

# GARMIN®

## 1.2 L AND 2.0 L HYDRAULIC PUMP INSTALLATION INSTRUCTIONS

### Important Safety Information

#### WARNING

See the *Important Safety and Product Information* guide in the 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.

Always be prepared to promptly regain manual control of your boat.

#### CAUTION

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

#### NOTICE

To avoid 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.

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

This pump is only for use with Garmin® autopilot systems. Attempting to use this pump with any other system may damage the system, the pump, or the vessel.

This pump must not be installed with a steering system that has an unvented reservoir, because it will damage the pump. Before installing the pump, you must verify that the vessel steering has a vented reservoir. Typically, the vent hole is in the filler cap of the highest helm. If you are not clear as to whether the steering system is vented, you should check with the manufacturer of the helm or the reservoir to verify.

The pump must be installed in a dry location, protected from water and the weather.

The hydraulic pump steers your boat by interacting with the hydraulic steering system, based on commands from the autopilot system. The pump is not included in the autopilot corepack box because the type of pump you use with your autopilot is determined by the size and type of steering system on your boat.

### Autopilot Software Updates

After completing the autopilot installation, you should update the software before performing the configuration process.

If you connected the autopilot system to a NMEA 2000® network with a Garmin chartplotter, you can update the software using the chartplotter.

If you did not connect the autopilot system to a NMEA 2000 network with a Garmin chartplotter, you must use a NMEA 2000 Network Updater (sold separately). Go to [support.garmin.com](http://support.garmin.com) for update information.



## Tools Needed

- Safety glasses
- Drill and drill bits
- Wrenches
- Wire cutter/stripper
- Screwdrivers: Phillips and flat
- Cable ties
- Marine corrosion inhibitor spray
- Mounting screws: the pump kit includes mounting screws, but if the included screws are not appropriate for the mounting surface, you must provide the correct types of screws
- Hydraulic system hardware (*Hydraulic Considerations, page 3*):
  - Hydraulic hose, -4 [6 mm (1/4 in.) ID] or larger, with machine-crimped or field-replaceable fittings that have a minimum rating of 1000 psi
  - Hydraulic T-connectors
  - Hydraulic shut-off valves
  - Thread sealant, such as LOCTITE® 567
  - Hydraulic bleeding equipment
  - Hydraulic fluid

## Mounting Considerations

### NOTICE

The pump must be installed in a dry location, protected from water and the weather.

- Before you start the pump installation, you must identify the type of hydraulic steering system in your boat and consult the hydraulic diagrams. Each boat is different, and you must consider the existing hydraulic layout before deciding where to mount the pump (*Hydraulic Considerations, page 3*).
- Before you start the pump installation, you should verify that you have selected the appropriate pump for the needs of your vessel. You can reference the autopilot compatibility guide on [garmin.com](http://garmin.com).
- The pump must be located within 19 in. (0.5 m) of the ECU.
- The cables that connect the pump to the ECU cannot be extended.
- You should install the pump in a location near the cylinder so that no more than 3 m (10 ft.) of hydraulic hose connects the pump to the cylinder.
- You should mount the pump horizontally, if possible.
- If you cannot mount the pump horizontally, you must mount it vertically with the pump head connectors facing up.
- You must mount the pump in a location to which you can extend the hydraulic steering lines of the boat.

## Mounting the Pump

Before you can mount the pump, you must select a location (*Mounting Considerations, page 2*) and determine the correct mounting hardware (*Tools Needed, page 2*).

- 1 Hold the pump in the intended mounting location and mark the locations of the mounting holes on the mounting surface, using the pump as a template.
- 2 Using a drill bit appropriate for the mounting surface and selected mounting hardware, drill the four holes through the mounting surface.
- 3 Secure the pump to the mounting surface using the selected mounting hardware.

## Hydraulic Considerations

### NOTICE

This pump must not be installed with a steering system that has an unvented reservoir, because it will damage the pump. Before installing the pump, you must verify that the vessel steering has a vented reservoir. Typically, the vent hole is in the filler cap of the highest helm. If you are not clear as to whether the steering system is vented, you should check with the manufacturer of the helm or the reservoir to verify.

Do not attempt to use the autopilot to steer the boat until you bleed all air from each part of the hydraulic system.

When adding hydraulic line to the system, use only hose that is -4 [6 mm ( $1/4$  in.) ID] or larger with machine-cripped or field-replaceable fittings that have a minimum rating of 1000 lbf/in<sup>2</sup> (6,895 kPa).

You must not use thread seal tape, such as Teflon<sup>®</sup> tape, or thread putty on any hydraulic fitting in this system. Small debris from thread seal tape or thread putty can enter the hydraulic system, become stuck in valves, and render the autopilot or steering system inoperable. Using thread seal tape or thread putty on any hydraulic fitting in this system voids your warranty.

Use caution when applying liquid thread sealant to avoid damage to the hydraulic system or to the autopilot system.

**NOTE:** You cannot install this pump on a system with an unbalanced cylinder.

Before you connect the pump to the hydraulic lines, you should consult the hydraulic-layout diagrams to help determine how to best install the pump in the hydraulic system of the boat ([Hydraulic Layouts, page 3](#)).

When planning the hydraulic layout and making all hydraulic connections, consider the following:

- You must use -4 [6 mm ( $1/4$  in.) ID] or larger hoses for all hydraulic connections, including the return line.
- You should install the pump in a location near the cylinder so that no more than 3 m (10 ft.) of hydraulic hose connects the pump to the cylinder.
- For hydraulic fittings with an O-ring, such as ORB and ORFS fittings, you should not use thread sealant.
- For hydraulic fittings without an O-ring, you should use a liquid thread sealant, such as LOCTITE 567.
- When using liquid thread sealant, you must follow the instructions regarding the cure time, for example, LOCTITE 567 cures after four hours. If the thread sealant is not properly cured per the manufacturer's instructions, the high pressure in the hydraulic lines may push the sealant out of the threads and create a leak.
- When disconnecting a connector sealed with liquid sealant, you must take care to keep any slivers or other debris from the cured sealant from entering the hydraulic system.

## Hydraulic Layouts

### NOTICE

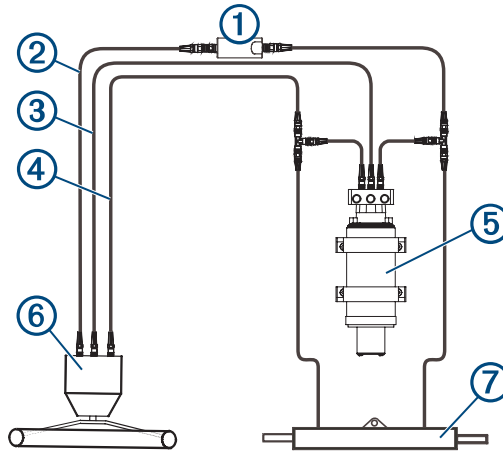
If the steering system in your boat does not match any of the hydraulic layouts in this manual and you are unsure how to install the pump, contact Garmin Product Support.

This pump must not be installed with a steering system that has an unvented reservoir, because it will damage the pump. Before installing the pump, you must verify that the vessel steering has a vented reservoir. Typically, the vent hole is in the filler cap of the highest helm. If you are not clear as to whether the steering system is vented, you should check with the manufacturer of the helm or the reservoir to verify.

Before you start the pump installation, identify the type of hydraulic steering system in your boat. Each boat is different, and you must consider certain aspects of the existing hydraulic layout before deciding where to mount the pump.

Before you start the pump installation, you should thoroughly review the hydraulic considerations for important information on hydraulic hose and fitting types, installation methods, and thread-sealant information ([Hydraulic Considerations, page 3](#)).

## Single Helm without Power Assist Layout



① Shadow Drive™ valve

See the installation instructions provided in the autopilot corepack when installing the Shadow Drive valve.

**NOTE:** You can install the Shadow Drive valve in either the starboard or port line.

② Starboard line

③ Return line

④ Port line

⑤ Pump

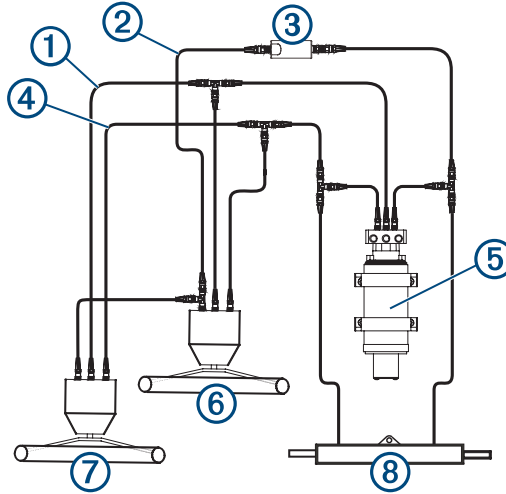
You should mount the pump horizontally, if possible.

If you cannot mount the pump horizontally, you must mount it vertically with the pump head connectors facing up.

⑥ Helm

⑦ Steering cylinder

## Dual-Helm without Power Assist Layout



①	Return line	
②	Starboard line	
③	Shadow Drive valve	See the installation instructions provided in the autopilot corepack when installing the Shadow Drive valve. <b>NOTE:</b> You can install the Shadow Drive valve in either the starboard or port line.
④	Port line	
⑤	Pump	You should mount the pump horizontally, if possible. If you cannot mount the pump horizontally, you must mount it vertically with the pump head connectors facing up.
⑥	Lower helm	
⑦	Upper helm	
⑧	Steering cylinder	

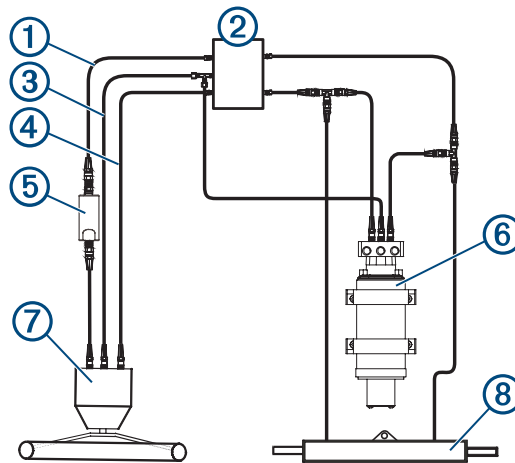
## Single Helm with Power Assist Layout

### NOTICE

You must install the pump between the cylinder and the power-assist module to function correctly.

You must install the Shadow Drive valve between the helm and the power-assist module to function correctly.

**NOTE:** You may need to remove the power assist-module to gain access to the fittings, hoses, and bleed-tee fitting.



①	Starboard line	
②	Power-assist module	
③	Return line	
④	Port line	
⑤	Shadow Drive valve	See the installation instructions included in the autopilot corepack when installing the Shadow Drive valve. <b>NOTE:</b> You can install the Shadow Drive valve in either the starboard or port line.
⑥	Pump	You should mount the pump horizontally, if possible. If you cannot mount the pump horizontally, you must mount it vertically with the pump head connectors facing up.
⑦	Helm	
⑧	Steering cylinder	

## Connecting the Hydraulic Hoses to the Pump

For assistance, see the layout diagrams ([Hydraulic Layouts, page 3](#)).

- 1 Disconnect the necessary hoses from the hydraulic system.
- 2 Add a T-connector to the starboard and port hoses of the hydraulic system between the helm and the steering cylinder.
- 3 Complete an action:
  - If the boat does not have a return hose connected to the helm, add enough hydraulic hose to connect the return fitting on the helm to the pump.
  - If the boat has a return hose connected to the helm, add a T-connector to the return hose.
- 4 Add hydraulic hose to the unused fitting on each T-connector, with enough hose to connect the T-connector to the pump fittings.
- 5 Connect the port and starboard hoses from the T-connectors to the appropriate pump fittings, as shown in the layout diagram for your hydraulic configuration.
- 6 Complete an action:
  - If you added hydraulic hose to the return fitting on the helm, connect the return hose from the helm to the center pump fitting.
  - If you added a T-connector to an existing return hose, connect the return hose from the T-connector to the center pump fitting.
- 7 Install the Shadow Drive valve in the port or starboard hydraulic hose between the helm and the T-connector that connects to the pump.

See the installation instructions provided in the autopilot corepack when installing the Shadow Drive valve.

## Connection Considerations

- See the installation instructions provided in the autopilot corepack when installing the ECU.
- You should mount the pump and connect it to the hydraulic system before connecting the pump to the ECU.
- The two cables from the pump connect to the ports on the ECU marked DRIVE and FEEDBACK.

Some Garmin pumps and ECU models use quarter-turn locking connectors on the cables and ports, and others use threaded connectors. If the connectors on the cable of the pump you purchased do not match your ECU model, you can remove the collar from the cable and replace it with a snap-together collar included or available from your Garmin dealer.

## Completing the Installation

- 1 Follow the instructions included in the autopilot corepack to install the rest of the autopilot components.
- 2 Follow the instructions included in the autopilot corepack to bleed the air from the hydraulic system.
- 3 Apply a marine corrosion inhibitor spray to the pump body and manifold to ensure corrosion resistance.

Garmin recommends that you re-apply the marine corrosion inhibitor once each year to extend the life of the pump.

## Configuration and Service

### Correcting an Unwanted Gradual Turn in One Direction

This pump is designed to allow for a gradual bleed down of pressure when the autopilot is in standby. For installations with uneven rudder loads, this can result in a tendency of the boat to steer gradually to one side without continuous manual steering corrections. To correct or prevent this behavior in such installs, you can install a check valve accessory to block the bleed down path through the autopilot pump during manual steering.

- 1 Purchase the autopilot check valve kit (010-11203-10) from your Garmin dealer or from [garmin.com](http://garmin.com).
- 2 Follow the instructions provided in the check valve kit to install the check valve in the hydraulic system.

## Engaging and Disengaging the Shutoff Valves

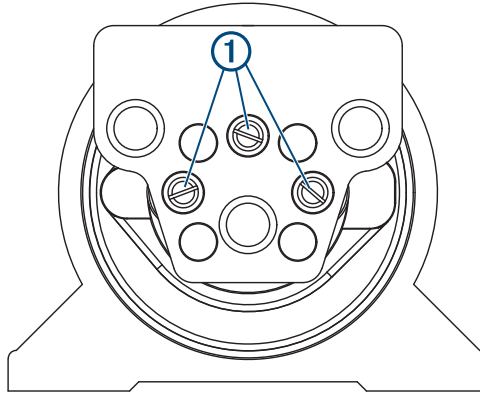
### NOTICE

When disengaging the shutoff valve, do not force the brass screws past the stopping point. Forcing the screws past the stopping point may permanently damage the manifold.

This pump features three shutoff valves that isolate the pump from the hydraulic system for troubleshooting and repairing the system.

When the shutoff valves are engaged, the boat steers normally, and the autopilot cannot control the steering system. When the shutoff valves are disengaged, you can remove the pump from the manifold for repair without disconnecting any hydraulic lines.

- 1 To engage the shutoff valves, fully tighten the valve screws ①.



- 2 To disengage the shutoff valves, fully loosen the valve screws.

## Specifications

Dimensions (L × W × H)	31.75 × 11.43 × 10.16 cm (12.5 × 4.5 × 4 in.)
Weight	3.2 kg (7.05 lbs)
Temperature range	From -10° to 60°C (from 14° to 140°F)
Material	Manifold: aluminum alloy Pump body: zinc alloy Piston/rotor: hardened steel Motor: magnet, copper, carbon steel Feet: rubber

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