GARMIN®

REACTOR™ 40 SAIL WITH SMARTDRIVE™

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.

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.

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.

Learn to operate the autopilot on calm and hazard-free open water.

Use caution when operating the autopilot near hazards in the water, such as docks, pilings, and other boats.

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

Failure to install and maintain this equipment in accordance with these instructions could result in damage or injury.

When in use, beware of hot surfaces on the heat-sink and motor components to avoid possible personal injury.

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

NOTICE

Failing to recalibrate the rudder after performing maintenance or adjustments could result in damage to the device or the vessel.

Installation Preparation

The autopilot system consists of multiple components. You should familiarize yourself with all of the component mounting and connection considerations before beginning installation. You must know how the components operate together in order to correctly plan the installation on your boat.

You can consult the layout diagrams to help understand the mounting and connection considerations.

You should lay out all of the components on the boat as you plan the installation to make sure your cables will reach each component. If needed, extension cables (sold separately) for various components are available from your Garmin® dealer or from garmin.com.

You should record the serial number of each component for registration and warranty purposes.

Tools and Supplies Needed

- Safety glasses
- Drill and drill bits
- Jigsaw or a rotary cutting tool (for installing an optional helm control)
- Wire cutters/strippers
- Phillips and flat screwdrivers
- Cable ties

- Solder and water-tight heat shrink tubing or water-tight, heat-shrink, butt-splice connectors
- Dielectric grease
- Marine sealant
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- Portable or handheld compass (to test for magnetic interference)
- For annual maintenance of the SmartDrive™ actuator:
  - High-quality marine-grade grease compatible with nitrile seals for lubricating pivot points
  - AeroShell® 64 grease for lubricating the leadscrew inside the actuator tube

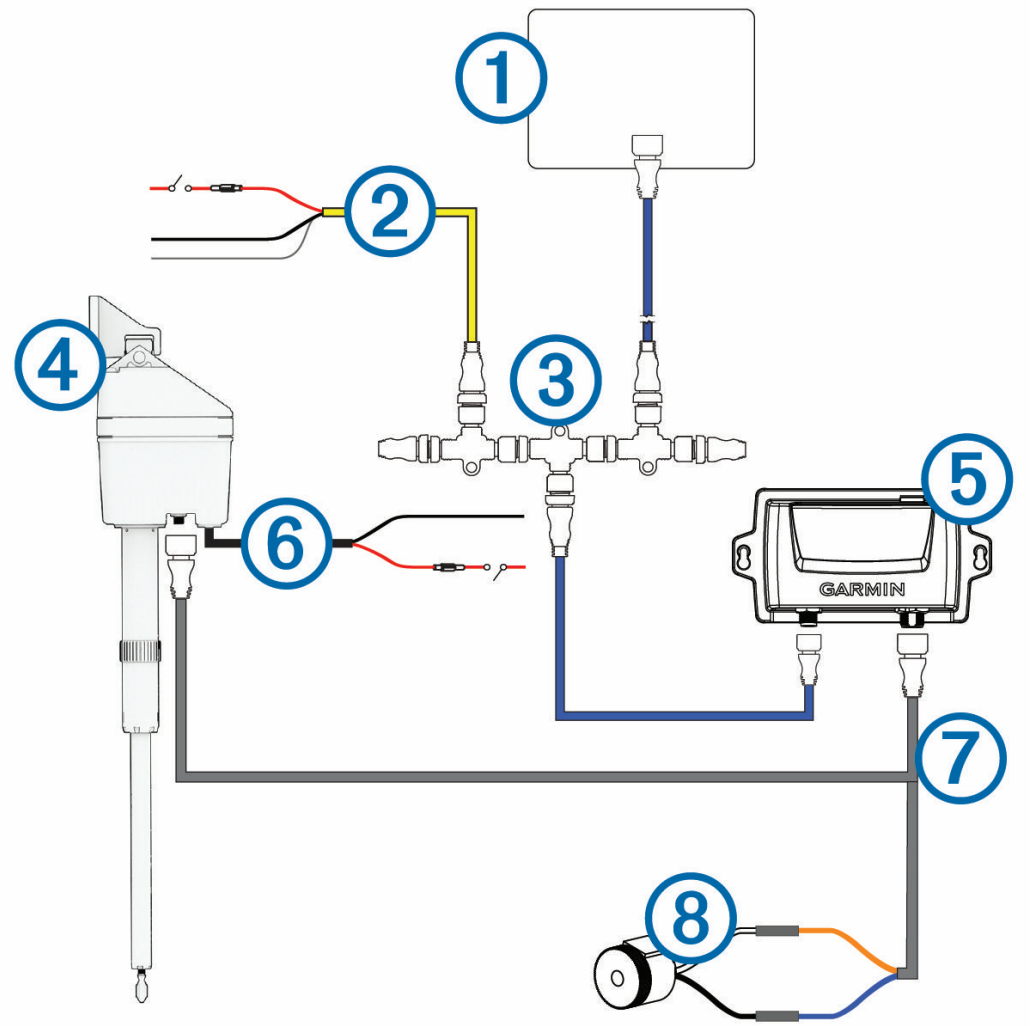
Mounting screws are provided for the main components of the autopilot system. If the provided screws are not appropriate for the mounting surface, you must provide the correct types of screws.

Power and Data Layout

⚠ WARNING

When connecting the power cable from the actuator, you must connect it to either the appropriate breaker or you must install the included fuse as described in the *SmartDrive™ Autopilot Actuator Installation Instructions*. Connecting the actuator 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.

When connecting the NMEA 2000® power cable, do not remove the inline fuse holder. To prevent the possibility of personal injury or product damage caused by fire or overheating, the included 3 A fuse must be in place. Connecting the NMEA 2000 power cable without the appropriate fuse in place voids the product warranty.



Item	Description	Important Considerations
①	Helm control	A dedicated helm control is not included in all autopilot packages. If you install the autopilot without a dedicated helm control, the autopilot CCU must be connected to the same NMEA 2000 network as a compatible Garmin® chartplotter to configure and control the autopilot system.
②	NMEA 2000 power cable	You should install this cable only if you are building a NMEA 2000 network. Do not install this cable if there is an existing NMEA 2000 network on your boat. You must connect the NMEA 2000 power cable to a 9 to 24 Vdc power source.
③	NMEA 2000 network	You must connect the helm control or compatible Garmin chartplotter and the CCU to a NMEA 2000 network using the included T-connectors (*NMEA 2000® Connection Considerations*, page 4). If there is not an existing NMEA 2000 network on your boat, you can build one using the supplied cables and connectors (*Building a Basic NMEA 2000® Network for the Autopilot System*, page 6).
④	SmartDrive actuator	
⑤	CCU	You can mount the CCU in a non-submerged location near the center of the boat, in any orientation (*CCU Mounting and Connection Considerations*, page 3). Mount the CCU away from sources of magnetic interference.
⑥	SmartDrive actuator power cable	You must connect the SmartDrive actuator to a 12 or 24 Vdc power source. To extend this cable, use the correct wire gauge according to the installation instructions provided with the SmartDrive actuator.
⑦	CCU cable	To extend this cable to reach the SmartDrive actuator, you may need to use cable extensions (sold separately) (*CCU Mounting and Connection Considerations*, page 3). You must connect this cable to the alarm.
⑧	Alarm	The alarm provides audible alerts from the autopilot system, and you should install it near the primary helm station (*Installing the Alarm*, page 5).

Mounting and Connection Considerations

The autopilot components connect to each other and to power using the included cables. Ensure that the correct cables reach each component and that each component is in an acceptable location before mounting or wiring any components.

NOTICE

Installing any of the autopilot components in an improper location may result in damage to the vessel or product, or may result in poor system performance.

CCU Mounting and Connection Considerations

- The CCU is the primary sensor of the Reactor™ 40 Sail with SmartDrive™ autopilot system. For best performance, observe these considerations when selecting a mounting location.
  - A handheld compass should be used to test for magnetic interference in the area where the CCU is to be mounted (*Testing a Location for Magnetic Interference*, page 4).
  - The CCU should be mounted on a rigid surface for best performance.
- Mounting screws are provided with the CCU. If you use mounting hardware other than the provided screws, the hardware must be quality stainless or brass material to avoid magnetic interference with the CCU.

  Test any mounting hardware with a handheld compass to make sure no magnetic fields are present in the hardware.
- The CCU cable connects the CCU to the SmartDrive actuator and is 5 m (16 ft.) long.
  - If the CCU cannot be mounted within 5 m (16 ft.) of the SmartDrive actuator, extension cables are available from your local Garmin® dealer or at garmin.com.
  - This cable must not be cut.

Finding the Best Mounting Location

1 Create a list of all suitable mounting locations for the CCU.

  Suitable mounting locations should not be within 60 cm (2 ft.) of the following:

  - Iron
  - Magnets

- High-current wires
- Intermittently-running pumps, such as head pumps and live well pumps

A large magnet, such as a subwoofer-speaker magnet, should be no closer than 1.5 m (5 ft.) to any of the mounting locations.

2. Locate the center of rotation of the boat, and measure the distance between the center of rotation and each of the suitable mounting locations you listed in step 1.
3. Select the location closest to the center of rotation.

   If more than one location is approximately the same distance from the center of rotation, you should select the location that best meets these considerations.
   - The best location is closest to the centerline of the boat.
   - The best location is lower in the boat.
   - The best location is slightly forward in the boat.

Testing a Location for Magnetic Interference

You can use a handheld compass to test a mounting location for magnetic interference.

1. Hold a handheld compass in the CCU mounting location.
2. Move the compass six inches to the left of the location, then six inches to the right, observe the needle, and select an action:
   - If the compass needle moves more than three degrees during this step, magnetic interference is present. Select a new mounting location and repeat the test.
   - If the compass needle does not move, or moves less than three degrees, proceed to the next step.
3. Repeat this process while moving the compass above and below the mounting location.
4. Repeat this process while moving the compass in front of and behind the mounting location.

SmartDrive™ Actuator Mounting and Wiring Considerations

- Before connecting the SmartDrive actuator to the rest of the autopilot system, you should securely mount the actuator and connect it to the tiller arm.
- To mount the SmartDrive actuator and connect it to power, refer to the instructions provided in the package with the actuator.

Alarm Mounting and Connection Considerations

- The alarm should be mounted near the primary helm station.
- The alarm can be mounted under the dashboard.
- If needed, the alarm wires can be extended with 28 AWG (0.08 mm^2) wire.

NMEA 2000® Connection Considerations

- The CCU and the helm control must connect to a NMEA 2000 network.
- If your boat does not already have a NMEA 2000 network, one can be built using the included NMEA 2000 cables and connectors (*Building a Basic NMEA 2000® Network for the Autopilot System*, page 6).
- To use the advanced features of the autopilot, optional NMEA 2000 devices, such as a wind sensor, a water-speed sensor, or a GPS device, can be connected to the NMEA 2000 network.

Installation Procedures

⚠ CAUTION

To avoid possible personal injury, 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 to avoid damaging the vessel.

After you have planned the autopilot installation on your boat and satisfied all of the mounting and wiring considerations for your particular installation, you can begin mounting and connecting the components.

Helm Control Installation

A dedicated helm control is not included in all autopilot packages. If you install the autopilot without a dedicated helm control, the autopilot CCU must be connected to the same NMEA 2000® network as a compatible Garmin® chartplotter to configure and control the autopilot system.

Detailed mounting instructions are included in the helm control box.

Mounting the CCU

1 Determine the mounting location.
2 Using the CCU as a template, mark the two pilot hole locations on the mounting surface.
3 Using a 3 mm ($^1/_8$ in.) bit, drill the pilot holes.
4 Use the included screws to attach the CCU to the mounting surface.

NOTICE

If you use mounting hardware other than the provided screws, the hardware must be quality stainless or brass material to avoid magnetic interference with the CCU. Magnetic interference may result in a heading error.

Test any mounting hardware with a handheld compass to make sure no magnetic fields are present in the hardware.

Connecting the CCU

1 Route the connector end of the CCU cable to the SmartDrive™ actuator and make the connection.

NOTICE

You should apply dielectric grease to the pin holes on the cable connector to prevent corrosion, especially if you are using the autopilot system in saltwater.

2 Route the orange and blue wires from the bare-wire portion of the CCU cable to the location where you plan to install the alarm (*Installing the Alarm*, page 5).

If the cable is not long enough, extend the appropriate wires with 28 AWG (0.08 mm^2) wire.

Installing the Alarm

Before you can mount the alarm, you must select a mounting location (*Alarm Mounting and Connection Considerations*, page 4).

1 Route the alarm cable to the bare-wire end of the CCU cable.

If the cable is not long enough, extend the appropriate wires with 28 AWG (0.08 mm^2) wire.

2 Using a water-tight connection method, connect the cables based on this table.

Alarm Wire Color	CCU Cable Wire Color
White (+)	Orange (+)
Black (-)	Blue (-)

3 Secure the alarm with cable ties or other mounting hardware (not included).

NMEA 2000® and the Autopilot Components

A dedicated helm control is not included in all autopilot packages. If you install the autopilot without a dedicated helm control, the autopilot CCU must be connected to the same NMEA 2000 network as a compatible Garmin® chartplotter to configure and control the autopilot system.

NOTICE

If you are connecting to an **existing** NMEA 2000 network, identify the NMEA 2000 power cable. Only one NMEA 2000 power cable is required for the NMEA 2000 network to operate properly.

A NMEA 2000 Power Isolator (010-11580-00) should be used in installations where the existing NMEA 2000 network manufacturer is unknown.

You can connect the CCU and the optional helm control through an existing NMEA 2000 network. If you do not have an existing NMEA 2000 network on your boat, all the parts needed to build one are supplied in the autopilot package (*Building a Basic NMEA 2000® Network for the Autopilot System*, page 6).

To use the advanced features of the autopilot, optional NMEA 2000 devices, such as a GPS device, can be connected to the NMEA 2000 network.

If you are unfamiliar with NMEA 2000, you should read the *Technical Reference for NMEA 2000 Products* at garmin.com/manuals/nmea_2000.

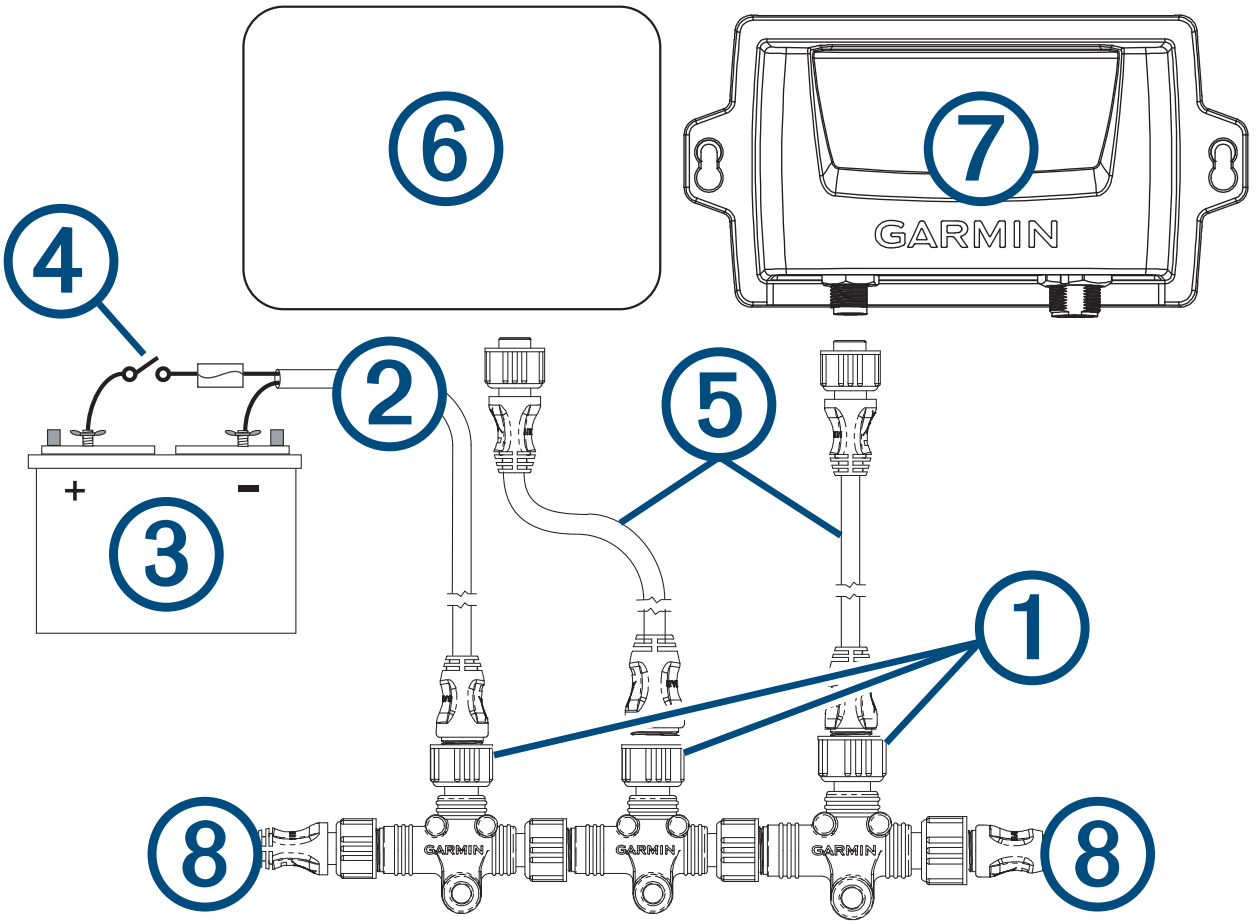
Building a Basic NMEA 2000® Network for the Autopilot System

NOTICE

If you are installing a NMEA 2000 power cable, you must connect it to the boat ignition switch or through another in-line switch. NMEA 2000 devices will drain your battery if the NMEA 2000 power cable is connected to the battery directly.

A dedicated helm control is not included in all autopilot packages. If you install the autopilot without a dedicated helm control, the autopilot CCU must be connected to the same NMEA 2000 network as a compatible Garmin® chartplotter to configure and control the autopilot system.

1 Connect the three T-connectors ① together side-by-side.



2 Connect the included NMEA 2000 power cable ② to a 9 to 12 Vdc power source ③ through a switch ④.

You should connect the power cable to the ignition switch of the boat if possible, or route it through an inline switch (not included).

NOTE: The braided drain wire (bare) on the NMEA 2000 power cable must be connected to the same ground as the black wire on the NMEA 2000 power cable for the network to function properly.

3 Connect the NMEA 2000 power cable to one of the T-connectors.

4 Connect one of the included NMEA 2000 drop cables ⑤ to one of the T-connectors and to the helm control (optional) or to a compatible Garmin chartplotter ⑥.

5 Connect the other included NMEA 2000 drop cable to the other T-connector and to the CCU ⑦.

6 Connect the male and female terminators ⑧ to each end of the combined T-connectors.

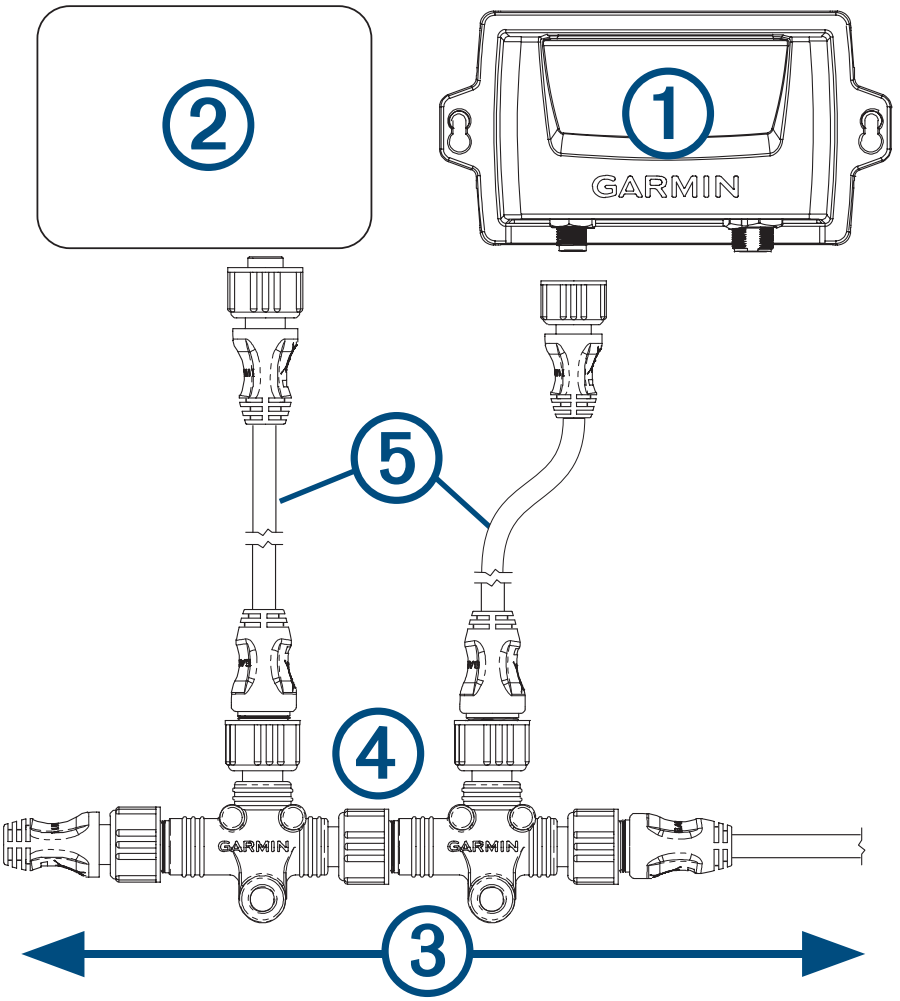
Connecting the Autopilot Components to an Existing NMEA 2000® Network

A dedicated helm control is not included in all autopilot packages. If you install the autopilot without a dedicated helm control, the autopilot CCU must be connected to the same NMEA 2000 network as a compatible Garmin® chartplotter to configure and control the autopilot system.

NOTICE

You should apply dielectric grease to the pin holes on the cable connectors to prevent corrosion, especially if you are using the autopilot system in saltwater.

1 Determine where to connect the CCU ① and the helm control (optional) ② to your existing NMEA 2000 backbone ③.



2 In the location where you plan to connect the CCU, disconnect one side of a NMEA 2000 T-connector ④ from the network.

3 If necessary, connect a NMEA 2000 backbone extension cable (not included) to the side of the disconnected T-connector to extend the NMEA 2000 network backbone.

4 Add an included T-connector for the CCU to the NMEA 2000 backbone by connecting it to the side of the disconnected T-connector or backbone extension cable.

5 Route the included drop cable ⑤ to the CCU and to the bottom of the T-connector added in step 4.

If the included drop cable is not long enough, you can use a drop cable up to 6 m (20 ft.) long (not included).

6 Connect the drop cable to the CCU and the T-connector.

7 If needed, repeat steps 2 through 6 for the helm control (optional) or a compatible Garmin chartplotter.

Connecting Optional NMEA 2000® Devices to the Autopilot System

You can use advanced features of the autopilot system by connecting optional NMEA 2000 compatible devices, such as a wind sensor or a GPS device, to the NMEA 2000 network.

1 Add an additional T-connector (not included) to the NMEA 2000 network backbone.

2 Connect the optional NMEA 2000 device to the T-connector by following the instructions provided with the device.

Configuration

The autopilot must be configured and tuned to your boat dynamics. You can use the Dockside Wizard and the Sea Trial Wizard on the helm control or a compatible Garmin® chartplotter to configure the autopilot.

See the included configuration guide for more information on configuring the autopilot.

Appendix

Specifications

CCU

Dimensions (L × W × H)	170 × 90 × 50 mm (6.7 × 3.5 × 2 in.)
Weight	200 g (7 oz.)
Temperature range	From -15° to 70°C (from 5° to 158°F)
Material	Fully gasketed, high-impact plastic
Water rating	IEC 60529 IPX7*
CCU cable length	5 m (16 ft.)
NMEA 2000® input voltage	From 9 to 24 Vdc
NMEA 2000 LEN	4 (200 mA)

The device withstands incidental exposure to water of up to 1 m for up to 30 min. For more information, go to www.garmin.com/waterrating.

Alarm

Specification	Measurement
Dimensions (L×diameter)	$^{29}/_{32}$ × 1 in. (23 × 25 mm)
Weight	2.4 oz. (68 g)
Temperature range	From 5°F to 140°F (from -15°C to 60°C)
Cable length	10 ft. (3.0 m)

NMEA 2000® PGN Information

CCU

Type	PGN	Description
Transmit and receive	059392	ISO acknowledgment
	059904	ISO request
	060928	ISO address claim
	126208	NMEA®: Command/Request/Acknowledge group function
	126464	Transmit/Receive PGN list group function
	126996	Product information
	127245	Rudder data
	127257	Transmit/Receive attitude data
	127251	Transmit/Receive rate of turn
Transmit only	127250	Vessel heading
Receive only	127258	Magnetic variation
	127488	Engine parameters: Rapid update
	128259	Water speed
	129025	Position: Rapid update
	129026	COG & SOG: Rapid update
	129283	Cross track error

Type	PGN	Description
	129284	Navigation data
	130306	Wind data

Helm Control

A dedicated helm control is not included in all autopilot packages. To view the PGN information for a helm control device, see the product owner's manual available for download at garmin.com/manuals/ghc50.

Error and Warning Messages

Error Message	Cause	Autopilot Action
Autopilot ECU Voltage is Low	The actuator supply voltage has fallen below 10 Vdc for longer than 6 seconds.	Alarm sounds for 5 seconds Continues in normal operation
Autopilot is not receiving navigation data. Autopilot will hold the current heading.	The autopilot is no longer receiving valid navigation data while performing a Route To maneuver. This message also appears if navigation is stopped on a chartplotter before the autopilot is disengaged.	Alarm sounds for 5 seconds Autopilot transitions to heading hold
Connection with Autopilot Lost	The helm control has lost connection with the CCU.	N/A
Autopilot Lost Wind Data (sailboat only)	The autopilot is no longer receiving valid wind data.	Alarm sounds for 5 seconds Autopilot transitions to heading hold
Autopilot ECU High Voltage	The actuator supply voltage has risen above 32 Vdc.	Alarm sounds for 5 seconds The ECU shuts down
Autopilot ECU Voltage has Dropped Rapidly	The SmartDrive™ actuator voltage has dropped quickly below 7.0 Vdc.	The error is cleared when the ECU voltage rises above 7.3 Vdc.
Autopilot ECU High Temperature	The SmartDrive actuator temperature has risen above 100°C (212°F).	The SmartDrive actuator shuts down
Error: Lost communication between ECU and CCU (when the autopilot is engaged)	Communication between the CCU and the SmartDrive actuator has timed out.	The helm control or chartplotter beeps, and the autopilot transitions to standby.