



Series Installation Instructions

To obtain the best performance and to avoid damage to your boat, install the device according to these instructions.

Read all installation instructions before proceeding with the installation. If you experience difficulty during the installation, contact Garmin® Product Support.

Important Safety Information

WARNING

See the *Important Safety and Product Information* guide in the product box for product warnings and other important information.

The radar transmits electromagnetic energy. Ensure that the radar is installed according to the recommendations in these instructions and that all personnel are clear of the path of the radar beam before transmitting. 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.

When the radar is transmitting, do not look directly at the antenna at close range; eyes are the most sensitive part of the body to electromagnetic energy.

When connecting the power cable, do not remove the in-line fuse holder. To prevent the possibility of injury or product damage caused by fire or overheating, the appropriate fuse must be in place as indicated in the product specifications. In addition, connecting the power cable without the appropriate fuse in place will void the product warranty.

CAUTION

This device should be used only as a navigational aid. Do not attempt to use the device for any purpose requiring precise measurement of direction, distance, location, or topography.

Always wear safety goggles, ear protection, and a dust mask when drilling, cutting, or sanding.

NOTICE

When drilling or cutting, always check what is on the opposite side of the surface.

Registering Your Device

Help us better support you by completing our online registration today.

- Go to <http://my.garmin.com>.
- Keep the original sales receipt, or a photocopy, in a safe place.

Contacting Garmin Product Support

- Go to www.garmin.com/support and click **Contact Support** for in-country support information.
- In the USA, call (913) 397.8200 or (800) 800.1020.
- In the UK, call 0808 2380000.
- In Europe, call +44 (0) 870.8501241.

Tools Needed

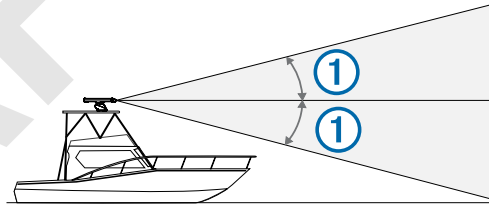
- #2 Phillips screwdriver
- 5 mm hex wrench
- Drill and 15.0 mm ($19/32$ in.) drill bit

- 17 mm ($2^{1}/_{32}$ in.) wrench and torque wrench
- A length of 3.31 mm² (12 AWG) copper wire to ground the radar housing (and voltage converter, if applicable).
- Marine sealant

Mounting Considerations

When selecting a mounting location, observe these considerations.

- It is highly recommended that the device is mounted out of range of people, with the vertical beam width above head height. To avoid exposure to harmful radio frequency (RF) levels, the device should not be mounted closer to people than the maximum safe distance value listed in the product specifications.
- The device should be mounted high above the ship's keel line with minimal blockage of the radar beam. Obstructions may cause blind and shadow sectors, or generate false echoes. The higher the installation position, the farther the radar can detect targets.
- The device should be mounted on a flat surface or a platform that is parallel to the vessel's water line and is sturdy enough to support the device's weight. The weight for each model is listed in the product specifications.
- The radar beam spreads vertically 11.5° above and 11.5° below ① the radar's radiating element. On vessels with higher bow angles at cruise speed, the installation angle can be lowered to point the beam slightly downward to the waterline while at rest. Shims can be used if necessary.



- The device should be mounted away from heat sources, such as smoke stacks and lights.
- The device should be mounted at a different level than horizontal spreaders and mast crosstrees.
- To avoid interference with a magnetic compass, the device should not be mounted closer to a compass than the compass-safe distance value listed in the product specifications.
- Other electronics and cables should be mounted more than 2 m (6.5 ft.) from the radar beam path.
- GPS antennas should be either above or below the radar beam path.
- The device should be mounted at least 1 m (40 in.) from any transmitting equipment.
- The device should be mounted at least 1 m (40 in.) away from cables carrying radio signals such as VHF radios, cables, and antennas.
- The device should be mounted at least 2 m (6.5 ft.) away from Single Side Band (SSB) radios.

Preparing the Surface and the Radar for Mounting

Before you can mount the radar, you must choose a suitable mounting location ([Mounting Considerations](#)).

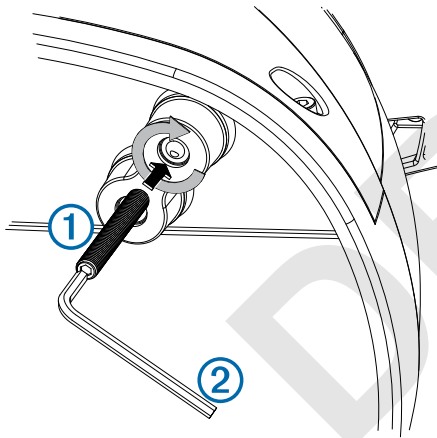
1 Select an option:

- If you are using a pre-drilled Garmin compatible Furuno® or Raymarine® mount, proceed to step 3.

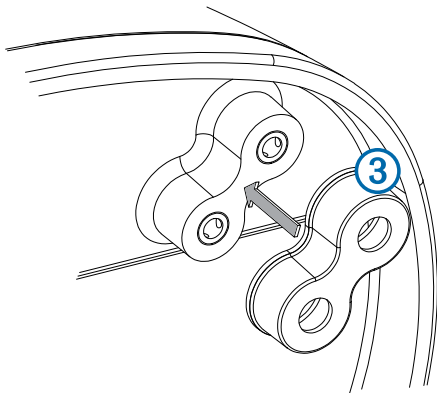
- Secure the included mounting template to the surface at the chosen mounting location, along the bow-stern axis as indicated on the template.
- 2 Determine which of the two mounting-hole patterns indicated on the template are appropriate for the mounting surface and drill the four mounting holes using a 15 mm (19/32 in.) drill bit.
 - 3 Remove the hatch on the front of the unit by loosening the screw and lifting it off of the hinges.

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- 4 Apply the included Petrolatum Primer to one half of the threads of the four threaded rods.
- 5 Insert the ends of the threaded rods coated in Petrolatum Primer into the unit base, matching the hole pattern chosen in step 2.
- 6 Tighten the threaded rods ① using a 5 mm hex wrench ②. To avoid damaging the unit base, you should stop tightening the threaded rods when they no longer turn easily.



- 7 Install the isolators ③ over the threaded rods, and push them securely onto the four raised locations on the bottom of the base ④.



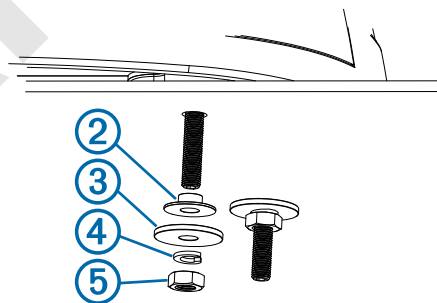
Mounting the Radar

Before you can mount the radar, you must first select a mounting location, and prepare the mounting surface and the radar ([Preparing the Surface and the Radar for Mounting](#)).

- 1 Take note of which end of the unit you plan to mount facing the bow along the bow-stern axis. If the hatch side is facing the bow, you must adjust the front-of-boat offset on the chartplotter to receive an accurate radar reading ([Front-of-Boat Offset](#)).
- 2 Position the included strap over the unit top, as close to the unit base as possible ①.

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- 3 Hoist the radar into position, and carefully lower it onto the mounting surface, feeding the threaded rods through the holes.
- 4 From under the mounting surface, place the shoulder washers ② on the threaded rods and feed them into the mounting surface so they fit securely.

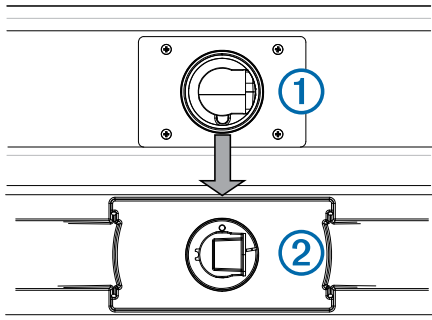


- 5 Place the flat washers ③, lock washers ④, and hex nuts ⑤ on the threaded rods.
- 6 Torque the hex nuts to 1.5 kgf-m (130 lbf-in. [11 lbf-ft.]) to securely fasten the radar to the surface without damaging the radar or the mounting hardware.

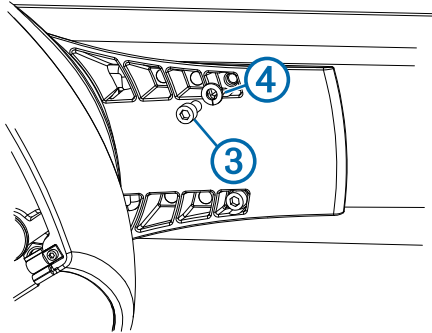
Installing the unit top

Before you can install the unit top on the radar, you must securely mount the base ([Mounting the Radar](#)).

- 1 Remove the protective cover from the waveguide on the top of the base.
- 2 Align the waveguide ① on the base with the socket on the bottom of the unit top ②, and slide the unit top onto the base.



- 3 Secure the antenna to the unit base using the included hex bolts ③ and spring washers ④.



- 4 Torque the hex bolts to 0.81 kgf-m (70 lbf-in. [6 lbf-ft.]) to fasten the antenna to the unit base without damaging the antenna or the mounting hardware.

Cable Considerations

It may be necessary to drill 31.7 mm (1 ¼ in.) holes for routing the power or network cable. The provided rubber cable grommet can be used to cover a cable installation hole.

- The grommet does NOT provide a waterproof seal. To make the grommet waterproof, marine sealant must be applied.
- If needed, the grommet can be trimmed to route both the power and the network cable through the same hole.
- Additional cable grommets can be purchased from Garmin or a Garmin dealer.

When installing the power and network cables, you should observe these considerations.

- Cutting the Garmin Marine Network cable is not recommended, but a field install kit can be purchased from Garmin or a Garmin dealer if cutting the network cable is necessary.
- To ensure safety, appropriate tie-wraps, fasteners, and sealant should be used to secure the cable along the route and through any bulkheads or the deck.
- Cables should not be run near moving objects and high-heat sources or through doorways and bilges.
- To avoid interference with other equipment, power and network cables should not be run next to or parallel to other cables, such as radio antenna lines or power cables. If this is not possible, the cables should be shielded with metal conduit or a form of EMI shielding.
- The power cable should be installed as close to the battery source as possible.
 - If it is necessary to extend the power cable, the appropriate gauge of wire must be used ([Power Cable Extensions](#)).
 - Incorrectly extended runs of cable may cause the radar to malfunction due to insufficient power transmission.

Connecting to Power Through the Voltage Converter

⚠ WARNING

When connecting the power cable, do not remove the in-line fuse holder. To prevent the possibility of injury or product damage caused by fire or overheating, the appropriate fuse must be in place as indicated in the product specifications. In addition, connecting the power cable without the appropriate fuse in place will void the product warranty.

NOTICE

Do not reuse any voltage converters from previous Garmin radar models, or third party voltage converters. Using any converter other than one included with the radar may damage the radar or prevent it from turning on.

Some radar models require a voltage converter unit to properly power the device. If your model is packaged with a voltage converter, it must be installed in order for your radar to function. If your model is not packaged with a voltage converter, connect the power cable directly to the boat battery ([Connecting Directly to Power](#)).

When installing the voltage converter for an applicable radar model, observe these considerations.

- The voltage converter requires an input voltage of 10 to 32 Vdc.
- It is recommended to install the voltage converter as close as possible to the power source.
- Connecting the power cable for the voltage converter directly to the battery is recommended. If it is necessary to extend the cable, the appropriate gauge of wire must be used for the length of the extension ([Power Cable Extensions](#)).

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Item	Description
①	To the Garmin Marine Network
②	7.5 A fuse holder
③	Red (+)
④	Black (-)
⑤	To the boat battery (10 to 32 Vdc)
⊥	Water ground connection

- 1 Route the power cable to the radar and the voltage converter.
- 2 Use crimp connectors and heat-shrink tubing to connect the power cable to the voltage converter.
The radar power cable contains a 7.5 A fuse which should not be removed when connecting to the voltage converter.
- 3 Connect the voltage converter to the boat battery through a 15 A, slow-blow fuse (not included).
The 15 A fuse (not included) between the voltage converter and battery is in addition to the 7.5 A fuse included in the radar power cable. Both fuses must be in place for the radar to function properly.
- 4 Connect the power cable to the POWER port on the radar.


Connecting Directly to Power

⚠ WARNING

When connecting the power cable, do not remove the in-line fuse holder. To prevent the possibility of injury or product damage caused by fire or overheating, the appropriate fuse must be in place as indicated in the product specifications. In addition, connecting the power cable without the appropriate fuse in place will void the product warranty.

Some radar models do not require a voltage converter unit. If your model is packaged without a voltage converter, it should be connected directly to power.

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Item	Description
①	To the Garmin Marine Network
②	15 A fuse holder
③	To the boat battery (10 to 32 Vdc)
	Water ground connection

- 1 Route the power cable to the radar and boat battery.
- 2 Connect the power cable to the boat battery.
- 3 Connect the power cable to the POWER port on the radar.

Power Cable Extensions


Connecting the power cable directly to the battery is recommended. If it is necessary to extend the cable, the appropriate gauge of wire must be used for the length of the extension.

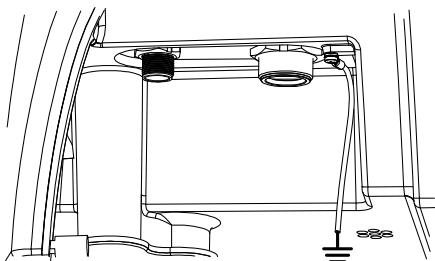
You must use crimp connectors and heat-shrink to create a water-resistant connection.

Distance	Wire Gauge
3 m (9 ft. 10 in.)	3.31 mm ² (12 AWG)
5 m (16 ft. 4 in.)	5.26 mm ² (10 AWG)
6.5 m (21 ft. 3 in.)	6.63 mm ² (9 AWG)
8 m (26 ft. 2 in.)	8.36 mm ² (8 AWG)

Grounding the Radar

The radar (and voltage converter, if applicable) must be connected to the appropriate type of ground using a 3.31 mm² (12 AWG) copper wire (not included).

- 1 Route a 3.31 mm² (12 AWG) copper wire to a water ground location and to the radar base.
- 2 Connect the wire to the ground connector on the unit base () using the pre-installed crimp connector.



- 3 Coat the ground screw and crimp connector with marine sealant.
- 4 Connect the other end of the wire to the water ground location on the boat, and coat the connection with marine sealant.
- 5 Select an option:
 - If your radar was not packaged with a voltage converter, no further grounding is necessary.
 - If your radar was packaged with a voltage converter, proceed to step 6.
- 6 Route a different 3.31 mm² (12 AWG) copper wire to water ground location and to the voltage converter.
- 7 Loosen a screw on one corner of the voltage converter and secure the copper wire to the screw.
- 8 Coat the screw and wire on the voltage converter with marine sealant.
- 9 Connect the other end of the wire to the RF ground location on the boat, and coat the connection with marine sealant.

Garmin Marine Network Considerations

This device connects to Garmin Marine Network devices to share radar data with compatible devices on the network. When connecting to a Garmin Marine Network device, observe these considerations.

- A Garmin Marine Network cable must be used for all Garmin Marine Network connections.
 - Third-party CAT5 cable and RJ45 connectors must not be used for Garmin Marine Network connections.
 - Additional Garmin Marine Network cables and connectors are available from your Garmin dealer.
- Although it is not recommended, you can use a field-installable connector to create a custom-length Garmin Marine Network cable if necessary. Follow the directions provided with the connector.

Radar Operation

All functions of this radar are controlled with your Garmin chartplotter. See the Radar section of your chartplotter's manual for operating instructions. To download the latest manual, go to www.garmin.com/support/.

Loading the New Software on a Memory Card

The device may contain a software-update memory card. If so, follow the instructions provided with the card. If a software update memory card is not included, you must copy the software update to a memory card.

- 1 Insert a memory card into the card slot on the computer.
- 2 Go to www.garmin.com/support/software/marine.html.
- 3 Select **Download** next to "Garmin Marine Network with SD card."
- 4 Read and agree to the terms.
- 5 Select **Download**.
- 6 Select **Run**.
- 7 Select the drive associated with the memory card, and select **Next > Finish**.

Updating the Device Software

Before you can update the software, you must obtain a software-update memory card or load the latest software onto a memory card.

- 1 Turn on the chartplotter.
- 2 After the home screen appears, insert the memory card into the card slot.

NOTE: In order for the software update instructions to appear, the device must be fully booted before the card is inserted.

- 3 Follow the on-screen instructions.
- 4 Wait several minutes while the software update process completes.
The device returns to normal operation after the software update process is complete.
- 5 Remove the memory card.

NOTE: If the memory card is removed before the device restarts fully, the software update is not complete.

Specifying the Unit Top Size

Before you can use the radar on your system, you must specify the antenna size.

You must mount the radar, connect it to power, and connect it to the Garmin Marine Network before you can specify the unit top size.

- 1 Turn on the radar and all devices connected to the Garmin Marine Network.
An antenna-selection prompt appears on the connected chartplotters.
NOTE: If the entire system is being powered on for the first time, the unit top selection screen is part of the initial setup process.

- 2 Select the installed unit top size for each radar installed on the boat.

TIP: If you need to specify a different antenna size, while viewing the radar screen for the radar you want to change, select **Menu > Radar Setup > Antenna Configuration > Antenna Size** and select the antenna size.

Front-of-Boat Offset

The front-of-boat offset compensates for the physical location of the radar scanner on a boat, if the radar scanner does not align with the bow-stern axis.

Specifications

Dimensions

Measuring the Potential Front-of-Boat Offset

The front-of-boat offset compensates for the physical location of the radar scanner on a boat, if the radar scanner does not align with the bow-stern axis.

- 1 Using a magnetic compass, take an optical bearing of a stationary target located within viewable range.
- 2 Measure the target bearing on the radar.
- 3 If the bearing deviation is more than $\pm 1^\circ$, set the front-of-boat offset.

Setting the Front-of-Boat Offset

Before you can set the front-of-boat offset, you must measure the potential front-of-boat offset.

The front-of-boat offset setting configured for use in one radar mode is applied to every other radar mode and to the Radar overlay.

- 1 From a Radar screen or the Radar overlay, select **Menu > Radar Setup > Front of Boat**.
- 2 Select **Up** or **Down** to adjust the offset.

Setting a Custom Park Position

If you have more than one radar on your boat, you must be viewing the radar screen for the radar you want to adjust.

By default, the unit top is stopped perpendicular to the base when it is not spinning. You can adjust this position (optional).

- 1 From the radar screen, select **Menu > Radar Setup > Antenna Configuration > Park Position**.
- 2 Use the slider bar to adjust the position of the unit top when stopped, and select **Back**.

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Item	Measurement	Description
①	181.8 mm (7 ³ / ₁₆ in.)	Center of rotation to the rear of the unit base.
②	236.2 mm (9 ⁵ / ₁₆ in.)	Center of rotation to the front of the unit base.
③	25 mm (1 in.)	Center of rotation to the inner rear mounting holes.
④	125 mm (4 ¹⁵ / ₁₆ in.)	Center of rotation to the inner front mounting holes.
⑤	50 mm (1 ¹⁵ / ₁₆ in.)	Center of rotation to the outer rear mounting holes.
⑥	150 mm (5 ²⁹ / ₃₂ in.)	Center of rotation to the outer front mounting holes.
⑦	140 mm (5 ¹ / ₂ in.)	
⑧	200 mm (7 ⁷ / ₈ in.)	

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Item	Measurement	Description
①	4 ft. models: 132.7 cm (4 ft. 4 1/4 in.) 6 ft. models: 193.7 cm (6 ft. 4 1/4 in.)	Antenna length.
②	45.1 cm (17 3/4 in.)	Base of the unit to the top of the unit.
③	31.8 cm (12 1/2 in.)	Width of the base.

Physical Specifications

Specification	Measurement
Base weight	21.4 kg (47.1 lb)
Unit top weight	Option 1: 5.5 kg (12.2 lb.) Option 2: 7.7 kg (16.9 lb.)
Power cable length	15 m (49 ft. 3 in.)
Network cable length	15 m (49 ft. 3 in.)
Unit top rotation speed	24 rpm and 48 rpm
Max wind load	80 kn
Temperature range	From -15 to 70°C (5 to 158°F)
Humidity	95% at 35°C (95°F)
Water resistance	IEC 60529 IPX6 (protected against heavy seas)
Bearing accuracy	0.25°

Electrical Specifications

Specification	Measurement
Minimum safe operating distance	Type 1 <ul style="list-style-type: none"> • 100 W/m²: 1.22 m (48 in.) • 10 W/m²: 3.9 m (154 in.) Type 2 <ul style="list-style-type: none"> • 100 W/m²: 1.54 m (61 in.) • 10 W/m²: 4.85 m (191 in.) Type 3 <ul style="list-style-type: none"> • 100 W/m²: 1.50 m (59 in.) • 10 W/m²: 4.70 m (185 in.) Type 4 <ul style="list-style-type: none"> • 100 W/m²: 1.90 m (75 in.) • 10 W/m²: 5.9 m (232 in.) Type 5 <ul style="list-style-type: none"> • 100 W/m²: 2.1 m (83 in.) • 10 W/m²: 6.65 m (262 in.) Type 6 <ul style="list-style-type: none"> • 100 W/m²: 2.65 m (104 in.) • 10 W/m²: 8.5 m (335 in.)
Compass-safe distance	Standard compass: 90 cm (35 7/16 in.) Standby steering and emergency compasses: 80 cm (31 1/2 in.)
Input voltage 	From 10 to 32 Vdc

Specification	Measurement
Fuse	Radar power cable, no voltage converter: 15 A (included) Radar power cable, with voltage converter (if applicable): 7.5 A (included) Voltage converter (if applicable): 15 A (not included)
Input power	Types 1 and 2: • Typical: 55 W • Max.: 160 W Types 3 and 4: • Typical: 65 W • Max.: 170 W Types 5 and 6: • Typical: 90 W • Max.: 125 W

Range	Pulse Width	Pulse Repetition Frequency (PRF)
0.125 nm	70 µs	4608 Hz
0.25 nm	70 µs	4608 Hz
0.5 nm	80 µs	4608 Hz
0.75 nm	90 µs	4608 Hz
1 nm	150 µs	4608 Hz
1.5 nm	200 µs	3456 Hz
2 nm	250 µs	2304 Hz
3 nm	350 µs	2304 Hz
4 nm	400 µs	1152 Hz
6 nm	700 µs	1152 Hz
8 nm	700 µs	1152 Hz
12 nm	800 µs	1152 Hz
16 nm	1000 µs	576 Hz
24 nm	1000 µs	576 Hz
36 nm	1000 µs	576 Hz
48 nm	1000 µs	576 Hz
64 nm	1000 µs	576 Hz
72 nm	1000 µs	576 Hz

Antenna Specifications

Specification	Measurement
Type	End-fed slotted waveguide
Horizontal beam width	4 ft. antenna: 1.8° 6 ft. antenna: 1.1°
Horizontal side lobes	-23 dB within ±10° of main -30 dB outside ±10° of main
Vertical beam width	23°
Antenna gain	29 dB
Polarization	Horizontal

Installation Troubleshooting

Symptom	Possible Causes
The radar does not turn on. The status LED is not on.	<ul style="list-style-type: none"> The power cable may not be connected correctly to the device or to the battery. Check all connections. The inline fuse may have blown. Check the fuse and replace it if necessary. The wire gauge used to extend the power cable may be too small for the length of the extension. Check the table provided in the Power Cable Extensions section of these instructions to make sure the correct wire gauge is used (Power Cable Extensions). If the radar uses a voltage converter, it may be connected through an incompatible or third-party voltage converter. Use only the voltage converter supplied with the radar.
The radar is not available on the Garmin device or on devices connected to the Garmin Marine Network.	<ul style="list-style-type: none"> The radar may not be powering on. Check the status LED. The device software may not be up-to-date. Update the software on the device or on the Garmin Marine Network. The network cable may not be connected correctly to the device or to the Garmin Marine Network. Check all connections. If a field-installable network connector was used, it may have been installed improperly. Check the connector.

The status LED is located on the product label, and can help troubleshoot installation problems.

Status LED Color and Activity	Radar Status
Solid red	The radar is getting ready for use. This should only stay red briefly before changing to flashing green.
Flashing green	The radar is operating properly.
Flashing orange	The radar software is being updated.
Flashing red	The radar has encountered an error. Contact Garmin product support for assistance.

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