LI-ION TAMER RACK MONITOR

ENGINEERING SPECIFICATIONS



OFF-GAS DETECTION SYSTEM FOR LITHIUM-ION BATTERIES

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# General

The off-gas monitoring system is a system comprised of a distributed sensing network that is designed to monitor lithium-ion batteries off gassing. The off-gas detection system should be installed in accordance with the manufacturer’s recommendations.

The system includes the following components:

* Sensor
* Controller
* Cable
* Adapter (optional)

# Components

## Sensors: Monitoring Sensor (Part # LT-SEN-M) & Reference Sensor (Part # LT-SEN-R)

* Monitoring Sensors should be distributed in the application to monitor for lithium-ion battery cell venting.
* Reference Sensors should be distributed in the application to monitor air contaminants.
* Sensors will have power supply rated at 3 – 16 VDC.
* Sensors can communicate status of error, warm-up, normal, and alarm.
* Sensor can operate within relative humidity ranges 5 – 95% and temperature ranges of 14°F to 140°F (-10°C to 60°C). The maximum allowable temperature change is 8.6°C/min.
* The unit will be certified to UL/IEC 61010 for product safety, EN60326-1 for EU Directive (2014/30/EU), RoHS 3 EU 2015/863 and REACH compliant.
* The sensor and controller must be manufactured in an ISO 9001:2015 production environment.
* The sensor shall be capable of self-diagnosing error states.
* The sensor should be checked with yearly maintenance checks to continue sensor performance. The validation of sensor operation shall be done in accordance with the manufacturer’s recommendations.

## Controller: Combined Controller (Part # LT-CTR-C)

* The Controller distributes power to the sensors, aggregates and processes sensor signals, and provides communication of sensor status.
* The Controller aggregates 12 Monitoring Sensors and 3 Reference Sensors.
* Multiple Controllers can be used when Controllers are properly daisy chained together by cables.
* The Controller processes the sensor signal status and communicates if a lithium-ion battery cell venting has occurred.
* The Controller will require a power supply rated at 12 – 28 VDC.
* The Controller has a power consumption detailed in the table below:

Table 1: Power Consumption

|  |  |
| --- | --- |
| Detail | Specification |
| Controller (no sensors) | 2.4 W (at 24 Vdc) |
| 1.4 W (at 12 Vdc) |
| Sensor | 275 mW (at 5 Vdc) |
| Controller (fully populated, 15 sensors) | 6.6 W (at 24 Vdc) |
| 5.6 W (at 12 Vdc) |

* The Controller will be protected by a 3.5 A replaceable fuse.
* The Controller will communicate individual and aggregated sensor status’ through two digital output ports and/or MODBUS RTU over RS-232.
* The Controller will communicate aggregated sensor error status’ through digital output and MODBUS RTU over RS-232.
* The Controller will communicate aggregated sensor network (sensors on all Controllers that are daisy chained) status’ through digital output and MODBUS RTU over RS-232.
* The Controller will communicate individual sensor error and alarm status locally through LED indicators.

## Cables: Sensor Cable, Power Cable, Communication Cable, Daisy Chain Cable

* Monitoring Sensor Cables are black 8P8C RJ45 shielded 24-28 AWG cable.
* Reference Sensor Cables are blue 8P8C RJ45 shielded 24-28 AWG cable.
* Daisy Chain Cables are grey 8P8C RJ45 shielded 24-28 AWG cable.
* Power Cables are 3-pin Molex connectors that include earth ground and terminate in bare wire leads.
* Digital Output Cables are 10-pin Molex connectors that terminate in bare wire leads.
* Serial Cables are female-to-female RS-232 cables.

## Adapters: MODBUS adapter, Relay

* The MODBUS TCP/IP adapter has the ability to convert the Controller’s native MODBUS RTU communication protocol to MODBUS TCP/IP.
* The Relay will turn the digital output signal into a dry contact signal.

# Execution

## Installation

The installation should be done in accordance with the manufacturer’s recommendations.

## Maintenance

The maintenance procedure should be done in accordance with the manufacturer’s recommendations.