

GARMIN®

SMARTDRIVE™ AUTOPILOT ACTUATOR

Installation Instructions

Important Safety Information

WARNING

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

You are responsible for the safe and prudent operation of your vessel. The autopilot is a tool that enhances your capability to operate your boat. It does not relieve you of the responsibility of safely operating your boat. Avoid navigational hazards and never leave the helm unattended.

To avoid possible personal injury and damage to your boat, the autopilot system should be installed by a qualified marine installer. Specific knowledge of marine steering and electrical systems is required for proper installation.

Performing maintenance while in motion, operating with the cover removed, or inserting fingers into the opening could cause serious personal injury or property damage.

CAUTION

To avoid possible personal injury, always wear safety goggles, ear protection, and a dust mask when drilling, cutting, or sanding.

When in use, beware of hot surfaces on the device to avoid possible personal injury.

When in use, beware the risk of entrapment or pinching from moving parts to avoid possible personal injury.

NOTICE

The actuator movement must be limited by physical travel stops on the vessel. Failure to install travel stops causes the actuator to act as a travel limiter and will damage the actuator.

The locations selected to mount the actuator and to install the travel stops must be structurally sound enough to withstand the force applied by the actuator during use.

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

Failing to recalibrate the rudder after performing maintenance or adjustments could damage the product or vessel.

To obtain the best performance and to avoid damage to your boat, install this actuator according to these instructions. Professional installation of the actuator is highly recommended, because specific knowledge of rudder operation is required to properly install it. Read all installation instructions before proceeding with the installation. If you experience difficulty during the installation, contact Garmin® Product Support.

Tools Needed

- M10 (3/8 in.) bolts, washers, and nuts to secure the actuator to the mounting surface
 - You must use marine-grade hardware, such as 316 stainless steel, to secure the mounting base
 - You should use hex bolts, flange bolts, or other suitable fastener with a pan head to avoid damaging the mounting base
- Tiller arm (if needed)
- Safety glasses
- Drill and drill bits
- Wrenches
- Hex bits or wrenches (to secure the actuator to the mounting base)
- LOCTITE® 638™ retaining compound or equivalent (recommended)
- For annual maintenance:

- High-quality marine-grade grease compatible with nitrile seals for lubricating pivot points
- AeroShell® 64 grease for lubricating the leadscrew inside the actuator tube

Mounting Location Considerations

NOTICE

Failure to follow these considerations when selecting a mounting location for the actuator may result in damage to the actuator, damage to the vessel, or poor product performance.

This device should be mounted in a location that is not exposed to extreme temperatures or conditions. The temperature range for this device is listed in the product specifications ([Specifications, page 7](#)). Extended exposure to temperatures exceeding the specified temperature range, in storage or operating conditions, may cause device failure. Extreme-temperature-induced damage and related consequences are not covered by the warranty.

The SmartDrive™ actuator must be installed within specific extension and angle limitations, as mentioned below and defined in the specifications at the end of these instructions. Exceeding the extension or angle limitations will damage the actuator. Installation-related damage is not covered by the warranty.

When selecting a mounting location, observe these considerations.

- The actuator should not be installed closer than 50 cm (20 in.) to a compass.
- The actuator must be installed under deck, in a location not subject to flooding or washdown.
- The base of the actuator must be mounted securely on a surface that is able to withstand the high thrusts generated by the rudder.
- The actuator movement must be limited by physical stops, and not by the length of the actuator rod, or damage to the actuator will occur.
- No part of the actuator or rod should contact the vessel, quadrant, or tiller arm throughout the full range of movement.
- You must not exceed the 5 degree tilt at the extremes of the stroke, because it will damage the actuator.

Tiller Arm and End Stop Considerations

NOTICE

The actuator must not act as a rudder-movement limiter. Physical end stops (not included) must be in place to prevent the actuator from acting as the rudder-movement limiter, or damage to the actuator will occur.

You can connect the SmartDrive™ actuator to either an existing quadrant or to a tiller arm (not included). If you do not have a quadrant or cannot install the actuator at your quadrant location, choose a tiller arm that fits the diameter of your rudder post and is the correct length for the installation location.

The supplied tiller bolt is suitable for a quadrant or tiller arm thickness of 12 mm (0.47 in.) to 16 mm (0.63 in.).

Mounting the SmartDrive™ Actuator

No hardware is supplied to fasten the actuator to the mounting surface. You must select the appropriate M10 ($\frac{3}{8}$ in.) bolts, washers, and nuts suitable for the type and thickness of the mounting surface at the location you are installing the actuator.

You must have access to the space under the mounting surface to properly secure the actuator base.

- 1 With the actuator in the mounting location, mark the locations of the four mounting holes on the surface.

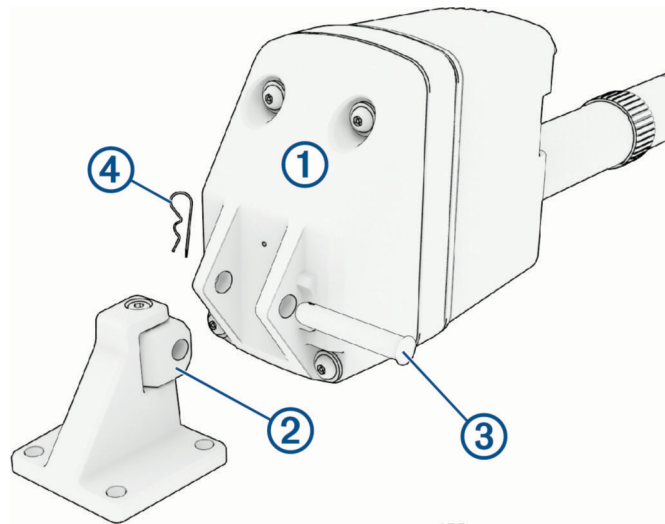
NOTE: You may find it is best to connect the actuator to the base when determining the best mounting location. After you have found the location and marked the mounting holes, it is easier to remove the actuator again when securing the base to the mounting surface.

- 2 Using an 11 mm ($\frac{25}{64}$ in.) bit, drill holes through the mounting surface at the marked locations.
- 3 Secure the base to the mounting surface using M10 ($\frac{3}{8}$ in.) bolts, washers, and nuts (not included).
- 4 Tighten the bolts until they securely hold the base to the mounting surface.

Connecting the Actuator to the Base

You can quickly connect the SmartDrive™ actuator to the base using no tools, and quickly remove it if needed for service.

- 1 With the base firmly secured to the mounting surface, place the SmartDrive actuator ① over the pivot joint on the base ②.



- 2 Apply general purpose marine grease to the pivot pin ③, and insert it through the actuator and the pivot joint to secure the actuator to the base.
- 3 Insert the R-pin ④ through the hole in the end of the pivot pin to secure it.

NOTE: Two R-pins are provided with the SmartDrive actuator. You should install the R-pin without the red tag when securing the pivot pin. The R-pin with the red tag is intended to be installed on the tiller pin that connects the actuator to the tiller.

If you need to disconnect the actuator from the base for service, remove the R-pin and the pivot pin.

NOTICE

If you must disconnect the SmartDrive actuator from the tiller in case of an emergency such as an unresponsive actuator, you should remove the R-pin with the red flag from the tiller pin and disconnect the actuator from the tiller pin instead of disconnecting it from the base. By removing the actuator from the tiller pin, you can quickly regain manual control of steering. If you leave the actuator connected to the tiller pin and disconnect it from the base instead, it can inhibit movement of the tiller arm and cause damage to the vessel or device.

Connecting the Actuator to the Tiller Arm

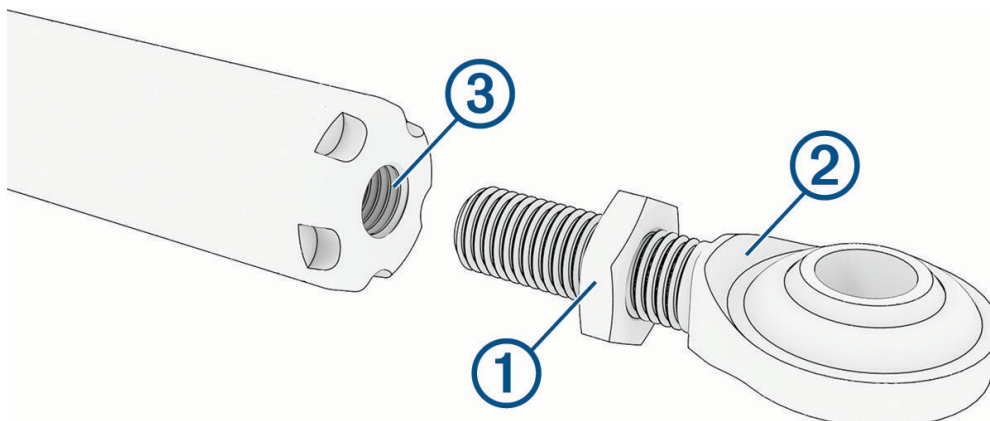
To properly steer the vessel, you must connect the actuator to the tiller arm (not included).

- 1 Install the tiller-pin connector on the actuator rod ([Installing the Tiller-Pin Connector on the Actuator Rod, page 3](#)).
- 2 Install the tiller bolt in the tiller arm ([Installing the Tiller Bolt and Connecting the Actuator Rod, page 4](#)).
- 3 Connect the actuator to the tiller arm.

Installing the Tiller-Pin Connector on the Actuator Rod

The tiller-pin connector hardware is included separately in the product packaging, and you must install it on the end of the actuator rod before you can connect the actuator to the tiller arm.

- 1 Screw the 12 mm nut ① onto the tiller-pin connector ② until it stops.



- 2 Screw the assembled tiller-pin connector into the end of the actuator rod ③.

For the most flexibility when adjusting the length, you should screw the pin into the rod until more than half of the threads are inside the rod.

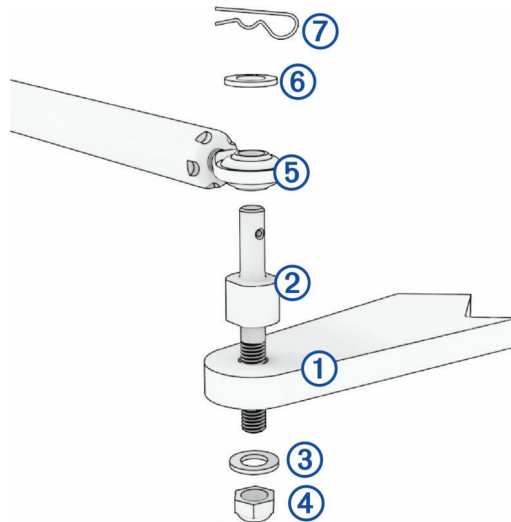
NOTICE

You must engage at least six full threads when connecting the tiller-pin connector to the end of the actuator rod, so initially screwing it into the rod deeper than this provides more leeway when making fine adjustments. Engaging fewer than six full threads may damage the tiller-pin connector or actuator rod during use.

Installing the Tiller Bolt and Connecting the Actuator Rod

The supplied tiller bolt is suitable for tiller arm thickness of 12 to 16 mm (0.47 to 0.63 in.).

- 1 Drill a 12.2 mm (0.48 in.) hole in the tiller arm ① (not included) for the tiller bolt.



- 2 Place the threaded end of the tiller bolt ② into the tiller arm, and secure it with the M12 washer ③ and the M12 cap nut ④.

It is recommended to apply LOCTITE® 638™, or an equivalent retaining compound, to the threads on the end of the tiller bolt to hold the cap nut in place during use.

- 3 Apply general purpose marine grease to the unthreaded end of the tiller bolt.
- 4 Adjust the actuator arm so it is at midstroke and place the tiller-pin connector ⑤ on the tiller bolt.
- 5 Check for a 90-degree angle between the tiller arm and the actuator rod, and fine-tune the length of the actuator rod by screwing or unscrewing the tiller-pin connector to shorten or lengthen it as needed.

NOTICE

At least six full threads must be engaged when adjusting the tiller-pin connector on the end of the actuator rod. Engaging fewer than six full threads may damage the tiller-pin connector or actuator rod during use.

- 6 After you finish fine-tuning the length of the actuator rod, tighten the 12 mm nut on the tiller-pin connector so it is snug against the actuator rod.
- 7 Fasten the rod to the tiller bolt with the other M12 washer ⑥ and the locking R-pin ⑦.
- 8 Place the included red tag on the R-pin using the hook-and-loop fastener.
This tag helps indicate that you can quickly remove this pin and lift the actuator rod off of the pin to manually restore normal steering to the boat.

Connecting the Actuator to Power

⚠ WARNING

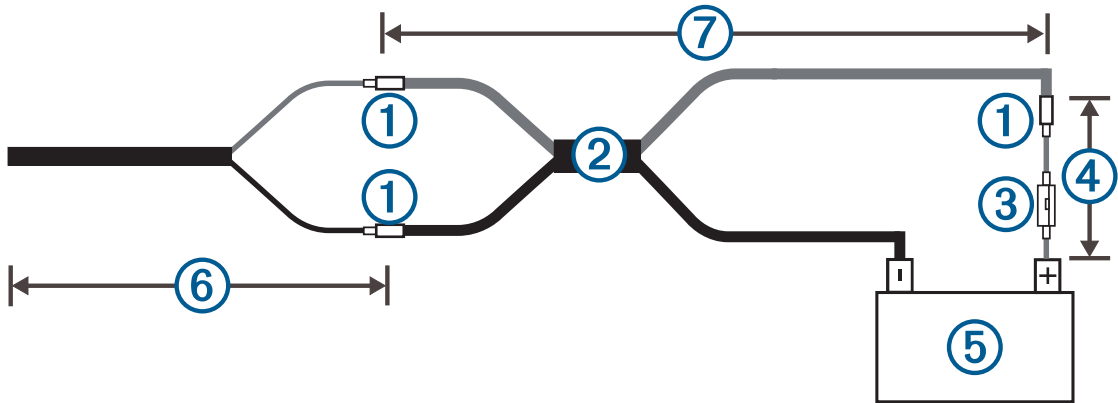
When connecting the power cable, you must connect it to either the appropriate breaker or you must install the included fuse. Connecting the power cable without the appropriate fuse or breaker in place may result in personal injury or product damage caused by fire or overheating, and it voids the product warranty.

You should connect the actuator power cable directly to the boat battery using the included 30 A fuse, if possible. Although it is not recommended, if you connect the power cable to a terminal block or other source, you must connect it through a 30 A breaker.

- 1 Route the power cable from the actuator to the boat battery.
If the cable is not long enough, it can be extended using the appropriate wire gauge for the length of the extension (*Power Cable Extensions*, page 5).
- 2 Connect the black wire (-) to the negative (-) terminal of the battery.
- 3 Connect the red wire from the fuse holder (+) to the positive (+) terminal of the battery.

Power Cable Extensions

If necessary, you can extend the power cable using the appropriate wire gauge for the length of the extension.



Item	Description
①	Splice
②	Wire gauge needed based on the length of the extension
③	Fuse
④	8 in. (20.3 cm)
⑤	Battery
⑥	8 in. (20.3 cm)
⑦	Length of the extension needed

Length of Extension	Wire Gauge Needed
Up to 15 ft. (4.6 m)	10 AWG (5.26 mm ²) extension wire
Up to 23 ft. (7 m)	8 AWG (8.36 mm ²) extension wire
Up to 36 ft. (11 m)	6 AWG (13.29 mm ²) extension wire

Connecting the Actuator to a Garmin® Autopilot

NOTICE
The data cable connected to the actuator should not be cut, because cutting the data cable voids your warranty.

See the installation instructions provided with your Garmin autopilot system to install the rest of the autopilot components and to connect the actuator to the correct component.

Steering Actuator Routine Maintenance and Storage Information

To keep the autopilot functioning properly, it is recommended that you perform routine maintenance to the steering actuator throughout the boating season.

NOTICE

You must use high-quality marine-grade grease that is compatible with nitrile seals when lubricating the mounting and connection points. You must use AeroShell® 64 grease when lubricating the leadscrew inside the actuator tube. Any other type of grease may harden and cause the actuator to seize.

- Once or more per season (depending on use), you should remove the steering actuator from the mount and complete these actions:
 - Clean the pivoting mount points to remove all grease and any rust.
 - Lubricate the leadscrew inside the actuator tube ([Lubricating the Actuator Drive Rod, page 6](#)).
 - Clean and apply high-quality marine-grade grease that is compatible with nitrile seals to critical locations where movement and friction occur, including:
 - Mount pivot points
 - Tiller-pin connector and tiller bolt
 - Clean the cable connectors, and re-apply dielectric grease to remove and prevent corrosion.
- When you store the boat for the off-season, you should complete the above maintenance actions, then fully retract the actuator rod into the tube to protect it.

Lubricating the Actuator Drive Rod

You should add lubrication to the actuator drive rod at least once per boating season.

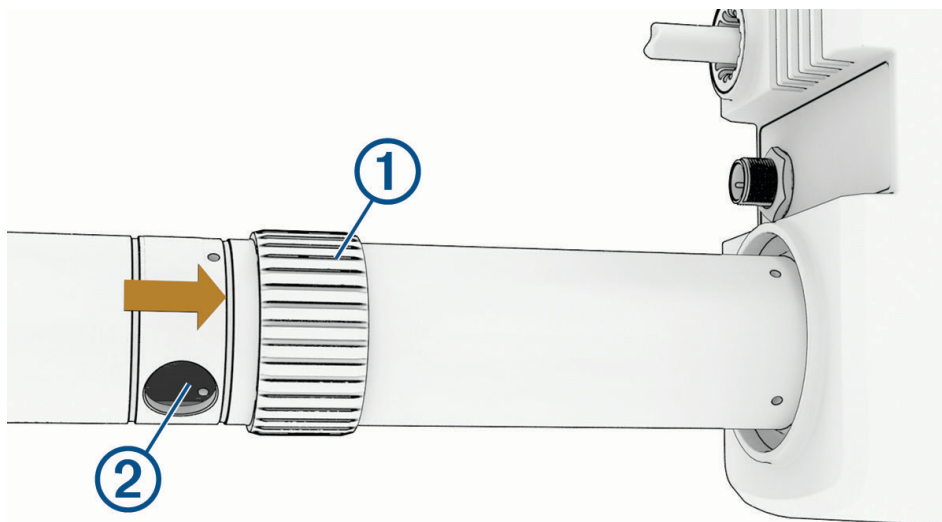
⚠ WARNING

Performing maintenance while in motion, operating with the cover removed, or inserting fingers into the opening could cause serious personal injury or property damage.

NOTICE

You must use AeroShell® 64 grease when lubricating the leadscrew inside the actuator tube. Any other type of grease may harden and cause the actuator to seize.

- 1 Disconnect the SmartDrive™ actuator from power.
- 2 Remove the SmartDrive actuator from the mount and the tiller arm.
- 3 Fully extend the actuator rod by hand.
- 4 Pull the rubber service port cover ① down the tube to reveal the service port ②.



- 5 Through the service port opening, apply AeroShell 64 grease directly onto the threads of the lead screw inside the tube, coating the entire diameter of the screw in the visible area.
- 6 Pull the rubber cover back over the service port opening.
- 7 Manually contract and extend the drive rod between five and ten times to distribute the grease along the length of the leadscrew.
- 8 Reinstall the actuator on the mount and tiller arm.
- 9 Reconnect the actuator to power.

Tips for Reducing Load

You may receive an error message if the actuator is experiencing a higher-than-expected load. This error can be caused by different factors, so if you receive this message, you should examine the installation to find and correct the cause.

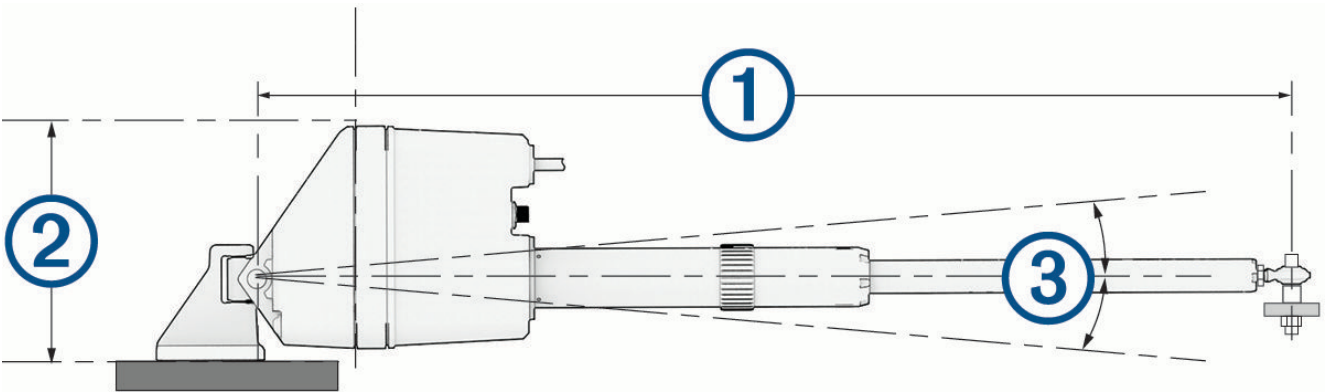
- Check the steering system for any binding or excessive resistance caused by steering components.
- Verify that the actuator is sized appropriately for the vessel.
- Make sure that the actuator and steering components have been properly maintained.

If the error persists after you have examined the installation and ruled out the above factors, the actuator may require service. Contact Garmin® Product Support for assistance.

Specifications

Specification	Value
Input voltage	10 to 32 Vdc
Peak momentary current	25 A
Average power	0.8 to 5 A, depending on conditions
Max. operating thrust	4670 N (1,050 lbf) (intermittent)
Weight	9 kg (19.84 lbs)
Water-ingress protection	IPx7
Operating temperature	-20° to 55°C (-4° to 131°F)
Compass-safe distance	50 cm (20 in.)

Drive Unit Dimensions



Item	Description	Measurement
①	Length from the base attachment to the tiller pin at midstroke	700 mm (27.5 in.)
②	Height from the mounting surface to the top of the actuator housing.	197 mm (7.8 in.)
③	Maximum tilt angle of the actuator when it is at the extremes of the stroke.	5 degrees above or below center
NOTICE Exceeding this angle will damage the drive unit.		

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