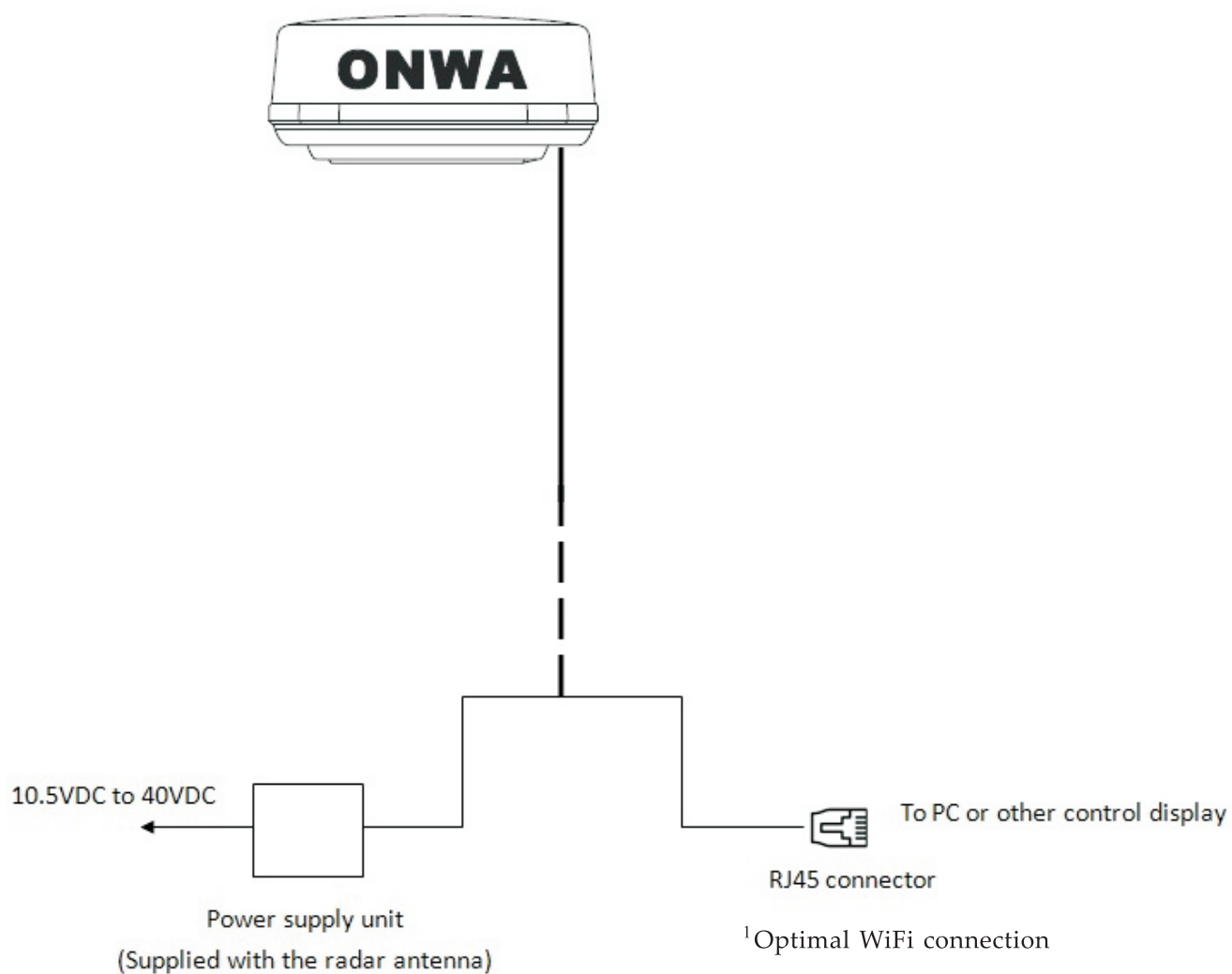
Since all Onwa marine magnetron radar shares same communication protocol so a PC or control display can connect any one of below models :

- 1) KRA-1006, 4KW radome antenna.
- 2) KRA-1007\_N, 4KW radome antenna with built-in regulated power supply.
- 3) KRA-1007W, 4KW radome antenna with built-in regulated power supply and WIFI module.
- 4) KRA-1009, 4KW radome antenna with built-in regulated power supply
- 5) KRA-4001\_N, 6KW open array antenna with external regulated power supply
- 5) KRA-3002\_N, 12.5KW open array antenna with external regulated power supply
- 6) KRA-5002\_N, 25KW open array antenna with external regulated power supply

For any questions of connections and installation please consult Onwa dealer or distributor or email to [technical@onwamarine.com](mailto:technical@onwamarine.com)

# CONNECTION OF KRA-1006

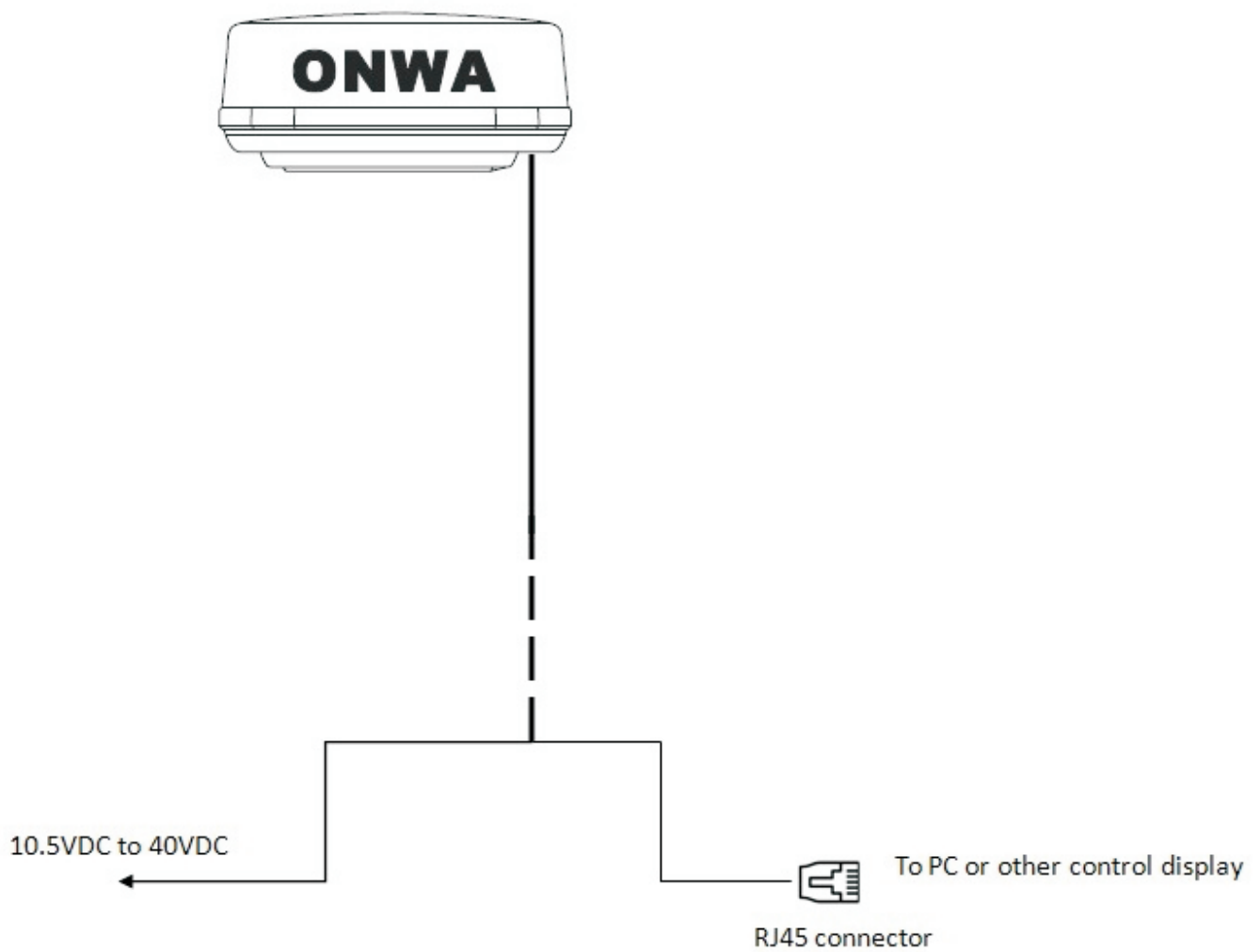
---



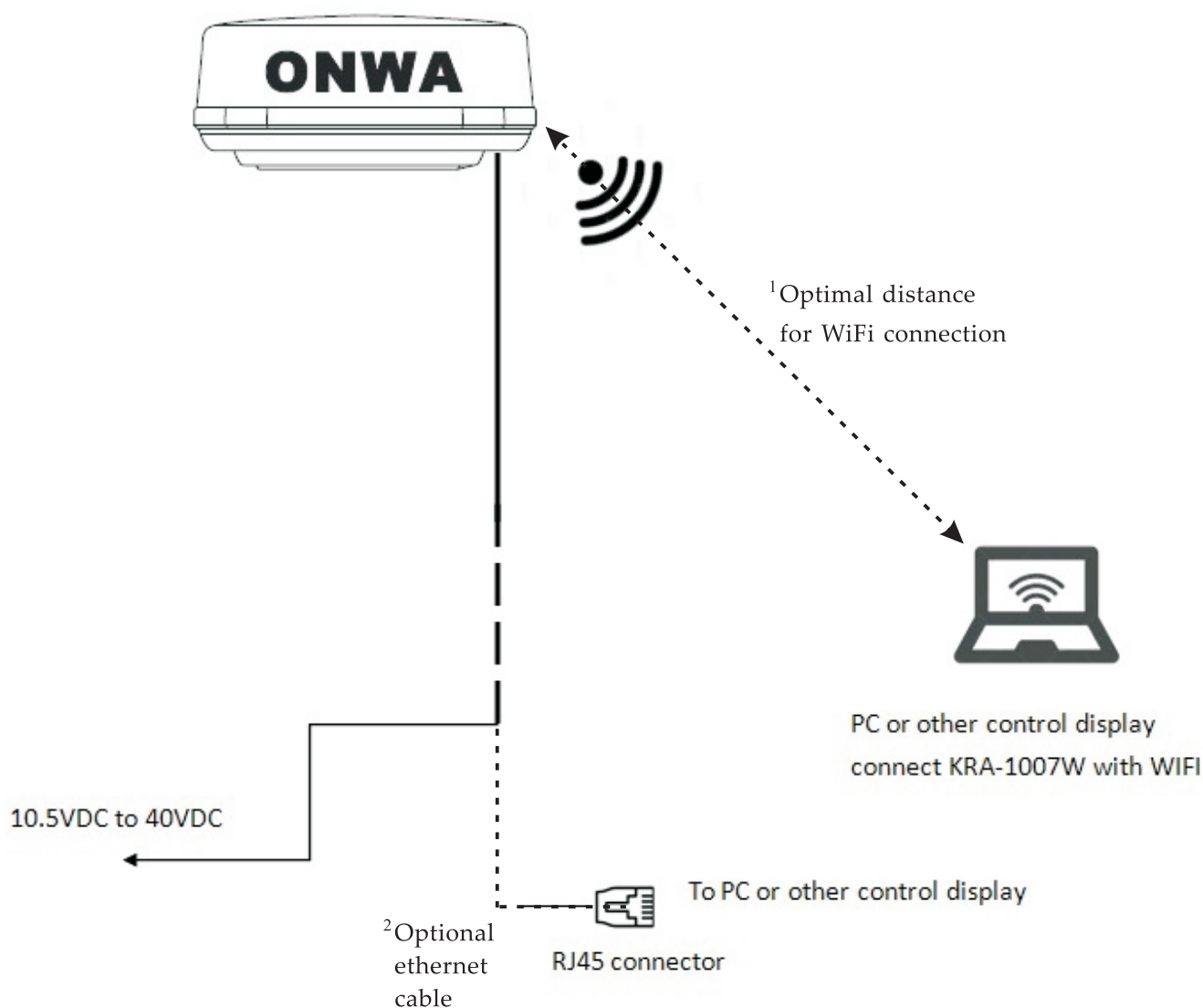
<sup>1</sup>For WiFi connection to compatible control displays, add a WiFi router to the RJ45 connector.

# CONNECTION OF KRA-1007\_N

---



# CONNECTION OF KRA-1007W

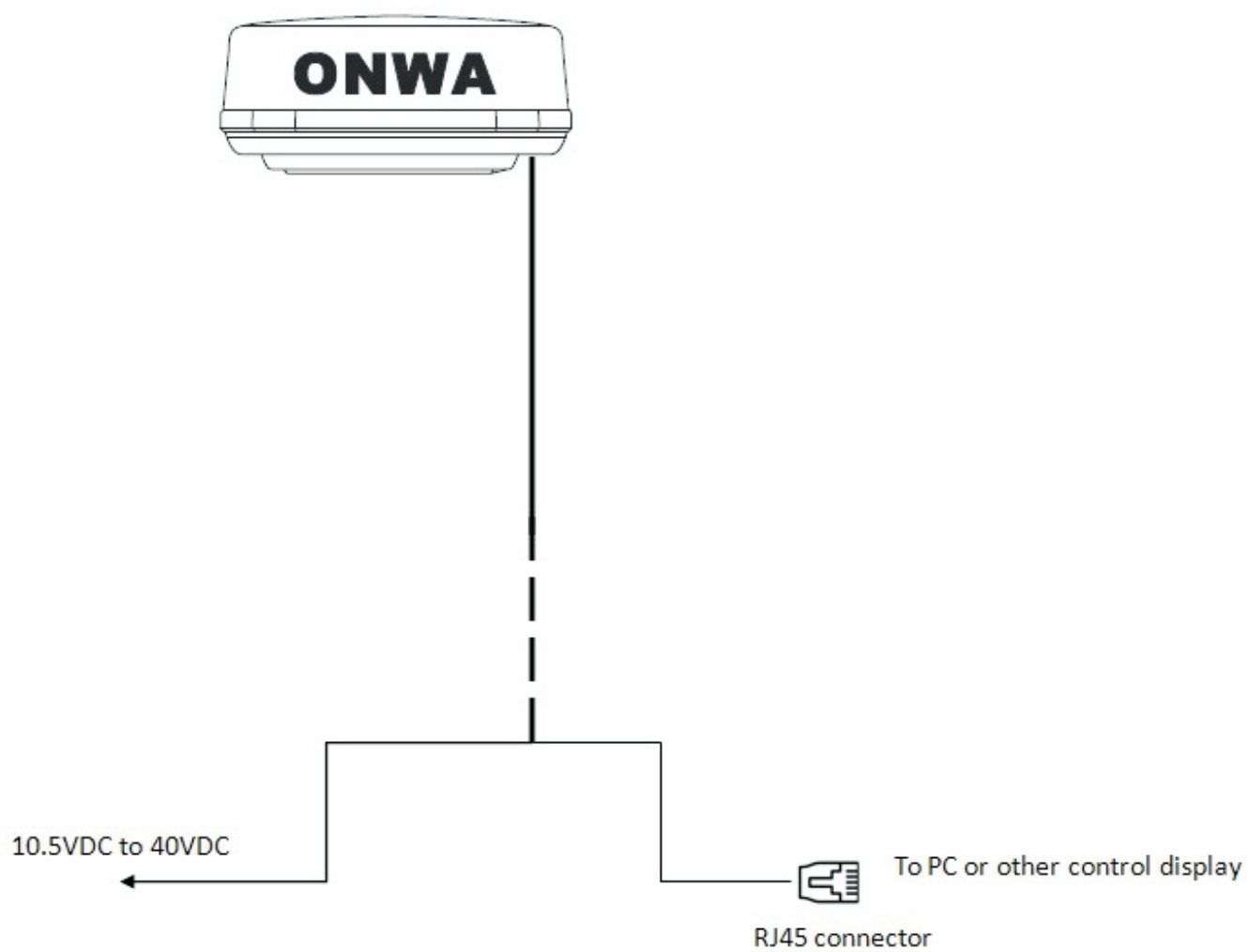


<sup>1</sup>For optimal WiFi connection, position your control display a minimum of 1.5m and a maximum of 20m from the KRA-1007W antenna. limiting as much as possible interference by metal barriers, walls and other WiFi or strong electronic transmissions.

<sup>2</sup>The KRA-1007W can also be connected to WiFi routers/extenders or control displays via optional ethernet cable with RJ45 connectors.

# CONNECTION OF KRA-1009

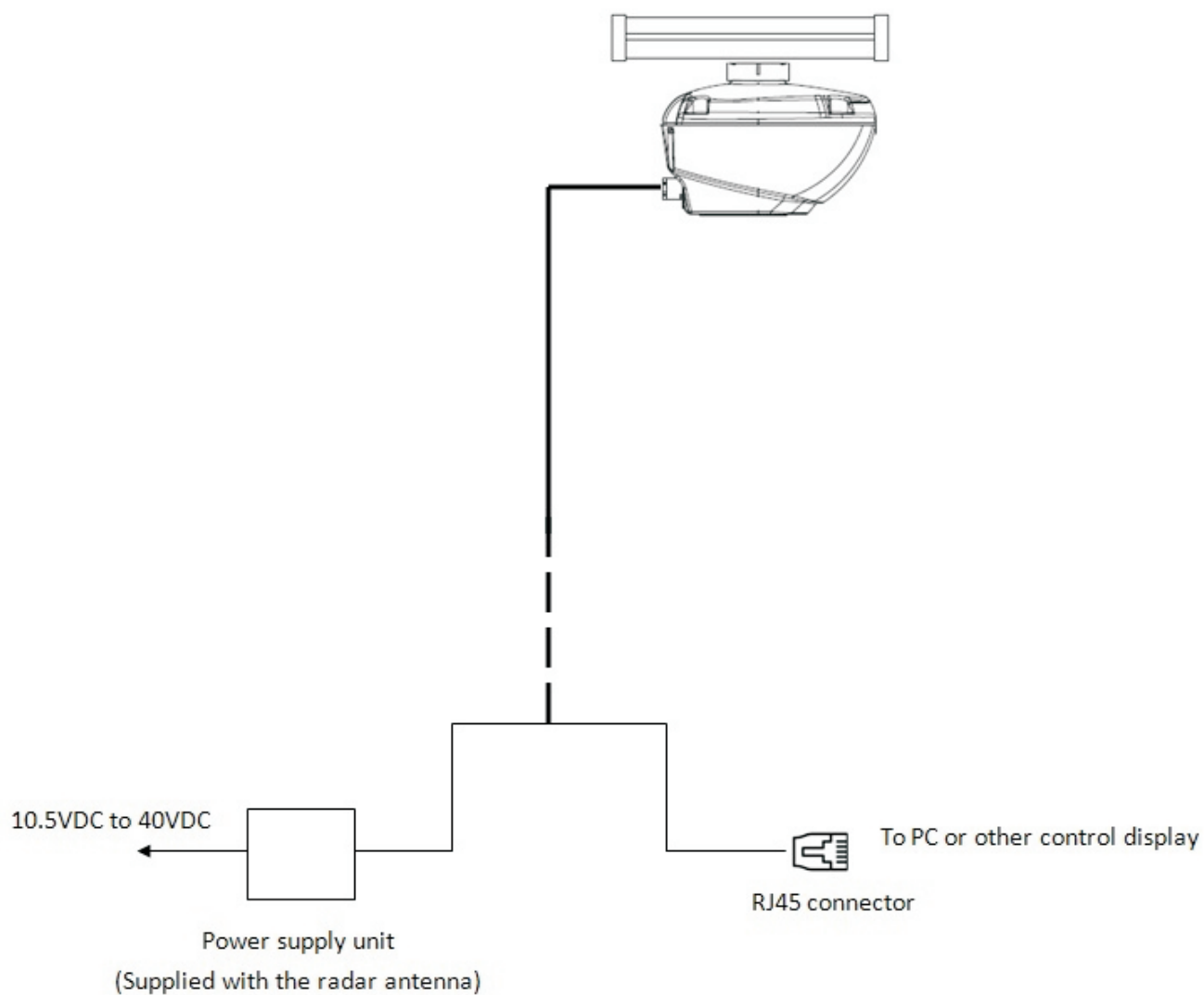
---





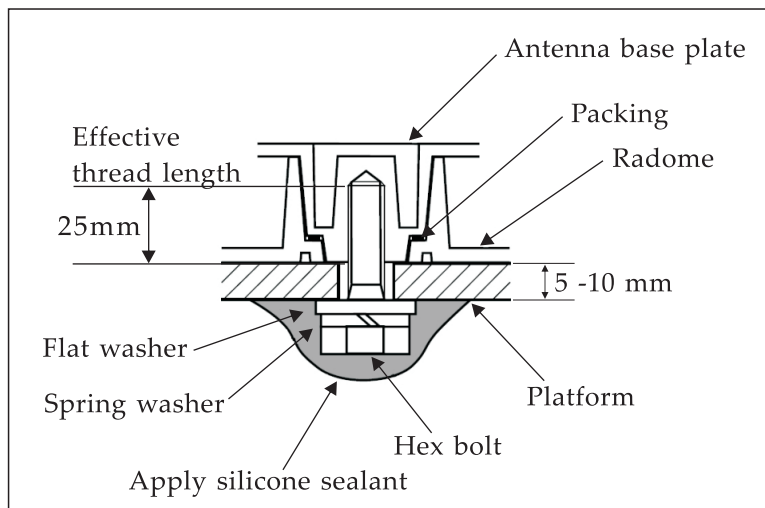
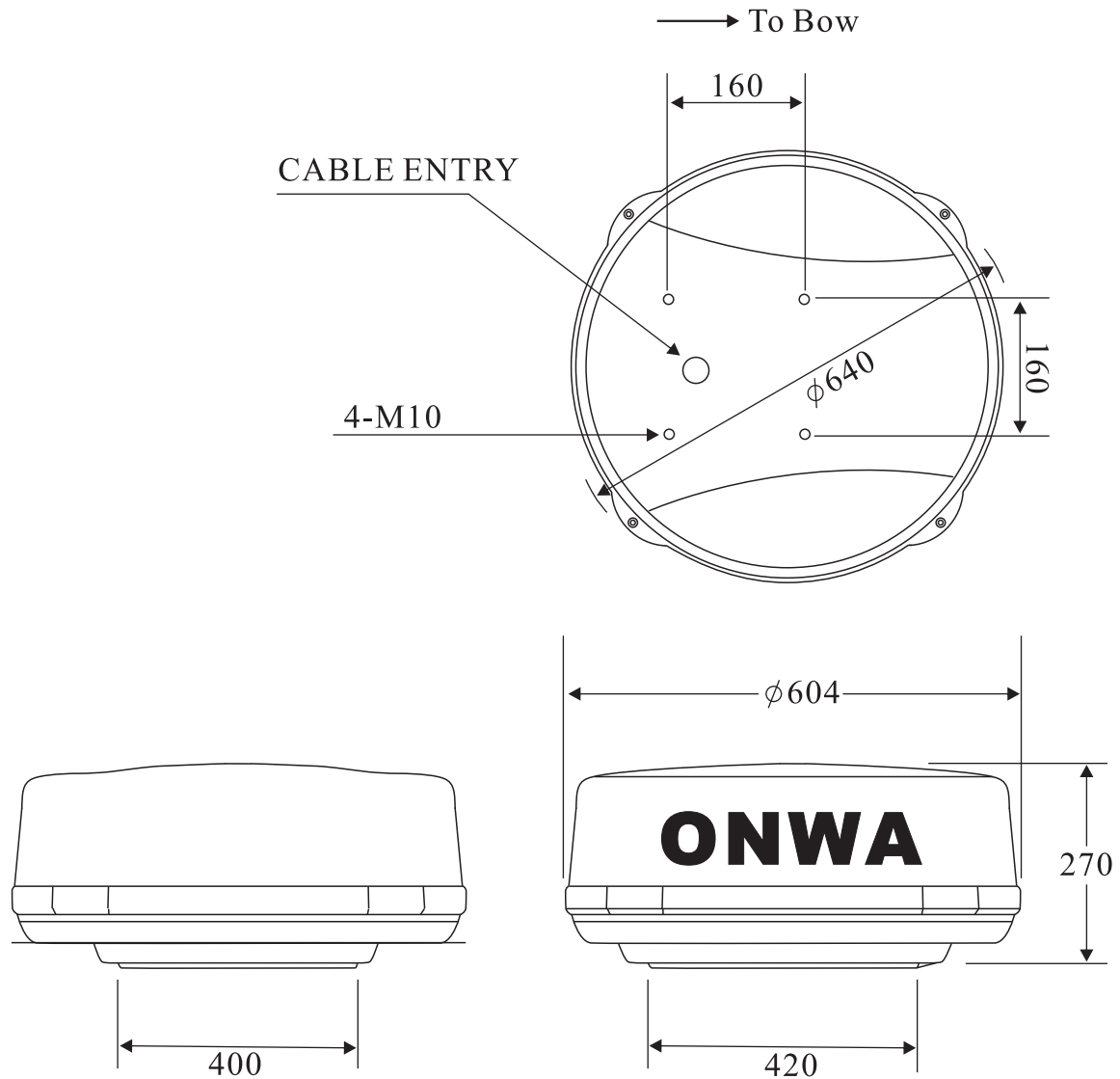
## CONNECTION OF KRA-4001\_N, KRA-3002\_N, KRA-5002\_N

---

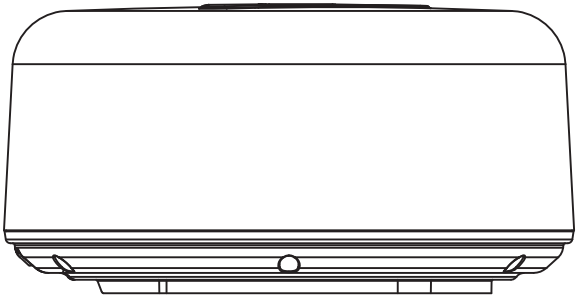
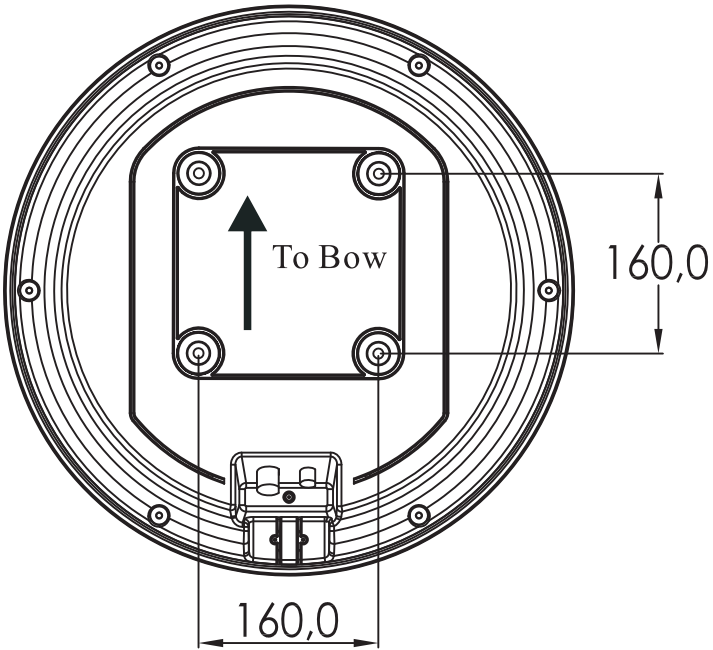
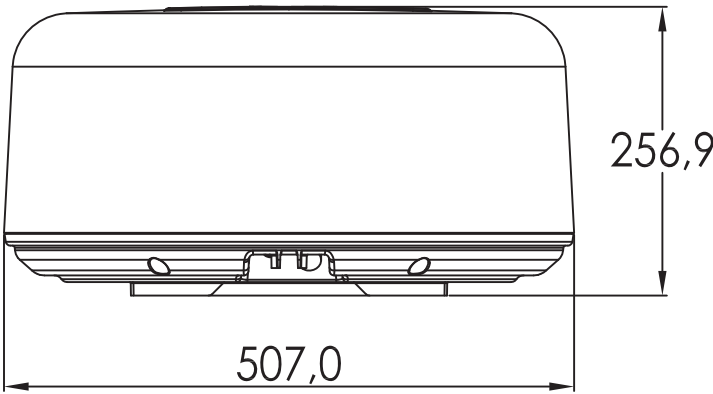


# 3.DRAWINGS AND DIMENSIONS

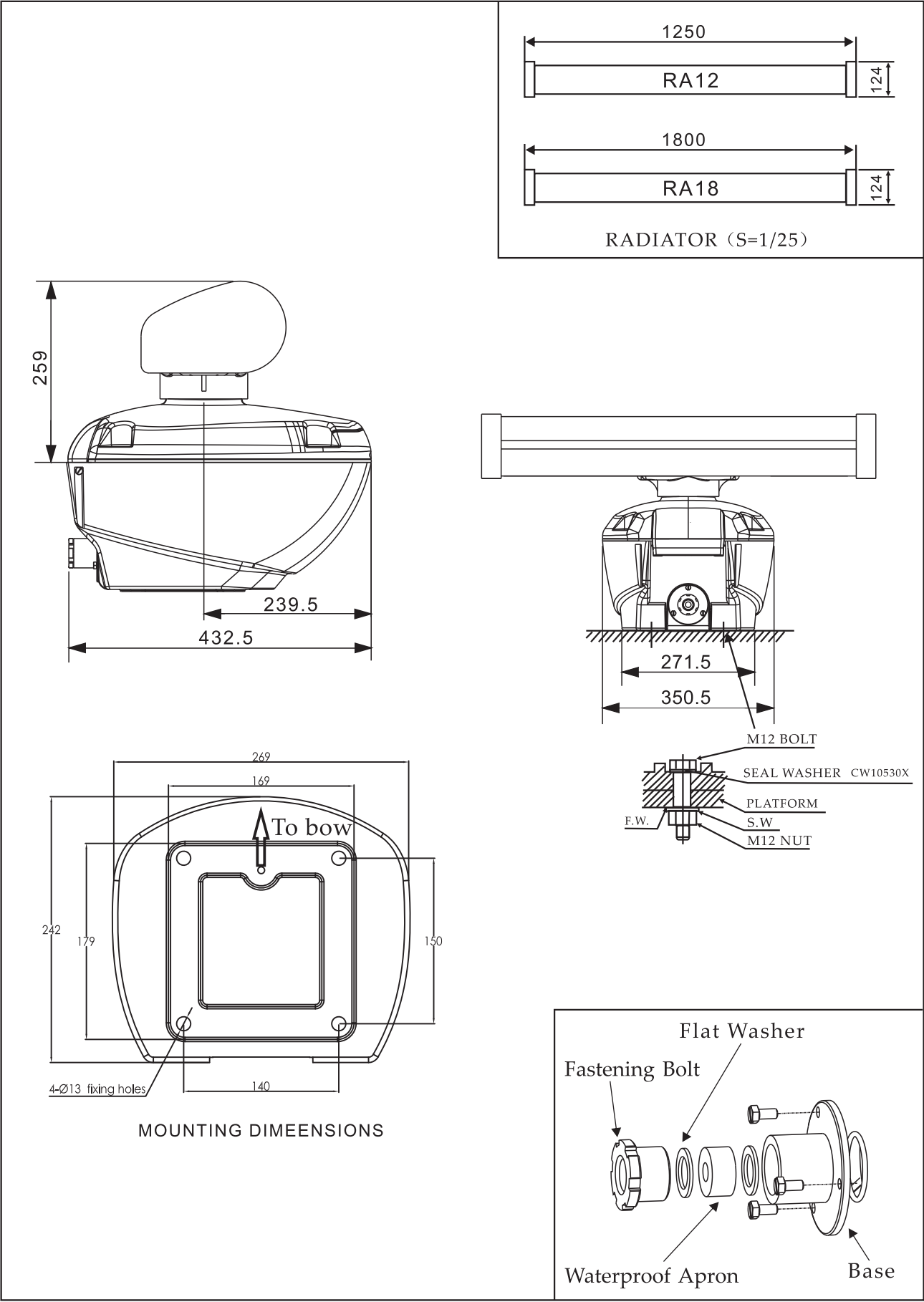
## 3.1 KRA-1006, KRA-1007\_N, KRA-1007W



3.2 KRA-1009



3.3 KRA-4001\_N, KRA-3002\_N



[illegible]