

Application Tips – General Purpose Batteries

- When using metal-jacketed or film label wrapped (metal can) batteries, special care is required when selecting a holder.
- Metal holders with spring retainer arms can cause inadvertent charging or short circuits. Isolation of the battery jacket is required as well as the avoidance of burrs and/or sharp edges and corners that could make contact with the battery by cutting thru the mounting holes if metal rivets or screws contact both battery and circuitry cabinet, etc.
- Metal holders can be insulated from other components, but if the holder is live, inadvertently someone could make contact with the holder and short circuit the equipment and battery.
- Use caution with measuring equipment. Insulate metal micrometers and calipers with tape to avoid short circuiting batteries during dimensional checks.
- Rotate inventory. Maintain a first in, first out method of stock storage and usage.
- Always store batteries in the trays and/or cartons in which they were shipped. Whenever possible, reship the batteries in their original trays and/or cartons to avoid potential short circuit and shipping damage situations.
- When measuring battery voltage, use a meter with an internal resistance of 1MW or greater. Otherwise correct voltage measurements cannot be obtained.
- Alkaline primary batteries continue to register high voltage even toward the end of their serviceable life. As such, they may be mistakenly judged as yet being strong. If one or several batteries being used in a set is found to be exhausted, it can be assumed that there is very little life remaining in the others even though they may continue to register high voltage. It is therefore advisable to exchange all of the batteries at the same time.
- The direction of polarity in a battery may reverse as it nears the end of its serviceable life. This occurs when it is the first among several batteries being used in a set to be exhausted. It is not due to an abnormality in the battery itself.
- Build a good service, life, and size balance for best operation and user satisfaction. Users seldom evaluate performance of a battery through any parameter other than service hours. When service life is perceived too short, the consumer becomes dissatisfied with the device. Don't let this happen in your design.
- Help users correctly insert the fresh batteries into your device. The best assistance is to design the battery contact so that a battery installed backwards cannot supply power. If this is not feasible, then provide clear instructions. A sticker or easily readable instructions molded in the battery compartment are suggested. These instructions should include the type of battery to be used and polarity symbols.
- Design around battery sizes that have distribution at least equal to that which you expect for you product. While industrial customers have access to all types, consumer outlets tend to stock the most popular sizes. Unless your device will require unique operating characteristics available only in new battery sizes, packs, or systems, make battery replacement easy for consumers by using only the most popular batteries.
- Water-tight aquatic devices must be designed to deal with battery generated hydrogen. The tremendous growth of aquatic activities has increased interest in waterproof cordless devices. Lighting devices, photographic gear, and various types of instrumentation have become usable under water. Designers of any water or air-tight device should be aware of the normal evolution of hydrogen gas from batteries. This gas must either be absorbed or allowed to escape. Otherwise, high temperature or a static spark could trigger the ignition of the entrapped hydrogen/air mixture.

- Allow batteries to breathe (vent), and expand or contract. Avoid encapsulation or potting.
- Locate batteries as far away as possible from any heat source to prevent service degradation. Provision for ventilation or insulation can help.
- Devices with alternate power supply options should be designed to assure the batteries are isolated from the alternate power supply circuit. Use of external switches, activated by the alternate power supply cord should be avoided. Commercially available "generic" replacement cords may not activate the protection switch. Consider redundant diode protection against unintended battery charging.
- Use series battery connections, if practical. If a battery is inserted backwards in parallel or series/parallel wiring or in some series connections, leakage and/or battery rupture may occur.
- Design the battery compartment to have a high resistance to leakage. In the rare case of battery leakage, the device can still serve the customer if the battery compartment is designed to minimize any damage.
- Battery compartments should be accessible, yet tamperproof, to protect children who might have access to your products.
- Battery compartment size and contact location should be based on the American National Standards Institute's standard dimensions, not upon measurement of physical samples. Refer to ANSI Standard C18.1 and national Electrotechnical Commission Standards IEC 86-1 and 86-2.