

# **GMR 404/406**

*marine radar*

*installation instructions*



Garmin International, Inc.  
1200 East 151<sup>st</sup> Street,  
Olathe, Kansas 66062, USA  
Tel. (913) 397.8200 or (800) 800.1020  
Fax (913) 397.8282

Garmin (Europe) Ltd.  
Unit 5, The Quadrangle,  
Abbey Park Industrial Estate,  
Romsey, SO51 9LR, UK  
Tel. +44 (0) 870.8501241 (outside the UK)  
0808 2380000 (within the UK)  
Fax +44 (0) 870.8501251

Garmin Corporation  
No. 68, Jangshu 2<sup>nd</sup> Road,  
Sijhih, Taipei County, Taiwan  
Tel. 886/2.2642.9199  
Fax 886/2.2642.9099

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## WELCOME

Thank you for choosing the Garmin GMR 404/406. These instructions help you assemble and install the GMR 404/406 radar. To install your Garmin chartplotter, consult the installation instructions packaged with the chartplotter.

### Product Registration

Help us better support you by completing our online registration today! Connect to our Web site at [www.garmin.com/registration/](http://www.garmin.com/registration/).

Use this area to record the serial number (8-digit number located on the back of the GMR 404/406 pedestal door, or on the product packaging) in case your GMR 404/406 needs service. Keep the original sales receipt, or a photocopy, in a safe place.

Serial Number: \_ \_ \_ \_ \_

### Contact Garmin

Contact Garmin if you have any questions while using your GMR 404/406. In the USA contact Garmin Product Support by phone: (913) 397-8200 or (800) 800-1020, Monday–Friday, 8 AM–5 PM Central Time; or go to [www.garmin.com/support/](http://www.garmin.com/support/), and click

#### Product Support.

In Europe, contact Garmin (Europe) Ltd. at +44 (0) 870.8501241 (outside the UK) or 0808 2380000 (within the UK).



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**NOTE:** The Garmin GMR 404/406 has no user-serviceable parts. If you encounter a problem with your unit, please take it to an authorized Garmin NMEA dealer or contact Garmin Product Support for repairs.

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### Packing List

Before installing and getting started with your unit, please check to see that your package includes the following items. **If any parts are missing, please contact your Garmin dealer immediately.**

#### Standard Package:

- GMR 404 or 406 radar pedestal and antenna
- Power/marine network cable
- Voltage Converter
- Hardware kit
- Installation manual

# INSTALLATION

## Installing the Scanner

The following section covers the assembly and installation of the GMR 404 or GMR 406 marine radar. The GMR 404 and 406 only operate with components of the Garmin Marine Network, and MFDs (multifunction displays). See your Garmin dealer or the Garmin Web site for more details. To complete the installation, you need the appropriate fasteners, tools, and mounts. These items should be available at most marine dealers. Always wear safety goggles, ear protection, and a dust mask when drilling, cutting, or sanding. When drilling or cutting, always check first to see what is on the other side of the surface. If you experience difficulty with the installation, contact Garmin Product Support or seek the assistance of a professional installer.



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**WARNING:** The selected radar mounting location must be able to hold the weight of the radar and any inertial forces.

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## Installation Guidelines

To maximize the performance of the radar, please observe the following installation guidelines:

- An ideal scanner mounting location is high above the ship's keel line with a minimal part of the vessel's structure or rigging blocking the radar beam. Obstructions in the path of the radar beam may cause blind and shadow sectors, or generate false echoes. The higher the installation position, the further the scanner can detect targets.
- Avoid mounting the scanner on the same level as smoke stacks, horizontal spreaders, or crosstrees on a mast. Do not install the scanner near heat sources where it may be subjected to smoke or hot air from smoke stacks or heat from lights.
- The mounting surface or platform should be sturdy enough to support the weight of the radar and any inertial forces, flat as possible, and parallel with the vessel's water line.
- It is recommended that the scanner be mounted out of range of personnel (horizontal beam width above head height). When the scanner is transmitting, do not look directly at the antenna at close range, because the eyes are the most sensitive part of the body to electromagnetic energy. When properly installed and operated, the use of this radar conforms to the requirements of ANSI/IEEE C95.1-1992 Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields.
- A "Compass Safe Distance" must be maintained between the compass and the scanner. The Compass Safe Distance is measured from the center point of the compass to the nearest point on the scanner.

Standard compass = 3.28 ft (1 m)

Standby Steering and Emergency compasses = 1.97 ft (0.6 m)

- Mount other electronics and cables more than 7 ft (2 m) from the path of a radar beam. A radar beam can normally be assumed to spread 25° vertically above and below the scanner's radiating element. For vessels with higher bow angles at cruise speed, it may be helpful to lower the angle so the beam points slightly downward to the waterline while at rest. Shims may be used as necessary.
- Install the scanner away from antennas or other electronics. GPS antennas should be either above or below the radar beam path of the scanner. Mount at least 3 ft (1 m) from any equipment transmitting or cables carrying radio signals, such as VHF radios, cables and antennas. In the case of SSB radios, the distance should be increased to 7 ft (2 m). IEC 60936-1 clause 3-27.1 states maximum distances from the antenna at which RF (radio frequency) levels can be expected.

GMR 404 (100W/m squared = 60" [151 cm]) (10W/m squared = 187" [475 cm])

GMR 406 (100W/m squared = 75" [189 cm]) (10W/m squared = 236" [598 cm])

- The scanner transmits electromagnetic energy. It is important that the radar is turned off or the DC power input is disconnected when personnel are required to come close to the scanner to perform work on the scanner assembly or associated equipment.

## Step 1

### Install the Mounting Studs and Seals:

1. Remove the hatch on the front of pedestal by loosening the screw and lifting the hatch off of the hinges as shown in Figure 1.
2. Using a 5 mm Allen wrench, install the M10 x 71 mounting studs (Figure 2) in the pedestal matching the hole pattern that was selected. Tighten the mounting studs until they bottom out in the pedestal. **DO NOT** overtighten the studs because this may cause damage to the pedestal. The mounting studs have a thread locking patch applied at the factory.  
OPTIONAL—Apply moisture inhibitive grease or paste to the four studs prior to installation.
3. Install the Seals onto the pedestal (Figure 3).

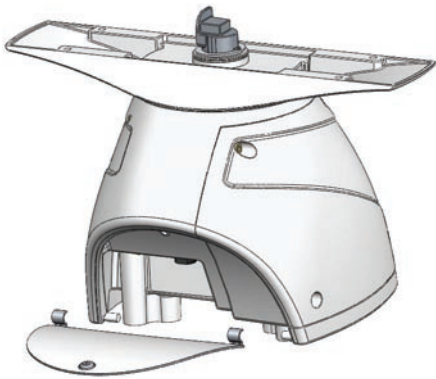


Figure 1

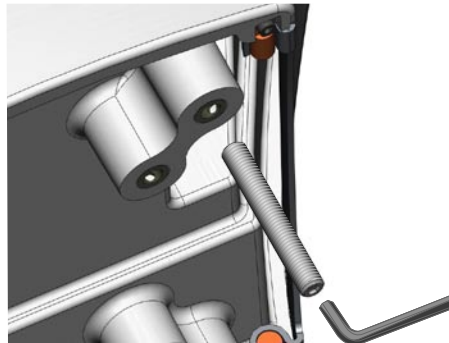


Figure 2

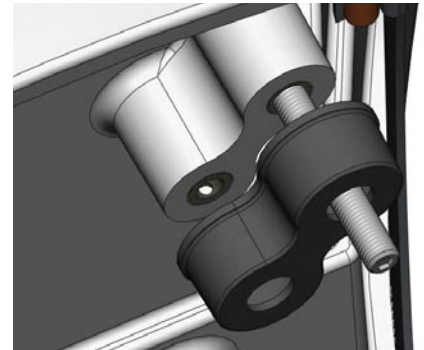


Figure 3

## Step 2

### Mount the Scanner

The scanner can be mounted with either end pointed toward the bow as long as it is mounted along the Bow-Stern Axis line indicated on the Mounting Template. If the end with the hatch is pointed toward the bow, the Bearing Offset in the chartplotter must be set to 180° (Figure 4).

#### To mount the scanner:

1. Determine a suitable mounting location and tape the Mounting Template in place. The Mounting Template has two hole patterns Option A and Option B. Determine which pattern fits your mount or better suits your mounting location. Using a Center Punch, indent the center of each mounting hole. Using a 13 mm (1/2") bit, drill the four mounting holes. (This step is not necessary if you are using a pre-drilled Garmin compatible Furuno® or Raymarine® mount).
2. Hoist the scanner into position using the supplied strap. Position the strap over the ends of the antenna mount as shown in Figure 5. Make sure that the strap is positioned as close to the scanner as possible.
3. Fasten the scanner to the mounting surface using the M10 hex nuts, spring washers, and flat washers in the order shown in Figure 6. **The M10 nuts should be torqued to 130 in.lbs (11 ft.lbs) (1.5 kgf.m).**

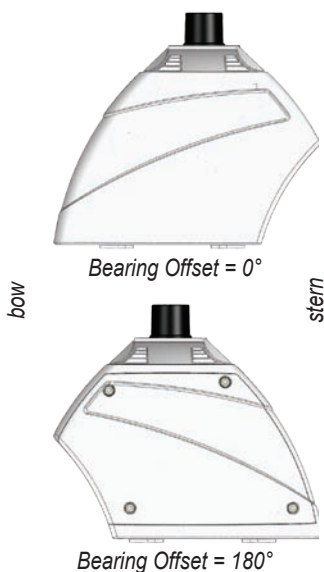


Figure 4

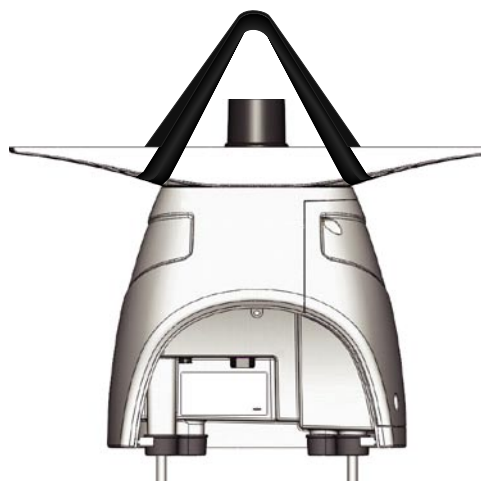


Figure 5

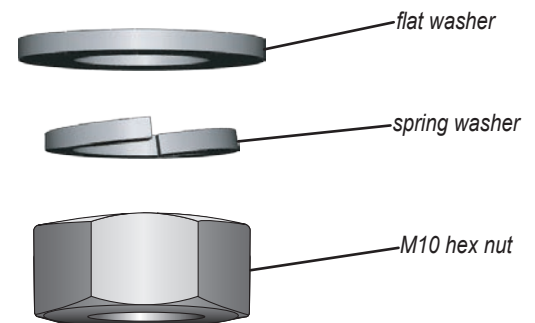
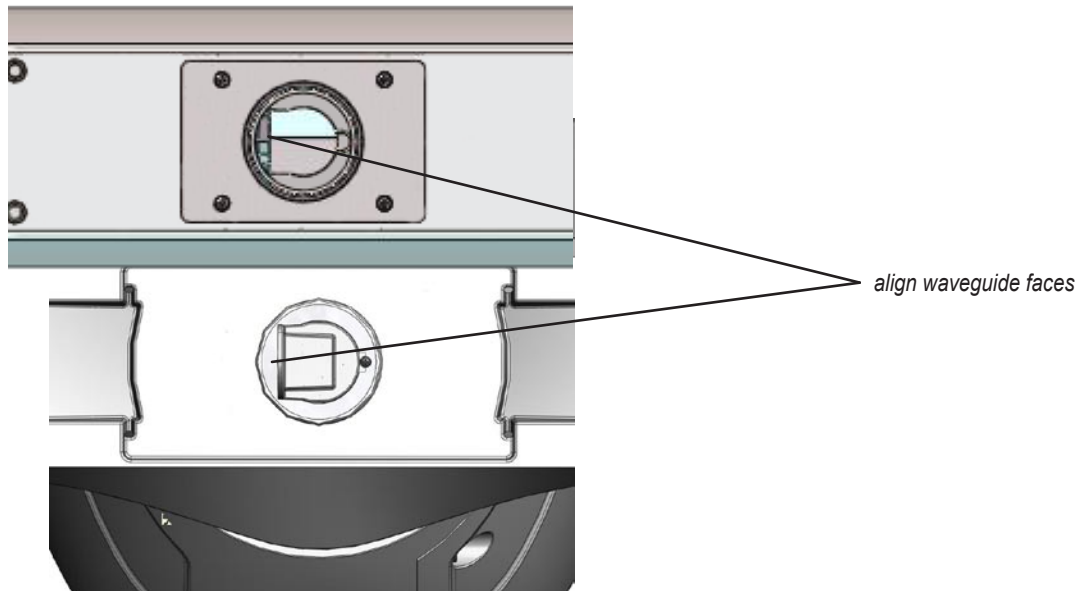


Figure 6

### Step 3

#### Mount the Antenna:

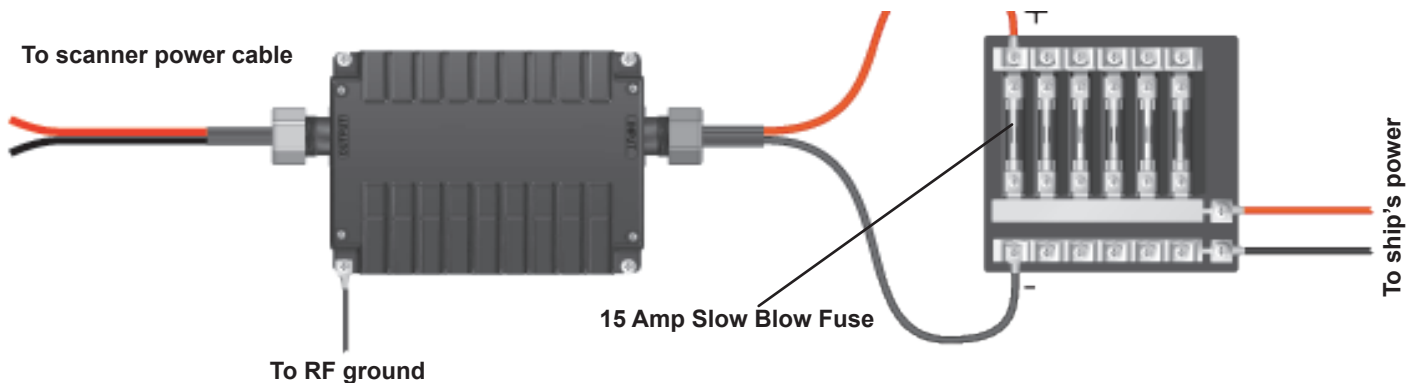
1. Remove the protective cover from the pedestal wave guide.
2. Verify that the antenna wave guide is aligned with the pedestal wave guide and slide the antenna onto the pedestal.
3. Secure the antenna to the pedestal using the 8 mm hex bolts and spring washers. **The 8 mm bolts should be torqued to 70 in.lbs (6 ft.lbs) (.81 kgf.m).**



### Step 4

#### Install the Voltage Converter Unit

The voltage converter requires an input voltage of 10-40VDC and provides an output of 36 VDC. The converter must be fused using a 15 Amp slow-blow fuse. It is recommended that voltage converter be installed as close as possible to the selected power source. If the input wires need to be extended, follow the recommendations in Figure 7. If the wires are extended, use the supplied heat shrink butt connectors. After the connector is crimped, heat the connector to shrink it for a water resistant fit. For optimal performance, the voltage converter housing should be connected to the vessel's RF ground.



| Distance             | Gauge  |
|----------------------|--------|
| 3 meters (9.8 ft)    | 12 AWG |
| 5 meters (16.4 ft)   | 10 AWG |
| 6.5 meters (21.3 ft) | 9 AWG  |
| 8 meters (26.2 ft)   | 8 AWG  |

Figure 7  
Wire Gauge Table

## Step 4

### Install the Cable Assembly

Route the cable as needed, depending on the type of mount you are using. **DO NOT** cut the cable! It may be necessary to drill a 31.7 mm (1.25") hole for routing the power/network cable. Garmin provides a rubber cable grommet that can be used to cover the cable installation hole. The grommet does **NOT** provide a waterproof seal. To waterproof the grommet, apply a marine sealant. You can purchase additional cable grommets through Garmin or a Garmin dealer.

When installing the power/network cable, observe the following:

- To ensure safety, use the appropriate tie-wraps, fasteners, and sealant to secure the cable along a route and through any bulkhead or deck. Avoid running the cable near moving objects, high-heat sources, or through doorways and bilges.
- Avoid installing the cable next to or parallel to other cables, such as radio antenna lines, or power cables. This is essential to avoid interference to or from other equipment. If this is not possible, shield the cable with metal conduit or a form of EMI shielding.

#### To install the cable assembly:

1. Align the notch and locking ring on the power cable to the power connector. Press the 2-pin power cable to the power connector and the RJ-45 marine network cable to the RJ-45 socket. Turn the power cable locking ring clockwise until it stops. Tighten the RJ-45 locking ring clockwise until it is firmly sealed. (Figure 8)
2. The power/network cable can be routed through the front of the scanner (Figure 9), or through a hole drilled through the mounting surface (Figure 10). Avoid excessive bending or twisting of the cable.
3. Re-install the hatch on the front of the scanner.

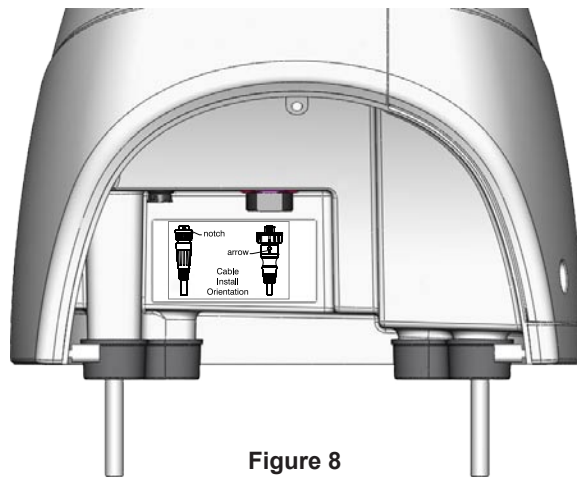


Figure 8

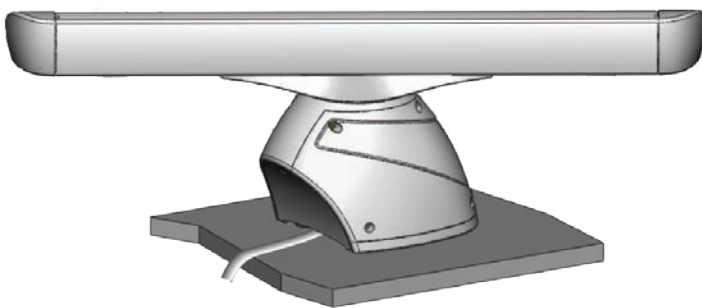


Figure 9

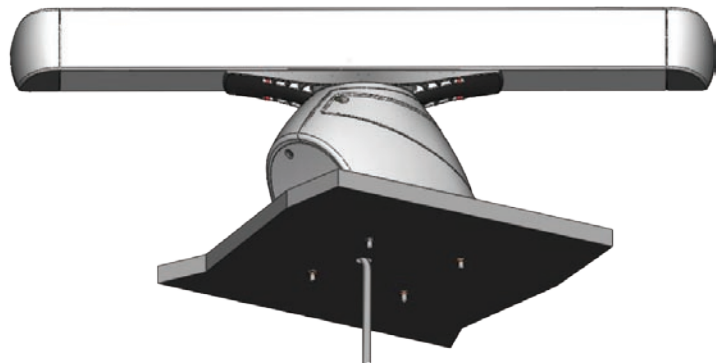


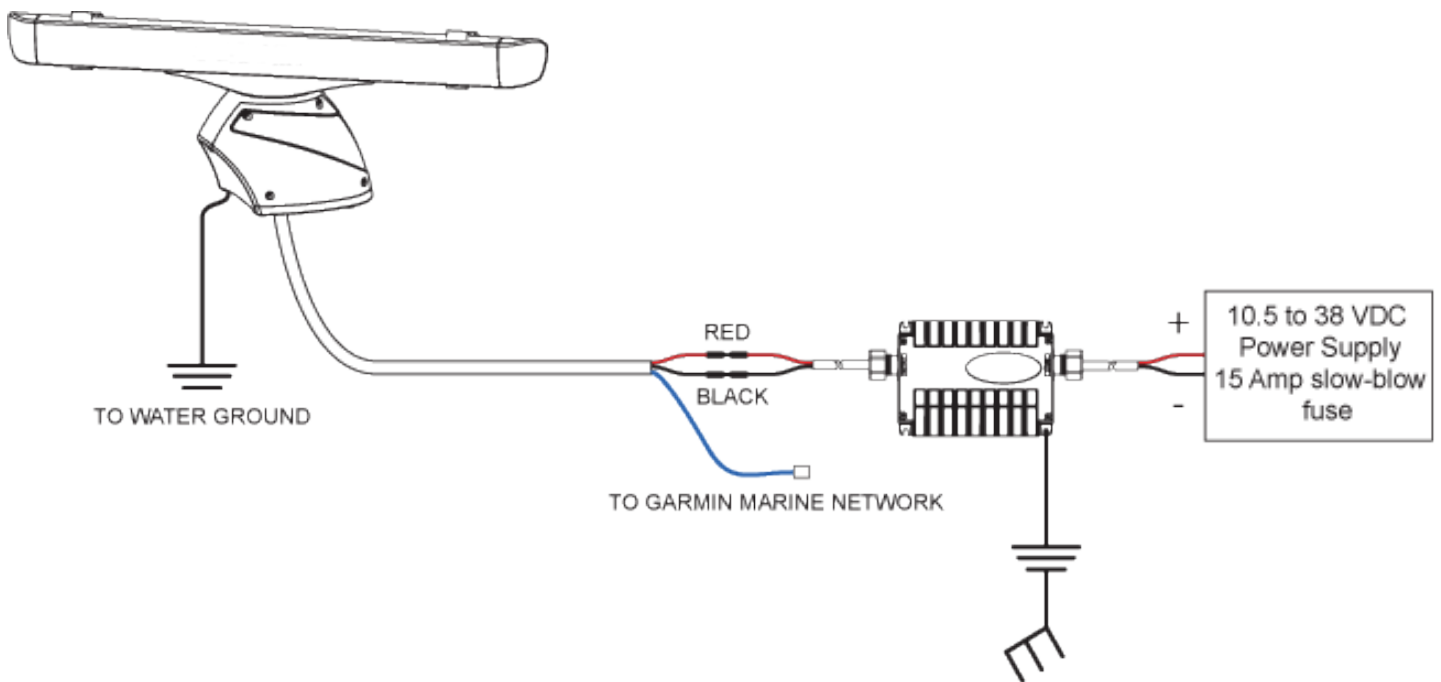
Figure 10

## Step 5

### Connecting the scanner

Connect the scanner power cable (Red and Black) to Voltage Converter output cable (Red and Black) using the supplied heat-shrink crimp connectors. DO NOT cut the scanner cable and DO NOT remove the in-line fuse located on the scanner power cable. After crimping the connections, heat the connectors to shrink the housing for a water resistant fit.

Connect the scanner to the vessel's water ground using an 8 gauge copper cable. The scanner connection should be made on one of the four mounting studs using a M10 nut and flat washer to secure the cable.



Wiring Diagram

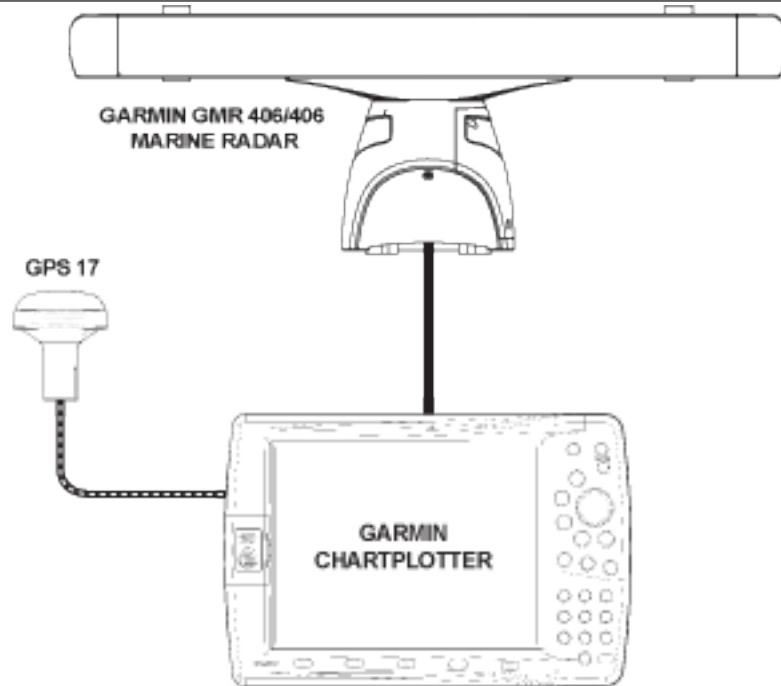


## Step 6

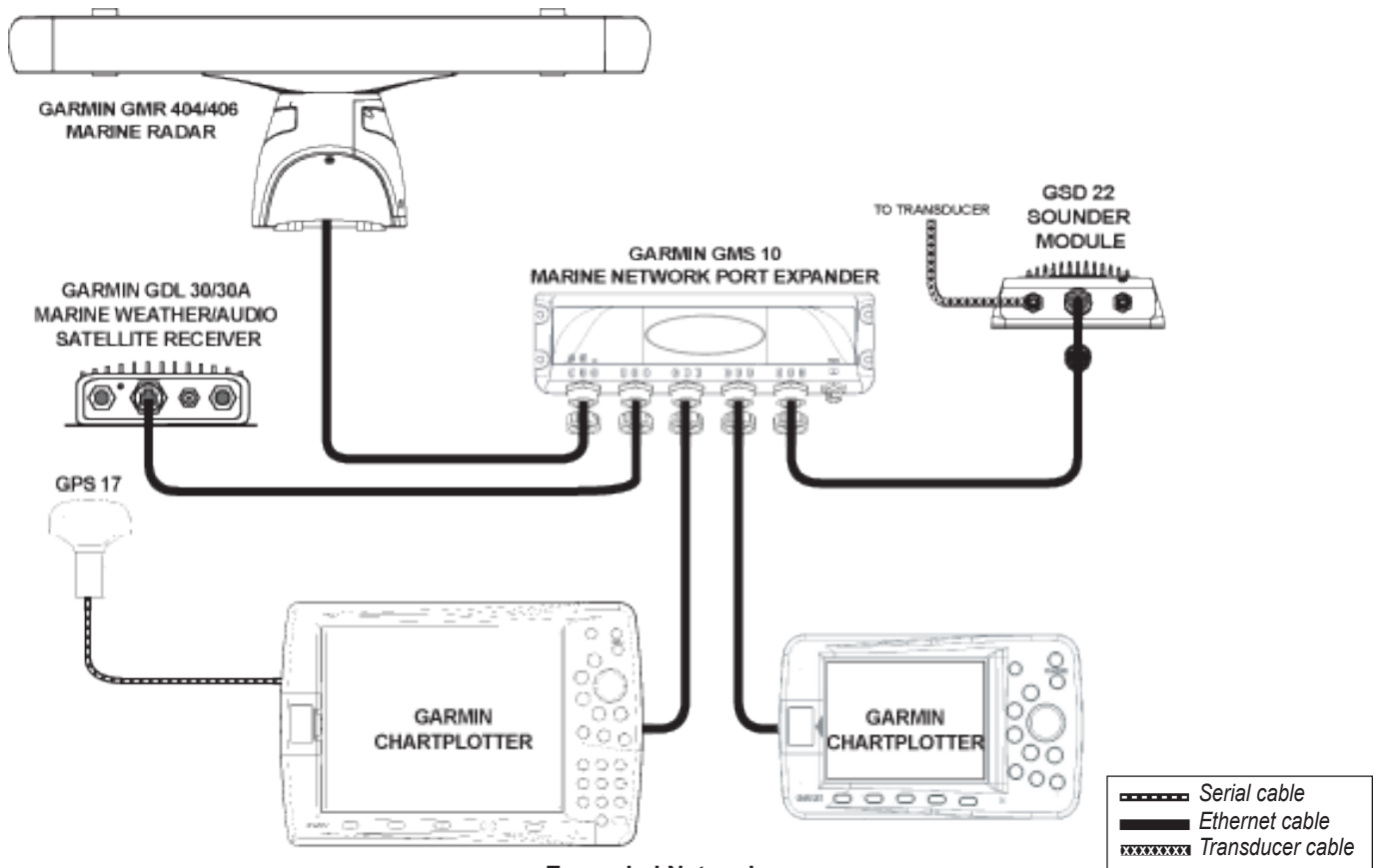
### Connection the network:

For a stand-alone network (chartplotter and radar only), attach the RJ-45 marine network cable to the RJ-45 socket on the back of the chartplotter. For an expanded network (chartplotter, radar, GMS 10), attach the RJ-45 marine network cable to an open RJ-45 socket on the GMS 10 network power expander. Tighten the RJ-45 locking ring clockwise until it is firmly sealed.

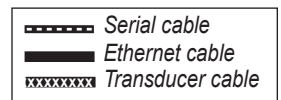
**NOTE:** Each component of the expanded network must be installed according to its installation instructions. These diagrams only show how a GMR 404/406 radar interacts with a network and do not show proper wiring for other network components.



Stand Alone Network



Expanded Network



## Radar Setup

To take advantage of the GMR 404/406 features, the Garmin Marine Network may require a software update. A software update card is provided in the Marine Data Management Kit.

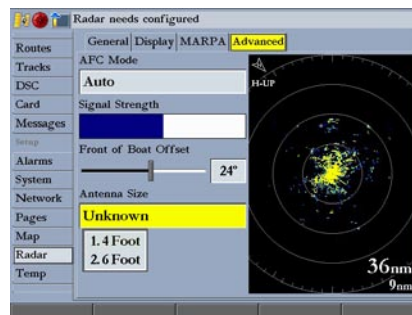
The newly installed GMR 404 or 406 will not transmit until the radar is properly configured. Follow the instructions below to properly configure the radar.

### Turn on the Garmin Marine Network:

1. Press the **Power** key on the chartplotter. The scanner turns on with the network. The Welcome Page appears showing that a GMR 404/406 is detected as a network connection.
2. When the **I Agree** button turns yellow, press the **ENTER** key.

### Configure the Radar:

1. From the Map Page, press **QUIT** to clear the message "Radar Needs Configured" and show the Radar Setup Page.
2. Using the **ROCKER**, highlight the **Advanced** tab, then the **Antenna Size** field, and press **ENTER**.
3. Select the correct antenna size, **4 foot** or **6 foot**, and press **ENTER**.
4. When prompted, press and hold **FCTN** to begin radar transmission. Before beginning radar transmission, verify that the area around the scanner is clear. Microwave energy can be harmful to humans and animals. While the radar is transmitting, avoid looking directly at the scanner. The eyes are the most sensitive part of the body to microwave radiation.



Select Antenna Size

### Front of Boat Offset

Depending on the scanner installation, it may be necessary to adjust the Front of Boat Offset. If the scanner installation requires a 180° offset, change the Front of Boat Offset to 180° and test the radar. If the Front of Boat Offset needs further adjustment, continue with the procedure below.

Using a magnetic compass, take an optical bearing of a stationary target located within viewable range. Measure the target bearing on the radar. If the bearing deviation is more than +/- 1°, then do the following to correct the Front of Boat Offset.

#### To change the Front of Boat Offset:

1. From the Radar Page, press the **ADJ** key to display the Adjustment Menu.
2. From the Adjustment Menu, select **Setup**, and press **ENTER**. Using the **Rocker**, select the **Advanced** tab.
3. Using the **ROCKER**, highlight the **Front of Boat Offset** slider, and press **ENTER**.
4. Press left on the **Rocker** to adjust to a negative value, or press right to adjust to a positive value. The preview window changes as you adjust the slider.
5. After an offset is determined, press **ENTER** to save, and press **QUIT** to return to the Radar Page. Your new Garmin Marine Radar is now ready to use! Refer to your chartplotter's *Owner's Manual* for details about operating the radar.

### Stopping the Radar

When you enter standby mode, the antenna will stop spinning, but the magnetron will remain charged. This means that the Radar can be quickly turned on again without having to warm up.

#### To place the GMR 404/406 in Standby mode:

1. From any page, press and hold the **FCTN** key.
2. Using the **ROCKER**, highlight **Yes** and press **ENTER**.



**NOTE:** When the radar is placed into standby mode, the GMR 404/406 antenna will reduce its spinning speed for approximately 15 seconds, then stop perpendicular to the length of the boat, or as defined by the Front of Boat Offset.

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## Specifications

### **4 ft Open-Array Antenna:**

|                       |   |
|-----------------------|---|
| Type:                 | End fed slotted waveguide   |
| Horizontal Beamwidth: | 1.8 degrees   |
| Horizontal Sidelobes: | -23 dB within $\pm 10$ deg of main<br>-30 dB outside $\pm 10$ deg of main |
| Vertical Beamwidth:   | 24 degrees  |
| Antenna Gain:         | 29 dBi  |
| Polarization:         | Horizontal  |
| Input Return Loss     | Better than -20 dB  |
| Weight                | 12 lbs (5.4 kg)   |

### **6 ft Open-Array Antenna:**

|                       |   |
|-----------------------|---|
| Type:                 | End fed slotted waveguide   |
| Horizontal Beamwidth: | 1.1 degrees   |
| Horizontal Sidelobes: | -25 dB within $\pm 10$ deg of main<br>-30 dB outside $\pm 10$ deg of main |
| Vertical Beamwidth:   | 24 degrees  |
| Antenna Gain:         | 30 dBi  |
| Polarization:         | Horizontal  |
| Input Return Loss:    | Better than -20 dB  |
| Weight:               | 16 lbs (7.3 kg)   |

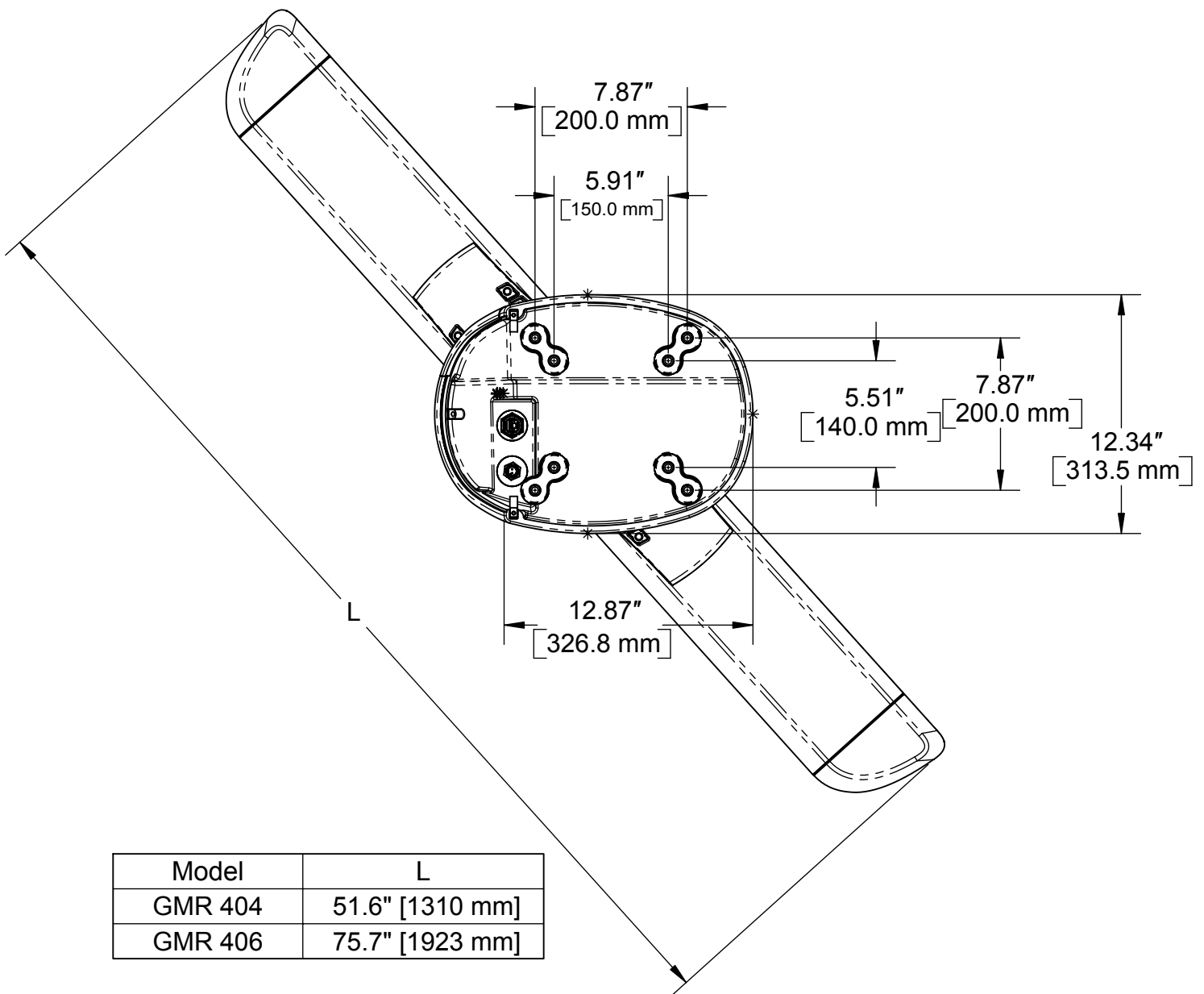
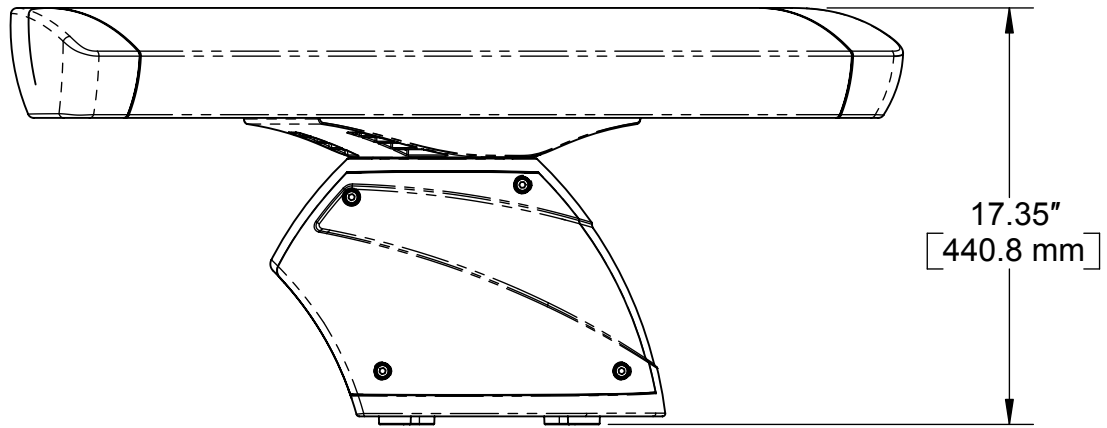
### **Open-Array Scanner**

|                                     |  |
|-------------------------------------|--|
| Transmit Power:                     | 4 kW   |
| Transmitter Frequency:              | 9410 $\pm 30$ MHz  |
| Input Voltage:                      | 10.5 – 38 VDC  |
| Typical Input Power:                | 45 W   |
| Input Power (100 kts wind):         | 130 W maximum  |
| Range/Pulse Width/PRF (nm/nsec/Hz): | 0.125/65/2304<br>0.250/65/2304<br>0.500/80/2304<br>0.750/200/1152<br>1.0/250/1152<br>1.5/500/576<br>2.0/500/576<br>3.0/800/576<br>4.0/800/576<br>6.0 – 24/1000/576<br>36 – 72/1000/288 |

|                        |  |
|------------------------|--|
| Antenna Rotation:      | 24 rpm and 48 rpm  |
| Maximum wind load:     | 100 kts  |
| Receiver Noise Figure: | Less than 4 dB   |
| Environmental:         | Temp: 14 to 140° F (-10 to +60° C)<br>Humidity: 95% @ 95 °F (35 °C)<br>Rel Wind: 100 kts<br>Waterproof to IEC 60529 IPX6 |
| Range:                 | 65.5 ft (20 m) minimum, 72 nm max  |
| Range discrimination:  | 65.5 ft (20 m)   |
| Radar interference:    | Anti-jamming algorithm   |
| Clutter suppression:   | Sea Clutter<br>Rain Clutter<br>FTC   |
| Weight:                | 42 lbs (19 kg)   |
| Dimensions:            | 17" x 11" x 16" (43.2 x 28 x 40.6 cm)  |
| Cable:                 | 49.21' (15 m) long<br>8.4 lbs (3.8 kg)   |

### ***Radar Display Features***

|                      |   |
|----------------------|---|
| Presentation Modes:  | North up, Course up, Heading up   |
| VRM/EBL:             | 2 user adjustable, capable of floating  |
| Bearing Accuracy:    | 1 degree  |
| Controls:            | Auto & Manual Gain Adjust; Manual or Auto (AFC) receiver tuning;<br>Manual adjust for Rain Clutter and 3 presets for Sea Clutter; FTC presets |
| Radar/Chart Overlay: | Overlay mode is supported. Also has split overlay with standard radar presentation  |
| Zoom Mode:           | 2x, 4x  |
| Trails (Wakes):      | Short, Medium, Long   |
| Guard Zone Alarm:    | 2 guard zones – user adjustable   |
| Off center Function: | Look ahead, Auto Shift and Manual   |
| Antenna RPM          | Selectable to 24 or 48 rpm  |
| MARPA:               | Tracks up to 10 MARPA targets for radar plotting and collision avoidance<br>(Heading sensor is required)                                      |



| Model   | L               |
|---------|-----------------|
| GMR 404 | 51.6" [1310 mm] |
| GMR 406 | 75.7" [1923 mm] |



## Warnings and Important Information

**Failure to avoid the following potentially hazardous situations could result in an accident or collision resulting in death or serious injury.**

- Use this unit only as a navigational aid. Do not attempt to use the unit for any purpose requiring precise measurement of direction, distance, location, or topography.
- The radar scanner transmits electromagnetic energy. Ensure that the scanner has been installed according to the recommendations given in this guide, and that all personnel are clear of the scanner before switching to transmit mode.
- For protection from lightning, this installation must conform to NFPA code, section 302. The installation of a lightning protective mast is recommended, and the scanner must be connected to water ground using an 8 gauge copper cable.

**WARNING:** This product, its packaging, and its components contain chemicals known to the State of California to cause cancer, birth defects, or reproductive harm. This Notice is provided in accordance with California's Proposition 65. See [www.garmin.com/prop65](http://www.garmin.com/prop65) for more information.

**CAUTION:** Use the GMR 404/406 at your own risk. To reduce the risk of unsafe operation, carefully review and understand all aspects of this Installation Manual, and thoroughly practice operation using the simulator mode prior to actual use. When in actual use, carefully compare indications from the GMR 404/406 to all available navigation sources, including the information from other NAVAIDs, visual sightings, charts, etc. For safety, always resolve any discrepancies before continuing navigation.

### FCC Compliance

The GMR 404/406 complies with Part 80 of the FCC rules. It has received a grant of equipment authorization, issued under the authority of the FCC.

This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one of the following measures:



- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and the receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help..

This product does not contain any user-serviceable parts. Repairs should only be made by an authorized Garmin service center. Unauthorized repairs or modifications could result in permanent damage to the equipment, and void your warranty and your authority to operate this device under Part 15 regulations.

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## Software License Agreement

BY USING THE GMR 404/406, YOU AGREE TO BE BOUND BY THE TERMS AND CONDITIONS OF THE FOLLOWING SOFTWARE LICENSE AGREEMENT. PLEASE READ THIS AGREEMENT CAREFULLY.

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## Limited Warranty

All Garmin marine radomes and open array scanners are warranted to be free from defects in materials or workmanship for two years from the date of purchase. Within this period, Garmin will, at its sole option, repair or replace any components that fail in normal use. Such repairs or replacement will be made at no charge to the customer for parts or labor, provided that the customer shall be responsible for any transportation cost. This warranty does not cover failures due to abuse, misuse, accident, or unauthorized alteration or repairs.

THE WARRANTIES AND REMEDIES CONTAINED HEREIN ARE EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES EXPRESS, IMPLIED, OR STATUTORY, INCLUDING ANY LIABILITY ARISING UNDER ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, STATUTORY OR OTHERWISE. THIS WARRANTY GIVES YOU SPECIFIC LEGAL RIGHTS, WHICH MAY VARY FROM STATE TO STATE.

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To obtain warranty service, contact your local Garmin authorized dealer or call Garmin Product Support for shipping instructions and an RMA tracking number. Securely pack the unit and a copy of the original sales receipt, which is required as the proof of purchase for warranty repairs. Write the tracking number clearly on the outside of the package. Send the unit, freight charges prepaid, to any Garmin warranty service station.

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Garmin International, Inc.  
1200 East 151<sup>st</sup> Street,  
Olathe, Kansas 66062, USA  
Tel. (913) 397.8200 or (800) 800.1020  
Fax (913) 397.8282

Garmin (Europe) Ltd.  
Unit 5, The Quadrangle,  
Abbey Park Industrial Estate,  
Romsey, SO51 9LR, UK  
Tel. +44 (0) 870.8501241 (outside the UK)  
0808 2380000 (within the UK)  
Fax +44 (0) 870.8501251

Garmin Corporation  
No. 68, Jangshu 2<sup>nd</sup> Road,  
Sijhih, Taipei County, Taiwan  
Tel. 886/2.2642.9199  
Fax 886/2.2642.9099





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1200 East 151<sup>st</sup> Street, Olathe, Kansas 66062, USA

Garmin (Europe) Ltd.  
Unit 5, The Quadrangle, Abbey Park Industrial Estate, Romsey, SO51 9RL, UK

Garmin Corporation  
No. 68, Jangshu 2<sup>nd</sup> Road, Sijhih, Taipei County, Taiwan

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