

M7000-X+ System

Operation Manual

English

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IMPORTANT: Refer to important safety information in the product documentation and review all warnings, limitations, and disclaimers before using this product.

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Safety alerts

Throughout this publication and on your power package, safety alerts labeled WARNING and CAUTION (accompanied by the symbol ) are used to alert you to special instructions concerning a particular service or operation that may be hazardous if performed incorrectly or carelessly. Observe these alerts carefully.

These safety alerts alone cannot eliminate the hazards that they signal. Strict compliance to these special instructions when performing the service, plus common sense operation, are major accident prevention measures.

 WARNING
Indicates a hazardous situation which, if not avoided, could result in death or serious injury.

 CAUTION
Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

Additional alerts provide information that requires special attention:

NOTICE
Indicates a situation which, if not avoided, could result in engine or major component failure.

IMPORTANT: Identifies information essential to the successful completion of the task.

NOTE: *Indicates information that helps in the understanding of a particular step or action.*

More information

Document version: 001

Features described in this document may vary from your unit due to connected devices, settings, brand, and continuous software development. For the latest version of this document in supported languages, and other related documentation, visit <https://fathom.navico.com/resources/>.

Contact us

For product support and service information, visit <https://fathom.navico.com/contact-us/>.

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General information

Introduction to Fathom M7000-X+

Welcome to the future of silent, sustainable energy.

Fathom is a lithium-ion power management system with advanced controls and monitoring to power your adventures all day, every day. Fathom e-Power systems combine the latest lithium-ion technology with premium components from the world's leading brands to deliver a complete energy management system providing long-lasting, reliable power and the ability to visualize and manage your usage with ease.

Having all energy management data in one place puts you in total control. An intuitive display provides real-time readouts of battery status and energy consumption, as well as alerts and guides for more efficient usage and charging.

This manual contains specific instructions for using and maintaining your product. It is suggested that this manual remain with the system for quick-reference while you are on the water.

We appreciate you putting your confidence in us to power your adventures, and sincerely wish you a memorable experience on the water.

The Fathom M7000-X+ system replaces the need for an onboard genset by generating power via smart alternators equipped on Fathom-ready Mercury Marine V10 and V12 outboards. The system starts the outboards on command to charge a bank of Mastervolt® MLI Ultra batteries, integrated with CZone controls. This allows flexible configurations to scale energy capacity to your vessel's electrical requirements. This charging feature is known as charge control.

The system offers an interactive display that allows the operator to view on-board energy use, make decisions in regard to managing electrical loads, and charge the system via on-screen commands or with a physical button.

Charge rate can be customized by selecting one of two available charge modes which offers a standard charge rate (extend), or elevated charge rate where the engine speed is raised further (boost). Further flexibility is offered by allowing the user to select which engines will be started during each charge sequence based on key position.

Boater's responsibilities

The operator (captain) is responsible for the correct and safe operation of the boat and the safety of its occupants and general public. It is strongly recommended that each operator read and understand this entire manual, as well as the outboard engine operation manual, before operating any outboards or systems on the vessel.

Before operating the system

Read this manual carefully. Learn how to operate this system, as well as the outboards properly. If you have any questions, contact your dealer.

Lanyard stop switch

The purpose of a lanyard stop switch is to turn off the engine(s) if the operator moves far enough away from the helm (as in accidental ejection from the operator's position) to pull out the lanyard and activate the switch. The lanyard cord is to be fastened to the operator while the vessel is underway.

During operation of the system in charge control mode, the outboards are locked in the neutral position and cannot be placed in forward or reverse, accidentally or intentionally, without physically changing the key switches to **RUN** mode. While in charge control mode it is not necessary for the operator to be tethered to the lanyard cord, however the stop switch must remain in the "Run" position.

Protecting people in the water

While the system is designed to lock the outboards in neutral and allow passengers to continue swimming when charge control mode is active, it should be noted that swimming near the transom can expose swimmers to exhaust gasses and, in some cases, higher concentrations of carbon monoxide (CO). It is the operator's responsibility to ensure the safety of themselves and all passengers when operating the system.

Exhaust emissions

⚠ WARNING

Inhaling engine exhaust gases can result in carbon monoxide poisoning, which can lead to unconsciousness, brain damage, or death. Avoid exposure to carbon monoxide.

Stay clear from exhaust areas when engine is running. Keep the boat well-ventilated while at rest or underway.

General information

Be alert to Carbon Monoxide poisoning

Carbon monoxide (CO) is a deadly gas that is present in the exhaust fumes of all internal combustion engines, including the engines that propel boats and the generators that power boat accessories. By itself, CO is odorless, colorless, and tasteless, but whenever engine exhaust can be tasted or smelled, CO is being inhaled.



Early symptoms of carbon monoxide poisoning—which are similar to the symptoms of seasickness and intoxication—include headache, dizziness, drowsiness, and nausea.

Boats with enclosed cabins should have one or more CO sensors installed.

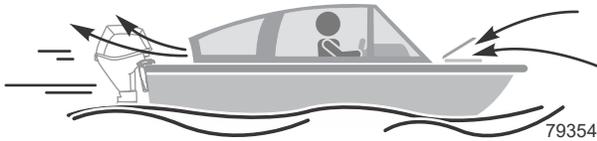
Stay clear of exhaust areas

Avoid areas of concentrated engine exhaust gases. When engines are running, keep swimmers away from the boat, and do not sit, lie, or stand on swim platforms or boarding ladders. While underway, do not allow anyone to be positioned immediately behind the boat (platform dragging, teak/body surfing). This practice not only poses the risk of extreme physical harm, but also places that person in an area of high engine exhaust concentration.

Good ventilation

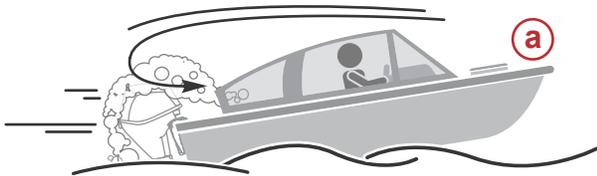
Ventilate the passenger area by opening side curtains, forward hatches, or windshield vents.

The following image shows an example of desired air flow through the boat.

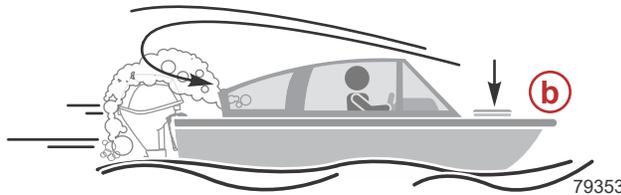


Poor ventilation

- **Boat in motion:** Under certain running or wind conditions, permanently enclosed or canvas enclosed cabins or cockpits with insufficient ventilation may draw in carbon monoxide. The following shows examples of poor ventilation while the boat is moving.

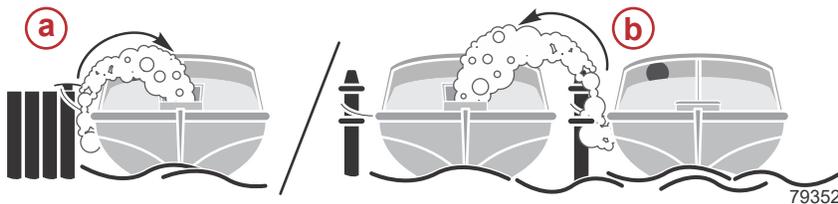


a - Operating the boat with the trim angle of the bow too high



b - Operating the boat with no forward hatches open

- **Stationary boat:** Although the occurrence is rare, on a calm day, persons in an open area of a stationary boat that contains, or is near, a running engine may be exposed to a hazardous level of carbon monoxide. The following shows examples of poor ventilation while the boat is stationary.



a - Operating the engine when the boat is moored in a confined space

b - Mooring close to another boat that has its engine operating

Mode overview

Propulsion mode

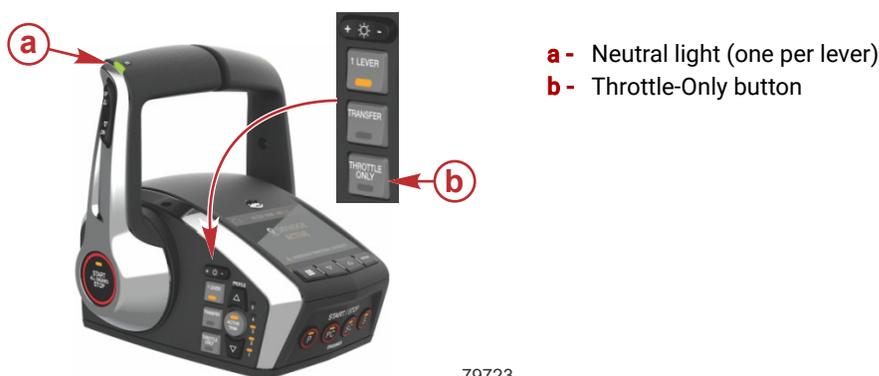
Propulsion mode is the traditional mode of operation with forward, neutral, and reverse capability. This is when one or more of the outboards is running with key switches in the **ON** position. In propulsion mode the alternator will charge the system at a lower rate when at idle, in throttle-only, trolling, or low-speed cruise below 2,000 RPM. At engine speeds higher than 2,000 RPM the alternator will switch to a higher charge rate (48 V nominal, 56 V max).

Note that this is different than how an onboard genset operates. Refer to **Charging while underway** to understand how to charge the system if the house batteries need to be charged while underway.

Throttle-only mode

Mercury Marine outboards with Digital Throttle and Shift (DTS) controls include a **Throttle-Only** button, also known as neutral warm-up. This feature allows the user to elevate the engine speed in neutral to warm up the engine quickly or charge the 12 V electrical system in certain instances. Throttle-only should not be used for sustained charge events.

The following image is an example of a Mercury Marine electronic remote control (ERC). The actual control on your boat may vary, depending on engine configuration and options.



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Charge control

Charge control is when the Fathom system commands the vessel's outboards to start and generate power to replenish the 48 V battery bank. This is performed at the operator's discretion based on the state-of-charge of the house bank, vessel electrical loads, and planned activities.

As mentioned in the previous section, this mode is different than throttle-only and will only activate on Fathom-ready outboards when the vessel is stationary and with the key in the **ACC** position. The charge control feature is locked out when any engine is in propulsion mode.

Charge control uses an advanced combustion technology that allows the engine to operate in a more efficient mode, resulting in improved fuel economy and reduced CO emissions. This feature is not offered in throttle-only mode.

In the event that a fault or other issue prevents charge control mode from operating properly see your dealer for service. Do not charge the system with throttle-only mode for prolonged periods. Only use throttle-only mode if conditions are safe to do so.

Refer to the Mercury Outboard Operation Manual for additional information and proper use of throttle-only mode on the ERC.

Genset vs Fathom M7000-X+

Fathom is intended to replace the off-grid benefits of a genset. However, how it functions is quite different. In many cases, a genset may be turned on as soon as the operator arrives at the boat, and it may be left on for the duration of the trip. During overnight or multi-day trips, the generator may be left running for several days, providing power on-demand as electrical loads change.

Fathom on the other hand uses either shore-power or the outboards to charge a larger bank of batteries to power the vessel's electrical system. Having additional battery capacity allows the system to provide power without having to run the engine(s) continuously.

As loads change or the state of charge is reduced, the user simply enables charge control mode to provide additional power or to replenish the battery bank.

IMPORTANT: Charge control mode is not intended to run indefinitely like a traditional genset. The system provides the most benefit when used to replenish the batteries rather than provide sustained power to the vessel electronics.

General information

Charging while underway

When in propulsion mode, or underway, the Mercury 12/48 V alternators will not switch to high output 48 V charging unless engine speed is above 2,000 RPM and other conditions are met. Operating under 2,000 RPM may be common during low-speed cruises or while trolling. During these conditions the house-bank state-of-charge may approach or fall below the desired threshold, requiring a higher charge rate (48 V charging), especially when vessel electrical loads are high, such as air conditioners.

The operator has two primary options in this scenario:

1. Stop the vessel when permissible, securing if necessary and enabling charge control mode or connecting to shore-power if available.
2. Or, if conditions permit and no wake restrictions exist, engine speed can be elevated and maintained above 2,000 RPM while in propulsion mode to increase the charge rate. If conditions change, and speed cannot be safely maintained, or the vessel enters a no-wake area, reduce engine speed as soon as possible.

IMPORTANT: Increasing engine speed while in propulsion mode may result in larger than anticipated wake. This can be especially true for planing hulls at or around the planing speed of the vessel, which in many cases is around 2,000 RPM.

Engine cooling

The vessel must be in the water with the outboards trimmed down in order for cooling water to be provided to the engines. Check water depth before trimming the engines down. The system will check trim level before allowing charge control mode to start. If an engine lacks cooling water due to plugged water inlets on the outboard or other cooling system issues, the engine will limit power and return to idle.

NOTICE

Avoid engine damage due to overheating. Engine flush adapters and flush ports do not supply enough water to cool an engine under load. Never operate an engine in Charge Control mode when the boat is out of the water.

Refer to the Mercury Marine Outboard Operation Manual for additional information regarding the cooling system and function.

Mercury Marine Guardian system

Mercury Marine outboards are equipped with monitors to protect the engine while in both propulsion and charge control mode. This system is referred to as Guardian. In the event that the Guardian system detects conditions of operation outside of safe parameters it will notify the operator with an audible warning.

There are two types of audible warnings. A series of six beeps indicates a cautionary system state or a solid six second horn to indicate a critical system state. In the caution state, Guardian may reduce power to 65% available power, minimally disrupting normal operation. In the critical system state, a parameter has exceeded safe operation. In this state, Guardian may reduce power to 5% available power.

In some instances, and only while in charge control mode, the Fathom system may shut down the engines completely. Refer to **System monitors, System alerts, notifications, and alarms** and **Emergency shutdown** for Fathom-specific information.

Refer to the Mercury Marine Outboard Operation Manual for additional information regarding engine Guardian.

Battery system overview

The Fathom system is equipped with Mastervolt MLI Ultra Lithium Iron Phosphate (LiFePO4) batteries, each with its own internal battery management system (BMS) to ensure safe, continuous operation to support the vessel's house loads. It is critical to the safety of the system, vessel, operator, and occupants that only approved batteries are installed and used in the system. The dealer, operator, or anyone else responsible for the system should not replace these batteries with another model, brand, or battery type unless approved by Navico Group.

IMPORTANT: Do not replace faulty, damaged, defective, or end-of-life batteries with anything other than those specified and approved for the system. If a battery needs service or replacement, see your dealer.

The house-bank is configured with two 24 V batteries wired in series to produce a 48 V bank. Multiple 48 V banks can be paralleled to increase the capacity of the system. Do not attempt to reconfigure this arrangement.

Each Mercury Marine outboard is wired to its own separate 12 V battery. Fathom is designed to charge the 12 V system and safely deliver power where and when it is needed. Do not attempt to connect jumper cables or other devices between the 12 V and 48 V systems.

Hazardous voltage

The Fathom system operates between 48 V and 58.4 V which in some cases may be higher than the operator is accustomed to. Service must be performed by authorized personnel only. If service is required, please see your dealer.

⚠ WARNING

Hazardous voltage (>50 V) is present in the system that can cause severe electrical shock or arc flash condition, resulting in injury or death. Service should only be performed by trained personnel in the proper handling of these systems.

- **Avoid touching electrical contacts**
- **Never attempt any battery repair work**
- **Never touch chaffed, damaged, or severed wiring or obviously defective components**
- **Do not reconfigure connection points or modify the battery cables in the system.**

⚠ CAUTION

Leaking electrolytes or gases from a damaged battery can cause injury to the skin, eyes, and respiratory system. Avoid contact with skin and eyes. Never inhale gases directly.

Electrical load types

Fathom has the ability to manage various electrical loads commonly found in marine applications. These include the following (examples only, refer to each device's manual for specific power requirements):

- 12 V outboard electrical system:
 - Engine sensors and controls
 - Trim, steering, and shift actuators
 - Fuel pumps
 - Water pumps (fresh, waste, bilge, gray, flush, etc)
 - Wipers
 - Fish box pumps
 - Lighting
 - Deck actuators (seats, tables, bunks, etc)
 - Bilge/Berth Ventilation Fans/Blowers
 - Stereos
 - VHF radio
 - Receptacles (USB, courtesy outlets, wireless chargers, etc.)
 - Displays and gauges
 - Radar
 - Sonar
 - Cameras
 - Vessel control modules
- 48 V DC vessel loads:
 - Grills/stoves
 - Water heaters
 - Thrusters
 - Windlass
 - Deck actuators (sunshade or other)
- AC vessel loads:
 - Air conditioning
 - Cooling appliances
 - Gyros
 - Cabin receptacles
 - Televisions
 - Refrigerators/freezers
 - Chiller plates

General information

Conditions affecting performance

Weather conditions can have a significant impact on an electrical system's performance. Hot ambient conditions, coupled with bilge compartments with little or no airflow can lead to overheating of batteries and power electronics, especially during periods of high charge/discharge. The Fathom system is designed to power down system components if they approach critical temperatures. If this occurs, identify electrical loads that can be reduced or turned off, such as AC units, stoves, grills, etc.

In contrast, Lithium-ion batteries can also experience reduced performance under extreme cold conditions. Vessels used during colder periods may benefit from bilge heaters to maintain battery temperatures above freezing and to prevent reduced charge performance.

Shore power input

The Fathom M7000-X+ system is equipped with shore power input. When possible, shore power should be used to recharge and maintain the batteries. Charging the system with shore power eliminates the need to operate the engines which saves on fuel, eliminates engine noise, reduces maintenance cost on the outboards, and eliminates emissions output.

An additional feature is the ability to supplement the AC shore power by supplying additional power from the Fathom system for large AC electrical loads.

The system will automatically accept shore power if a connection with acceptable AC voltage input is detected. If charge control is enabled when shore power is connected or restored after an outage, it is the operator's responsibility to disable charge control.

Cowl safety feature

Mercury Marine V10 outboard engines have a means of detecting if the cowl has been opened and will prevent the system from running in charge control mode when the cowl is removed. Mercury Marine V12 outboard engines do not require this feature. Please contact your dealer if the system or outboard is in need of service.

Component identification

Below are illustrations of components commonly found in the Fathom system. The exact number of each depends on the size of your system, number of Fathom-ready Mercury Marine outboards, as well as a number of other factors such as customization during the vessel build process.



Mastervolt MLI Ultra 24V Li-ion battery with Soft-Start module (not-shown)



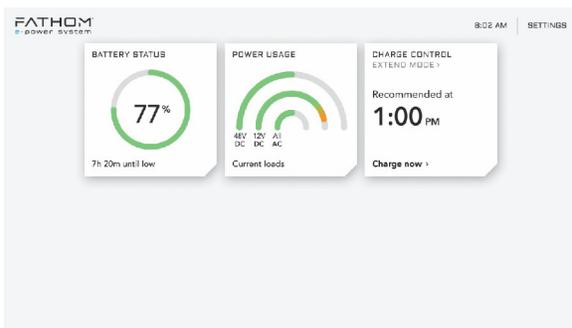
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Mastervolt CombiMaster (left) and Mastervolt Mac Plus DC-DC (right)



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Blue Sea Systems remote battery switches



79771

Simrad display



79772

Alternator mode switch

General information

Notes:

Features and controls

CZone

Fathom is controlled and monitored by the CZone digital switching ecosystem. CZone replaces manual controls and switches with a smart digital interface for turning loads on and off, setting scenes, and monitoring vessel systems.



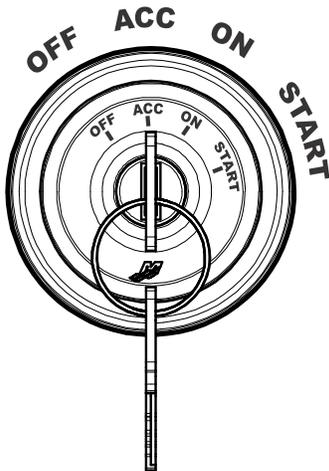
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CZone can be viewed on dedicated displays, or shared displays with other vessel digital systems, such as Simrad or Garmin. In the event that the display is unavailable or manual switching is required, circuits can be manually activated or deactivated at the Czone I/O interface in the main distribution.

IMPORTANT: Manually overriding a digital switch is only recommended if the system is not accessible via the CZone or other enabled displays. See your dealer if the issue persists.

Outboard designation for key switches

Fathom-ready outboards use the traditional key switch as non-Fathom outboards. When the key switch is placed in the **ACC** position, Fathom features are enabled and the engine may run during charge control. Non-Fathom outboards will not run with the key switch in the **ACC** position.



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The vessel can only be operated in one running state at a time, meaning that charge control mode cannot be enabled on certain engines while propulsion mode is enabled on others. Mixed key states, where **ACC** and **ON** are selected on different switches is not permitted. Non-Fathom engines must remain in the **OFF** position while in charge control mode.

IMPORTANT: Charge control and propulsion mode are not permitted at the same time, only one engine mode is allowed at a time.

Features and controls

Mixed key states for Fathom enabled engines, however, are allowed where **ACC** and **OFF** are selected on different key switches. The operator can determine which of the Fathom-ready outboards to start during a charge control charge event. In some cases, the operator may wish to run fewer than the total number of Fathom-ready outboards. Reasons could include to keep noise levels to a minimum or if electrical loads are relatively low and minimal charge is needed. If occupants will be using the boarding ladder, the operator may want to leave the engine closest to the ladder in the off position.

If charge control is desired, the desired Fathom-enabled engines can be selected by turning their respective key switch to **ACC** and assuring all other key switches are **OFF**. Use either the manual Fathom switch (described below) or select 'Charge Now' and 'Tap to Start' on the charge control tile of the Fathom icon to start those selected outboard engines. Do not use the **START** position on the key switch to start the engines in charge control mode. This is reserved for propulsion mode.

If charge control is active and power consumption is reduced, select engines can be turned off to reduce fuel consumption and associated noise. This can be done by switching the key switch from **ACC** to **OFF**.

If charge control is active and power consumption increases requiring additional engines be turned on to support charging, charge control must first be disengaged. Once all engines have stopped running, the additional engines would need to be set to the **ACC** key switch position and charge control re-engaged via the display or manual switch.

Manual charge control switch

Fathom is equipped with a manual switch that is typically mounted at the helm or electrical panel. The switch itself could be a momentary push-button as seen below on the left, or a momentary rocker-style as seen on the right.



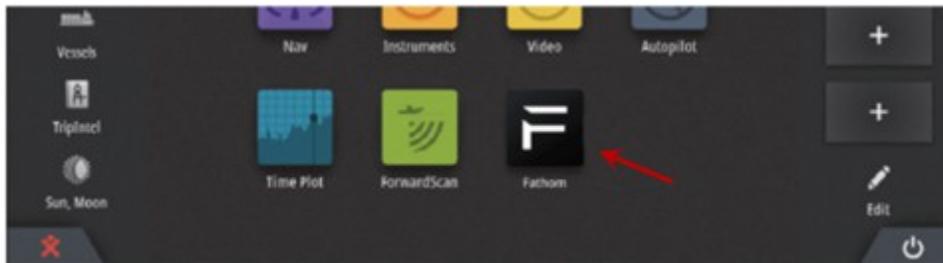
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The manual switch can be used to start and stop Fathom-ready engines with the key switch in the **FATHOM** position.

Displays

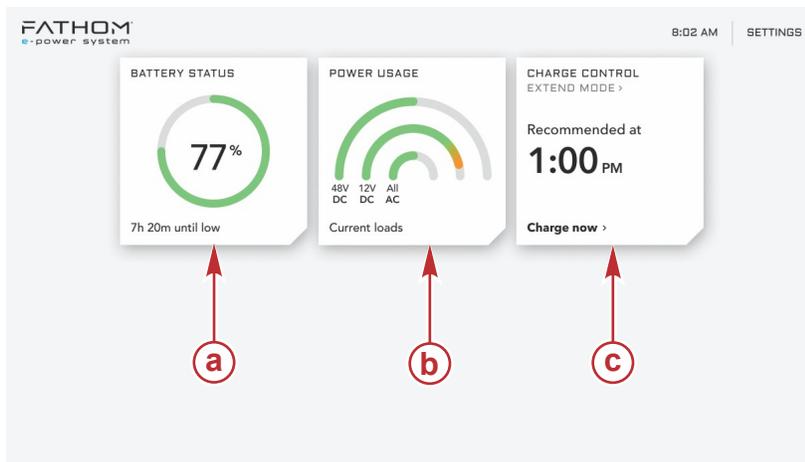
The Fathom system is intended to be controlled primarily from the onboard displays. The primary vessel screens will have a Fathom app icon which will open the Fathom M7000-X+ home screen.

NOTE: Refer to the Fathom App Guide for more information on the user interface.



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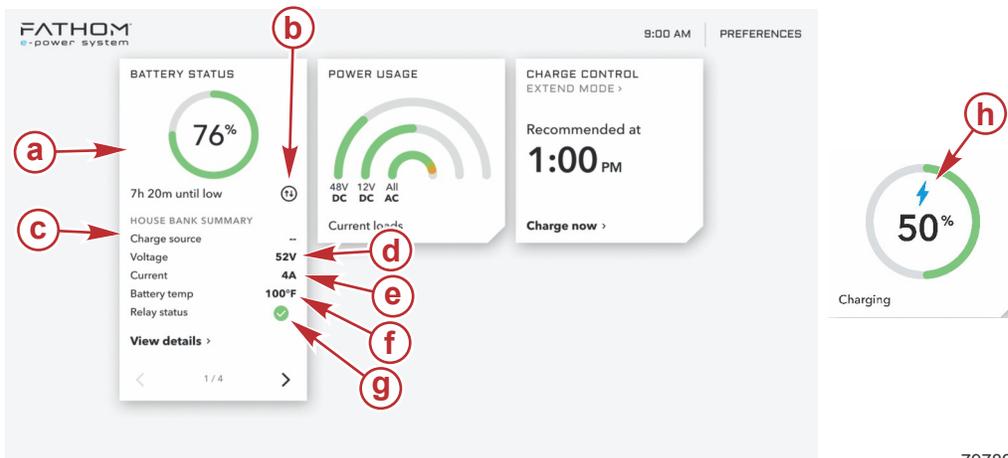
There are three main tiles found on the home screen: Battery Status, Power Usage, and Charge Control.



- a - Battery Status tile
- b - Power Usage tile
- c - Charge Control tile

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Battery status tile

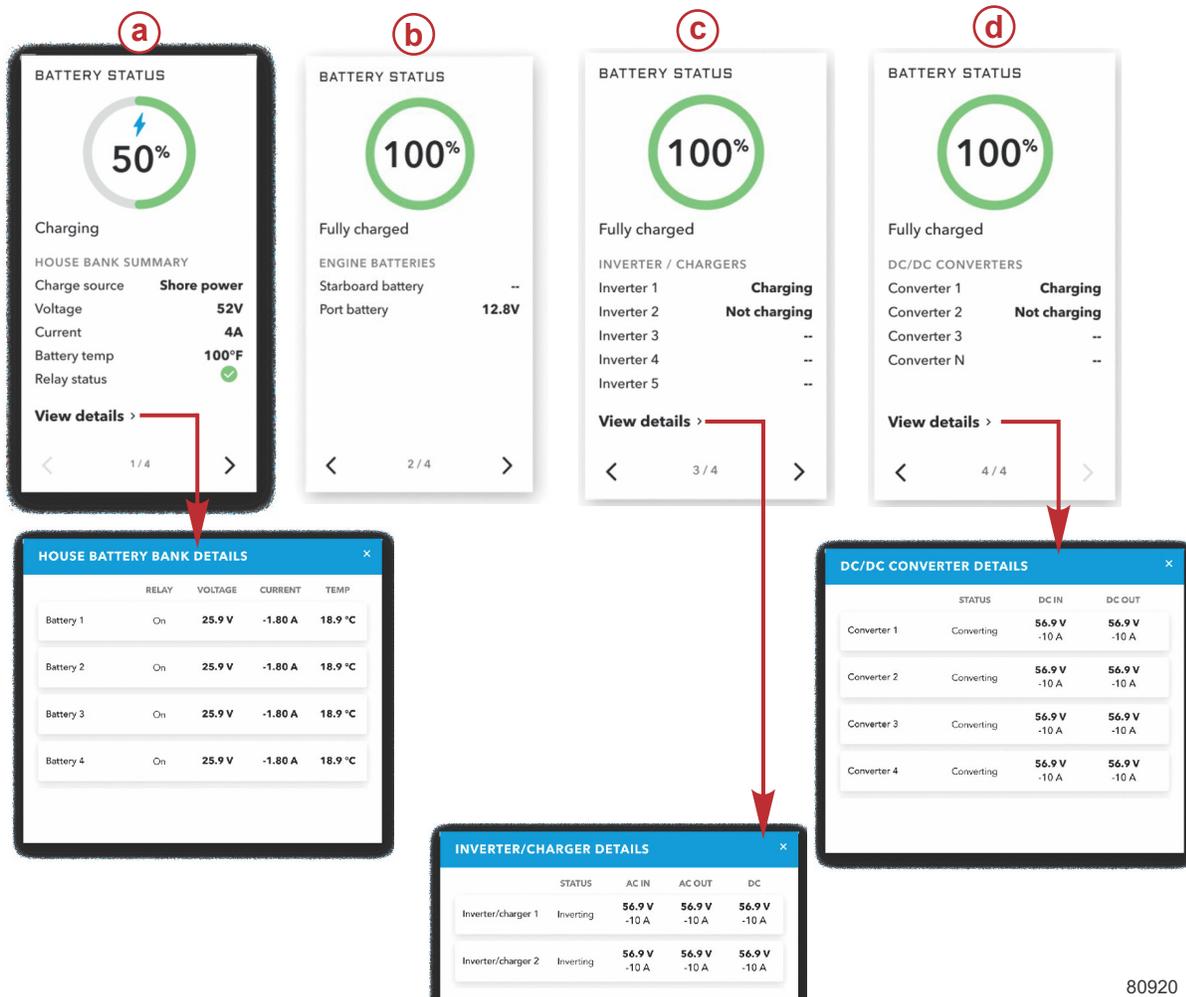


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- a** - Battery Status tile (tap to open)
- b** - Toggle button to view time or percentage
- c** - Charge source - shows active charging source
- d** - Voltage - 48 V battery voltage
- e** - Current - 48 V battery current
- f** - Battery temp - temperature of battery
- g** - Relay status - status of the 48 V contactor
- h** - Lightning bolt indicates active charging

Features and controls

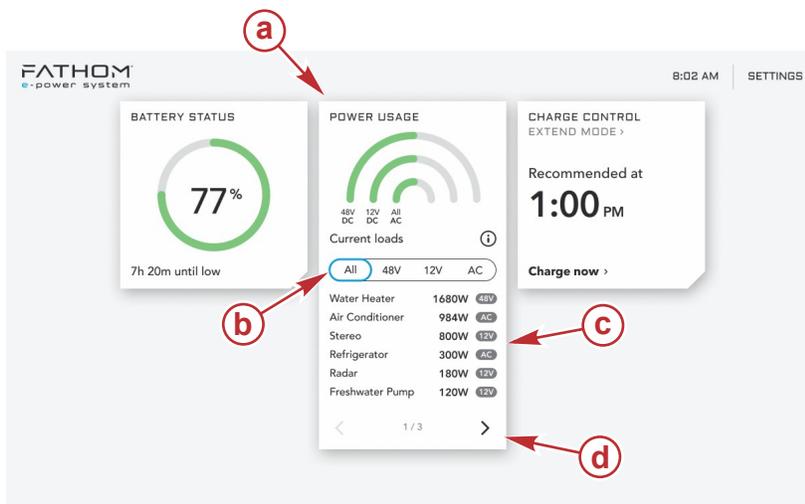
Battery status pages 1-4 with view details expanded



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- a** - House bank summary page
- b** - Engine batteries page (no additional details)
- c** - Inverter/chargers page
- d** - DC/DC converters page

Power usage tile



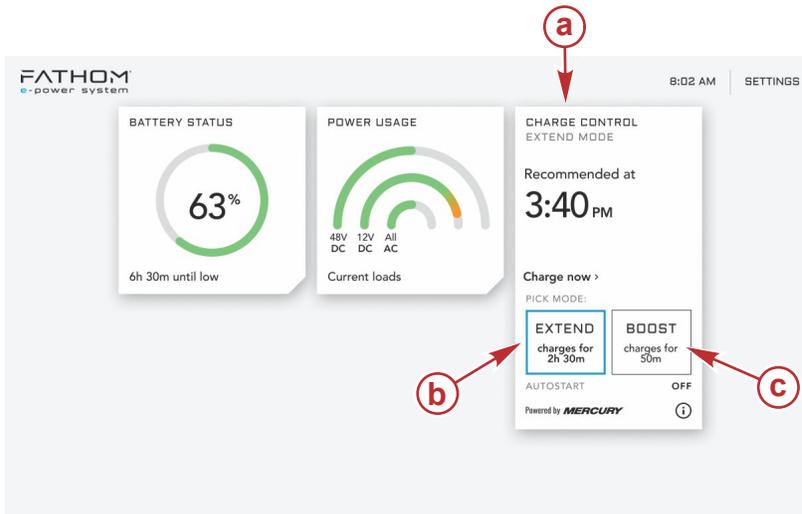
Power Usage: Current loads and power draw

- a** - Power Usage (tap to open)
- b** - Load type selection
- c** - Electrical load displays
- d** - Page selection arrow

79790

- AC—Outlets, stove, refrigerator, air conditioner, gyro
- 48 V DC—Grill, bow thruster, water heater, windlass, shade
- 12 V DC—VHF radio, lights, stereo

Charge control tile

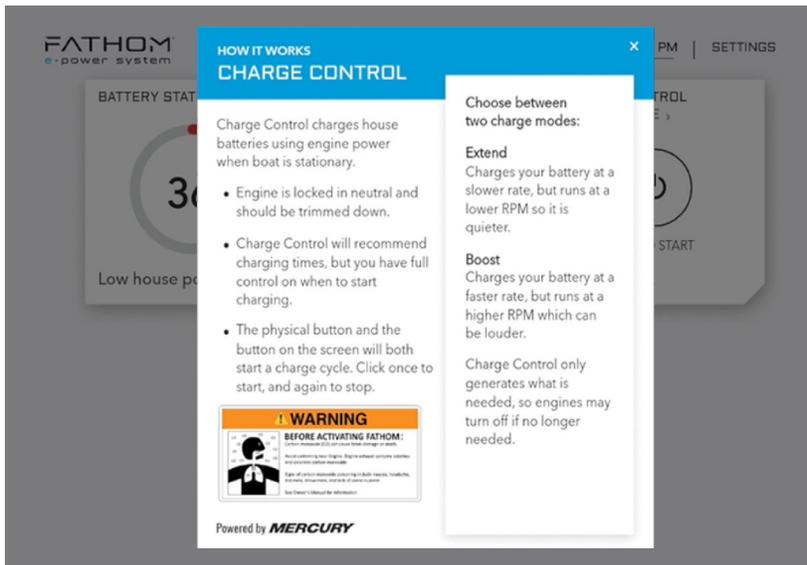


Charge control: Current power source and control of alternative charge source

- a** - Charge Control tile (tap to open)
- b** - Extend mode
- c** - Boost mode

79791

Charge control mode is the feature that starts the outboards to charge the house batteries when the boat is stationary. There are two modes available as seen above in callouts "b" and "c". Extend mode runs at a lower RPM so it is quieter but takes longer to charge. Boost mode runs the engines at a higher RPM, which can be louder, but takes less time to charge. You may view the estimated charge times on the screen.



80921

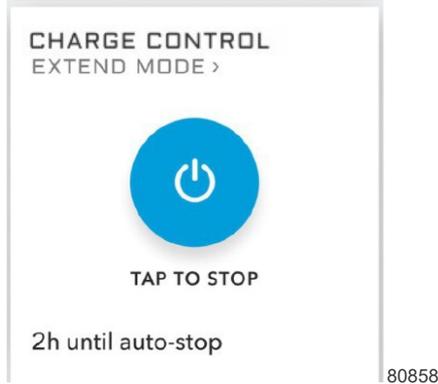
⚠ WARNING

Inhaling engine exhaust gases can result in carbon monoxide poisoning, which can lead to unconsciousness, brain damage, or death. Avoid exposure to carbon monoxide.

Stay clear from exhaust areas when engine is running. Keep the boat well-ventilated while at rest or underway.

Features and controls

To stop a charge event, the operator can "TAP TO STOP" on the screen. If the display is unavailable, the operator may push the manual Fathom button to stop all engines running in charge control, or turn the key switch to the **OFF** position for those engines that are running. If configured to do so the system will also automatically stop when 100% state of charge is reached. Otherwise, the user will have to turn the systems off when fully charged.



IMPORTANT: Using the keys to terminate a charge event is not preferred as it will abruptly stop the engines. The manual Fathom button and on-screen "Tap to Stop" options provide a more controlled shutdown of the engines.

CO monitoring

The Fathom system requires the installation of CO monitors in the main cabin areas of the vessel. The system will only allow the outboards to be started if the monitors are functioning, fault-free, and do not indicate elevated levels of CO. If at any time during a charge event, the system detects that a monitor has been tampered with or if high levels of CO are detected, all engines will shut down immediately.

System monitors

The Fathom system monitors several inputs to ensure conditions are as safe and trouble-free as possible for the operator, vessel occupants, the vessel systems, the Fathom system, and outboards. At the time of this publication, this includes the following:

- Outboard trim position to ensure cooling water is available
- Outboard fault status to ensure the engines are functioning properly
- Fuel level for the fuel level threshold monitor
- Battery state of charge
- Ambient/outboard temperatures
- Battery fault status
- Power electronics fault status
- Battery temperatures, voltages, and current
- Engine cowl switch

System alerts, notifications, and alarms

IMPORTANT: The audio warning system alerts the operator that a problem has occurred. It does not protect the engine, system, or vessel from damage. It is the operator's responsibility to determine the proper course of action based on vessel location and conditions.

Mercury Marine outboard audio warning system

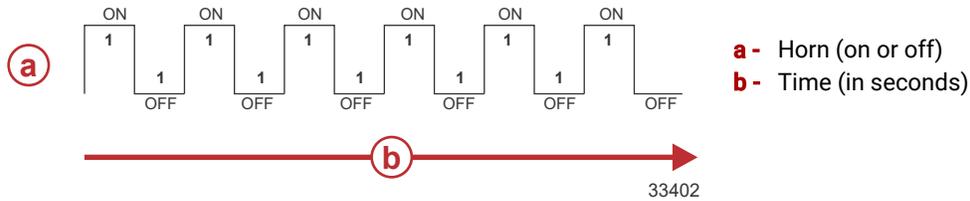
Most faults cause the warning horn circuit to activate. How the warning horn activates depends on the severity of the problem.

There are two warning horn states:

- Caution
- Critical

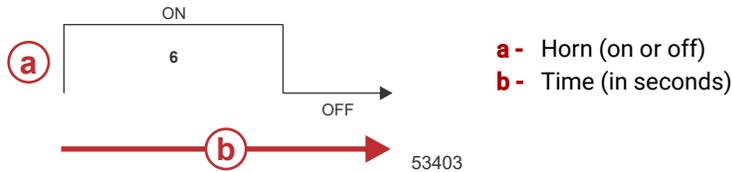
Caution

If a caution state is detected, the audio warning system will sound for six one-second intervals.



Critical

If a critical state is detected, the audio warning system sounds for six seconds and then turns off.



Testing the audio warning system

1. Turn the key switch to the **ON** position without cranking the engine.
2. Listen for the audio alarm. The alarm will sound if the system is functioning correctly.

Additional horn

Denial: A double rapid horn indicates denial of the attempted action.

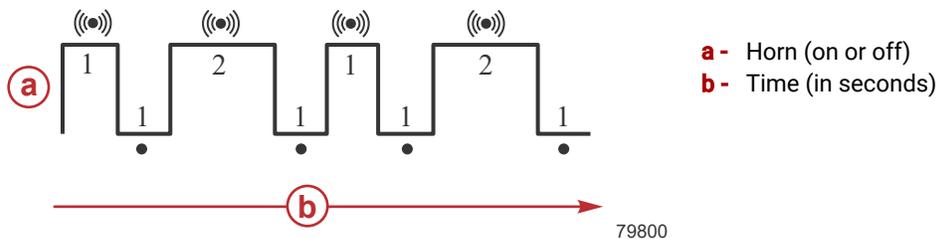
Fathom alarms and notifications

Similar to the Mercury Marine outboards, Fathom has its own warning system. Only the most severe faults cause the alarm circuit to activate. There are two warning horn states:

- Important
- Vital

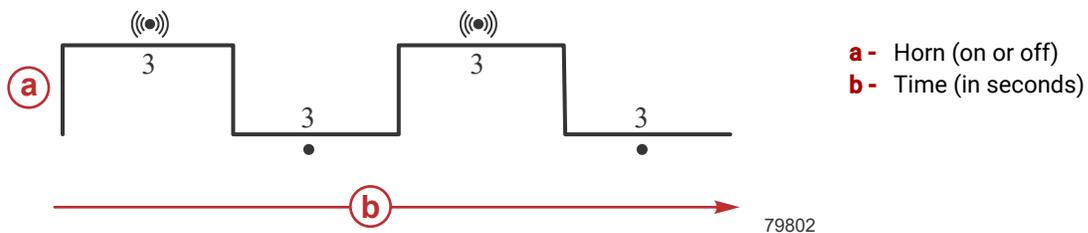
Important

If an important state is detected, the audio warning system sounds for alternating one and two second intervals, repeating three times before turning off:



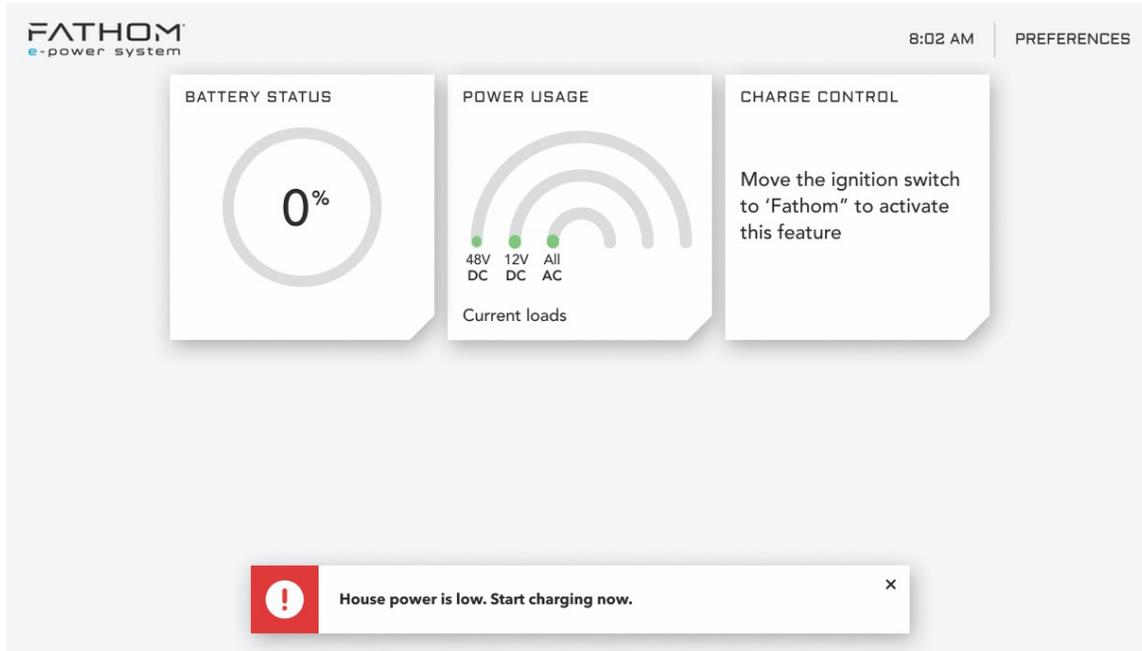
Vital

If a vital state is detected, the audio warning system will sound for two 3-second intervals before turning off:



Features and controls

In many cases an alarm notification will be displayed on the vessel's primary display(s). See the troubleshooting guide for more information. See your dealer if service is required.



79792

When charge control is commanded, the audible alarm from the Mercury Marine system will sound, similar to the Testing of the audio warning system described above. This is normal and should not be a cause for concern.

Mercury Advanced Range Optimization

Certain Mercury Marine outboards are equipped with Advanced Range Optimization, a feature that improves efficiency and reduces fuel consumption while underway. This technology has been carried over to Fathom-ready outboards for use when in charge control mode. Advanced Range Optimization is only available while underway in propulsion mode, or while the charge control feature is used. It is not available in throttle-only mode.

IMPORTANT: Throttle-only mode and charge control mode are similar in nature, but different in function. Charge control mode offers enhanced safety features to reduce CO emissions. Do not charge the system with throttle-only mode for prolonged periods.

Operation

Checklists

Important checklist before each use

- Operator has read the appropriate manuals to operate the vessel and associated systems.
- Check for obstructions near or around the cabin CO sensors.
- Check system components to assure everything is secure.
- Assure the cowls are closed and latched.
- Check state-of-charge of the 48 V system.
- Use shore-power (or charge control if shore-power isn't available) to charge the system to the desired SoC if planning to depart.
- Before departure, ensure the vessel has sufficient fuel for propulsion and charge control charging.

Pre-start checklist

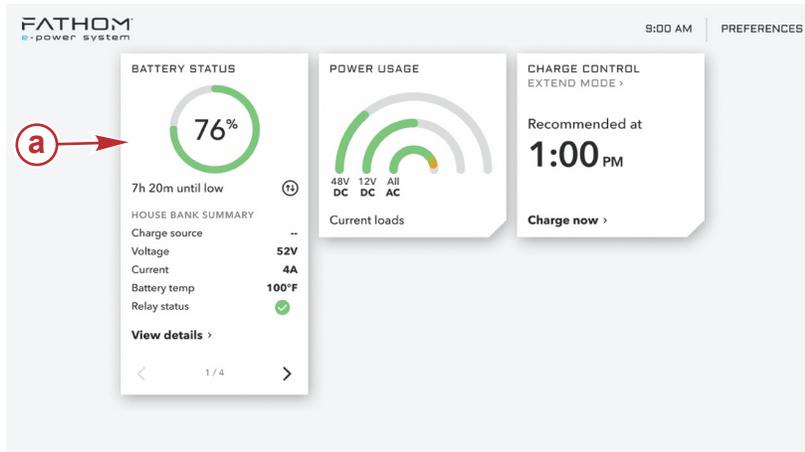
- Check wind conditions to determine where exhaust will flow.
- Ensure the vessel is in an open area.
- Ensure the vessel will be occupied through the duration of the charge event.
- Know where all occupants are before starting charge control.
- Make sure that the vessel is secure and will not drift into other boats, shore, or shallow areas while charge control is active.
- Ensure the outboards and Fathom system is in good working order.
- Check that the outboards are trimmed down and water inlets are below the waterline.
- Make sure all other key switches are in the **OFF** position.
- Determine charge needs and select which outboards will run for this instance of charge control and switch those key switches to the **ACC** position.
- If swimmers are in the water or if occupants are near/around the transom, notify them that the engines will be starting.
- Ensure the vessel-end of the lanyard is connected to the safety switch and that it is in the "Run" position.
- Start charge control with the manual switch/button or via the display.
- Allow charge control to run until it shuts off when the system reaches 100% or it may be terminated manually at any time during charging.

Operation

System operation

Overview

Fathom is an integrated energy management system that optimizes silent operation and efficient charging to bring comfort on the water to a new level. Fathom will continue to provide power to all electrical systems while the engines are off. During this time the operator will be required to monitor the state-of-charge of the 48 V house batteries. This can be done through the BATTERY STATUS in the Fathom App. Alternatively, if the vessel is equipped with Auto-Start, the system will monitor itself and charge as needed.



a - Battery Status tile (tap to open)

Here the operator can see battery information such as estimated time until low, state-of-charge, system voltage, current draw, temperatures, relay status and other relevant information that may be user-customized.

NOTE: "Time Until Low" and "Recommended Charge Time" estimates will fluctuate with electrical loads. As variable loads such as air conditioning and refrigerators cycle on and off, these estimates may move.

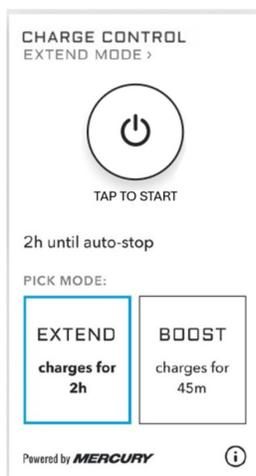
Determining when to charge

Fathom provides estimates regarding when the system will likely need to charge, however the operator has control over when to enable charge control. For example, if the 'Time to Charge' estimate shows 2 hours but the plan is to go for a longer, low-speed cruise beforehand, it would be recommended to charge prior to leaving to ensure sufficient energy while underway.

Starting/stopping charge control

Charge control can be started by one of the following methods:

- Pressing the physical Fathom button
- Tapping the "Charge Now" button in the Fathom app on the display:



80953

Charge control charging events can be stopped by any of the following methods:

- Pressing the physical Fathom button
- Tapping the "Tap to Stop" button in the Fathom app on the display

- Pulling the lanyard from the safety switch
- Physically turning each of the Fathom-ready outboard keys to the **OFF** position
- Turning any of the keys to the **RUN** or **START** position
- Pressing the Mercury Marine Start/Stop button on the dash or ERC

For stop requests, any one of the first two methods will result in a controlled ramp back to idle, followed by stopping of the engine. The last four methods will result in a more abrupt stop, similar to an emergency stop, or E-stop. An E-stop should only be used if it is imperative to abruptly stop the outboards.

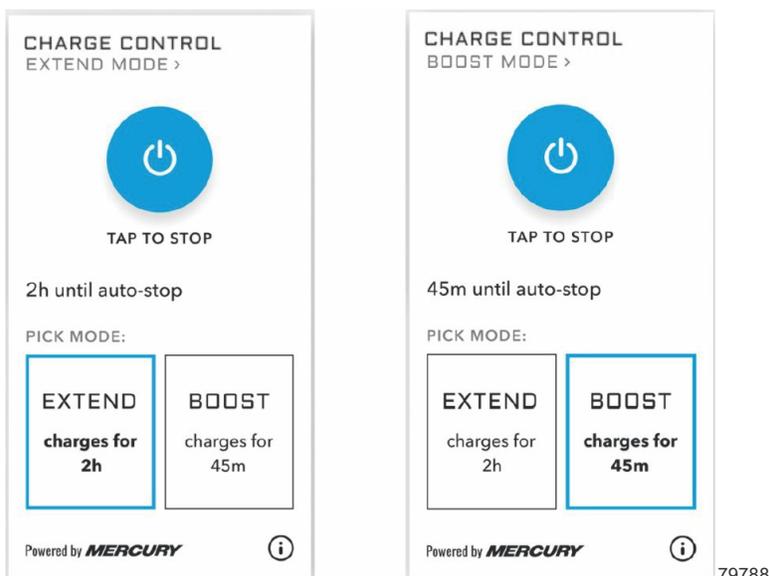
Engine warm-up period

During engine start-up, CO concentrations can be higher than after the engine has warmed up. To reduce ambient concentrations of CO during charge control mode, the engines will start and then warm-up at idle for a pre-determined period of time before transitioning to the desired charge mode. This is normal and will still charge the system during this period, just at a reduced rate and only at 12 V. During this time this illuminated ring around the Fathom button will blink rapidly until the engine has warmed enough to ramp to the desired speed, at which point the light will go solid to indicate it is charging at 48 V.

Charge rate

The rate at which the system charges in charge control is determined when selecting extend vs boost Mode. The charge rate is determined by engine speed. In the graphic below you can see that the estimated time to fully charge the system is displayed on each tile. This can be selected prior to starting, as well as when charge control is active.

As a guideline, extend mode should be used when time is not a concern or if a quieter setting is desired and vessel electrical loads are low. Boost mode can be used to quickly charge the system before getting underway or so that the transom area can be used for swimming or entertaining with the engines off.



Fathom auto-start

Auto-start is a feature that autonomously manages the enablement and disablement of charge control mode. The feature monitors battery state-of-charge and compares it to a lower threshold which is used to trigger a charge event, and an upper threshold which is used to stop a charge event. Auto-start is a dealer-enabled feature available only on Simrad multi-function displays (MFDs).

Special considerations

Even though Auto-start is an automated feature, it is the operator's responsibility to remain aware of changing conditions to the vessel, its occupants and surroundings, the weather, or anything else that may impact the safety of anyone on or around the vessel. Below is a list of special considerations before enabling the feature:

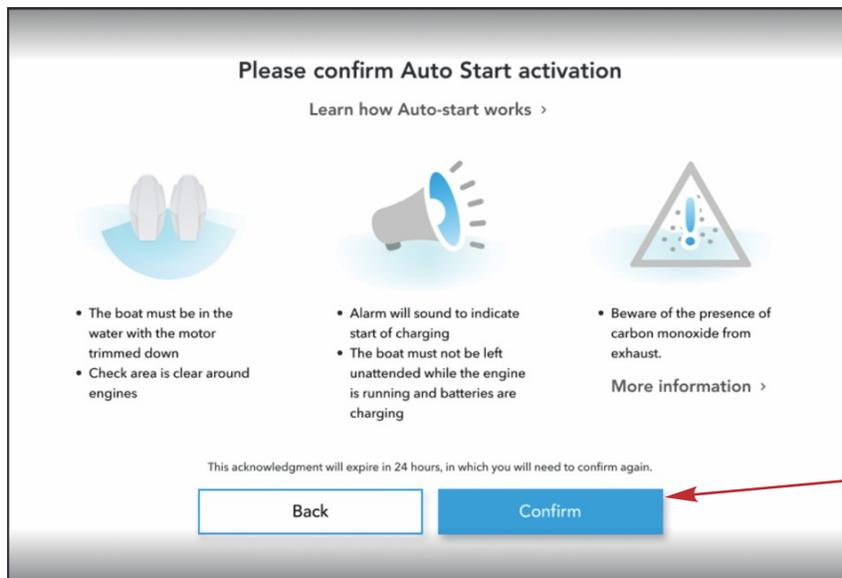
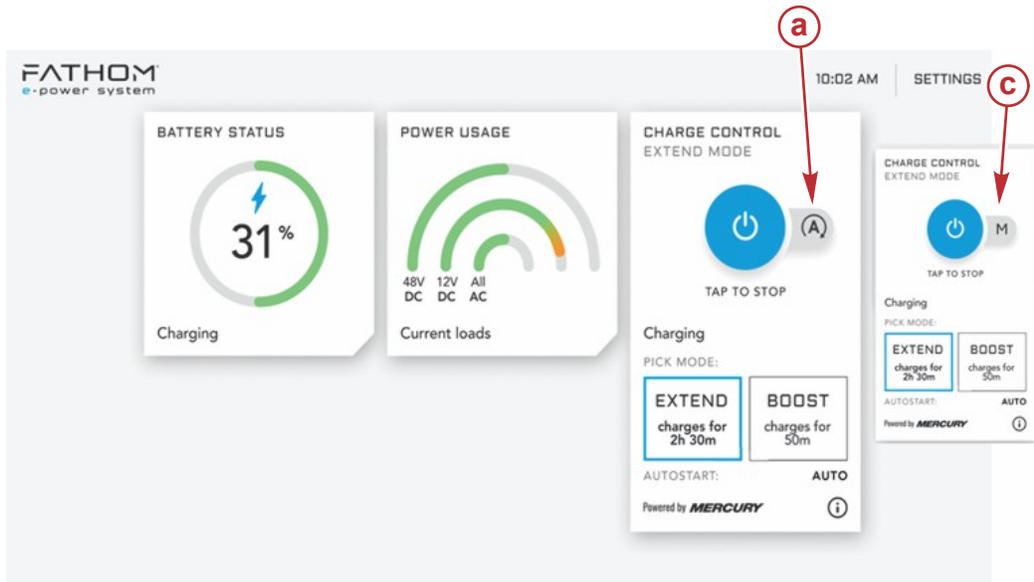
- Be aware of the presence of Carbon Monoxide from exhaust.
- Auto-start is not intended for use in boat houses or covered docks as CO may accumulate within and around the structure or other vessels.
- The vessel must be in the water with the engines trimmed down to ensure adequate cooling.
- Auto-start is not to be used when on a lift or on dry land.
- The vessel must be occupied while auto-start is enabled.

Operation

- Be aware of other vessels, marina infrastructure, or other surroundings that may be subject to CO exposure from exhaust gases.
- Inform occupants to stay clear of the engines when charging, especially on swim platforms, in the water near the transom, or other areas around the transom.
- Be aware of changing conditions (weather, surroundings, or other).

Acknowledgment and enablement criteria

Before the system allows auto-start to be activated, the operator must acknowledge the enablement and associated risks. This is done by pushing auto-start Indicator (a) and then pressing Confirmation (b) as seen below.



80606

- a** - Auto-Start indicator
- b** - Acknowledgment confirmation
- c** - Manual mode indicator

To account for changing conditions, and for the safety of the operator and the occupants, the acknowledgment period expires after 24 hours. The acknowledgment period will also expire if any key switch is moved to the **RUN** position, if certain engine or system faults occur, or if the CO alarm is triggered.

IMPORTANT: If the CO alarm is triggered, do not attempt to restart the engines, either in charge Control mode or propulsion mode. Move to a well ventilated space until the alarm clears.

Establishment Criteria:

- At least one key switch in the **Fathom/ACC** position (others must be off).
- Engines trimmed down with drives in the water.
- System and engine(s) clear of faults.
- Engine/ambient temperature above the low temp threshold of 15 °C (59 °F).
- Fuel level above the low fuel threshold.

Emergency shutdown

The system is designed to immediately shut down an outboard or outboards if certain issues or faults are detected. In the event of a situation that requires immediate intervention by the operator, the system can be shut down quickly by following one of the following methods:

NOTE: *These are in addition to any of the traditional emergency stop procedures such as pulling the safety lanyard.*

- Pressing the physical Fathom button
- Tapping the "Tap to Stop" button in the Fathom app on the display
- Physically turning each of the Fathom-ready outboard keys to the **OFF** position
- Turning any of the keys to the **RUN** or **START** position
- Pressing the Mercury Start/Stop button on the dash or ERC

IMPORTANT: The operator should be aware of the quickest way to terminate a charge event. This should also be communicated to at least one other individual onboard in case the operator is not immediately available.

Operating in cold/freezing temperatures

The lithium-ion Fathom batteries have a low operating temperature of -20 °C (-4 °F). However, operating at temperatures below 0 °C (32 °F) may derate the available power and/or capacity from the batteries. Care should be taken to limit the amount of usage and charging at these low temperatures. Bringing the battery internal temperature above 0 °C (32 °F) is desirable for optimal performance. Operation below -20 °C (-4 °F) is prohibited.

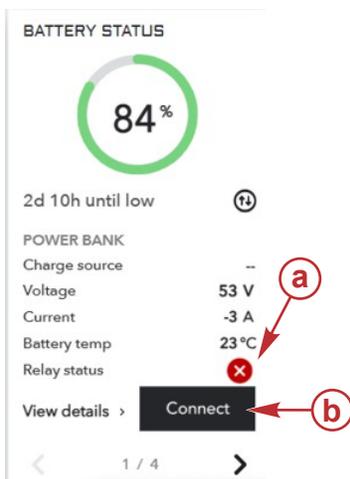
Operating in hot temperatures

The lithium-ion Fathom batteries have an upper operating temperature of 50 °C (122 °F). Operating in ambient temperatures above 50 °C (122 °F) may derate and disconnect the available power and can damage the battery or reduce the battery life. While the system protections will shut down the battery at internal temperatures above 50 °C (122 °F), caution should be taken to avoid operating at these temperatures for prolonged periods.

⚠ CAUTION
Operating lithium-ion batteries above the maximum operating temperature for prolonged periods may cause them to derate, disconnect, or vent potentially causing injury or damage.

48 V relay fault open

The 48 V Lithium-ion battery monitors several parameters and may disconnect itself by opening its relay if there is a fault or potential safety issue. If the 48 V battery relay was forced open due to a fault, once the fault clears the relay may need to be re-closed. The relay status will show a red "X" and a black 'Connect' button may appear on the Battery Status tile. The relay may be manually turned on at the battery, or by selecting the black 'Connect' button on the Battery Status tile.



81009

Operation

Overnight operation

Charge control should not be operated unattended overnight. A key benefit of the Fathom system is silent operation while still maintaining the comfort of conditioned sleeping space. When overnighting, starting with batteries at full capacity and minimizing electrical loads is recommended to extend battery operation so charge control does not need to be used.

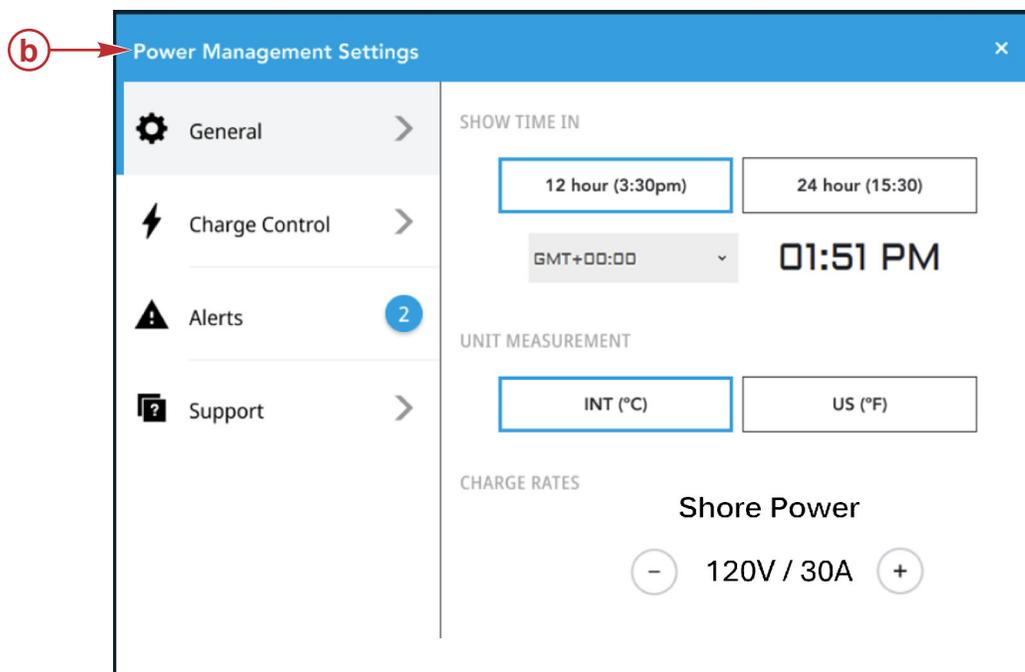
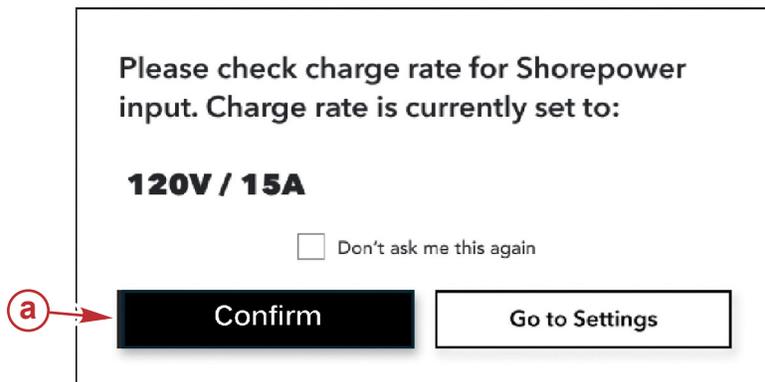
Engine-hour balancing

Depending on electrical loads and capacity needed during charge control operation, only one engine may be needed to recharge. To keep engine hours similar between engines, it is recommended to alternate between Fathom equipped engines for each new charge control session. If equipped with Auto-Start, the fathom engine with the lowest hours will start first to equalize the runtime between engines.

Shore power operation

To charge the Fathom system at the dock, plug into the vessel's shore power inlet. Fathom will detect the AC input and switch to charge mode to charge the 48 V battery bank. The internal transfer switch(s) on the CombiMaster(s) will redirect the connected AC loads to be powered from the incoming shore power. The word "Shore power" will also appear as the charge source on the Battery Status tile.

Depending on the available shore pedestal service, the CombiMaster inverter/charger current limit can be set to match the shore power current limits. If other onboard AC loads are present, the CombiMaster current limit can be reduced to avoid exceeding the breaker current limit. This selectable current limit can be found in the Settings page. Once shore power is connected, a message will appear to either confirm the available shore power, or select a different one in the Power Management Settings:



81010

- a** - "Confirm" button
- b** - Power Management Settings

Operation

Notes:

Maintenance

Inspection and maintenance schedule

The Fathom system requires no further maintenance other than maintaining proper charge and regular visual inspections. It is recommended to inspect cabling and connections to assure all harness and cables are secure, electrical connectors are properly seated and bolted connections are tight. Also check all mechanical mounting and hold-downs for batteries and electrical components. Additionally, check for corrosion around the system components.

⚠ WARNING

The Fathom system operates at greater than 50 V and contact with energized components could result in serious injury or death. Service should only be performed by trained personnel in the proper handling of these high-voltage systems.

De-energizing the system between uses

To de-energize the Fathom system between uses, follow the steps below. If the vessel is moving to storage, refer to **Storage** for the proper battery state-of-charge levels. The steps below will de-energize the system and only charging will be available until the system is energized.

1. Ensure the system is inactive, the key switches are off, AC/DC loads are off, and the vessel is connected to shore power.
2. If the boat is equipped with a Smart Battery Hub, simply turn off the main boat **ON/OFF** switch with a long press. Otherwise, turn the engine battery(s), 12 V house battery, and any auxiliary batteries to the **OFF** position from the CZone display, main panel, or manual switch by the component.
3. Ensure the CombiMaster unit "AC IN" green led is illuminated. The CHARGE led may be illuminated as well if the unit is charging.
4. If the vessel will not be plugged into shore power and therefore not have charging capability, ensure the battery state-of-charge (SoC) is above 75% and monitor the SoC at least every six months.

Lithium-ion batteries

Mastervolt Lithium-ion batteries are designed to be maintenance-free. Unlike traditional lead-acid batteries, they must remain completely sealed. **DO NOT** add water to them.

IMPORTANT: The 48 V Mastervolt lithium-ion batteries have a nominal voltage of 52 V. Due to the hazardous voltage and arc flash potential, appropriate personal protection is required any time the protective covers are removed, exposing live terminals.

NOTICE

Do not open or attempt to add water to the lithium-ion batteries. This will result in severe damage to the battery and risk of gas or electrolyte venting which could cause physical injury.

Other system batteries

The vessel is equipped with one starting battery per engine. Follow the proper guidelines for maintenance per the manufacturer's recommendation. For example, a lead acid battery should have water levels checked at least once per year, more often for warmer climates .

Outboards

Alternator drive belt

Inspection of the drive belts, including the alternator belt, is part of the regular maintenance of the Mercury outboards. Belts should be changed at regular intervals outlined in the Mercury maintenance manual. However, if at any time a belt squeal, pulley rattle or burning rubber smell is noticed, the drive belts should be inspected immediately.

Cables, wiring, and harness inspections

The Fathom system is comprised of several devices and therefore utilizes numerous interconnections. For reliability, Fathom uses only sealed electrical connectors with locking tabs for long lasting performance. Regardless, the marine environment can be harsh and therefore connections should be regularly inspected to ensure optimal system performance.

Handling damaged, defective, or submerged products

Caution must be taken when handling any damaged, defective or submerged electrical parts or wiring, in particular, lithium-ion batteries. Only qualified service personnel should repair and or replace any failed or submerged equipment.

⚠ WARNING

Lithium-ion batteries may pose a risk of venting electrolytes or toxic gases if internally damaged. Any attempt to repair or remove the batteries could result in serious injury or death. Handling should only be performed by trained personnel in the proper handling of these systems.

If any electrical component becomes damaged, defective or submerged, the Fathom system should be turned off if the system has not already forced a fault shutdown. This will isolate the batteries and keep energy from flowing to other components. While the batteries are IP65 rated, they are not watertight and eventually water could begin to seep in if submerged. Any battery or electrical device that has been in standing water or submerged should be inspected or replaced by an authorized service dealer.

Storage

Storage preparation

NOTICE

Lithium-ion batteries have specific storage requirements and can sustain damage if not stored at the proper temperatures or state-of-charge (SOC).

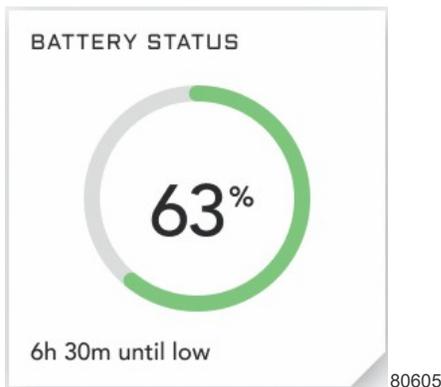
The Fathom lithium-ion batteries have specific storage requirements. Proper storage preparation is paramount to enjoying a trouble free system when the vessel is put back in service. If the vessel will not be plugged in with charging available, the following guidelines should be implemented

Proper storage temperature is also vital in keeping the batteries performing well. Storage temperatures should stay between 0 °C (32 °F) to 35 °C (95 °F). It is permissible to store in temperatures up to 45 °C (113 °F) for up to 30 days.

Short-term non-use / storage

Short-term storage is considered any non-operation usage for up to three months. If the Fathom system or vessel will be unused for up to three months without charging, the system state-of-charge (SoC) as shown on the Battery Status (figure below) should be between 50% and 95% when entering storage. Ideally for storage, the batteries should remain above 25% SoC.

NOTE: A 25% state-of-charge (SoC) will trigger a low SoC warning. The green ring on the Battery Status tile will change to red as a visual alert.



To ensure there is no external drain on the batteries, the Fathom system should be de-energized. Refer to **De-energizing the system between uses** inside the **Maintenance** section preceding.

Seasonal storage

Seasonal storage is considered any non-operation usage for three to six months. If the Fathom system or vessel will be unused for up to six months without charging (such as winter storage) the system SoC should be between 75% and 95% when entering storage. The same de-energizing steps for short-term storage should be taken to minimize any external drain. With the system properly shut down, there should be very little internal battery drain. However, the Battery Status should be checked periodically to assure the system does not drop below 25% SoC.

Extended long-term storage

If the storage period extends past six months, the SoC of the Fathom system should be checked periodically to ensure that the system does not drop below 25% SoC. Charge the system as needed to maintain the SoC. The system SoC should continue to be monitored and maintained during the entire storage period.

Storage

Notes:

Troubleshooting

Charging

System will not charge when connected to shore power

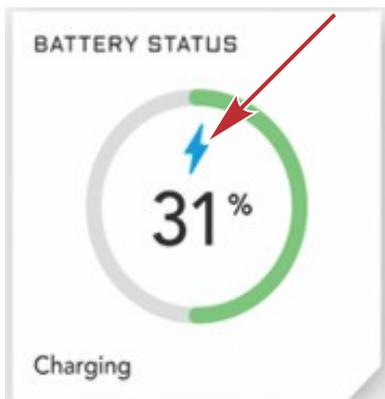
Possible Causes	Recommended Maintenance
48 V battery switch turned off	Turn 48 V battery switch on at the relay or on the user interface.
No AC voltage from pedestal	Ensure pedestal breaker is on and that the shore cord is firmly plugged in.
Damaged shore power cord	Inspect the shore power cord for damage or wear. Discard and replace if necessary.
Low AC voltage	Check that AC voltage is within the acceptable range (90-140V) on the display. If pedestal power is suspect, check for local power outages or contact a qualified electrician or maintenance crew if at a marina.
Fathom CombiMaster INV/CHG is not working properly	Check that the INV/CHG switch on the underside of the unit is in the correct position. Ensure the CombiMaster battery switch is on and the green led indicators for AC IN and CHARGE are illuminated.
Charger breaker in the AC panel or Czone AC module is off	Check for the blue lightning bolt inside the SoC of the Battery Hub display tile. This should be present if the system is charging. Ensure that the correct circuit breaker in the AC panel is on and that the circuit is active, including CZone controlled circuits.
Input current setting on CombiMaster exceeds pedestal rating	Navigate to the settings menu and select a lower shore power input level. This will limit the power draw from the CombiMaster.
System may be in support mode due to excessive AC loads	Reduce the AC load on the system to increase charge capacity.

Fathom CombiMaster inverter/charge green LED indicators:



78785

Battery Status showing blue lightning bolt charge indicator:



79786

Troubleshooting

Reduced charge performance when Mercury engines are running in charge control mode

Possible Causes	Recommended Maintenance
Engines are in "Warm-Up" mode	The engines will start and remain at idle for up to five minutes to properly warm-up. After this period, they will increase in speed and charging should begin.
High electrical/house loads	The rate at which the batteries charge is dependent on how many electrical loads are on at any given time. Reducing loads such as air conditioning can increase charge performance.
Elevated ambient or system temperatures	High ambient temperatures can impact the performance of batteries and other electronics. Providing adequate ventilation to compartments and cabinets where the system is installed, especially during prolonged or repeated charge events, can improve the performance of the system.
Cold temperatures	Cold ambient temperatures below 5 °C (41 °F) can impact the performance of batteries and other electronics. Compartments where the system is installed may need to be heated to increase the ambient temperature.
Automatic mode switch (AMS) is not working properly	The AMS switches from 12 V to 48 V above 2000 RPM engine speed. If the AMS is not able to switch to 48 V, it may default to 12 V, limiting charge. Check that the 48 V green led is illuminated above 2000 RPM.
Alternator belt slip	Visual inspection through the cowling for belt dust or debris or listen for belt squeal or noise. See Mercury Marine manual for service.

Reduced charge performance when mercury engines are in propulsion mode

Possible Causes	Recommended Maintenance
48 V charging not available	Alternator belt broken or damaged.
	Engine speed could be too low. Increase engine speed above 2,000 RPM if safe to do so.
	Check Alternator Mode Switch (AMS) status lights. An illuminated green LED labeled 12 V indicates 12 V input, and an illuminated green LED labeled 48 V indicates 48 V input. See De-Energizing Section regarding System Reset.
High electrical/house loads	The rate at which the batteries charge is dependent on how many electrical loads are on at any given time. Reducing loads such as air conditioning can increase charge performance.
Elevated ambient or system temperatures	High ambient temperatures can impact the performance of batteries and other electronics. Providing adequate ventilation to compartments and cabinets where the system is installed, especially during prolonged or repeated charge events, can improve the performance of the system.
Cold temperatures	Cold ambient temperatures below 5 °C (41 °F) can impact the performance of batteries and other electronics. Compartments where the system is installed may need to be heated to increase the ambient temperature.
Automatic mode switch (AMS) is not working properly	The AMS switches from 12 V to 48 V above 2000 RPM engine speed. If the AMS is not able to switch to 48 V, it may default to 12 V, limiting charge. Check that the 48 V green led is illuminated above 2000 RPM.

Battery system

One or more batteries from the 48 V house bank are critically low

Possible Causes	Recommended Maintenance
System charging issues or faults	Check if the blue lightning bolt is present inside the SoC display on the Battery Hub tile. If shore power is connected, check that the Combi INV/CHG shows AC IN and CHARGE leds illuminated. If engines are running, check that the AMS green leds are illuminated.
Excessive loads on the system	Start charge control mode and/or reduce system loads such as air conditioning or other high-load items.
Extended storage at low SoC without charging	Ensure proper steps are taken to account for SoC loss over long periods of storage. If a Fathom battery drops too low in SoC, the battery may go into protective shut down. Refer to long-term storage section above.
Battery fault or limit exceeded	The Fathom batteries have several built-in protections that may disconnect one or more batteries if an unsafe or damaging condition exists. Check that there are no errors on the Fathom display.

One or more propulsion batteries are critically low

Possible Causes	Recommended Maintenance
Charging not implemented	If only certain engine start batteries are critically low, they can be paralleled via the Emergency Parallel switches in the BEP Smart Battery Hub or similar battery switch system. It may be possible to start one engine and charge the remaining engine batteries. As a second method, the Fathom system produces 12 VDC via the DC-DC converters. This 12 VDC output is used to charge the engine batteries. Assure the 48 V battery bank is on and check that the DC/DC converter shows a green led and is providing energy to the 12 V batteries. Check that shore power is on (if plugged in) and DC-DC converters show green leds, indicating charge to the 12 V batteries.
Battery low on water	A flooded cell battery may be low on water. Refer to the manufacturer's instruction for maintenance or consider using a sealed battery such as AGM or gel.
Defective battery	A failed battery may appear intact on the outside. The battery should be removed and tested or replaced. Note, propulsion batteries should all be the same. Replace only with the same type and capacity battery.
Battery is disconnected	Ensure the battery switch is on and applicable in-line fuses are intact. Refer to the Smart Battery Hub or vessel main DC distribution system operation.

Fathom display and controls

Charge control mode not available

Possible Causes	Recommended Maintenance
Outboard(s) trimmed too high	Trim outboard engines down so that water pickups are below the waterline.
CO detected	If CO is detected move to a well ventilated area. Do not attempt to restart the engines until the alarm is clear. If the alarm persists, reduce the number of engines that are allowed to run simultaneously.
Elevated battery temperature	For safe operation, 48 V charging may not be available if the battery temperature is too high.
System or engine fault	There are various system faults that may halt charge control mode. Refer to Fathom fault list or engine manual for more details.

Fathom app unresponsive or not available

Possible Causes	Recommended Maintenance
Loss of communication	Cycle power to the system by turning off the 12 V house battery for 20 seconds and turning back on.
Multi-function display is not functioning	Check the fuses or breakers for the display units (location and type will vary by vessel and display model). If the issue cannot be resolved, charge control may be manually operated via the physical switch.

Mercury Marine Fathom-ready outboards

Charge control mode will not start or shuts down

Possible Causes	Recommended Maintenance
Key switches are not configured properly	Ensure Fathom-ready outboard key switches are in the ACC position. Ensure non-Fathom outboard key switches are in the OFF position.
System or engine fault	There are various system faults that may prohibit charge control mode. Refer to Fathom fault list or engine manual for more details.
Low fuel	Check fuel gauge to ensure the tank has fuel available.
Too cold	Extreme cold conditions can cause poor or failed starts.
High state of charge	If the system is configured to shut down automatically, the system may be at or above the threshold.

Notes:

Frequently asked questions

Frequently asked questions

What is the difference between a genset and Fathom charge control?

The key difference between the two is that a genset is often started and left running for the duration of a trip.

The Fathom system is intended to provide periods of silent operation, allowing the battery bank to supply energy to the vessel's electrical system during periods of normal use. When the battery state of charge reaches a certain level, the outboards can be used to charge the system before turning off and allowing silent operation again.

During periods of high electrical loads, charge control mode can be used for longer durations to supplement the battery bank, ensuring continuous power to the vessel's devices.

How long can I run the outboards in charge control mode?

Charge control mode is available any time charge is needed, or the electrical demand is greater than the battery capacity. If equipped with Auto-Start, the outboards are allowed to run up to four hours continuously, assuming there is adequate fuel capacity. Auto-Start sessions are limited to a maximum of 24 hours. Note that the system will not need to run as often if electrical loads are reduced when not needed, such as AC usage in unoccupied cabins or open areas of the vessel.

What should I do if the 12 V batteries for the Mercury outboards are critically low or cannot start the engines?

Refer to **Troubleshooting** for one or more propulsion batteries critically low.

What should I do if the 48 V batteries are critically low, or cannot deliver power to the vessel systems any longer?

If the Fathom battery system has been depleted fully, plugging into Shore power or running the engines in either propulsion mode or charge control mode should restore charging and bring the 12 V and 48 V house banks back up to capacity. Depending on the battery bank size and electrical loads, this may take several hours. It is advisable to limit electrical loads to necessities only to charge the batteries quicker. The boost function on the charge control display may be utilized to decrease charge time.

How can I isolate a battery or set of batteries from the system if they are non-responsive at a critically low state of charge (SoC)?

The BEP Smart Battery Hub allows you to easily isolate a battery that has become unresponsive. By turning off that battery switch and engaging the Emergency Parallel Switch that is connected to that battery switch, the corresponding battery will now be connected to the adjacent battery switch. As an example, turn on the Port Emergency Parallel Switch. The port engine will now be connected to the starboard battery.

If the Fathom 48 V battery becomes unresponsive at a critically low SoC, it will de-energize and isolate itself. With the Fathom system off, you will lose the ability to power 48 V devices as well as AC loads. Note, the engine batteries will still operate and charge normally from their associated engine as will the house and auxiliary batteries.



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Can I charge while cruising at low speed or trolling?

Yes, however, charge rate is dependent on engine speed, so at lower speeds charge performance will be reduced.

To maximize system performance during sustained periods of low-speed cruise or trolling, it is recommended to charge the system to 100% prior to departure, and to minimize electrical loads.

If charging is needed, the vessel can be stopped and placed in charge control mode, or, if safe to do so, engine speed can be increased above 2,000 RPM while in forward gear. Always be mindful of no-wake zones and other boat traffic.

How can I tell if the outboard is charging in 12 V or 48 V mode?

Frequently asked questions

The AMS has green led indicators for 12 V or 48 V output. As described earlier, below 2000 RPM should be 12 V mode and above 2000 RPM should be 48 V mode.

How much fuel does charge control use?

Fuel use will vary depending on weather conditions, electrical load, engine maintenance, as well as a number of other factors. To get the most accurate estimate for your application, refer to the Mercury App on your display. Individual engine and combined consumption can be displayed there.

Can I safely charge if the display or Fathom App is unavailable?

Yes, if the display or app is unavailable, the system is still functional by setting the physical key switches to **ACC** and pressing the physical charge control button. The system will idle for five minutes before ramping to the last charge point that was used, either boost or extend.

If the system reaches 100%, it will safely manage the alternator output until the engines are turned off.

Why shouldn't I use the "throttle-only" option for charging?

The charge control function offers safety and performance features not offered in throttle-only, such as a more controlled warmup strategy, reduced emissions and increased efficiency with Advanced Range Optimization, safety lockouts if CO is detected, as well as other monitors to protect the engines when specifically being used in generator mode. Continued use of throttle-only will prompt a message to switch to Fathom mode.

Can I run charge control while away from the vessel or onshore?

The Fathom system and charge control feature have several safety monitors to protect the system, the outboards, and most importantly the occupants. While it is not required that the operator remain at the helm during charge events, it is recommended that the operator remain with the vessel to monitor for any change in conditions and surroundings that may require the system to be disabled.

What is different on the Mercury engine to make it Fathom-ready vs a standard Mercury engine?

Fathom-ready Mercury engines have a unique dual-voltage alternator, belt, engine software, and cowl detection. They have unique model numbers and are only available on the V10 and V12 engine platforms.

When Fathom goes into boost mode, how long does it take to become fully charged?

This will depend on the size of the battery bank, its SoC, the number of Fathom-equipped engines, and the DC and AC system loads. Each engine equipped with a dual-voltage alternator is capable of producing 5kW.

What is Time until Low on the GUI?

'Time until low' is the estimated amount of time the Fathom system will continue to supply power with the current loads. This can change dynamically with varying loads or charge input.

Are you required to exit out of Fathom mode to enter into Propulsion mode?

Yes, the key switches must be moved from **ACC** to **ON** to enter propulsion mode.

Will the non-Fathom engines be locked out during Fathom mode?

Yes, the non-Fathom engines will need to be in the **OFF** key switch state. Any attempt to key-on the non-Fathom engines will disable Fathom mode.

Is there a mobile version of the Fathom app?

Not currently.

Is there a lockout on the display to prevent inadvertent activation/deactivation, or a parental control lockout?

Not currently. If children or others have access to the helm it is the operator's responsibility to prevent misuse or unintended operation.

What is Auto-Start, and is it available on my system?

Auto-Start is an optional feature that is only available on Simrad displays. It allows for autonomous control of the charge control feature, automatically maintaining battery SoC with minimal user interaction.

Can Fathom start if the boat is on a trailer?

Charge control mode should only be used when the vessel is in the water. However, if a vessel is loaded onto a trailer with the drives down and the keys are moved into the **ACC** position, inadvertent engagement of charge control could occur if Auto-Start was enabled, or if manual mode was accidentally started. In this case engines may start, but would shut down within 10-15 seconds if cooling water was not detected.

What safety precautions are on the Fathom system?

Fathom has numerous safety precautions embedded in its design, from CO monitoring to propulsion lockout and system health. These are continuously monitored and will alert if conditions are not met.

What happens if the battery gets too low?

A warning will be displayed on the MFD and the status ring around the SoC will turn **red** at 25%. Warnings will continue before a system shutdown occurs at 3% SoC.

Will the batteries go into safety mode? If so when?

As stated, the system will shut down at 3% SoC. The battery system may also shut down due to over temperature or over current conditions.

If the key switches are ON vs ACC, will it still go into Fathom mode?

No, the key switch must be in the Fathom/**ACC** position for Fathom mode to be activated.

What is the warranty period?

5 years for recreational marine, 3 years for commercial use.

Am I allowed to upgrade or replace components of the Fathom system?

Fathom is an integrated solution with very specific components and software operating at hazardous voltages. Do not attempt to repair, replace, or alter any components in the system. Refer to your dealer for service.

Frequently asked questions

Notes:

Fathom fault list

Fathom fault list

Alarm ID	Message / Text	Possible Cause	Suggested Resolution
0	Fathom: Guardian Mode Active	A critical issue has been detected with the Mercury Marine outboard and/or its controls	Review specific fault and consult Mercury Marine manual or dealer
1	Fathom: Cowl Open	Cowl open (cowl switch) – CAN H error	Assure cowling is properly installed
2	Fathom: Trim Up	Trim is above the configured threshold	Trim down until water inlets are below the waterline
3	Fathom: Engine Stalled	Fuel delivery issue; lanyard disconnected; extreme cold or flooded condition	Evaluate symptoms and consult Mercury Marine manual
4	Fathom: Engine Dead	Outboard electrical system not energized; clean power fuse blown; battery switches off; 12 V battery dead	Confirm 12 V power, check switches/fuses, consult Mercury Marine manual
5	Fathom: Exhaust Gas Over Temp.	High exhaust gas temperature due to cooling restriction, pump degradation, or drive trimmed up out of the water	Inspect water inlets for debris, trim down, confirm adequate water pressure, consult Mercury Marine manual
6	Fathom: Engine Not Running at Requested RPM	Actual engine RPM does not match commanded RPM	Consult dealer
7	Fathom: Alternator Communications Fault	Not used	Not used
8	Fathom: Alternator Electrical Fault	Damaged or loose wiring or connections; damaged or defective alternator	Visual inspection of alternator and connections; consult Mercury Marine manual or dealer
9	Fathom: Alternator Mechanical Fault	Broken, damaged or loose alternator belt or pulley, or other alternator damage	Visual inspection of alternator and belt; consult Mercury Marine manual or dealer
10	Fathom: Alternator High Temp Fault	Alternator high temp fault is received from SmartCraft	Consult Mercury Marine manual or dealer
11	Fathom: Faulted Requesting Primary Volts	A fault is being communicated when the alternator is switching to 12 V	Consult dealer
12	Fathom: Faulted Requesting Secondary Volts	A fault is being communicated when the alternator is switching to 48 V	Consult dealer
13	Fathom: Gen Mode Faulted	Fathom has faulted because the engine reports a Gen Mode fault	Consult dealer
14	Fathom: Gen Mode Not Supported	Fathom has faulted because the engine either does not support Gen Mode (Fathom) or a timeout occurred during verification	Consult dealer
15	Fathom: SmartCraft Network Error. Check Connections	CAN H Fathom Smartcraft Network Error: Check connections, fault may be associated with invalid 12 V or 48 V mode switching, inability to communicate with helm module or communication timeout/fault	Consult dealer
16	Fathom: Alternator 48 V Mode Failed	Engine has not entered 48 V mode in time (<10 sec)	Consult dealer
17	Fathom: Alternator 12 V Mode Failed	Engine has not entered 12 V mode in time (<10 sec)	Consult dealer
18	Fathom: Low Engine Battery Voltage	Engine battery voltage is below threshold (11.0V)	Charge battery. Consult dealer if fault remains

Fathom fault list

Alarm ID	Message / Text	Possible Cause	Suggested Resolution
19	Fathom: No Lean Burn Timeout	Lean burn may not go active if warmup is incomplete, a potential fueling issue is detected, or if there are other pending or active faults	Check fuel supply; confirm thermostat operation (engine temp reaches fully warm); consult Mercury Marine manual or dealer
20	Fathom: Engine Start Failed	A failed start could be due to a fuel supply issue, extreme cold, a flooded engine, and/or fouled spark plugs	Ensure adequate fuel level and fuel valves are on. Consult Mercury Marine manual or dealer
21	Fathom: Helm(s) Configured	Fathom has not received helm authentication. No helm configured	Consult dealer
22	Fathom: Seawater Pressure Too Low	Low seawater pressure could be due to a cooling restriction, pump degradation, drive trimmed up or out of the water	Inspect water inlets for debris, trim down, confirm adequate water pressure, consult Mercury Marine manual
23	Fathom: Engine Fault Detected	Engine fault (unknown fault from SmartCraft)	Consult Mercury manual or dealer
100	Fathom: Full-Auto Start/Stop Disabled	Engine failed running or stopped	Consult dealer
101	Fathom: Cannot Start (Fathom Not Enabled)	Fathom mode not enabled in system configuration	Consult dealer
102	Fathom: Cannot Start (Safety Lockout)	Emergency lockout condition active	Check that all safety items are deactivated such as the lanyard and CO monitor
103	Fathom: Cannot Start (Keys off)	Keys off and Fathom switch pressed	Turn keys to ACC /Fathom position
104	Fathom: Cannot Start (Keys on)	In Propulsion mode and Fathom switch pressed	Turn keys to ACC /Fathom position
105	Fathom: Cannot Start (Auto-Stop Condition Present)	Auto-Stop condition (battery SoC above threshold)	Battery is fully charged. No charging needed
106	Fathom: Stopping (Fathom Disabled)	Fathom mode was disabled while running	Start new Fathom session. If fault does not clear, consult dealer
107	Fathom: Stopping (Safety Lockout)	Emergency lockout condition active while running (i.e. lanyard pull)	Emergency lockout condition active while running. Ensure lanyard is in place. If CO monitor is active, move to well ventilated area until fault is cleared
108	Fathom: Cannot Start (House 48 V Battery Issue)	MLI Relay opened, relay failure alarm, battery safety	Consult dealer
109	Fathom: Stopping (House 48 V Battery Issue)	MLI Relay opened, relay failure alarm, battery safety while running	Consult dealer
110	Fathom: Forcing 12 V (House 48 V Battery Issue)	Propulsion mode, force to 12 V	Consult dealer
111	Fathom: Joystick/Lever De-active in Gen Mode	Joystick is de-active in Fathom mode	No action. Informative alarm only
112	Fathom: Multiple Charging Sources Detected	Engine running and shore power also present	For typical charging at the dock, only shore power is needed. If Support Mode is required to run large AC loads at the dock, Fathom can run engines to supplement
113	Fathom: Fuel Level Low	Fuel threshold value reached	Add fuel

