ORR® Protection
Mission Critical Fire Protection Experts®

OFF-GAS GAS DETECTION SYSTEM

For Lithium Ion Batteries

LI-ION TAMER®

1.0 GENERAL

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

2) The system includes the following components:.

- Sensor
- Controller
- Cable
- Adapter *(optional)*

2.0 GENERAL

2.01 SENSORS
Monitoring Sensor, Reference Sensor

A) Monitoring Sensors should be distributed in the application to monitor for lithium-ion battery cell venting.

B) Reference Sensors should be distributed in the application to monitor air contaminants.

C) Sensors will have power supply rated at 3 – 16 VDC.

D) Sensors can communicate status of error, warm-up, normal, and alarm.

E) Sensor can operate within relative humidity ranges 5 – 95% and temperature ranges of 14oF to 140oF (-10oC to 60oC). The maximum allowable temperature change is 8.6oC/min.

F) 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.

G) The sensor and controller must be manufactured in an ISO 9001:2015 production environment.

H) The sensor shall be capable of self-diagnosing error states.

I) 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.

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2.01 CONTROLLER
Monitoring & Reference Controller

A) The Controller distributes power to the sensors, aggregates and processes sensor signals, and provides communication of sensor status.

B) The Controller aggregates 12 Monitoring Sensors and 3 Reference Sensors

C) Multiple Controllers can be used when Controllers are properly daisy chained together by cables.

D) The Controller processes the sensor signal status and communicates if a lithium-ion battery cell venting has occurred.

E) The Controller will require a power supply rated at 12 – 28 VDC.

F) The Controller has a power consumption detailed in the table below:

Part	Dimensions
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)

G) The Controller will be protected by a 3.5 A replaceable fuse.

H) The Controller will communicate individual and aggregated sensor status' through two digital output ports and/or MODBUS RTU over RS-232.

I) The Controller will communicate aggregated sensor error status' through digital output and MODBUS RTU over RS-232.

J) 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.

K) The Controller will communicate individual sensor error and alarm status locally through LED indicators.

2.03 CABLES
Sensor Cable, Power Cable, Communication Cable, Daisy Chain Cable

A) Monitoring Sensor Cables are black 8P8C RJ45 shielded 24-28 AWG cable.

B) Reference Sensor Cables are blue 8P8C RJ45 shielded 24-28 AWG cable.

C) Daisy Chain Cables are grey 8P8C RJ45 shielded 24-28 AWG cable.

D) Power Cables are 3-pin Molex connectors that include earth ground and terminate in bare wire leads. Cable is 22 AWG multi-conductor with foil shielding.

E) Digital Output Cables are 10-pin Molex connectors that terminate in bare wire leads. Cable is 22 AWG multi-conductor with foil shielding.

F) Serial Cables are female-to-female RS-232 cables.

2.04 ADAPTERS
MODBUS adapter, Relay

A) The MODBUS TCP/IP adapter has the ability to convert the Controller's native MODBUS RTU communication protocol to MODBUS TCP/IP.

B) The Relay will turn the digital output signal into a dry contact signal.

3.0 EXECUTION

3.01 INSTALLATION

A) The installation should be done in accordance with the manufacturer's recommendations.

3.02 MAINTENANCE

A) The maintenance procedure should be done in accordance with the manufacturer's recommendations.