WARNING!

Lithium Ion Batteries with Hydro Turbine

Lithium Ion batteries have their own internal management system known as the BMS. The BMS controls the battery's parameters and can turn the battery off for any one of five reasons (high voltage, low voltage, high current, high temperature, low temperature). When this happens while the turbine is running, high voltage from the turbine can damage the inverter and charge controllers.
Typically, power from the hdyro is controlled by a diversion or shunt regulator to prevent the voltage going too high. When the battery turns off, the shunt regulator will no longer function, allowing high voltage into the system.
To prevent this, the combination of both a series regulator (like solar) and a diversion controller need to be used. The Outback and Midnite controllers can be used to do both series and shunt regulation and, although they will turn off if the battery turns off, their series function will protect the rest of the system.
An alternative, less expensive method is to put a relay on the hydro that will turn off, if the inverter turns off. A single pole relay can be used on sites with pressure below 50 psi, but on higher pressure systems, a double pole double throw (DPDT) is better. Even with a series regulator, the turbine will spin at 2 or more times its normal speed, if disconnected from the battery. The DPDT relay can be wired to divert the hydro power to the diversion load (resistor box or water heating element) to prevent the hdyro from overspeeding. The high power single pole or DPDT costs about $100, along with a 12V power supply. The power supply is plugged into the inverter, which will turn off, if the battery turns off. We have some DPDT relays that are slightly scratched for $40 with wiring instructions.

Most of the larger quality inverters (Outback, Magnum, Schneider, Victron, Midnite, etc.) have an adjustable high- and low battery cutout. It is important to set the inverter operating voltage to stay within the BMS limits. If the inverter drains the batteries below the BMS limits or temperature limits, the battery will turn off. When this happens, you typically have to use a stand-alone charger to get them working again. The inverter charge parameters should also be set to the lithium battery specs.

HYDRO INDUCTION POWER
PO Box 1936, Redway, CA 95560, 707-923-3507, hipower@asis.com, www.homehydro.com