GARMIN.

GHP™ Compact Reactor™ Hydraulic Configuration Guide

The autopilot system must be configured and tuned to your boat dynamics. The Dockside Wizard and the Sea Trial Wizard are used to configure the autopilot. These wizards walk you through the necessary configuration steps.

If your autopilot package did not contain a helm control, you must configure the autopilot system using a compatible chartplotter on the same NMEA 2000® network as the autopilot CCU. Instructions for configuration using either the helm control or a chartplotter are provided.

Dockside Wizard

> **NOTICE**
> If you perform the Dockside Wizard while your boat is out of the water, provide rudder-movement clearance to avoid damage to the rudder or other objects.

You can complete the Dockside Wizard while the boat is in or out of the water.

If the boat is in the water, it must be stationary while you complete the wizard.

Performing the Dockside Wizard

> **NOTICE**
> If you have a boat with a power assist steering system, turn on the power assist steering system before performing the Dockside Wizard to avoid damaging the steering system.

1 Turn on the autopilot.

  The first time you turn on the autopilot, you are prompted to complete a short setup sequence.

2 If the **Dockside Wizard** does not start automatically after the setup sequence, select an option:
  - On a helm control, select **Menu** > **Setup** > **Dealer Autopilot Setup** > **Wizards** > **Dockside Wizard**.
  - On a chartplotter, select **Settings** > **My Vessel** > **Autopilot Installation Setup** > **Wizards** > **Dockside Wizard**.

3 Select the vessel type.

4 Test the steering direction (*Testing the Steering Direction*, page 1).

5 If necessary, select the speed source (*Selecting a Speed Source*, page 1).

6 If necessary, verify the tachometer (*Verifying the Tachometer*, page 1).

7 Test the helm lock-to-lock.

8 Review the results of the **Dockside Wizard** (*Reviewing the Results of the Dockside Wizard*, page 1).

Testing the Steering Direction

1 While moving at a low rate of speed, select ❮ and ❯.

  When you select ❮, the rudder must turn the boat to the left. When you select ❯, the rudder must turn the boat to the right.

2 Select **Continue**.

3 Select an option:
  - If the steering test turns the boat in the correct direction, on a helm control, select **Yes**.
  - If the steering test turns the boat in the correct direction, on a chartplotter, select **Next**.

  - If the steering test turns the boat in the opposite direction, on a helm control, select **No**, and repeat steps 1 though 3.
  - If the steering test turns the boat in the opposite direction, on a chartplotter, select **Switch Direction**, and repeat steps 1 though 3.

Selecting a Speed Source

Select an option:
  - If you connected one or more NMEA 2000 compatible engines to the NMEA 2000 network, on a helm control, select **Tach. - NMEA 2000 or Proprietary**.
  - If you connected one or more NMEA 2000 compatible engines to the NMEA 2000 network, on a chartplotter, select **Tachometer**.
  - If NMEA 2000 tachometer data source is not available from one or more engines, or is unusable, select **GPS** as a speed source.
  - If you did not connect a NMEA 2000 tachometer or GPS device as a speed source, select **None**.

    NOTE: If the autopilot does not perform well using **None** as the speed source, Garmin® recommends connecting a tachometer through the NMEA 2000 network or using a GPS device as the speed source.

Verifying the Tachometer

This procedure does not appear when GPS or None is selected as the speed source.

  With the engine (or engines) running, compare the RPM readings on the helm control with the tachometer (or tachometers) on the dashboard of your boat.

  If the RPM numbers do not align, there may be a problem with the NMEA 2000 speed source or connection.

Reviewing the Results of the Dockside Wizard

The values you chose when you ran the Dockside Wizard are displayed.

1 Examine the results of the **Dockside Wizard**.

2 Select any incorrect value.

3 Correct the value.

4 Repeat steps 2 and 3 for all incorrect values.

5 When you are finished reviewing the values, select **Done**.

Sea Trial Wizard

The Sea Trial Wizard configures the fundamental sensors on the autopilot, and it is extremely important to complete the wizard in conditions appropriate for your boat.

Important Sea Trial Wizard Considerations

The Sea Trial Wizard must be completed in calm water. Because the nature of calm water is relative to the size and shape of the boat, before you begin the Sea Trial Wizard, the boat must be in an appropriate location.

- The boat must not rock while sitting still or moving very slowly.
- The boat must not be significantly affected by the wind.

While completing the Sea Trial Wizard, observe these considerations.

- Weight on the boat must remain balanced. While completing any of the steps in the Sea Trial Wizard, do not move around on the boat.

Performing the Sea Trial Wizard

1 Drive your boat to an open area of calm water.

2 Select an option:
  - On a helm control, select **Menu** > **Setup** > **Dealer Autopilot Setup** > **Wizards** > **Sea Trial Wizard**.

- On a chartplotter, select **Settings** > **My Vessel** > **Autopilot Installation Setup** > **Wizards** > **Sea Trial Wizard** > **Begin**.

3 Select an option:
- On a planing-hull power boat with the speed source set to **Tach. - NMEA 2000 or Proprietary** or **Tachometer**, configure the planing RPM.
- On a planing-hull power boat with the speed source set to **GPS**, configure the planing speed.
- On a power boat with the speed source set to **Tach. - NMEA 2000 or Proprietary**, **Tachometer**, or **GPS**, configure the high RPM limit.
- On a power boat with the speed source set to **GPS**, configure the maximum speed.

4 Calibrate the compass (*Calibrating the Compass*, page 2).
5 Perform the **Autotune** procedure (*Performing the Autotune Procedure*, page 2).
6 Set north (*Setting North*, page 2) if GPS-heading information is available, or set the fine heading adjustment (*Setting the Fine Heading Adjustment*, page 2) if GPS-heading information is not available.

Calibrating the Compass
1 Select an option:
- If you are performing this procedure as part of the **Sea Trial Wizard**, select **Begin**.
- If you are performing this procedure outside of the **Sea Trial Wizard** on a helm control, from the heading screen, select **Menu** > **Setup** > **Dealer Autopilot Setup** > **Compass Setup** > **Calibrate Compass** > **Begin**.
- If you are performing this procedure outside of the **Sea Trial Wizard** on a chartplotter, select **Settings** > **My Vessel** > **Autopilot Installation Setup** > **Compass Setup** > **Compass Cal.** > **Begin**.

2 Follow the directions until calibration is complete, taking care to keep the boat as steady and flat as possible.

The boat should not list during calibration.

3 Select an option:
- If the calibration completes successfully on a helm control, select **Done**.
- If the calibration completes successfully, on a chartplotter select **OK**.
- If the calibration is not successful, select **Retry** and repeat steps 1 through 3.

When the calibration is complete, a value is shown. A value of 100 indicates the CCU was installed in a perfect magnetic environment and calibrated correctly. If this value is low, you might need to relocate the CCU and calibrate the compass again.

Performing the Autotune Procedure
Before you can begin this procedure, you must have a large stretch of open water available.

1 Adjust the throttle so the boat travels at a typical cruising speed (below planing speed) that provides responsive steering.
2 Select an option:
- If you are performing this procedure as part of the **Sea Trial Wizard**, select **Begin**.
- If you are performing this procedure outside of the **Sea Trial Wizard** on a helm control, from the heading screen, select **Menu** > **Setup** > **Dealer Autopilot Setup** > **Autopilot Tuning** > **Autotune** > **Begin**.
- If you are performing this procedure outside of the **Sea Trial Wizard** on a chartplotter, select **Settings** > **My**

Vessel > **Autopilot Installation Setup** > **Autopilot Tuning** > **Autotune** > **Begin**.

The boat performs various zigzag motions while the Autotune is in progress.

3 After the procedure is finished, follow the on-screen instructions.
4 Select an option:
- If the **Autotune** procedure is not successful, but you have not reached maximum cruising speed, increase the speed and repeat steps 1 through 3 until the **Autotune** procedure completes successfully.
- If the **Autotune** procedure is not successful, and you have reached maximum cruising speed, reduce your speed to the initial **Autotune** speed and select **Alternate Autotune** to begin an alternate procedure.

When the Autotune procedure is complete, gain values are displayed. You can use these values to determine the quality of the Autotune procedure.

Autotune Gain Values
After the Autotune procedure is complete, you can review the gain values provided on the helm control. You can record these numbers for reference if you want to run the autotune procedure at a later time or if you want to manually adjust the gain settings (not recommended) (*Adjusting the Autopilot Gain Settings*, page 3).

Gain: Sets how tightly the autopilot holds the heading and how aggressively it makes turns.

Counter Gain: Sets how aggressively the autopilot adjusts any over-steering after making a turn.

Setting North
Before you can begin this procedure, you must have a large stretch of open water available.

This procedure appears if the autopilot is connected to an optional GPS device, and the device has acquired a GPS position. During this procedure, the autopilot aligns the compass heading with the Course over Ground (COG) information from the GPS device.

If you do not have a GPS device connected, you are prompted to set the fine heading adjustment instead (*Setting the Fine Heading Adjustment*, page 2).

1 Drive your boat at cruising speed in a straight line.
2 Select an option:
- If you are performing this procedure as part of the **Sea Trial Wizard**, select **Begin**.
- If you are performing this procedure outside of the **Sea Trial Wizard** on a helm control, from the heading screen, select **Menu** > **Setup** > **Dealer Autopilot Setup** > **Compass Setup** > **Set North** > **Begin**.
- If you are performing this procedure outside of the **Sea Trial Wizard** on a chartplotter, select **Settings** > **My Vessel** > **Autopilot Installation Setup** > **Compass Setup** > **Set North** > **Begin**.

3 Continue to drive the boat at cruising speed in a straight line and follow the on-screen instructions.
4 Select an option:
- If the calibration completes successfully, select **Done**.
- If the calibration is not successful, repeat steps 1 through 3.

Setting the Fine Heading Adjustment
This procedure appears only if you do not have an optional GPS device connected to the autopilot. If the autopilot is connected to a GPS device that has acquired a GPS position, you are prompted to set north instead (*Setting North*, page 2).

1. Select an option:
   - If you are performing this procedure as part of the **Sea Trial Wizard**, proceed to step 3.
   - If you are performing this calibration outside of the **Sea Trial Wizard** on a helm control, from the heading screen, select **Menu** > **Setup** > **Dealer Autopilot Setup** > **Compass Setup** > **Fine Heading Adjustment**.
   - If you are performing this calibration outside of the **Sea Trial Wizard** on a chartplotter, select **Settings** > **My Vessel** > **Autopilot Installation Setup** > **Compass Setup** > **Fine Heading Adjustment** > **Begin**.
2. Adjust the fine heading setting until it shows the correct heading as determined by a trusted heading indicator, such as the ship compass or a handheld compass.
3. Select **Back**.

Testing and Adjusting the Configuration

NOTICE

Test the autopilot at a slow speed. After the autopilot has been tested and adjusted at a slow speed, test it at a higher speed to simulate normal operating conditions.

1. Drive the boat in one direction with the autopilot engaged (heading hold).

   The boat may oscillate slightly, but it should not oscillate significantly.
2. Turn the boat in one direction using the autopilot and observe the behavior.

   The boat should turn smoothly, not too quickly or too slowly.

   When you turn the boat using the autopilot, the boat should approach and settle on the desired heading with minimal overshoot and oscillation.
3. Select an option:
   - If the boat turns too quickly or too sluggishly, adjust the autopilot acceleration limiter (*Adjusting the Acceleration Limiter Settings*, page 3).
   - If the heading hold oscillates significantly or the boat does not correct when turning, adjust the autopilot gain (*Adjusting the Autopilot Gain Settings*, page 3).
   - If the boat turns smoothly, the heading hold oscillates only slightly or not at all, the boat adjusts the heading correctly, the configuration is correct. No further adjustments are necessary.

Adjusting the Acceleration Limiter Settings

1. On a helm control, enable **Dealer Mode** (*Enabling Dealer Configuration on the Helm Control*, page 3).
2. Select an option:
   - On a helm control, from the heading screen, select **Menu** > **Setup** > **Dealer Autopilot Setup** > **Autopilot Tuning** > **Acceleration Limiter**.
   - On a chartplotter, select **Settings** > **My Vessel** > **Autopilot Installation Setup** > **Autopilot Tuning** > **Accel. Limiter**.
3. Select an option:
   - Increase the setting if the autopilot turns too quickly.
   - Decrease the setting if the autopilot turns too slowly.

   When you manually adjust the acceleration limiter, make relatively small adjustments. Test the change before making additional adjustments.
4. Test the autopilot configuration.
5. Repeat steps 2 through 4 until the autopilot performance is satisfactory.

Adjusting the Autopilot Gain Settings

The autopilot gain settings are set during the Autotune procedure. Adjusting these values is not recommended, and you should record the values set by the Autotune procedure before making any changes.

1. On a helm control, enable **Dealer Mode** (*Enabling Dealer Configuration on the Helm Control*, page 3).
2. Select an option:
   - On a helm control, from the heading screen, select **Menu** > **Setup** > **Dealer Autopilot Setup** > **Autopilot Tuning** > **Rudder Gains**.
   - On a chartplotter, select **Settings** > **My Vessel** > **Autopilot Installation Setup** > **Autopilot Tuning** > **Rudder Gains**.
3. Select an option based on the type of boat:
   - If you have a sailboat, a displacement-hull powerboat, or a powerboat with the speed source set to **None**, select **Gain** and adjust how tightly the rudder holds the heading and makes turns.

     If you set this value too high, the autopilot may be overactive and attempt to constantly adjust the heading at the slightest deviation. An overactive autopilot can drain the battery at a faster-than-normal rate.
   - If you have a sailboat, a displacement-hull powerboat, or a powerboat with the speed source set to **None**, select **Counter Gain** and adjust how tightly the rudder corrects the turn overshoot.

     If you set this value too low, the autopilot can overshoot the turn again when it attempts to counter the original turn.
   - If you have a planing-hull powerboat with the speed source set to **Tach. - NMEA 2000 or Proprietary**, **Tachometer**, or **GPS**, select **Low Speed** or **High Speed** and adjust how tightly the rudder holds the heading and makes turns at low speed or high speed.

     If you set this value too high, the autopilot may be overactive and attempt to constantly adjust the heading at the slightest deviation. An overactive autopilot can drain the battery at a faster-than-normal rate.
   - If you have a planing-hull powerboat with the speed source set to **Tach. - NMEA 2000 or Proprietary**, **Tachometer**, or **GPS**, select **Low Speed Counter** or **High Speed Counter** to adjust how tightly the rudder corrects the turn overshoot.

     If you set this value too low, the autopilot can overshoot the turn again when it attempts to counter the original turn.
4. Test the autopilot configuration, and repeat step 2 and 3 until the autopilot performance is satisfactory.

Advanced Configuration Settings

You can run the autotune process, calibrate the compass, and define north on the autopilot without running the wizards. You can also define each setting individually, without running the configuration processes.

Enabling Dealer Configuration on the Helm Control

Advanced configuration options are not available on the helm control under normal conditions. To use the advanced configuration settings of the autopilot, you must enable Dealer Mode.

Enabling Dealer Mode to use the configuration options is not necessary on a chartplotter.

1. On a helm control, from the heading screen, select **Menu** > **Setup** > **System** > **System Information**.
2. Hold the center key for 5 seconds.

   Dealer Mode appears.
3. Select **Back** > **Back**.

If the option for Dealer Autopilot Setup is available on the Setup screen, the procedure was successful.

Running the Automated Configuration Processes Manually

1 On a helm control, enable **Dealer Mode** (*Enabling Dealer Configuration on the Helm Control*, page 3).

2 Select an option:
- On a helm control, from the heading screen, select **Menu** > **Setup** > **Dealer Autopilot Setup**.
- On a chartplotter, select **Settings** > **My Vessel** > **Autopilot Installation Setup** > **Autopilot Tuning**.

3 Select an automated process:
- To start the compass calibration procedures, select **Compass Setup** > **Compass Cal.** (*Calibrating the Compass*, page 2).
- To start the procedures to define north, select **Compass Setup** > **Set North** (*Setting North*, page 2).
- To start the automatic autopilot tuning procedures, select **Autopilot Tuning** > **Autotune** (*Performing the Autotune Procedure*, page 2).

4 Follow the on-screen instructions.

Defining Individual Configuration Settings Manually

Configuring certain configuration settings may require you to modify other settings. Review the detailed configuration settings section prior to modifying any settings*Detailed Configuration Settings*, page 4).

1 On a helm control, enable **Dealer Mode** (*Enabling Dealer Configuration on the Helm Control*, page 3).

2 Select an option:
- On a helm control, from the heading screen, select **Menu** > **Setup** > **Dealer Autopilot Setup**.
- On a chartplotter, select **Settings** > **My Vessel** > **Autopilot Installation Setup**.

3 Select a setting category.

4 Select a setting to configure.

Descriptions of each setting are available in this manual (*Detailed Configuration Settings*, page 4).

5 Configure the value of the setting.

Detailed Configuration Settings

Although all of the configuration is typically completed automatically through wizards, you can manually adjust any setting to fine-tune the autopilot.

NOTE: Depending upon the configuration of the autopilot, certain settings may not appear.

NOTE: On a powerboat, each time you change the Speed Source setting, you must review the Low RPM Limit, High RPM Limit, Planing RPM, Planing Speed, or Max. Speed settings, where applicable, and you must perform the autotune procedure again (*Performing the Autotune Procedure*, page 2).

Autopilot Tuning Settings

On a helm control, select **Menu** > **Setup** > **Dealer Autopilot Setup** > **Autopilot Tuning**.

On a chartplotter, select **Settings** > **My Vessel** > **Autopilot Installation Setup** > **Autopilot Tuning**.

Acceleration Limiter: Allows you to limit the speed of autopilot-controlled turns. You can increase the percentage to limit the turn rate, and decrease the percentage to allow a higher turn rate.

Speed Source Settings

NOTE: Speed source settings are available only for power boats.

On a helm control, select **Menu** > **Setup** > **Dealer Autopilot Setup** > **Speed Source Setup**.

On a chartplotter, select **Settings** > **My Vessel** > **Autopilot Installation Setup** > **Speed Source Setup**.

Speed Source: Allows you to select the speed source.

Verify Tachometer: Allows you to compare the RPM readings on the helm control with the tachometers on the dashboard of your boat. This setting applies to the helm control only.

Planing RPM: Allows you to adjust the RPM reading on the helm control at the point when your boat transitions from displacement to planing speed. If the value does not match the value on the helm control, you can adjust the value.

Low RPM Limit: Allows you to adjust the lowest RPM point of your boat. If the value does not match the value on the helm control, you can adjust the value.

High RPM Limit: Allows you to adjust the highest RPM point of your boat. If the value does not match the value on the helm control, you can adjust the value.

Planing Speed: Allows you to adjust the planing speed of your boat. If the value does not match the value on the helm control, you can adjust the value.

Max. Speed: Allows you to adjust the maximum speed of your boat. If the value does not match the value on the helm control, you can adjust the value.

Rudder Gain Settings

NOTE: If you set these values too high or too low, the autopilot may become overactive, attempting to constantly adjust the heading at the slightest deviation. An overactive autopilot can cause excess wear on the pump and drain the battery at a faster-than-normal rate.

On a helm control, select **Menu** > **Setup** > **Dealer Autopilot Setup** > **Rudder Gains**.

On a chartplotter, select **Settings** > **My Vessel** > **Autopilot Installation Setup** > **Rudder Gains**.

NOTE: These settings apply only to displacement-hull powerboats and powerboats with the speed source set to None.

Gain: Allows you to adjust how tightly the rudder holds a heading and makes turns.

Counter Gain: Allows you to adjust how tightly the rudder corrects turn overshoot. If you set this value too low, the autopilot can overshoot a turn when attempting to counter the original turn.

NOTE: These settings apply only to planing-hull powerboats with the speed source set to Tach. - NMEA 2000 or Proprietary, Tachometer, or GPS.

Low Speed: Allows you to set the rudder gain for low speeds. This setting applies when the vessel operates below planing speed.

Low Speed Counter: Allows you to set the rudder gain counter-correction for low speeds. This setting applies when the vessel operates below planing speed.

High Speed: Allows you to set the rudder gain for high speeds. This setting applies when the vessel operates above planing speed.

High Speed Counter: Allows you to set the rudder gain counter-correction for high speeds. This setting applies when the vessel operates above planing speed.

Steering System Settings

On a helm control, select **Menu** > **Setup** > **Dealer Autopilot Setup** > **Steering System Setup**.

On a chartplotter, select**Settings** > **My Vessel** > **Autopilot Installation Setup** > **Steering System Setup**.

Allows you to set the direction the rudder must move to turn the vessel to port and to starboard. You can test and reverse the steering direction if necessary.