

Integral
solutions

Boat hibernation & battery care



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HIBERNATION & STORAGE OF A VESSEL



IT IS CRITICAL THAT BATTERIES ARE PLACED INTO 'STORAGE MODE' IF A VESSEL WILL NOT BE USED FOR AN EXTENDED PERIOD OF TIME (E.G. WINTERING YOUR BOAT). WHEN IN STORAGE MODE, ANY DEVICE THAT MAY DRAW POWER FROM THE BATTERY BANK MUST BE DISCONNECTED.

The following guide provides information about managing batteries on a boat during a storage period, however, it is strongly recommended to read the battery manufacturer's documentation regarding the storage of batteries during idle periods.

Failing to follow these instructions may result in fully discharging your batteries and/or permanent damage to batteries. The Integrel Warranty statement does NOT cover the replacement of batteries damaged in this manner. If in doubt, consult a Marine Electrician or open a ticket with our support desk at <https://integrelsolutions.com/resources/support/>

PREPARING FOR STORAGE

The objective of system hibernation is to store batteries safely for dormant periods. It is important that the batteries are not discharged below the minimum voltage recommended for storage, or exposed to extreme temperatures.

Essential systems, like remote monitoring, alarms, fire suppression and bilge pumps can remain functional if required, provided that the powered electronics system is managed and monitored correctly. Solar chargers are sometimes left ON to replenish the minimal power consumed by the essential systems during short periods of storage.

Loads must be switched OFF, particularly high power and long duty cycle systems like refrigeration, air conditioning, heating and inverters. Where possible, completely shut down a 48V lithium bank, and run only essential loads from a 12V bank for hibernation periods. Most lithium battery manufacturers recommend storing batteries at 60-80% state of charge.



SHORT TERM SYSTEM HIBERNATION

1-2 MONTHS MAX | ASHORE OR AFLOAT

48V LITHIUM BATTERY BANK

- Ensure the batteries are charged to between 60% and 80% of full capacity
- Ensure Integrel E-Power is switched OFF
- Ensure the batteries are switched OFF
- Ensure that any BMS connected to the batteries is turned OFF and/or disconnected
- Set the negative disconnect to OFF at the batteries (if installed)
- Turn the Integrel Smart Switch 90 degrees clockwise to avoid it accidentally being bumped ON
- If any essential or safety system needs to be powered for the lay-up period, these can be powered by a 12V bank.

12V BATTERY BANK

- Switch OFF all non essential loads like heating, refrigeration, inverters, etc.
- Leave only essential safety systems powered ON
- Ensure all battery voltage temperature alarms and bilge alarms are set, and notifications are ON
- Ensure bilge pumps are ON AUTO if the boat is left afloat
- Test and check all float switches
- Ensure the 12V bank has an appropriate charge source, such as a solar MPPT or AC charger capable of replenishing the loads taken by essential safety and monitoring systems.
- Check that the repeated absorption frequency is set to an appropriate interval.

Check the system daily via remote monitoring to ensure all is normal. Ensure marina or yard staff have a boat key and clear access, and emergency systems are clearly labelled and daily checks are in place.

If a boat is left afloat, bilge pump operation may be required in emergencies, or to maintain wet bilges. Emergency bilge pumps are generally powered by the 12V battery bank and are often permanently live (ON even if the main switch is OFF). As such, for periods of storage afloat, the 12V battery bank should have a source of charge, such as a solar MPPT or AC charger, capable of replenishing the loads taken by essential safety and monitoring systems, and bilge pumps.

WINTER HIBERNATION

UP TO 6 MONTHS

48V LITHIUM BATTERY BANK

- Ensure the batteries are charged to between 60% and 80% of full capacity
- Ensure Integrel E-Power is switched OFF
- Ensure the batteries are switched OFF
- Ensure that any BMS connected to the batteries is turned ODD and/or disconnected
- Set the negative disconnect to OFF at the batteries (if installed)
- Turn the Integrel Smart Swicth 90 degrees clockwise to avoid it accidently being bumped

If any essential or safety system needs to be powered for the lay-up period (remote monitoring, fire suppression, alarms etc.), these can be powered by a 12V bank.

12V LITHIUM BANK

- Switch OFF all non-essential loads like heating, refrigeration, etc.
- Ensure the batteries are charged to between 60% and 80% of full capacity
- Switch OFF the main 12V battery isolator, ensure the batteries are completely isolated from the 12V system
- Ensure that any BMS connected to the batteries is turned OFF and/or disconnected
- Use a 12V charger, set to 'power source', running on shore power, to power the minimal 12V systems for the lay-up period
- Leave only essential safety systems powered ON
- Ensure all battery voltage, temperature, and any other alarms are set, and remote monitoring notifications are ON

Check the system daily via remote monitoring to ensure all is normal. Ensure the marina or yard staff have a boat key and clear access, and the emergency systems are clearly labeled and daily checks are in place.

LEAD ACID BATTERY BANKS

- Same considerations as the lithium bank above, except:
- Most lead acid or AGM batteries must be FULLY charged before storage to prevent sulfation. Storing them somewhere cool is preferable, and they must be recharged at intervals recommended by the manufacturer, often trickle-charged. This can be onboard, or the batteries can be removed and maintained at home.

LONG TERM HIBERNATION

6 MONTHS AND OVER

Same as the section above *Winter Hibernation (up to 6 months)*, **plus** the following considerations:

- All batteries should be charged and checked at the intervals recommended by the battery manufacturer
- Ensure lead acid batteries are FULLY charged before storage, stored somewhere cool, and regularly recharged or trickled charged during the storage period
- Before long periods of storage, apply a corrosion-inhibiting substance to battery terminals and connections
- As seasons change, weather changes. Ensure the heater or dehumidifiers on the vessel are ON/OFF as appropriate to best control the temperatures and humidity in the vessel. This will help hugely with corrosion and dampness
- Thorough checks should be carried out before restarting the system. Check for corrosion, dampness, etc. See below.

RECOMMISSIONING

AFTER A PERIOD OF STORAGE

After a period of storage, it is important to reverse the storage procedure in order to correctly start the system.

Prior to switching the system ON, carefully check the voltage of each battery with a voltmeter or multimeter. Ensure the voltage of each battery in the system is greater than the minimum voltage recommended by the battery manufacturer. Check all the electrical connections and devices/components for corrosion, dampness, and tightness.

If one or more batteries are below the minimum recommended voltage, or if the batteries are imbalanced (different voltages) DO NOT turn the system ON. Contact a marine electrician for advice before proceeding.

When it's been confirmed that batteries are balanced, ensure they are at a suitable temperature for charging (check manufacturer's manual) and charge them ready for normal use, with either engine + Integrel E-Power, solar MPPTs, or AC charger.

GENERAL BOAT & BATTERY STORAGE

- 1** Always follow the battery manufacturers' recommendations when storing batteries. Recharge at the correct intervals, store at the correct temperatures and store at the correct state of charge.
- 2** Leave the vessel in a condition in which the batteries are safe from extreme temperatures. If the boat's ambient temperature is likely to be below the minimum for battery storage at any time, consider leaving a low-power heater onboard, powered by shore power. A dehumidifier set to run for a few hours per day, draining into a sink drain or seacock will help reduce mould and condensation, and help maintain an ambient temperature above the dew point. If the vessel is to be left somewhere very hot, ventilate the boat well. In warm humid environments, a condensing dehumidifier will make the boat cooler and drier.
- 3** If the boat is left afloat, bilge pump operation may be required in emergencies or to maintain wet bilges. Bilge pumps and other essential systems are generally powered by the 12V bank, and are usually permanently live (ON even if the main switch is OFF). As such, for periods of storage afloat, the 12V bank should have a source of charge, such as a solar MPPT or AC charger capable of replenishing the loads taken by essential safety and monitoring systems.
- 4** For short periods of boat lay-up, it's possible to maintain lithium batteries with solar MPPTs or AC chargers, if they are monitored or supervised sufficiently. But, particularly if the lithium batteries are to see reduced use and increased temperature variation on a laid-up boat, it's important to keep them at the recommended state of charge (60-80%).

To do this, the absorption and float phases voltages can be reduced, so that the charger keeps up with the minimal loads of the essential safety systems (monitoring, BMS, bilge pumps, alarms, fire suppression, etc.), without charging the battery all the way to 100%. Ensure any solar yield is sufficient to keep up with the consumption, and that the repeated absorption frequency is set to an appropriate interval.



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