Making Wireless Sensors Truly Wireless

by Sol Jacobs, Tadiran Batteries

Demand is growing for intelligent, low-cost wireless sensors. Approximately 80 million “wireless” monitoring devices are in use worldwide, serving applications such as SCADA, level monitoring, flow meters, AMR, data loggers, measurement while drilling, overflow alarms and RTUs. However, many applications considered “wireless” are not truly wireless since devices that are not hard-wired for communications still require hard-wiring for power. Hard-wiring involves expensive cable and wiring (estimated at $18 to $40 per foot), and limits the choice of potential locations.

Designing Remote Wireless Sensors Using Lithium Battery Technology

Recently, Oak Ridge National Laboratory outlined 12 requirements for “The Ideal Wireless Sensor.” Their number-one criteria was the need for “adequate battery life” followed by the need to “be self powered” and “suitably small.”

Based on these and other performance criteria, lithium batteries represent a good choice for wireless sensors. Unlike household alkaline batteries that have low initial voltages and high self-discharge, lithium chemistries feature the highest specific energy (energy per unit weight) and energy density of all battery types. Higher energy density is due to lithium’s high potential.

Primary batteries can use a variety of lithium chemistries including Li/CFx (lithium poly carbon to +150°C. Lithium-based cells able to operate in temperatures up to +150°C. Higher energy density is due to lithium's high potential. Lithium cells also feature high specific energy per weight and energy density of all battery types. Higher energy density is due to lithium's high potential.

Lithium Batteries Are Not All Alike

Lithium thionyl chloride cells offer extended operating temperature ranges with some chemistries, with up to 15 to 20 years of service life. Lithium thionyl chloride batteries are most often used in portable monitoring devices. These sensors are used in severe environmental conditions (-40°C to 85°C) for extended temperature range of the lithium thionyl chloride battery is essential, as these MTUs must operate in severe environmental conditions (-40°C to 85°C) for up to 20 years.

AMR Meter Interface Units. An application involves meter interface units (MIUs) that transmit data from utility meters to walk-by or drive-by data collectors. Capable of multiple data transmissions per day, these MIUs require a long-life battery because battery replacements add to service costs. Hybrid lithium thionyl chloride batteries are preferred for this application, both for their high capacity and their expected service life of more than 15 years.

Examples of Truly Wireless Remote Sensors

Asset Tracking/Monitoring Devices. A manufacturer of mobile asset tracking and monitoring sensors for cargo vessels, truck fleets and vehicles, as well as sensor sensors for engines and tank levels, utilizes wireless sensors to communicate with headquarters via satellite communications. These sensors require a battery that combines high energy density, a wide temperature range and a long service life. Alkaline batteries are problematic due to the number of cells required (20 D-sized cells).

Lithium thionyl chloride cells from Tadiran. (HLCs) offer higher pulse rates and lower current (or background current) coupled with high energy density and high current pulsing. These sensors require a battery that combines high energy density, a wide temperature range and a long service life. Alkaline battery replacements add to service costs. Hybrid lithium thionyl chloride batteries are preferred for this application, both for their high capacity and their expected service life of more than 15 years.

Lithium thionyl chloride cells offer extended operating temperature ranges with some chemistries, with up to 15 to 20 years of service life. Lithium thionyl chloride batteries are most often used in portable monitoring devices. These sensors are used in severe environmental conditions (-40°C to 85°C) for extended temperature range of the lithium thionyl chloride battery is essential, as these MTUs must operate in severe environmental conditions (-40°C to 85°C) for up to 20 years.

AMR Meter Interface Units. An application involves meter interface units (MIUs) that transmit data from utility meters to walk-by or drive-by data collectors. Capable of multiple data transmissions per day, these MIUs require a long-life battery because battery replacements add to service costs. Hybrid lithium thionyl chloride batteries are preferred for this application, both for their high capacity and their expected service life of more than 15 years.

Examples of Truly Wireless Remote Sensors

Asset Tracking/Monitoring Devices. A manufacturer of mobile asset tracking and monitoring sensors for cargo vessels, truck fleets and vehicles, as well as sensor sensors for engines and tank levels, utilizes wireless sensors to communicate with headquarters via satellite communications. These sensors require a battery that combines high energy density, a wide temperature range and a long service life. Alkaline batteries are problematic due to the number of cells required (20 D-sized cells).

Lithium thionyl chloride cells from Tadiran. (HLCs) offer higher pulse rates and lower current (or background current) coupled with high energy density and high current pulsing. These sensors require a battery that combines high energy density, a wide temperature range and a long service life. Alkaline battery replacements add to service costs. Hybrid lithium thionyl chloride batteries are preferred for this application, both for their high capacity and their expected service life of more than 15 years.

Lithium thionyl chloride cells offer extended operating temperature ranges with some chemistries, with up to 15 to 20 years of service life. Lithium thionyl chloride batteries are most often used in portable monitoring devices. These sensors are used in severe environmental conditions (-40°C to 85°C) for extended temperature range of the lithium thionyl chloride battery is essential, as these MTUs must operate in severe environmental conditions (-40°C to 85°C) for up to 20 years.

AMR Meter Interface Units. An application involves meter interface units (MIUs) that transmit data from utility meters to walk-by or drive-by data collectors. Capable of multiple data transmissions per day, these MIUs require a long-life battery because battery replacements add to service costs. Hybrid lithium thionyl chloride batteries are preferred for this application, both for their high capacity and their expected service life of more than 15 years.