LI-ION TAMER®

LI-ION TAMER® GEN 3
ENGINEERING SPECIFICATIONS

OFF-GAS DETECTION SYSTEM FOR LITHIUM-ION BATTERIES

March 2025
Doc. No. 3003_01

Contents

1 General

The off-gas monitoring system is a system comprised of a distributed sensing network that is designed to monitor lithium-ion battery electrolyte solvent vapour venting. The off-gas detection system should be installed in accordance with the manufacturer's recommendations.

The system includes the following components:

- Sensors (Monitoring and Reference)
- Hub (Power over Ethernet (PoE) or Direct Power)
- Terminator
- PoE & Ethernet Switches
- Controller
- Cables
- Relay Module (optional)
- Power Supplies

2 Components

2.1 Sensors: Monitoring Sensor (Part # 261001) & Reference Sensor (Part # 261002)

- Monitoring Sensors shall be distributed in the application to monitor for lithium-ion battery cell venting.
- Reference Sensors shall be distributed in the application to monitor nuisance alarm sources.
- Sensors shall receive power supplied by the Hub.
- Sensors shall provide off-gas, temperature, and humidity readings via CANbus to the Hub.
- Sensors shall have two RJ45 connectors for upstream and downstream connection along the daisy-chain.
- Sensors can operate within relative humidity ranges from 0 to 90%, and temperature ranges from -10 to 50°C (14°F to 122°F).
- The unit will be certified to the following:
  - ETL listed to UL/IEC 61010 and CSA 22.2 NO. 61010 for product safety
  - EN 61326-1:2013 for EU Directive (2014/30/EU)
  - RoHS 3 EU 2015/863, WEEE, and REACH compliant
  - UKCA
  - FCC
- The sensor shall be manufactured in an ISO 9001:2015 production environment.
- The sensor shall be capable of self-diagnosing error states.
- The sensor shall 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.

2.2 Hub, PoE & Hub, Direct Power (Part # 261004, 261003)

- The Hub originates the daisy-chain connection of the sensors and distributes 12 VDC to the sensors.
- The Hub - PoE shall receive power from PoE.
- The Hub - Direct Power shall receive power from a 12 VDC Power Supply.
- The Hub shall be capable of communicating with the sensor(s) over CANbus.
- The Hub shall be capable of communicating information to the Controller via TCP/IP over Ethernet.
- The Hub - PoE shall have two RJ45 connectors for the daisy-chain connections to sensor(s).
- The Hub - Direct Power shall have one RJ45 connector for the daisy-chain connections to sensor(s).
- The Hub shall be capable of detecting various errors and alarm conditions for self-diagnosing capabilities.

2.3 Terminator

- The Terminator shall be an RJ45 plug that terminates the sensor's daisy-chain CANbus connection.

2.4 Ethernet Switch - PoE (Part # 311348, 311365)

- The Ethernet Switch - PoE shall distribute 44-57 VDC to the Hub(s).
- The Ethernet Switch - PoE shall be capable of communicating information from the Hub to the Controller via TCP/IP over Ethernet.
- All Ethernet ports on the Ethernet Switch - PoE shall meet IEEE 802.3af, Class 0.

2.5 Ethernet Switch (Part # 311349 - 311351)

- The Ethernet Switch shall be capable of communicating information from the Hub to the Controller via TCP/IP over Ethernet.
- 10/100 Ethernet ports shall meet IEEE 802.3i, 802.3u, 802.3x.

2.6 Controller (Part # 311367)

- The Controller is a Linux-based industrial computer that aggregates and processes sensor signals, communicates sensor status and records a detailed history of time-stamped data from the sensors for post-event diagnosis.
- The Controller aggregates up to 100 sensors.
- The Controller processes the sensor signal status and communicates if a lithium-ion battery cell venting has occurred.
- The Controller provides temperature and humidity measurements from each sensor.
- The Controller shall be capable of detecting and communicating system error status.
- The Controller will require a power supply rated at 12 VDC.
- The Controller will communicate system status through Modbus TCP/IP.
- The Controller will be capable of connecting to a relay module to provide configurable dry-contact outputs.

2.7 Network Cables (Part # 311359 - 311364)

- The Network Cable(s) shall be Cat 5e or Cat 6a, straight through, shielded (S/UTP), snag-free, 22-26 AWG cable with 50 micro inches gold plated connectors and shield connected to RJ45 connector shell on both ends.

2.8 Ethernet Relay Module (Part # 311366)

- The Ethernet Relay Module shall connect to the Controller via RJ45 Ethernet.
- The Relay Module shall provide 16x SPDT Form C relay outputs.

2.9 Power Supplies (Part # 311356, 311357)

- The Power Supplies shall provide an output voltage of either 12 VDC or 48 VDC.
- The Power Supplies shall require an input voltage of 90 ~ 264 VAC with a frequency of 47 ~ 63 Hz.

3 Execution

3.1 Installation

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

3.2 Maintenance

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