

1.0 Introduction

Seakeeper 3 Operation Manual

90379, Revision 6



Applicable to model serial number 3-243-5245 to Current.

2.0 System Overview

2.1 System Overview Introduction

Reference Documents

- [TB-90601 – Safe Boat Operation](#)

The Seakeeper 3 uses gyroscopic principles to dampen cyclic boat roll motions in waves and wakes. In installations involving multiple Seakeepers, each Seakeeper operates independently of one another; therefore, this manual only discusses the operation of a single unit.

Reduction of boat roll is a function of the boat's displacement, transverse metacentric height(GMT), and hull damping as well as the operating conditions (speed and heading with respect to waves) and sea state. Seakeeper's active control regulates the hydraulic brake to ensure the Seakeeper's anti-roll torque is maximized irrespective of hull characteristics or operating conditions.

Operation of the Seakeeper 3 requires mechanical, electrical, and plumbing interfaces with the boat. Figure 1 illustrates the interconnection of these components and their interface with the boat. **The Seakeeper 3 requires a connection to a display to support the Seakeeper Application; display options include a compatible MFD or optional Seakeeper 5" Touch Display.**

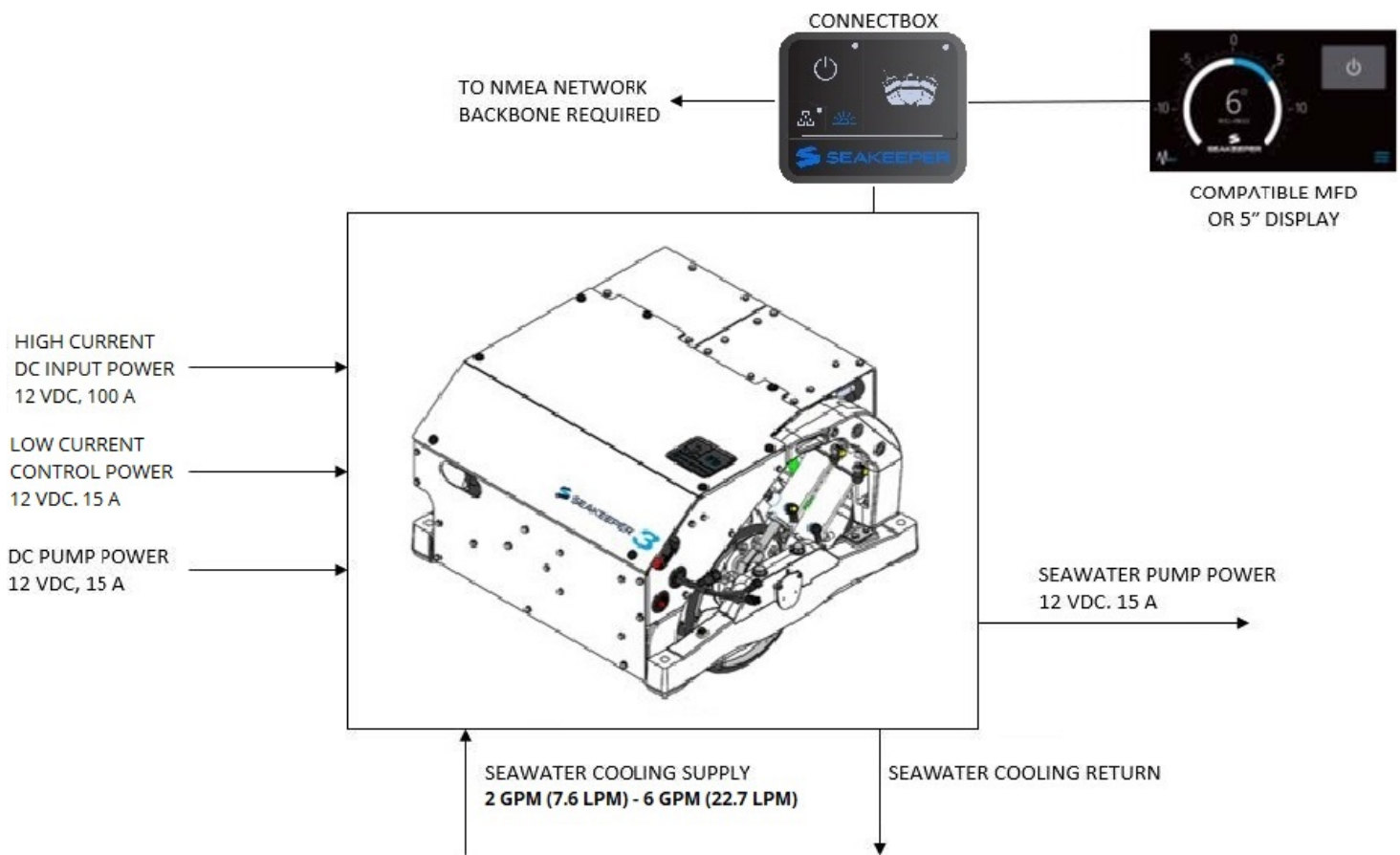


Figure 1 – Seakeeper 3 System Interfaces

Seakeeper 3 technical specifications provided in Section 6, list the power consumption, total weight, and dimensions of the major components. Gyroscopic principals that apply to boat roll control are discussed on Seakeeper’s website at www.seakeeper.com. The Seakeeper website also contains videos of Seakeeper operation and a variety of different boats operating in waves with the Seakeeper on and off. It is recommended that the reader play these videos prior to reading the remainder of this manual.

2.2 PRECAUTIONS



There is a large torque about the gimbal axis when the Seakeeper is precessing. Seakeeper cover panels are provided to prevent personnel or equipment from contacting

the Seakeeper while it is in operation.

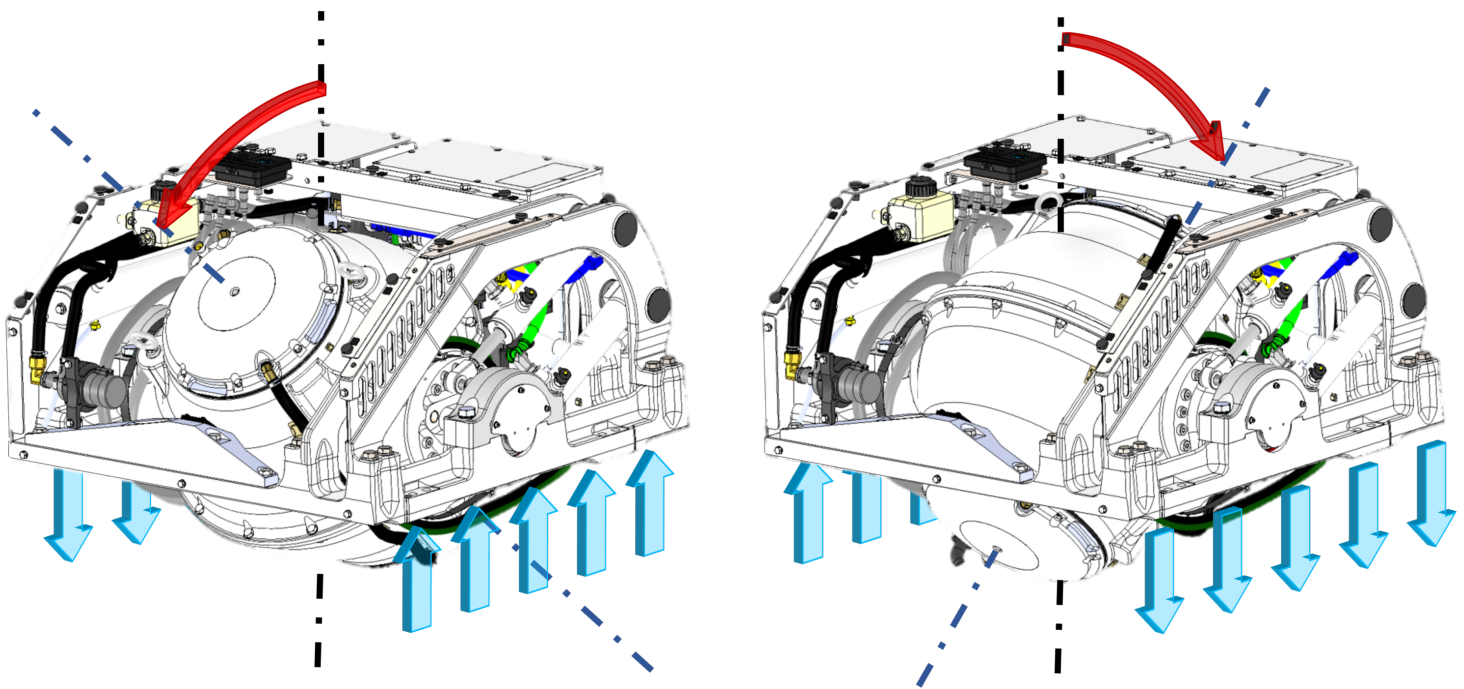
The Seakeeper covers should not be stood on or have anything placed on top. The covers should always be in place during operation.

If it is ever necessary to touch the Seakeeper while the flywheel is spinning, the Seakeeper must be locked (taken out of SEA MODE) at the display to stop the Seakeeper from precessing.

Because of remote start capabilities in some installations, Seakeeper maintenance should not be attempted unless the Seakeeper is locked, the flywheel has stopped spinning, and AC power has been disconnected for at least 10 minutes.

Seakeeper 3 technical specifications provided in Section: Specifications and Summary, list the power consumption, total weight, and dimensions of the major components. Gyroscopic principals that apply to boat roll control are discussed on Seakeeper's website at www.seakeeper.com. The Seakeeper website also contains videos of Seakeeper operation and a variety of different boats operating in waves with the Seakeeper on and off. It is recommended that the reader play these videos prior to reading the remainder of this manual.

The gimbal angle and the rate of rotation about the gimbal axis (termed precession rate) play an important role in its operation. These parameters are illustrated in the figure below. At zero degree gimbal angle, the sphere is vertical; it can precess a maximum of +/- 67 degrees about this position. The amount of torque that the Seakeeper exerts on a boat's hull to counter the wave induced roll is directly proportional to the precession rate. The farther the Seakeeper is from vertical (zero degrees) the lower the anti-roll torque. The vertical arrows in Figure 2 illustrate the direction of the forces that the Seakeeper exerts on the boat's hull to damp roll motion.



ANTI-ROLLTORQUE TO STARBOARD ANTI-ROLL TORQUE TO PORT

Figure 2 – Seakeeper Precession

Seakeeper precession is actively controlled by an electronic controller and a hydraulic brake throughout each roll cycle so the Seakeeper supplies the maximum anti-roll torque and limits mechanical contact with the hard stops that limit the maximum gimbal angle travel to ± 67 degrees.

Safe Boat Operation



Boat operators are advised that the Seakeeper's sole function is to dampen a boat's cyclic roll motions. The

Seakeeper is not, and is not intended to be, a substitute for adequate hull stability about the pitch, roll and yaw axes and the Seakeeper is not designed to prevent any instability due to improper boat operation, including, without limitation, any aggressive maneuvers at high speed. During aggressive maneuvers at high speed, the Seakeeper outputs a constant pitch moment which can create a small bow-down or bow-up trim change.

Improper boat operation including, without limitation, aggressive maneuvers at high speed can result in the boat becoming unstable. If you intend to operate the boat in such a manner, you should lock the Seakeeper in the vertical position before operating the boat in that manner. This is easily accomplished by turning the boat to starboard at slow speed in the Stabilize mode. After turning to starboard for 5 seconds, turn the Stabilize mode off while continuing to turn and then go to the Service Page on the display and confirm the Gyro Angle is within +/- 10 degrees of 0 degrees.

3.0 System Operation

3.1 ConnectBox and Display Screens: Overview

Introduction

When 12 VDC power is applied to the Seakeeper, the ConnectBox will illuminate and the Seakeeper Application on the 5" Touch Display and/or MFD will initialize. If connecting the ConnectBox to an MFD, and the Seakeeper App does not appear on the MFD, please refer to appropriate Technical Bulletin to troubleshoot, at www.seakeeper.com/technical-library/ and filter for the Seakeeper 3:

- [TB-90478 – Garmin and Seakeeper Compatibility](#)
- [TB-90479 – Raymarine and Seakeeper Compatibility](#)
- [TB-90480 – NAVICO \(Simrad/Lowrance/B&G\) and Seakeeper Compatibility](#)
- [TB-90598 – Furuno and Seakeeper Compatibility](#)
- [TB-90482 – Display Screens Overview](#)
- [90569 – Seakeeper ConnectBox and Application Quick Start Guide](#)

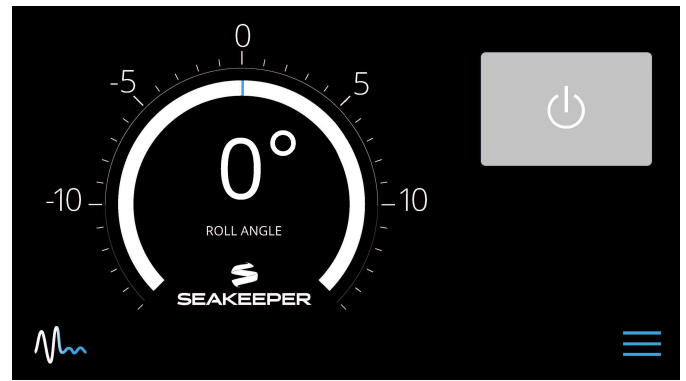
ConnectBox Overview



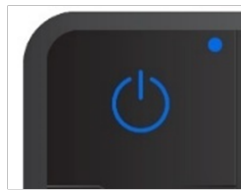
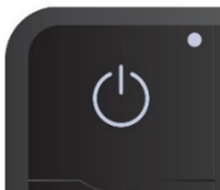
1. The ConnectBox POWER button will pulse red if the Seakeeper causes an alarm. The alarm must be addressed on the Seakeeper Application.
2. The BRIGHTNESS button  on the ConnectBox will toggle through different different brightness settings of the ConnectBox LED brightness.
3. The ETHERNET button  on the ConnectBox allows integration with Multifunction Displays (MFD). Pressing the button for several seconds will show the ConnectBox synchronization mode by strobing progress bar left or right. The progress bar is beneath the brightness and ethernet buttons. See applicable MFD and Seakeeper Compatibility technical bulletin for further information.

ConnectBox and Home Screen

1. After the Seakeeper ConnectBox and Application have initialized, the ConnectBox and Application Home Screen will be displayed as shown below.



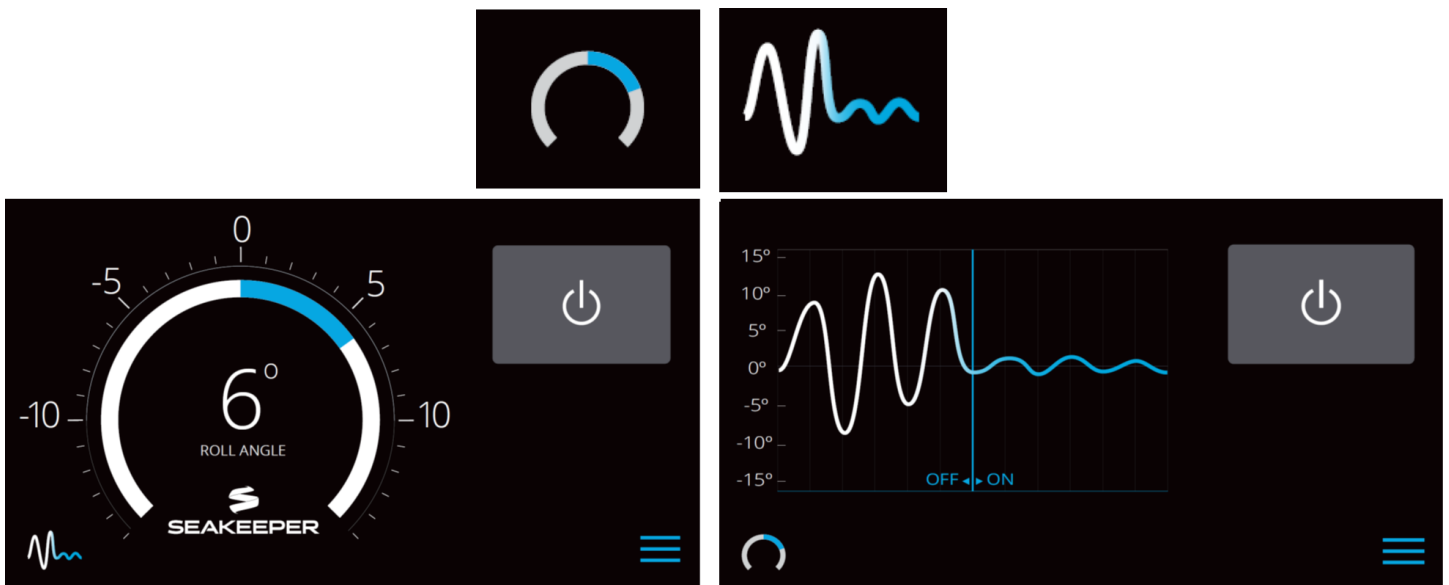
2. The Seakeeper can be controlled by either the ConnectBox (shown in images on left) or the Application on the Seakeeper 5" Touch Display or compatible MFD (shown in images on right). Seakeeper POWER button: when pressed, the button will change from grey (Seakeeper Off) to blue (Seakeeper On).



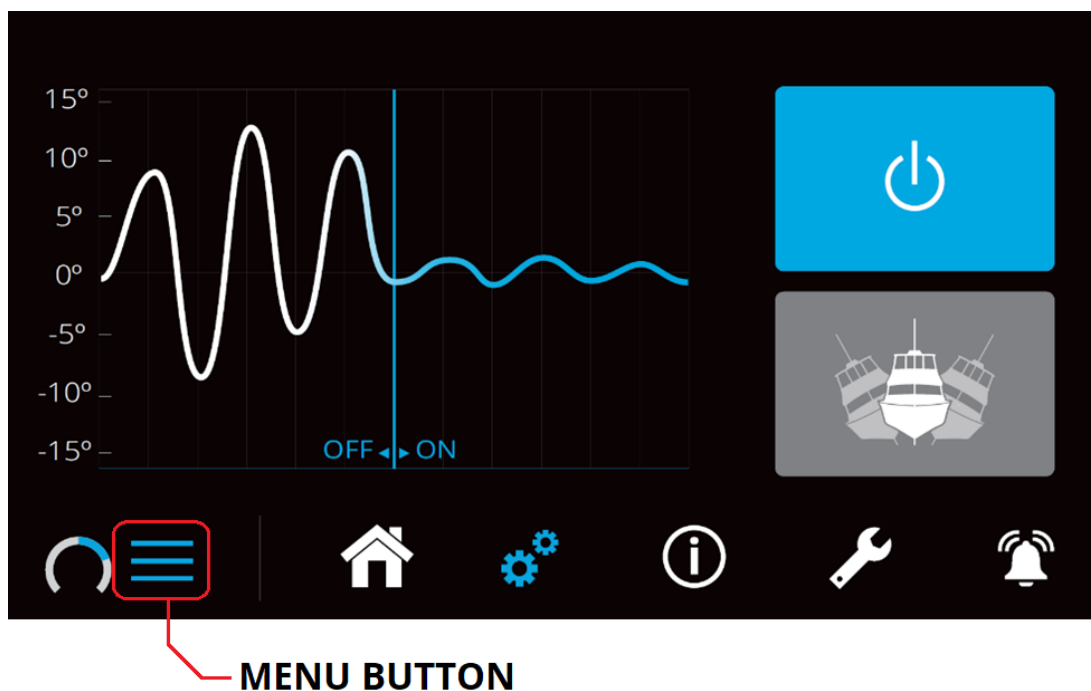
3. Seakeeper STABILIZE button: when pressed, the button will change from grey (Stabilize Off) to blue (Stabilize On).



4. On the MFD or 5" Touch Display Application Home Screen view, these buttons can be pressed to toggle Home Screen views between the Roll Angle Gauge and the Roll Angle Graph as shown below.



5. When the MENU button is pressed,  the Menu Bar will appear or disappear at the bottom of the screen.

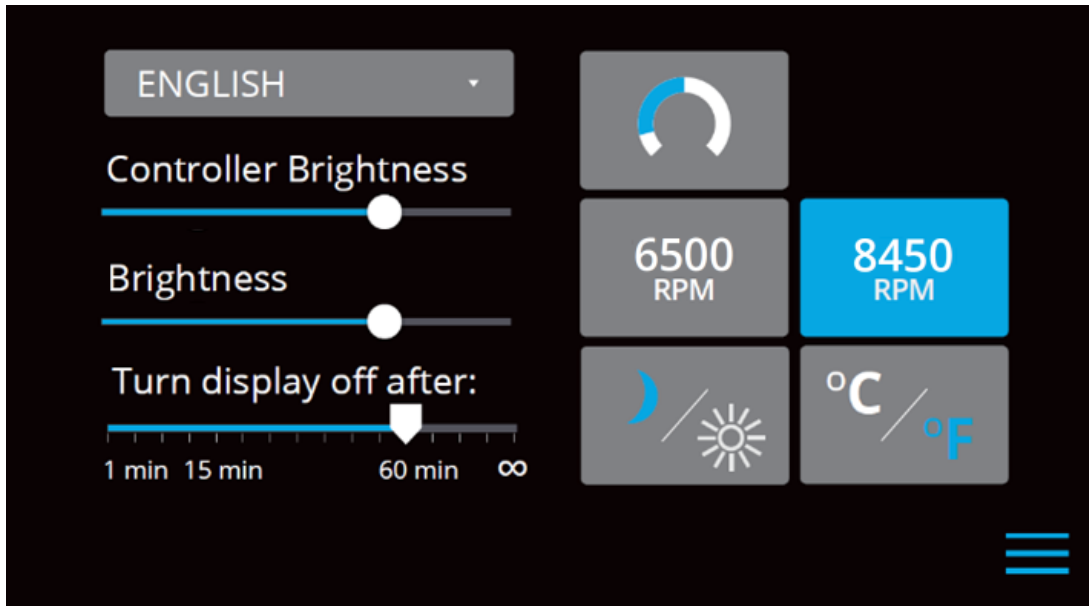


6. The Menu Bar is used to navigate between pages. From left to right, the available pages are Home, Settings, Information, Service, and Alarm History. The selected page is highlighted in blue on the Menu Bar.



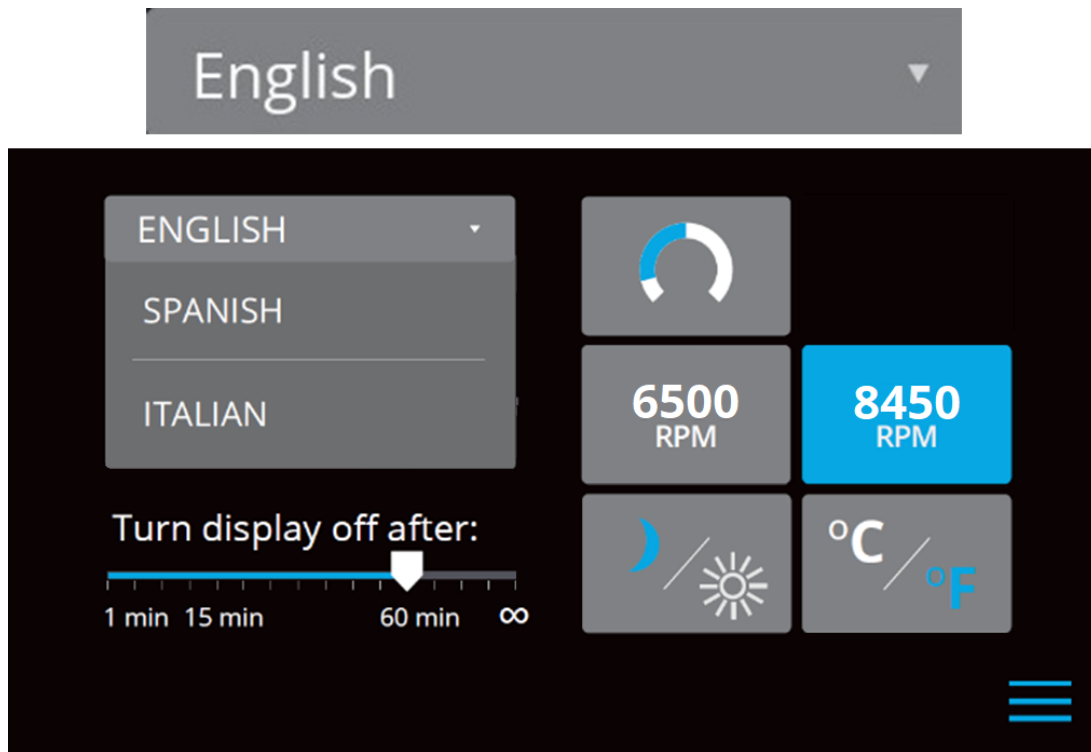
Settings Page

1. The Settings Page allows the user to adjust their preferences for the Seakeeper and its display. It can be accessed by pressing the gears  in the menu bar. Settings screen shown below is an example and may appear differently on the installed Seakeeper.



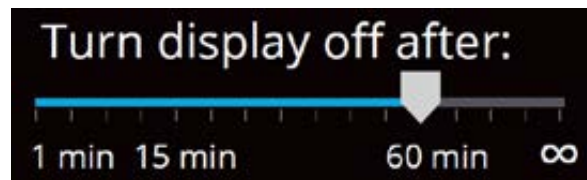
Your screen may appear differently

2. The language on the Seakeeper Application can be changed using the Settings Page. By clicking ENGLISH, a dropdown appears, and the desired language can be selected.



Your screen may appear differently

3. On the Seakeeper 5" Touch Display only, there is a sleep timer. Adjust the sleep timer from 1 minute to infinite using sleep time slider. Touching the screen will wake the display up after it has gone to sleep. The MFD should be controlled within the MFD's settings.



4. If the Seakeeper is facing the bow of the vessel, the Roll Angle Gauge should show the blue on the left (pictured left). If the Seakeeper is facing the stern of the vessel, one should select the Roll Angle Gauge with the blue on the right (pictured right). A positive roll angle should be displayed when the vessel rolls to starboard.



5. Change the speed of the Seakeeper between normal operation and low power operation. Low power mode consumes less power and should generate less noise. The

selected speed is colored blue. When power is cycled (or Seakeeper turned Off), this speed will default back to the normal higher operating speed.



6. Change the display between day and night mode. The selected mode is colored blue and to change between day and night mode, press the button.



7. Change the units of the temperatures displayed on the Service Page between degrees Celsius and degrees Fahrenheit. The selected units are colored blue.

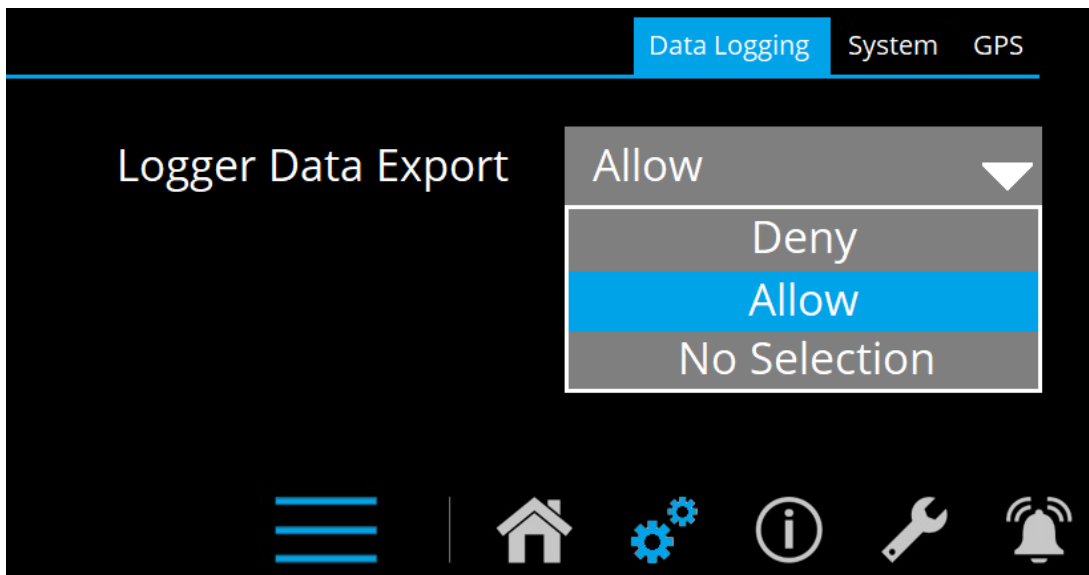


Settings Page Hidden Screen



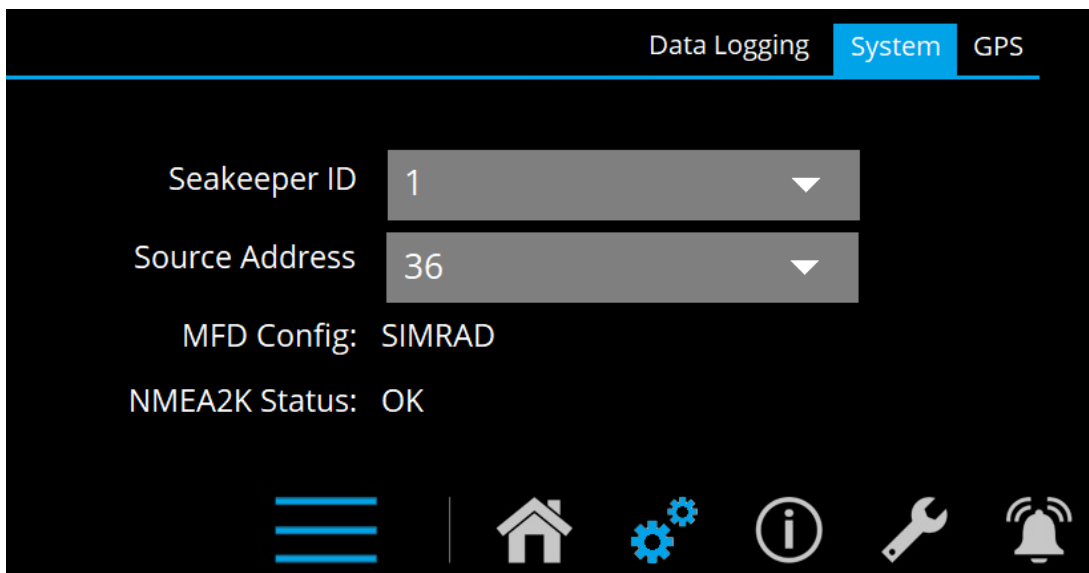
By performing a long press of the Settings icon a hidden screen will appear with tabs. The tabs include Data Logging, System, and GPS.

1. **Data Logging Tab** – This tab allows the user to select their privacy preferences concerning the sharing personal information that may be captured by the Seakeeper electronics. This data includes GPS and speed data.



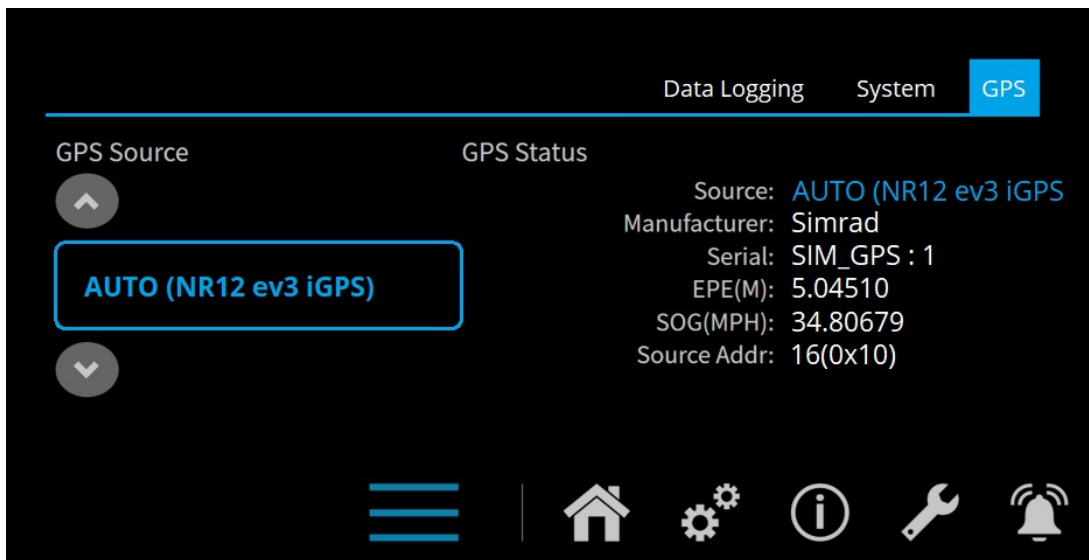
Your screen may appear differently

2. **System Tab** – The System tab displays settings programmed at installation for the MFD integration. Additionally, the user may view the Seakeeper to NMEA2000 connection status.



Your screen may appear differently

3. **GPS Tab** – The GPS tab displays the currently selected GPS device providing GPS data to the Seakeeper for enhanced operation.

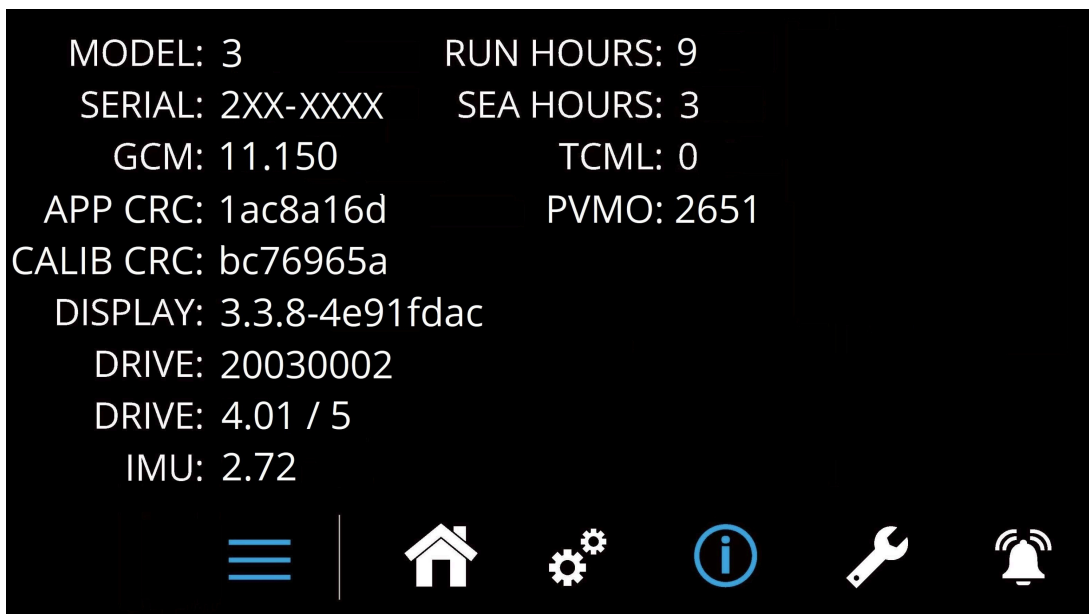


Your screen may appear differently

Information Page



The information page displays the Seakeeper Model, Serial Number, Software Versions, Run Hours, Sea Hours, and other information. **NOTE:** The image below is an example and may not match information details of installed Seakeeper.



Your screen may appear differently

Service Page

The Service Page  displays Seakeeper operating information.

MOTOR SPEED: 0 RPM

SEAKEEPER ANGLE: -1.3°

DRIVE: 82.0° F

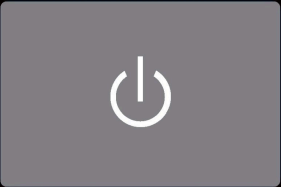
BATTERY: 12.0 V

Next Service Reminder: 1000 Run Hours

Reset Service Reminder: ☐

DRIVE CURRENT IN: 4.2 A

DRIVE VOLTAGE IN: 12.0 V











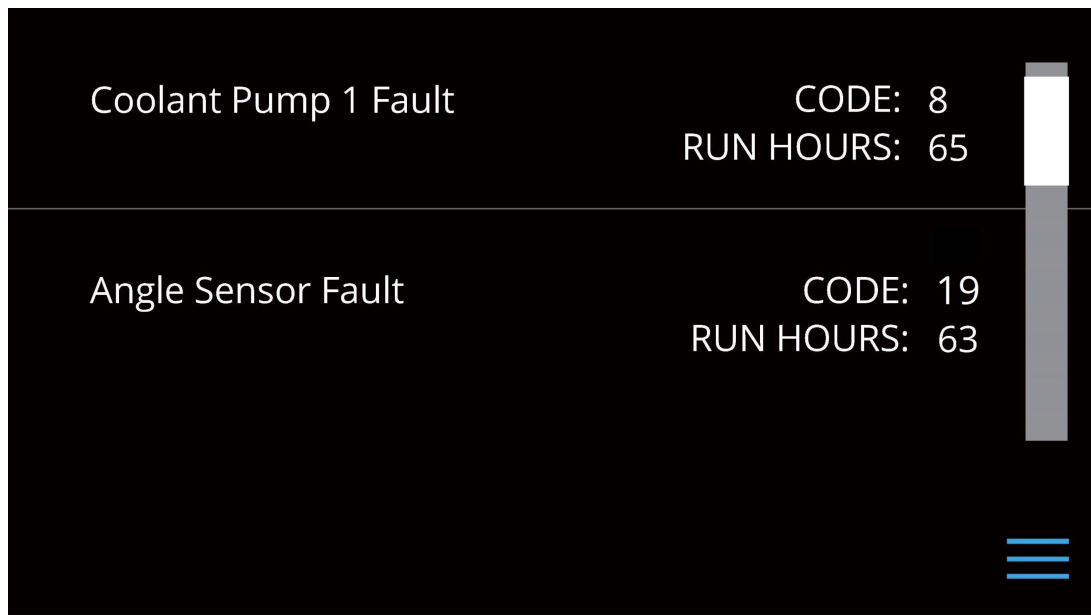




Your screen may appear differently

Alarm History Page

The Alarm History Page  shows alarms and warnings that have occurred in the past and their associated run hours. The scroll bar on the right is used to move up and down through the list.



Battery State of Charge Monitoring

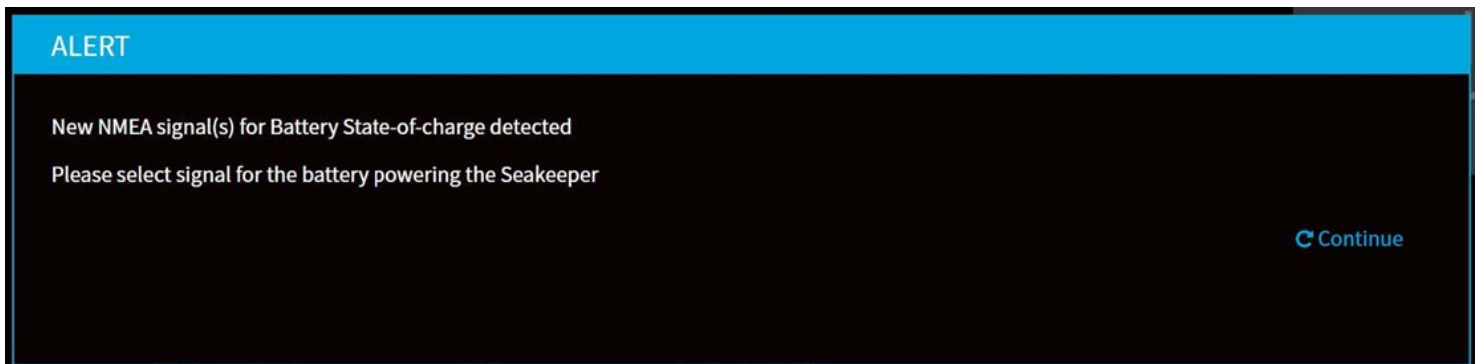
Traditional batteries have a near-linear discharge voltage curve; new Lithium batteries do not have the same voltage curve. This characteristic makes it difficult to determine the Lithium battery charge state. Seakeepers have used battery voltage depletion to initiate power ramp-downs to extend battery life. With Lithium batteries, battery voltage is no longer an accurate indicator for this function; the state of charge (SoC) NMEA 2000 signal is more accurate when available.

Seakeeper software uses the NMEA 2000 State of Charge (SoC) signal to initiate a power ramp-down when an NMEA 2000 SoC signal is available on the network—the following guides in setting the Battery Monitoring Logic of the Seakeeper.

1. Access battery monitoring configuration by one of the following methods:
 - a. Press and hold battery icon on home screen until configuration manager pop-up appears.
 - b. From SoC alert pop-up , press CONTINUE.



Battery icon on home screen



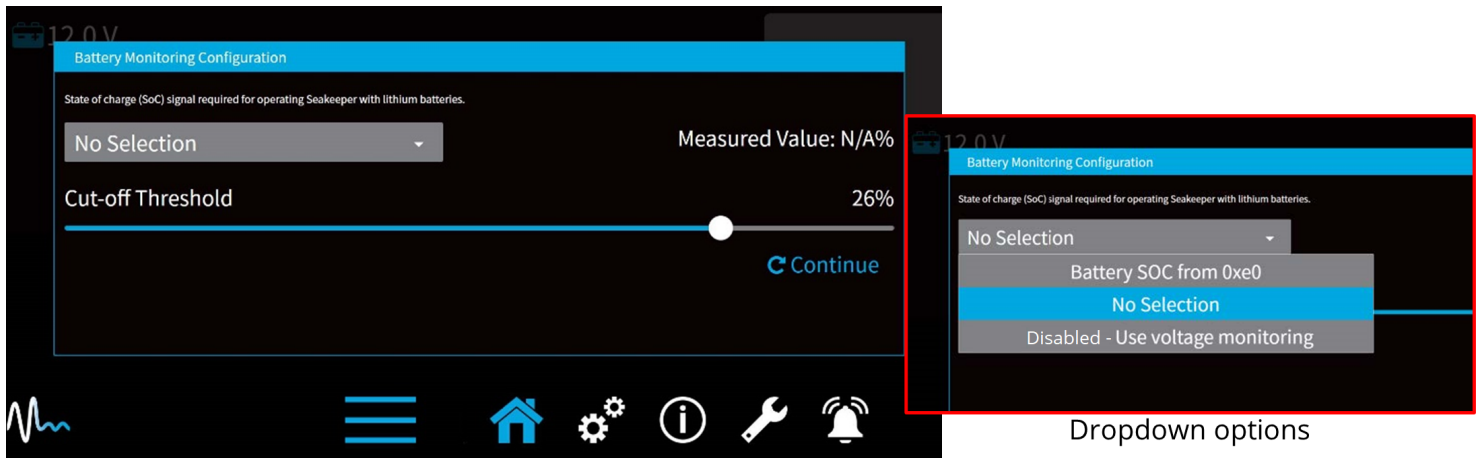
State of Charge alert pop-up

2. On Battery Monitoring Configuration window, select the appropriate selection from the dropdown menu:
 - a. *No Selection* – This is the default setting for the configuration manager.
 - b. *Disabled* – Use voltage monitoring: This disables SoC logic and uses actual battery voltage to initiate powering back of the Seakeeper when battery voltage is low.
NOTE: If Seakeeper is NOT supplied by lithium batteries, this option should be selected.
 - c. *Battery SoC from 0xE0* – This option allows the user interface to monitor the NMEA 2000 network for the battery state of charge from a battery management system monitoring the Seakeeper battery bank. (**recommended if lithium batteries are used to power the Seakeeper**).

When selected, the Cut-off threshold slider will determine at what battery charge the Seakeeper begins powering back to conserve battery power. Also, the 5" Touch Display will show battery state of charge in 20% increments beside the

battery icon on the home screen (instead of a voltage).

- d. *Battery SoC from 0xE4, etc.* – Lists all source addresses from which the NMEA SoC signal is received (Multiple battery management systems may exist; select only the battery monitor attached to the Seakeeper battery bank).



Dropdown options

Battery Monitoring Configuration screen with dropdown options

3.2 Operating Instructions

3.2.1 Start Up

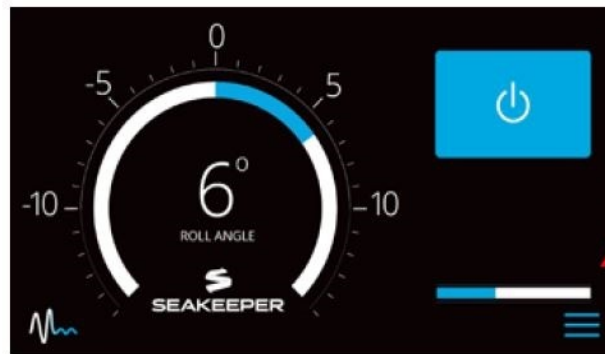
The Seakeeper should be shut down when stabilization is no longer required. This maximizes the longevity of the Seakeeper.

1. Energize Seakeeper 3 Battery Isolation Switch.
2. Energize Seakeeper 3 High Current DC Power Supply (12 VDC, 100 A) at customer-supplied circuit breaker.
3. Energize 12 VDC Seawater Pump power supply at the customer-supplied circuit breaker (unless a fuse is supplied as overcurrent protection).
4. When the high DC power is turned on, the ConnectBox and Seakeeper 5" Touch Display or MFD application will initialize as seen below. The Seakeeper 3 can be powered on and controlled by either the Seakeeper Application or the ConnectBox.



5. With system energized, check the Seakeeper display for any ALARMS. If there are any ALARMS present. Alarms must be addressed to proceed.

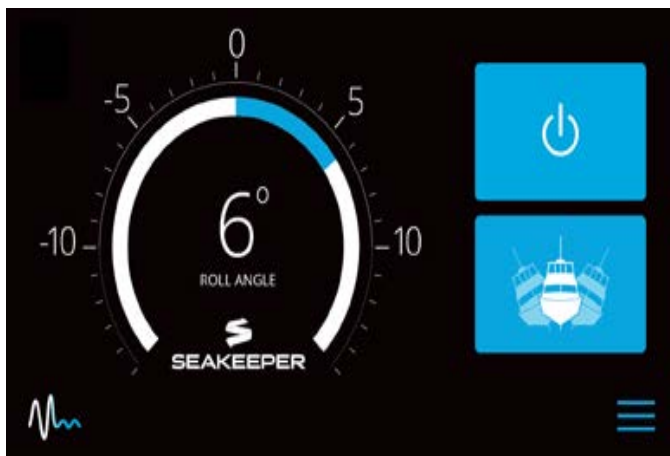
6. To turn the Seakeeper on, press the POWER button; the button will turn blue. The progress bar will appear and indicate how soon the Seakeeper will be available for stabilization. The progress bar indicates the speed of the flywheel as it accelerates to its rated operating RPM.



7. When the Seakeeper is initialized and up to Stabilization RPM the STABILIZE button will appear on the application, or if using the ConnectBox, the STABILIZE button will illuminate blue and pulsate. At this point, the Seakeeper is available for stabilization by pressing the STABILIZE button.



8. The progress bar indicating flywheel spool-up will disappear from the display screen once the STABILIZE button is pressed (turns blue) and the ConnectBox will fully illuminate. At this point, the Seakeeper has reached its rated operating RPM and maximum stabilization is available. If the STABILIZE button has not been pressed (button is grey), pressing the button will turn it blue and stabilization will be provided. The seawater pump will cycle on and off based on the operating temperature of the Seakeeper 3.



3.2.2 Stabilization



If it is necessary to shut off power to the flywheel motor and slow the flywheel for any reason, press Seakeeper On/Off button; the button will turn grey and the Stabilize button will disappear, indicating the command has been accepted. It takes approximately 8+ hours for the speed to slow down to 0 RPM.

If it is necessary to stop Seakeeper motion for any reason, press the Stabilize button. The Stabilize button will turn grey indicating that the Seakeeper is locked. Never attempt to work on the Seakeeper until the flywheel has stopped spinning. In the event that the brake system has automatically locked the Seakeeper due to an alarm or failure, no attempt should be made to bypass the alarm or automatic lock.

To stabilize the vessel after the Seakeeper is On and the flywheel is above the minimum stabilization RPM, press the STABILIZE button. The button will turn blue indicating that the Seakeeper is stabilizing the roll motion.



Boat operators are advised that the Seakeeper's sole function is to dampen a boat's cyclic roll motions. The Seakeeper is not, and is not intended to be, a substitute for adequate hull stability about the pitch, roll and yaw axes and the Seakeeper is not designed to prevent any instability due to improper boat operation, including, without limitation, any aggressive maneuvers at high speed. During aggressive maneuvers at high speed, the Seakeeper outputs a constant pitch moment which can create a small bow-down or bow-up trim change.

Improper boat operation including, without limitation, aggressive maneuvers at high speed can result in the boat becoming unstable. If you intend to operate the boat in such a manner, you should lock the Seakeeper in the vertical position before operating the boat in that manner. This is easily accomplished by turning the boat to starboard at slow speed in the Stabilize mode. After turning to starboard for 5 seconds, turn the Stabilize mode off while continuing to turn and then go to the Service Page on the display and confirm the Gyro Angle is within +10 degrees of 0 degrees.

3.2.3 Normal Shutdown

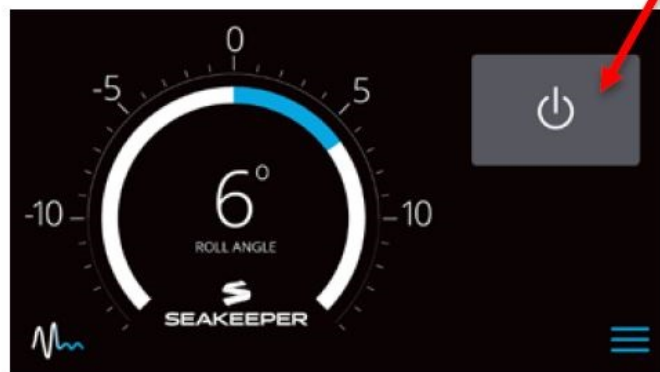


The Seakeeper should be stopped when stabilization is no longer required. Once the vessel is secured in the slip, the high and low current DC power to the Seakeeper should be switched to the Off position. The Seakeeper will continue to spool down to 0 RPM. No cooling is required during this time. Note Seakeeper will take 8+ hours to coast down to 0 RPM from full speed.

Note: The seawater pump may run for up to 5 minutes after the Seakeeper is switched off and is coasting (with low current DC power applied).

The Seakeeper should be shut down when stabilization is no longer required. This maximizes the longevity of the Seakeeper.

1. Press the Seakeeper POWER button. The POWER button will turn grey. The Seakeeper will discontinue stabilization and the flywheel will start coasting.



2. Once the vessel is secured in the slip, switch the high current and low current DC power to the Seakeeper off. The flywheel will continue to spool down to 0 RPM. This can take 8+ hours from full speed. When the flywheel has stopped spinning, 0 RPM will appear on the service screen.



MOTOR SPEED: 0 RPM
SEAKEEPER ANGLE: -1.3°
DRIVE: 82.0° F
BATTERY: 12.0 V
Next Service Reminder: 1000 Run Hours
Reset Service Reminder: ☐
DRIVE CURRENT IN: 4.2 A
DRIVE VOLTAGE IN: 12.0 V



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4.0 Power Failures, Alarms, and Troubleshooting

4.1 Power Failures and Alarms Introduction



The operator should physically examine the Seakeeper following an alarm. Continuing to reset alarms without service intervention can result in damage or personnel injury.

The Motor Connections should not be touched when the Seakeeper is Powered on, or the motor is running. This voltage hazard exists even if the flywheel is coasting down, and the supply voltage has been shut off.

The flywheel must be at Zero (0) RPM and DC input power disconnected for at least 10 minutes prior to any service work on the Seakeeper.

The Seakeeper 3 has safety features, such as alarms and warnings, that pop-up on the Seakeeper

Application and are signaled on the ConnectBox to protect the Seakeeper as well as the vessel. The brake can be locked from the Application, ConnectBox or by shutting off DC power at the supply breakers, preventing the Seakeeper from precessing.

In the event of a power failure, the brake automatically locks the Seakeeper so it cannot generate anti-rolling torque loads. When a power failure occurs, it is important to identify the three sources of power to the Seakeeper 3:

- 12 VDC high current powers the Motor Drive.
- 12 VDC low current powers the Seakeeper control electronics, ConnectBox, and optional 5" Touch Display.
- Seawater Pump 12 VDC input powers the seawater cooling pump.

These are supplied on cables which are shown on Drawing No. [90377 – Seakeeper 3 Cable Block Diagram](#).

Voltage-Related alarms include the following:

- DC INPUT VOLTAGE HIGH – Code 40
 - Alarms when low current DC input voltage varies from a reasonable range for the design voltage.
- DC INPUT VOLTAGE LOW – Code 41
 - Alarms when low current DC input voltage varies from a reasonable range for the design voltage.
- DC INPUT VOLTAGE LOW [SPEED LOSS DURING OPERATION] – Code 111
- DC INPUT VOLTAGE LOW [SLOW SPOOL UP] – Code 112
 - Code 11 and 112 occur to adjust power consumption as voltage drops below 11.1 VDC to prevent battery depletion. If battery voltage drops to 10 VDC, code 167 will trigger.
- BATTERY STATE OF CHARGE – Code 123
 - This alarm alerts the operator of a low state of charge (SoC) if the Seakeeper is receiving a SoC signal over the NMEA 2000 network and SoC based protection is

enabled in the Battery Monitor Configuration. The SoC will depend on the cut-off threshold slider setting (see Section 3.3).

- The Battery icon on the Home screen will appear red and empty.
- HIGH CURRENT DC VOLTAGE LOW – Code 167
- HIGH CURRENT DC VOLTAGE HIGH – Code 168
 - This alarm protects the Seakeeper 3 from an over-voltage of 16 VDC or higher.

4.2 12 VDC High Current Failure

If the 12 VDC high current is disconnected during operation, a notification screen will indicate “High Current DC Voltage Low”. If the failure is not corrected within two minutes, a “High Current DC Voltage Low” alarm will occur. The brake will lock.

- Verify the boat’s circuit breaker or fuse supplying +12 VDC high current has not tripped or blown.
- When +12 VDC high current is restored, operation may be restored.
- Press Power On/Off button . The progress bar will appear and indicate flywheel speed. When the flywheel is at minimum operating speed, the Stabilize button will appear so stabilization can be turned on. This may take up to 30 minutes, depending on the speed of the flywheel when the +12 VDC high current is restored.

4.3 12 VDC Failure

12VDC Low Current

If the 12 VDC low current is disconnected during operation, the display will be blank, flywheel speed will decrease, and the Seakeeper will be turned off (no stabilization).

- Verify the boat's circuit breaker or fuse supplying +12 VDC low current has not tripped or blown.
 - When +12 VDC low current is restored, the display will power up, the Splash Screen will appear, and then the Home Screen will appear.
 - Press Power On/Off button . The progress bar will appear and indicate flywheel speed. When the flywheel is at minimum operating speed, the Stabilize button will appear so stabilization can be turned on. This may take up to 30 minutes, depending on the speed of the flywheel when the +12 VDC low current is turned back on.
-

SW Pump Power

If Seawater Pump input 12 VDC power is disconnected during operation, the Seawater Pump will fail to provide cooling seawater flow when required. The resulting high temperatures would result in the Seakeeper being turned off (no stabilization) due to high temperature alarm(s).

- Verify the boat's circuit breaker or fuse supplying +12 VDC SW Pump power has not tripped or blown.
- When +12 VDC SW Pump power is restored, reset any alarm and continue Seakeeper operation.

4.4 Alarms and Notifications

Alarms

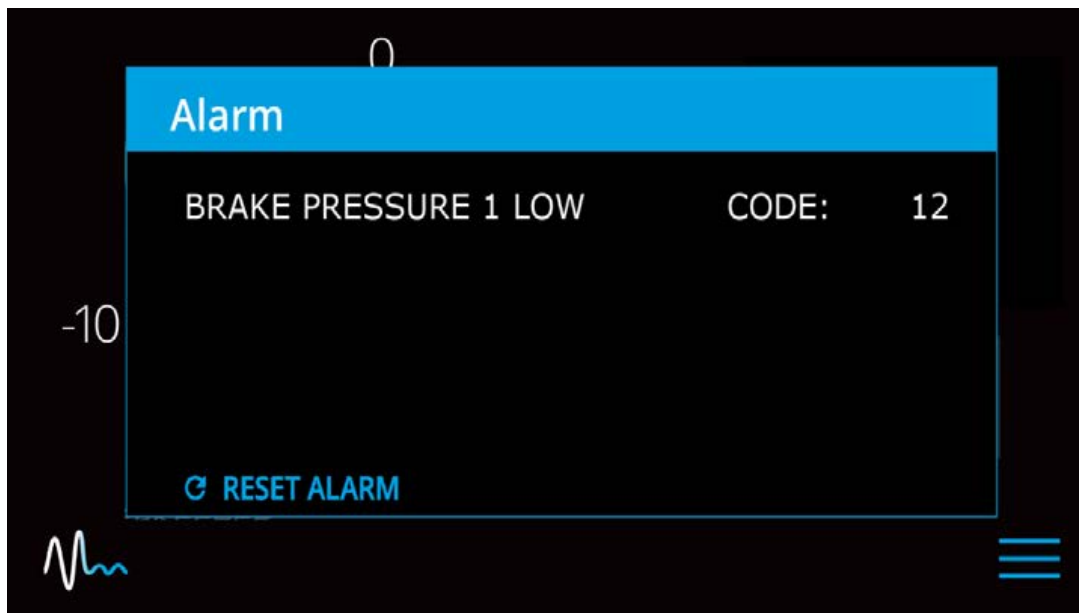


The operator should physically examine the Seakeeper following an alarm. Continuing to reset alarms without service intervention can result in damage or personnel injury.

Sensors, alarms, and shutdowns are provided to allow unattended operation. Sensors measure drive temperatures, gimbal angle, brake pressure, and vessel motion. The Seakeeper controller sends sensor values and alarm information to the display and locks the brake and shuts down the motor drive in the event of an alarm condition. Seakeeper operating history during faults or alarms is recorded in the controller's memory for subsequent recall if service is needed. Seakeeper and Seakeeper Dealers may access the Seakeeper's software to gather run hours, bearing loading, and hull slamming information.

NOTE: Only the Seakeeper 5" Touch Display or the MFD can identify and address the alarm. The alarm will not clear until the operator presses the Reset Alarm button, **AND** the alarm condition is no longer present. The operator can then press the POWER button again to resume Seakeeper operation.

- A view of a typical Alarm screen.



- To reset the alarm, press the Reset Alarm button:

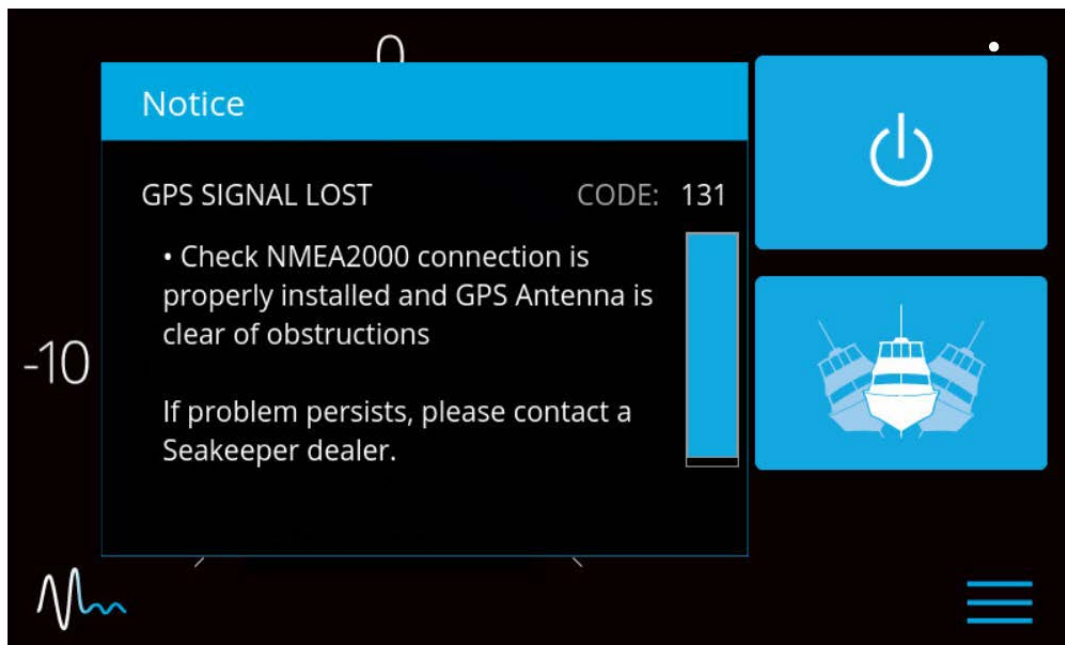
 **RESET ALARM**

Troubleshooting

1. At MFD app or 5" Touch Display, check for alarms or warnings.
 2. Power Supply: Check electrical power source breakers ON or fuses installed and NOT blown.
 3. Mechanical Components:
 - a. For temperature -related alarm, verify the coolant reservoir is filled with glycol mixture (50% ethylene glycol/50% distilled water). Verify seawater pump power aligned.
 - b. Visually check mechanical fittings and joints for leakage.
 - c. Visually check coolant and brake hoses for chaffing and leakage.
 4. Contact an authorized [Seakeeper dealer](#) for further assistance in diagnosing and resolving complex alarms.
-



If a GPS signal is lost, a warning message will appear in the Alarm History and a message will appear on the Home Screen, as seen below. The Seakeeper will not spool down, however the precession rate and angle of the sphere will be reduced until GPS signal returns.



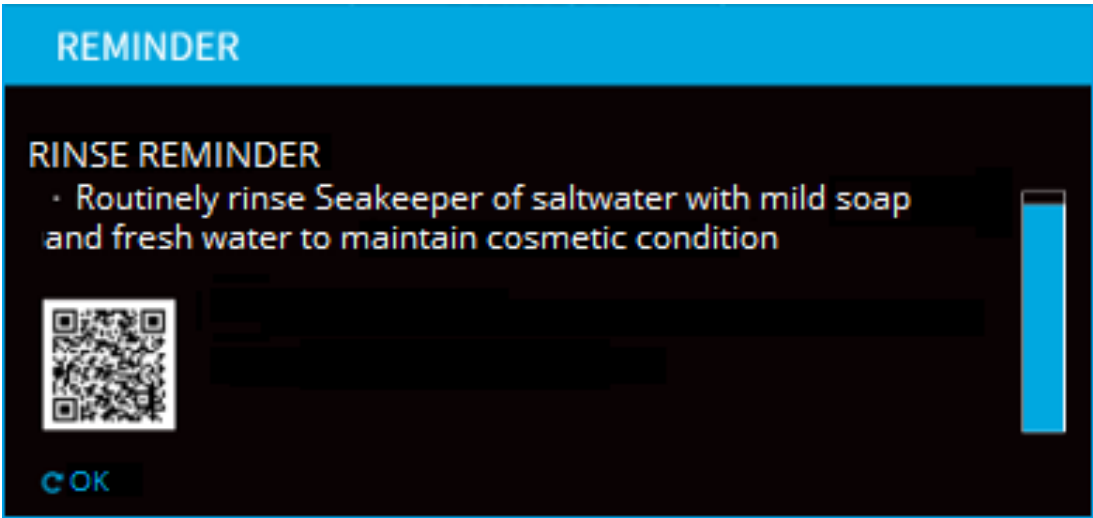
Notifications

Several notifications are programmed to pop up upon certain events. They do not affect the operation of the Seakeeper, and each notification may be dismissed or suppressed. Models produced or updated with software after September 2024 will have the following notifications:

Rinse Reminder

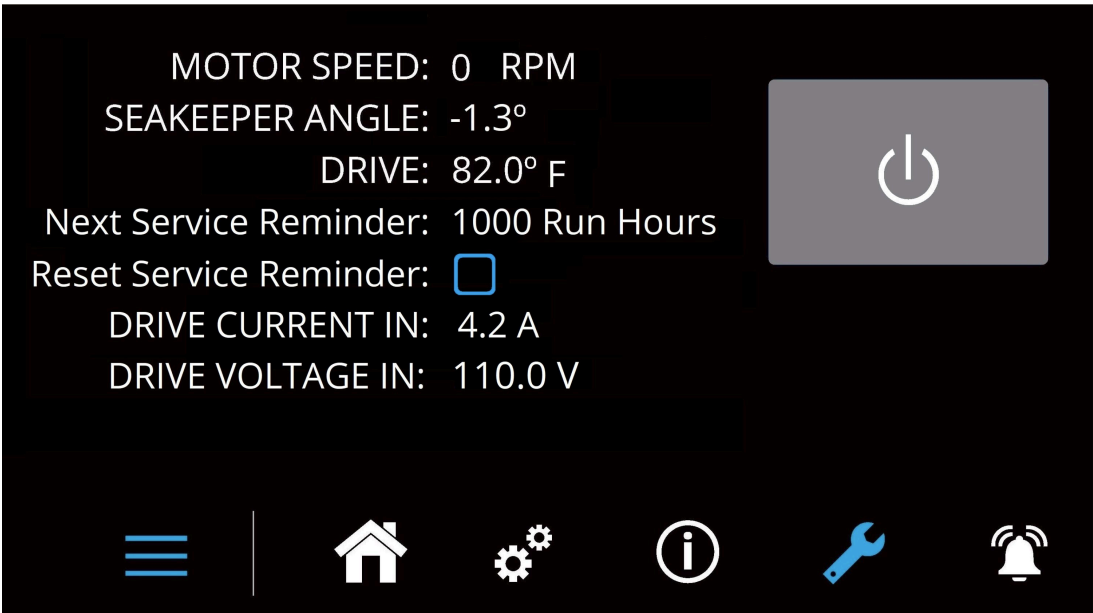
Upon pressing power button to turn OFF Seakeeper and start coast down, the Rinse Reminder notification will appear to remind the user to rinse the Seakeeper with mild soap and fresh water after use. Pressing the *OK* button will acknowledge the notification and it will not reappear until the next coast down event.

The QR code links the user to the Freshwater Rinse article on the Seakeeper website. If the Seakeeper was exposed to saltwater spray, it is desirable to rinse the Seakeeper to maintain cosmetic condition.



Maintenance Reminder

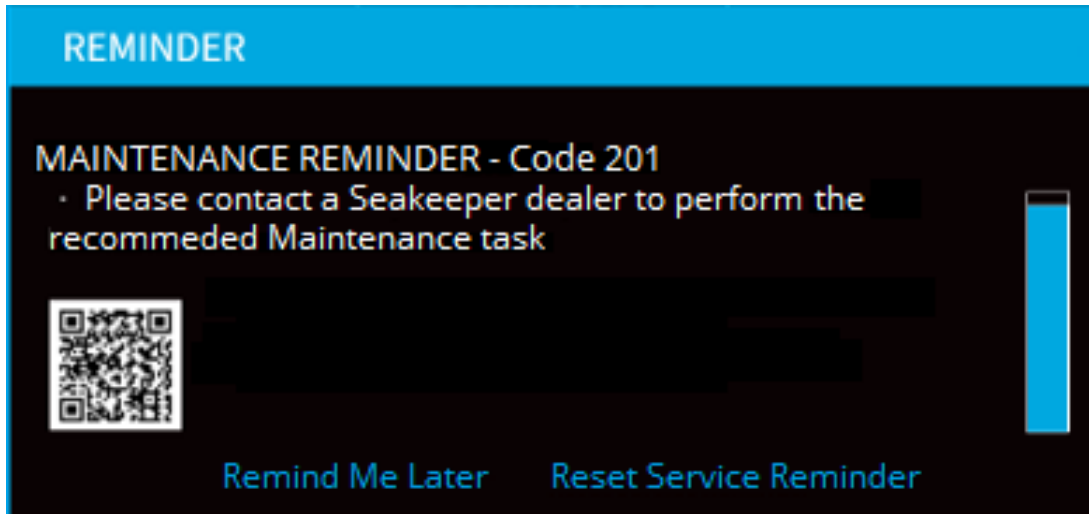
Seakeeper recommends routine service every 1000 run hours to maintain the Seakeeper in peak condition. To assist the user in Seakeeper maintenance, the Maintenance Service Reminder will appear after 1000 Run Hours has elapsed since the last reset of the Service Reminder. The “Next Service Reminder” timer can be found in the Service page, as shown below. Below the Next Service Reminder timer is the reset button that resets the timer to 1000 Run Hours.



When the timer reaches 0 Run Hours, the notification will appear in a popup on the

Seakeeper app. The user has an option to suppress the reminder until the next Seakeeper power cycle by selecting “Remind Me Later” or the user can reset the timer by selecting the “Reset Service Reminder”.

The QR code links the user to the Seakeeper Recommended Maintenance Schedule on the Seakeeper website.



Warranty Registration Reminder

Before warranty work can occur, a Seakeeper must be registered. Registering your Seakeeper before warranty service is required is recommended to allow for expedient service if needed. Registration also includes the user in any important Seakeeper notifications that may affect their unit.

At 20 Run Hours on the Seakeeper, a Registration Reminder notification will appear on the Seakeeper app. The reminder occurs only once in the life of the Seakeeper. To dismiss the reminder, press OK on the popup window. The QR link leads one to the Seakeeper warranty registration page of the Seakeeper website.

REMINDER

REGISTRATION REMINDER

- Register your Seakeeper to activate warranty



OK

4.5 Alarm History

The ALARM HISTORY page on the Seakeeper application shows the recent alarms and warnings. Alarms trigger a pop-up message to be displayed on the display or Seakeeper App. Warnings will be listed in the alarm history but do not affect Seakeeper operation. The alarms and warnings are in chronological order starting with the most recent. Warnings included in the history page are for issues that do not affect gyro operation.

Press the Menu button  to show the page options and then the ALARM button  to show alarm history.

Coolant Pump 1 Fault	CODE: 8 RUN HOURS: 65	
Angle Sensor Fault	CODE: 19 RUN HOURS: 63	



5.0 Maintenance

5.1 Maintenance Introduction

Seakeeper recommends a regular inspection interval and scheduled maintenance to keep the Seakeeper 3 running trouble-free.

If the Seakeeper is installed in a wet space, efforts should be made to keep the Seakeeper free of salt residue from either condensation or direct exposure to salt spray. If exposed, a regular wipe down and a rinse will help limit corrosion and keep the Seakeeper assembly in good cosmetic condition. Refer to [Seakeeper Care](#) article for details.

If any components of the Seakeeper or its sub-systems will be exposed to environmental temperatures where winterization is necessary for storage, reference [Seakeeper Winterization](#) article.

The Seakeeper comes standard with sealant and thread locker on applicable fasteners. When reinstalling all fasteners, use thread locker (Loctite 243 or equivalent) and sealant unless otherwise specified.

Reference Documents:

- [TB-90426 – Seakeeper Scheduled Maintenance Plan](#)
 - [TB-90747 – Seakeeper Annual Inspection](#)
 - [Seakeeper Winterization Article](#)
 - [Seakeeper Care Article](#)
-



Due to remote start capabilities of MFDs, ENSURE power removed from Seakeeper and flywheel at zero RPM at display/MFD app before removing covers.

Hydraulic Hand Pump Kit is required for servicing the brake. Pressure should NOT be relieved unless this tool is available.

5.2 Scheduled Maintenance Table

The following pages contain the scheduled maintenance table organized by systems: Mechanical, Hydraulic, Cooling, and Electrical. Recommended scheduled maintenance is not covered under warranty.

Every 200 Hours or 3 Months

Replace Zinc Anode (Seakeeper 5, 6, 9, 16, 18, 26, 35, and 40)

Every 1000 Hours or Annually

Inspect hydraulic manifold components and fittings

Inspect hydraulic cylinders and hoses

Inspect brake bushings

Inspect heat exchanger and cooling hoses

Inspect all electrical connections, cables, components

Inspect all mounting hardware/bolts

Inspect isolators, clevis assemblies, bushings, pins & clips (Seakeeper 26, 35, and 40)

Clean/Descale heat exchanger

Confirm proper seawater flow

Confirm hydraulic oil pressure (Seakeeper 2, 3, 5, 6, 9, 16, 18, 26, 35, and 40)*

Inspect and lubricate the latch assembly (Seakeeper 1)*

Every 2000 Hours

Inspect the Igus chain assembly (Seakeeper 1)*

Flush the glycol cooling circuit (Every 2000 Hours or 5 Years)*

Replace brake bushings*

Replace heat exchanger*

Replace the latch assembly (Seakeeper 1)*

- Scheduled Maintenance should be performed by a Seakeeper trained factory technician or trained technician within the Seakeeper Dealer network. Find a local Dealer on our website at [Seakeeper Dealer Locator](#).
- A Seakeeper technician or Dealer is required to perform a brake service and to replace brake bushings or other brake components. This requires a complete flush, bleed, purge and pressurization of the closed hydraulic system.

- Scheduled Maintenance and the replacement of 'wear' items are not covered by the standard warranty. Visit <https://www.seakeeper.com/standard-warranties/dc-powered-models/>.

6.0 Warranty, Limit of Liability, Property Rights

6.1 Data Privacy and Warranty

The complete Seakeeper warranty details may be found on the Seakeeper website www.seakeeper.com.

Seakeeper Data Privacy

The Default Data Setting has been activated for your Seakeeper Unit. In compliance with Seakeeper's Privacy Policy, the Default Data Setting collects pertinent data and information relative to the installed Seakeeper Unit. You are consenting to push such data and information for Seakeeper's internal usage and for service interventions. You can turn off the Default Data Setting by going to the "Settings Tab" of the Seakeeper application on the boat's Multifunction Display (MFD).

Seakeeper's current Privacy Policy indicates that Seakeeper Inc. and all its subsidiaries (collectively "Seakeeper") collect, store, and use your personal information in connection with and to provide and develop Seakeeper's products, mobile applications, services, and websites (together the "Service"). Data collected directly from your Seakeeper Unit includes, but is not limited to, the following:

- Boat speed
- Course over ground
- Latitude/Longitude (position)
- Accelerations (fore/aft, up/down, and side/side)
- Angles (roll, pitch, and yaw)
- Rates (roll, pitch, and yaw)

- Seakeeper metrics (System on/off, enclosure position, and faults)

By providing us information or using or accessing the Service you give consent to the processing, use and disclosure of your Seakeeper data and other content ("User Content"). Seakeeper will not rent or sell your information to third parties outside Seakeeper without your consent, except as noted in its Privacy Policy located at <https://www.seakeeper.com/privacy-policy>.

In addition to some of the specific uses of information we describe in our Privacy Policy, we may use information that we receive to:

- Manage your customer relationship and provide you with customer support
- Help you efficiently access your information after you sign in
- Provide, improve, test, and monitor the effectiveness of our Service
- Develop and test new products and features
- Diagnose or fix technology problems
- Enforce our terms and conditions
- Manage our business
- Perform functions as otherwise described to you at the time of collection

To set or change your Default Data Setting preference to deny sharing data, perform the following procedure.

1. At your MFD display, **OPEN** the Seakeeper application.
2. **NAVIGATE** to the Settings page (gears icon).
3. **PRESS AND HOLD** the gears icon again until a second screen appears (Figure 4).

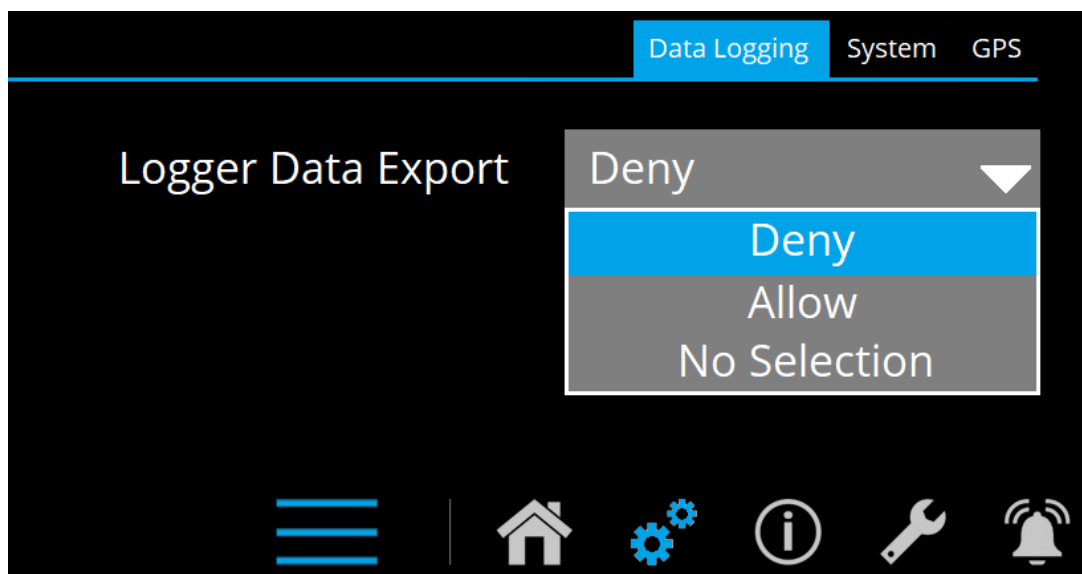


Figure 4: Hidden settings screen showing Data Logging tab

4. **SELECT** the *Data Logging* tab.
5. **SELECT** *Deny* option from the dropdown menu of Logger Data Export.

Seakeeper Warranty Policy

SEAKEEPER, INC., warrants that the product covered under this warranty (hereinafter the “Product”), when properly installed and used during this warranty term, is free from defects in material and workmanship and will perform essentially as stated in SEAKEEPER, INC.’s applicable specifications. This warranty does not cover third party equipment, hardware or software even if installed, connected or loaded into and/or onto the Product if outside the components included in the Product scope of supply.

This warranty starts from the earlier of the purchase date by the first end-user/retail purchaser or the in-service date, and the warranty period is for the shorter of the following periods:

1. 24 months (2 years) from date the Product is put into service, which shall conclusively be presumed to be the date of sale of a vessel on which the Product is installed, to a retail customer or date put into service on an existing vessel (refit), or
2. 2000 (two thousand) operating SEA hours, subject to verification and confirmation by SEAKEEPER, INC.

All Seakeeper Models

BUYER IS SOLELY RESPONSIBLE FOR ENSURING THAT GOODS ARE PROPERLY LOCATED, INSTALLED AND MAINTAINED ON VESSEL'S HULL FOUNDATION WITH AN ADEQUATE MARGIN OF SAFETY, INCLUDING, BUT NOT LIMITED TO, COMPLIANCE WITH ANY SPECIFIED LOAD-BEARING REQUIREMENTS.

EXCEPTIONS:

This warranty shall be void and not apply to defects resulting from:

1. ANY UNAUTHORIZED MODIFICATION OF THE PRODUCTS AS SHIPPED WILL RESULT IN VOIDING THIS WARRANTY.
2. An application or installation method not approved by Seller, including improper or inadequate site preparation, faulty installation, handling during maintenance or otherwise, if any, by the Customer and/or the End User, as well as to defects attributable to loading/shipment/delivery of the Product or any other defect or damage not attributable to SEAKEEPER, INC.
3. Defects resulting from Customer's or any third-party interface of equipment, hardware, or software if installed, connected or loaded into and/or onto the Product.
4. Misuse, operator error or fault caused by the failure of an external unit (i.e. Sea Water pump, Ships power supply).
5. Any gross negligence or willful misconduct.
6. Excessive exposure to water (salt or fresh) including submersion (partial or full) of any Electrical or Electronic components or major component such as the gyro sphere.
7. Acts of Nature such as, but not limited to, fire, flood, wind and lightning
8. Failure of the Customer/End User to strictly comply with any of the following requirements:
 - Operation and Maintenance according to the guidelines and recommendations specified in the SEAKEEPER, INC., Operation Manual.

- Proof of such compliance shall be provided upon request.

This express warranty is in lieu of and excludes: ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, BY OPERATION OF LAW OR OTHERWISE INCLUDING WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE (WHETHER KNOWN TO SELLER OR NOT), AND ALL OTHER SUCH WARRANTIES ARE HEREBY EXPRESSLY DISCLAIMED BY SELLER AND WAIVED BY CUSTOMER/END USER. SEAKEEPER, INC. SHALL IN NO EVENT BE LIABLE TO ANY SPECIAL, DIRECT, INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES FOR BREACH OF ANY WARRANTY OR OTHER OBLIGATION ARISING OUT OF THE SALE OF THE PRODUCTS, OR FROM THE USE OF THE PRODUCTS OR ANY INABILITY TO USE THE PRODUCTS.

Written notice of claimed defects shall have been given to SEAKEEPER within the Warranty Period, and within thirty (30) days from the date any such defect is first discovered. The Goods or parts claimed to be defective must be returned to SEAKEEPER, accompanied by a Return Authorization (RA) issued by SEAKEEPER's facility responsible for supplying Goods, with transportation prepaid by Buyer/User, with written specifications of the claimed defect.

If a warranty claim is valid, SEAKEEPER, INC. will repair or replace the Product, or part of the Product, proven to be defective, at its sole discretion, in a timeframe provided by SEAKEEPER, INC., on a reasonable best effort basis.

Under no circumstances shall SEAKEEPER be liable for removal of SEAKEEPER's Goods from Buyer's/User's equipment or re-installation into Buyer's/User's equipment. No person including any agent, distributor, or representative of SEAKEEPER is authorized to make any representation or warranty on behalf of SEAKEEPER concerning any Goods manufactured by SEAKEEPER.

Warranty Activation

A Warranty Registration must be fully completed and sent to SEAKEEPER, INC., for review, approval and registration upon delivery of the vessel to the first retail customer. Warranty registration and expiration date confirmation can be achieved by providing SEAKEEPER, INC., a copy of the original bill of sale, purchase agreement, Owner's name, address and SEAKEEPER Stabilizer Serial Number along with current RUN / SEA hours to SEAKEEPER's warranty registration department within thirty (30) days of purchase. For removal of doubt, it is clarified that the activation date shall in no event affect the warranty period set forth herein. Registering your Seakeeper can be performed online at

<https://www.seakeeper.com/extended-warranty/register-your-seakeeper/>

“Owner” is defined as the first retail customer (purchaser), or subsequent customer (by transfer), of the SEAKEEPER Product as identified in SEAKEEPER warranty registration(s).

6.2 Limitation of Liability

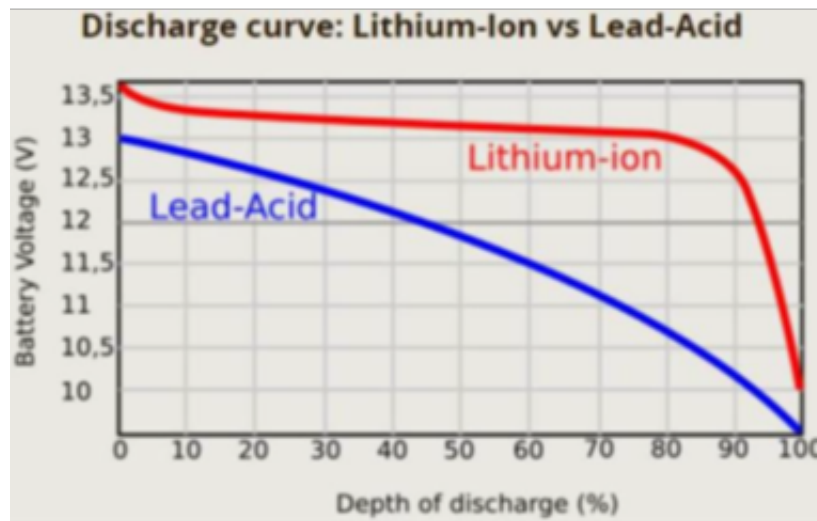
NOTWITHSTANDING ANYTHING CONTAINED HEREIN TO THE CONTRARY, SEAKEEPER, INC., SHALL NOT BE LIABLE FOR ANY SPECIAL, PUNITIVE, INCIDENTAL, INDIRECT OR CONSEQUENTIAL DAMAGES INCLUDING, BUT NOT LIMITED TO, LOST PROFITS, ARISING OUT OF THE PERFORMANCE, DELAYED PERFORMANCE OR BREACH OF PERFORMANCE OF THIS ORDER REGARDLESS OF WHETHER SUCH LIABILITY IS CLAIMED IN CONTRACT, EQUITY, TORT OR OTHERWISE, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGES. SEAKEEPER, INC.'S OBLIGATION IS LIMITED SOLELY TO REPAIRING OR REPLACING (AT ITS OPTION AND ONLY AS SET FORTH HEREIN), AT ITS APPROVED REPAIR FACILITY, ANY GOODS OR PARTS WHICH PROVE TO SEAKEEPER, INC.'S SATISFACTION TO BE DEFECTIVE AS A RESULT OF DEFECTIVE MATERIALS OR WORKMANSHIP, IN ACCORDANCE WITH SEAKEEPER, INC.'S STATED WARRANTY. IN NO EVENT SHALL SEAKEEPER, INC.'S CUMULATIVE LIABILITY EXCEED THE TOTAL PURCHASE PRICE SET FORTH IN THIS ORDER.

6.3 Property Rights

Except where otherwise expressly agreed, all patterns, tools, jigs and fixtures, drawings, designs, software and other materials and data developed, fabricated by Seakeeper shall be and shall remain Seakeeper's property. Except as specifically provided for in the order, Buyer shall have no right in any technical data, Intellectual Property Rights, and computer software associated with the order. Buyer shall not use or permit the use of the Goods that in any way could result in the disclosure of Seakeeper's proprietary information.

3.3 Battery Monitor Configuration

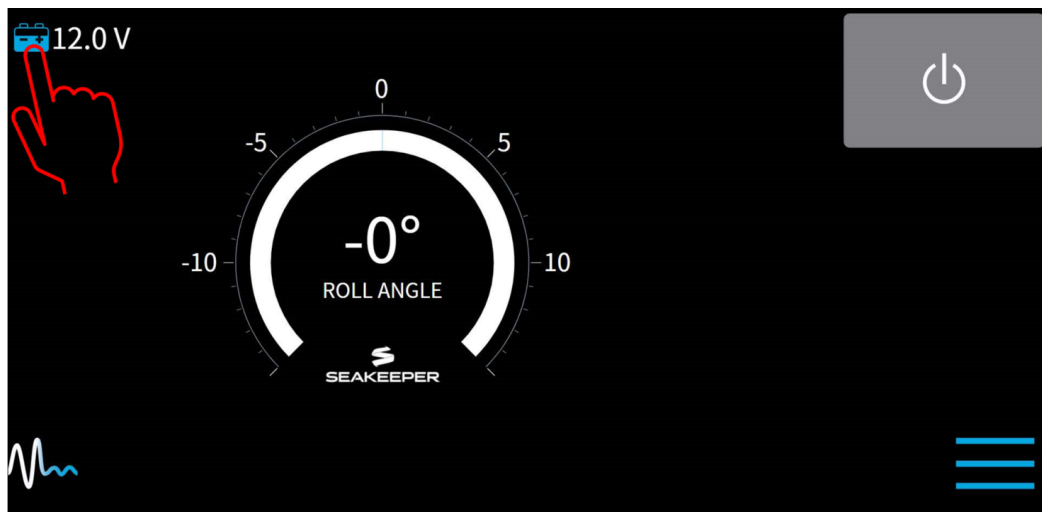
The Seakeeper 3 is equipped with voltage and state of charge (SoC) based battery monitoring logic to accommodate traditional battery chemistries and emerging lithium-ion technology. The default mode is a low voltage protection system using 11.1 VDC as the protection threshold for flooded and absorbed glass mat (AGM) batteries. SOC-based monitoring is enabled when a NMEA 2000 compatible battery monitoring system (BMS) is broadcasting SOC (PGN: 127506, DC Detailed Status) over the NMEA 2000 network and is required for Seakeeper operation with Lithium batteries. The default voltage-based protection is not compatible with lithium batteries due to the discharge characteristics of this battery type.



Lead-Acid vs. lithium battery depletion

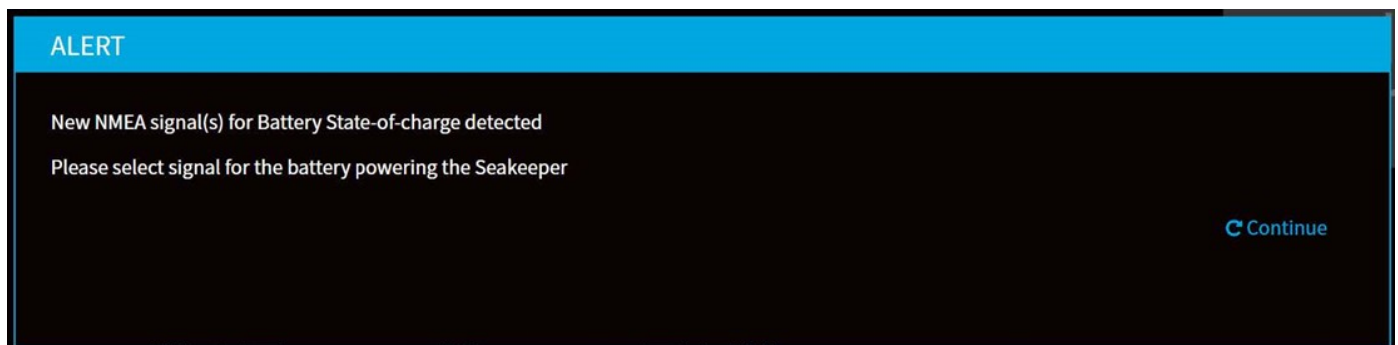
If powered by a lithium battery, the Seakeeper and BMS must be connected to a common NMEA 2000 network to prevent excessive discharge of the battery bank. An external BMS with a shunt can be used in place of a NMEA 2000 SOC signal, however, the Seakeeper will not provide any battery monitoring functionality. The following guide will explain the functionality of the user interface and menus.

1. To access the battery monitoring configuration manager, press and hold the battery icon on the Home screen until the Battery Monitoring Configuration pop-up appears.



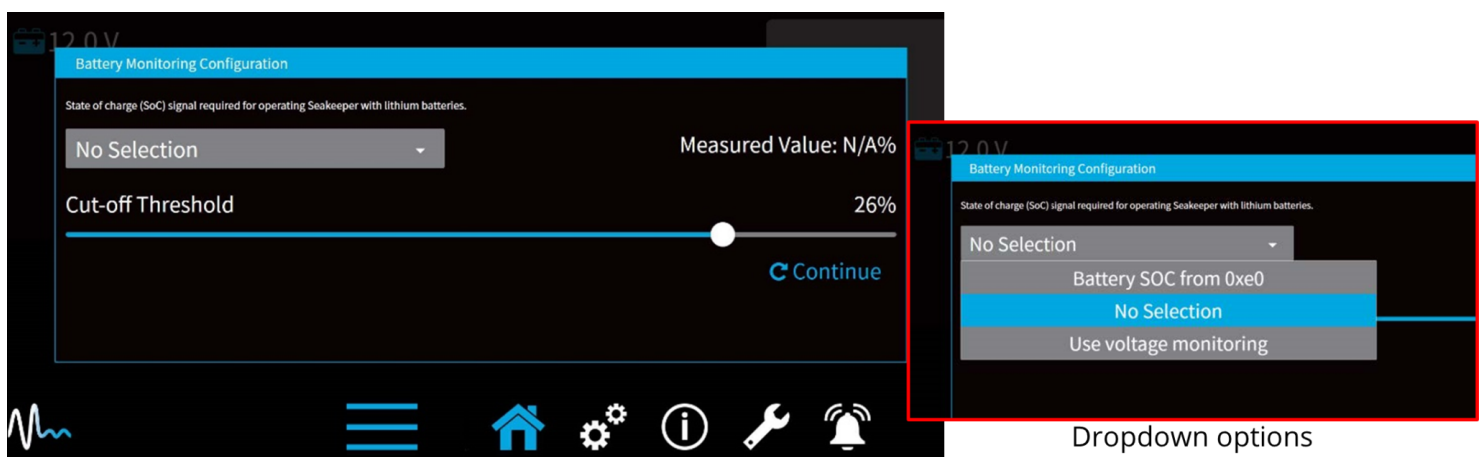
Accessing Battery Monitoring Configuration – Standard method

2. The Battery Monitoring Configuration will initiate a pop-up after detecting the SoC signal automatically. From this pop-up window, one can also open the Battery Monitoring Configuration by pressing the Continue button.



Alert pop-up indicating the SoC signal present on NMEA2000 network.

3. Once the Battery Monitoring Configuration manager window appears, press the dropdown menu down arrow and select SoC source from the dropdown menu.



Dropdown options

Battery Monitoring Configuration window

The dropdown options include:

- ***Battery SOC*** – This option allows the user interface to monitor the NMEA2000 network for the battery state of charge (required if lithium batteries are used to power the Seakeeper). When selected, the Cut-off threshold slider will determine at what battery charge the Seakeeper begins powering back to conserve battery power. Also, the 5" Touch Display will show battery state of charge.
- ***No Selection*** – This is the default setting for the configuration manager. Low voltage protection at 11.3 VDC is used until a different option is selected.
- ***Use voltage monitoring*** – This disables SoC logic and uses actual battery voltage to initiate lowering power drawn by the Seakeeper when battery voltage drops to 11.3 VDC on Seakeeper 3.

The **Cut-off Threshold Slider** controls the level of charge at which the Seakeeper will begin lowering the power it draws. The default setting is 20% charge. The slider allows the selection between 10% and 30% charge state.

7.0 Specifications and Summary

All Seakeeper 3 specifications can be viewed [here](https://www.seakeeper.com) (Seakeeper.com).



Arrangement

The Seakeeper 3 consists of the Flywheel, Enclosure, Foundation, Electronics, Brake, Cooling, and Cover Subsystems.

Installation Location

The Seakeeper is a torque device and does not have to be installed in a specific hull location or on the centerline. However, the Seakeeper should **not** be installed forward of the longitudinal center of gravity to minimize high acceleration loading due to hull/wave impacts during operation at high speed or in large waves.

Mounting Dimensions

See Drawing No. 90374 – Seakeeper 3 Bolt-In Installation Details.

Loads

The installer is responsible for designing the foundation to which the Seakeeper is attached and for ensuring that this foundation can safely transfer the concentrated Seakeeper loads from the frame to the adjacent hull structure. Loads that the Seakeeper imposes on the hull structure are explained on Drawing No. 90374 – Seakeeper 3 Bolt-In Installation Details; these loads do NOT include vessel motion accelerations, such as vertical slam loads which can be high for higher speed vessels.

Cooling

The Seakeeper bearings, Motor Drive Box, and hydraulic manifold are cooled by a closed water / glycol mix cooling loop that incorporates a seawater heat exchanger. The installer is responsible for providing 2 – 6 GPM (7.6 – 22.7 LPM) raw water at ambient sea temperature and a maximum pressure of 20 psi (1.4 bar) to the heat exchanger.

Electrical

The installer is responsible for supplying 12 VDC at 100 A service to the Motor Drive Box, 12 VDC at 15 A service to the Seakeeper Control System, and 12 VDC at 15 A service to the Seawater Pump. Separate circuit breakers should be used for each Motor Drive Box in multiple Seakeeper installations. Similarly, separate circuit breakers should be used for each Seakeeper Control System and Seawater Pump in multiple Seakeeper installations.

Operator Controls

A compatible MFD or a 5" Touch Display is used to start, operate, monitor, and shutdown the Seakeeper from the helm. The operator may also use the local ConnectBox interface on the Seakeeper 3 to start and shutdown the Seakeeper.

Performance

Reduction of boat roll is a function of the boat's displacement, transverse metacentric height (GM_T) and hull damping as well as the operating conditions (speed and heading with respect to waves) and sea state. The Seakeeper controller regulates the active hydraulic brake to ensure the Seakeeper's anti-roll torque is maximized regardless of hull characteristics or operating conditions.

Alarm and Monitoring

Sensors, alarms and shutdowns are provided to allow unattended operation. Sensors measure Seakeeper and drive temperatures, vacuum pressure, gimbal angle, brake pressure, and ship motion. The Seakeeper controller sends sensor values and alarm information to the display and also locks the brake and shuts down the motor drive in the

event of an alarm condition. Seakeeper operating history during faults or alarms is recorded in the controller's memory for subsequent recall if service is needed. Seakeeper may access the Seakeeper's software to gather run hours, bearing loading, and hull slamming information.

Safety

The brake automatically locks the Seakeeper so it cannot generate excessive anti-rolling torque loads in the event of a system fault or alarm, loss of electrical power or loss of brake pressure. The brake can be locked from the Display or by shutting off AC and DC power at the supply breakers.

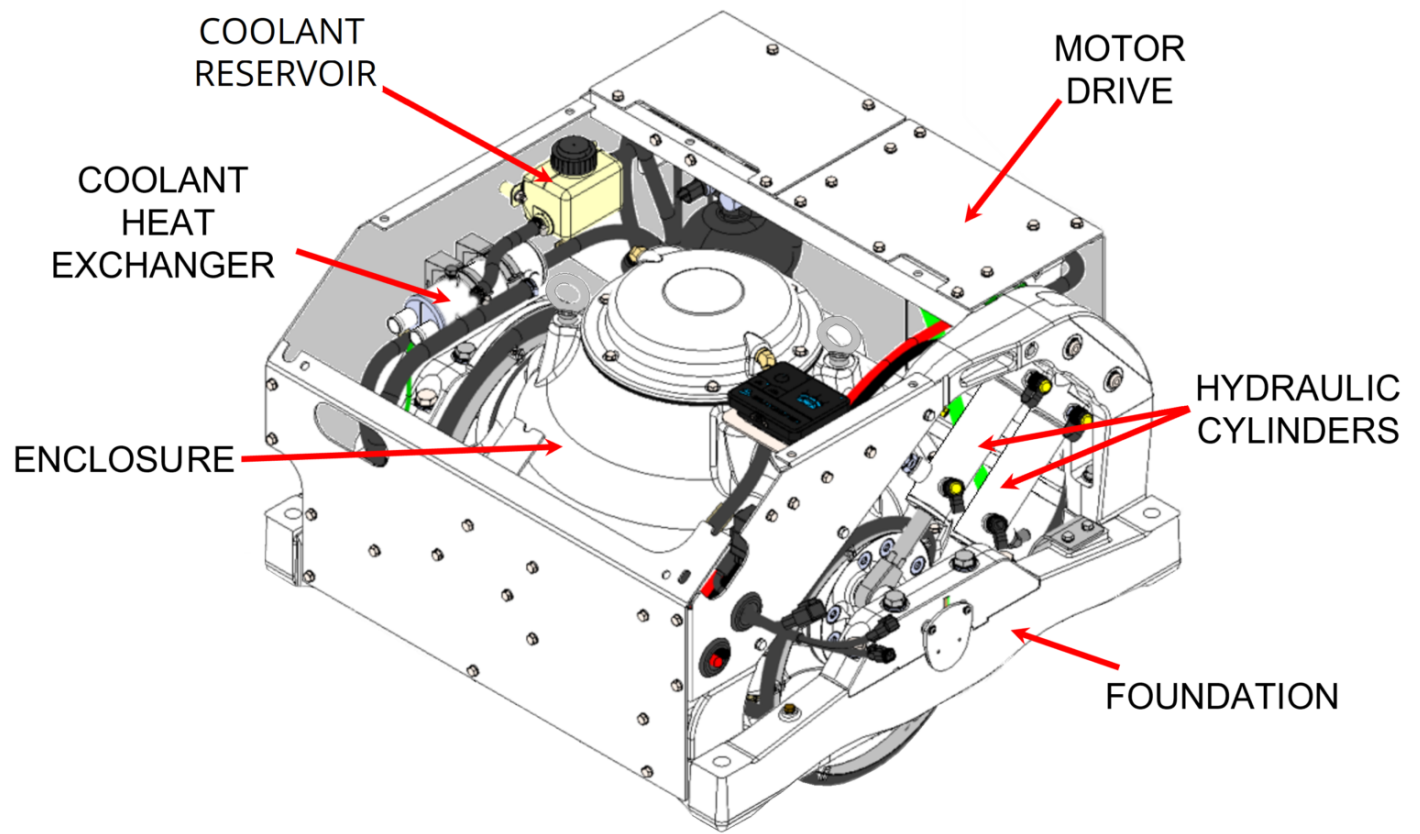
2.2 Seakeeper Assembly

The Seakeeper assembly consists of a flywheel housed in a cast aluminum vacuum-tight enclosure. The flywheel spins about a vertical axis and is supported by upper and lower pairs of bearings. A DC brushless motor mounted inside the enclosure spins the flywheel at high speed.

The enclosure is fastened to two gimbal shafts that are supported by gimbal bearings on either side. These shafts establish an athwartship gimbal axis about which the flywheel and enclosure precess or rotate up to ± 67 degrees during operation. The gimbal bearings are supported by a foundation which is attached to the hull structure. This foundation transfers the loads that the Seakeeper produces to the hull structure.

An active hydraulic brake mechanism is located on the Seakeeper assembly to regulate the Seakeeper's precession motions about the gimbal shaft. It includes two hydraulic cylinders and a hydraulic manifold.

A coolant pump, heat exchanger, and reservoir are located near the manifold. A glycol/water mix is circulated through a closed loop to the drive box, hydraulic manifold, and the end caps of the enclosure to remove heat.



Seakeeper Assembly

8.0 Revision History

REVISION	DESCRIPTION	DATE
5	ConnectBox release. Minor edits.	21JUL2023
6	Replaced screenshots with updated software functionality and screens. Minor edits throughout document.	20SEP2024