

GARMIN[®]

1.2 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

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 hydraulic steering componentry and marine electrical systems is required for proper installation.

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

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.

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.

Registering Your Device

Help us better support you by completing our online registration today. Keep the original sales receipt, or a photocopy, in a safe place.

- 1 Go to my.garmin.com.
- 2 Sign in to your Garmin[®] account.

Tools Needed

- Safety glasses
- Drill and drill bits
- Wrenches
- Torque wrench (if installing unbalanced kit)
- Wire cutter/stripper
- Screwdrivers: Phillips and flat
- Cable ties
- Marine corrosion inhibitor spray
- Hydraulic hose with machine-crimped or field-replaceable fittings that have a minimum rating of 1000 psi
- Hydraulic T-connectors
- Thread sealant
- Hydraulic bleeding equipment

- Hydraulic fluid
- Unbalanced kit (if installing in a boat with an unbalanced steering cylinder, part number 010-11201-00)
- 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

Mounting Considerations

- 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 1).
- 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 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 mount the pump, if your boat has an unbalanced cylinder steering system, you must re-configure the pump to work properly with the unbalanced cylinder (*Calibrating the Unbalanced Valve*, page 3).

Before you can mount the pump, you must select a location (*Mounting Considerations*, page 1) and determine the correct mounting hardware (*Tools Needed*, page 1).

- 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

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 with machine-crimped or field-replaceable fittings that have a minimum rating of 1000 lbf/in² (6,895 kPa).

Do not use plumber's tape on any hydraulic fitting. Use an appropriate thread sealant rated for marine use on all pipe threads in the hydraulic system.

Before you connect the pump to the hydraulic lines, you should consult the diagram for the hydraulic system of your boat to find the correct place to add the fittings and hose for the pump.

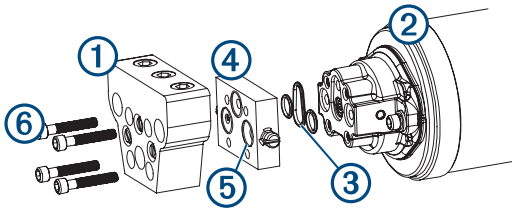
The pump has two sets of hose-connector fittings to allow for different hose configurations. You can use either set of fittings or a combination of the two. Where necessary, add hydraulic hose.

If your boat has an unbalanced cylinder steering system, you must install the optional unbalanced valve kit (*Installing the Unbalanced Valve Kit*, page 1).

Installing the Unbalanced Valve Kit

If your boat has an unbalanced cylinder steering system, you must install the optional unbalanced valve kit. The unbalanced valve kit is available from your Garmin dealer.

- 1 Remove the four screws that hold the manifold ① to the pump body ②, and remove the manifold from the pump body.



- 2 Replace the O-rings on the pump body with the O-rings included in the unbalanced kit ③.
- 3 Place the unbalanced valve ④ between the pump body and the manifold, with the O-rings on the unbalanced valve ⑤ facing the manifold.
- 4 Apply a thread-locking compound to the longer screws included in the unbalanced kit ⑥, and use the screws to connect the manifold and unbalanced valve to the pump body.
- 5 Tighten the screws to 35 lbf-in. (3.95 N-m).

After the hydraulic lines are connected, you must calibrate the unbalanced valve ([Calibrating the Unbalanced Valve](#), page 3).

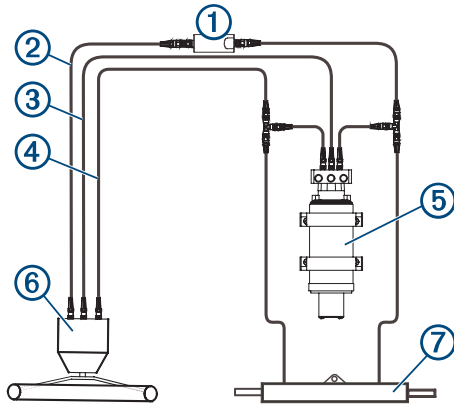
Hydraulic Layouts

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.

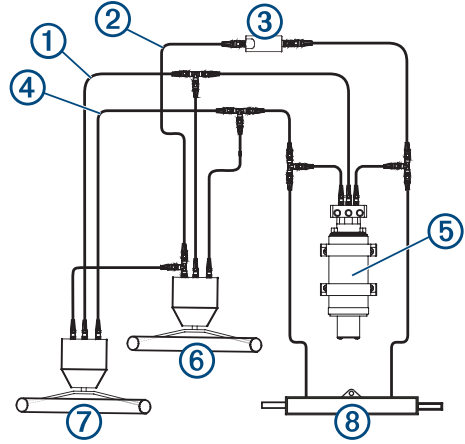
Before you start the pump installation, identify the type of hydraulic steering system in your boat. Each boat is different, and you must consider certain aspects of the existing hydraulic layout before deciding where to mount the pump.

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	If your boat has an unbalanced cylinder steering system, you must install the optional unbalanced valve kit (Installing the Unbalanced Valve Kit , page 1).

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. NOTE: 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	If your boat has an unbalanced cylinder steering system, you must install the optional unbalanced valve kit (Installing the Unbalanced Valve Kit , page 1).

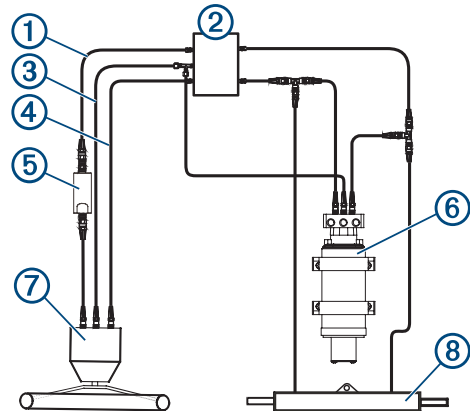
Single Helm with Power Assist Layout

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. NOTE: 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	If your boat has an unbalanced cylinder steering system, you must install the optional unbalanced valve kit (<i>Installing the Unbalanced Valve Kit</i> , page 1).

Connecting the Hydraulic Lines to the Pump

For assistance, see the layout diagrams (*Hydraulic Layouts*, page 2).

- 1 Disconnect the necessary lines from the hydraulic system.
- 2 Add a T-connector to the starboard and port lines of the system between the helm and the steering cylinder.
NOTE: If the boat has a power-assist module, you must add the T-connectors between the power-assist module and the steering cylinder.
- 3 Complete an action:
 - If the boat does not have a return line connected to the helm, add enough hydraulic hose to connect the return fitting on the helm to the center pump fitting.
 - If the boat has a return line connected to the helm, add a T-connector to the return line. If the return line is connected to a power-assist module, you must add the T-connector to the return line between the power-assist module and the helm.
- 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 line T-connectors to the appropriate pump fittings, as shown in the layout diagram for your hydraulic configuration.
- 6 Install the Shadow Drive valve in the port or starboard hydraulic line 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.

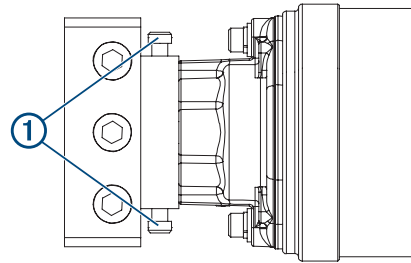
Configuration and Service

Calibrating the Unbalanced Valve

Before you can calibrate the unbalanced valve, you must connect all hydraulic lines to the pump.

If you installed the optional unbalanced valve kit because your boat has an unbalanced cylinder steering system, you must calibrate the valve.

- 1 Locate the brass calibration screws ① on the sides of the unbalanced valve body.



- 2 Tighten both of the calibration screws until they stop turning.
- 3 Measure the distance that each screw protrudes from the valve body.
- 4 If the length of the head of each screw protruding from the valve body is not the same, loosen the shorter screw until the length of both protruding screws is the same.
- 5 Unscrew each screw by two and one-half turns.

Engaging and Disengaging the Shutoff Valves

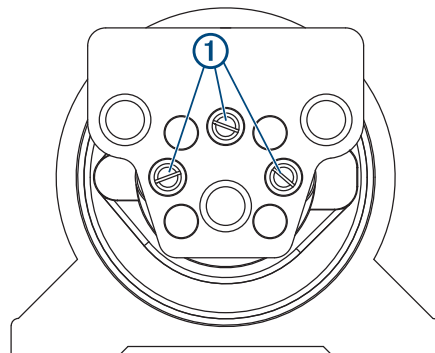
NOTICE

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 engaged, 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.

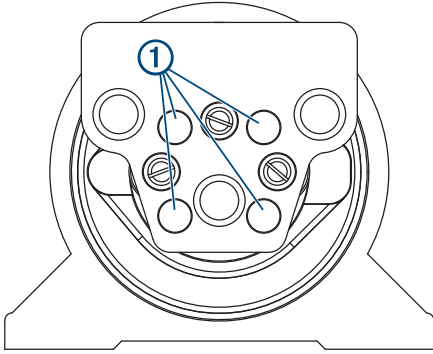
Removing the Pump from the Manifold

⚠ CAUTION

Do not get any dirt or debris in the pump or the manifold when the parts are disconnected. Any dirt or debris inside the pump or the manifold can cause steering malfunction, up to and including loss of steering.

Before you can remove the pump from the hydraulic system, you must engage the shutoff valves (*Engaging and Disengaging the Shutoff Valves*, page 3).

- 1 Remove the socket-head cap screws ① that connect the manifold to the pump.



- 2 Disconnect the pump cables from the ECU.
- 3 Remove the pump from the mounting location.

Reconnecting the Pump to the Manifold

- 1 Mount the pump in the original mounting location.
- 2 Connect the pump cables to the ECU.
- 3 Connect the manifold to the pump using the four socket-head cap screws.
- 4 Disengage the shutoff valves (*Engaging and Disengaging the Shutoff Valves*, page 3).

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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