## **LI-ION TAMER® GEN 3**

# LITHIUM ION OFF-GAS DETECTION SYSTEM



#### **Product Description**

The Li-ion Tamer GEN 3 is a device that detects the venting of battery electrolyte solvent vapours (off-gassing phase) that occurs early in the failure mode of lithium-ion batteries (LIB). The early detection of this event allows proper mitigation steps to be taken to avoid a catastrophic thermal runaway failure.

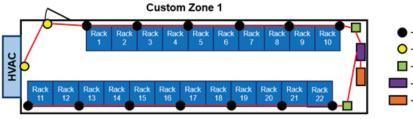
The Li-ion Tamer GEN 3 system is designed to be easy to install and configure, consisting of several components: (i) sensors, (ii) hub, (iii) power switch, (iv) network switch, (v) controller.

- Each sensing node comprises an off-gas sensor with advanced algorithms making it acutely sensitive to detecting battery
  electrolyte vapours (off-gassing compounds), does not require calibration, is compatible with all LIB form factors and chemistries,
  and has a lifetime comparable to a typical LIB system. The sensing node also includes temperature and humidity sensors for
  environmental monitoring.
- Sensing nodes are networked by the hubs and switches to the controller, which is the central point for managing and monitoring the entire system. The controller has relays and Modbus TCP/IP outputs that connect to the BMS or other control systems.

#### **System Configuration**

The Li-ion Tamer GEN 3 system is a versatile solution that accommodates the vast range of lithium-ion battery systems. In a typical setup, system configuration will consist of the following:

- · Monitoring sensors installed at the battery racks downstream convective airstreams to monitor off-gas events
- · Reference sensors installed to monitor the ambient environment and air inlets to prevent false positive signals
- Hubs installed local to their respective zone of sensors
- · Controller and Ethernet switch for aggregating sensor signals (optional PoE switches for distributing power to the system)



**Custom Zone 2** 

The Li-ion Tamer GEN 3 system requires minimal operation and maintenance procedures as the sensors are calibration-free and have comparable lifetime to that of the ESS battery system. The gas sensors response can be easily verified with a simple test. To confirm operation, sensors can be activated with a bottle of battery off-gassing compounds (Diethyl Carbonate, DEC) which is supplied by Xtralis.

**Important Note**: This device detects the venting of electrolyte vapours from lithium-ion batteries. It does not prevent fires or thermal runaway. This device is not a standalone safety device and should be incorporated into a proper safety system. If device responds, there is a risk of battery fault which could lead to thermal runaway. To avoid injury, leave area immediately.

#### **Hardware Details**

#### Controller



# Sensor and Hub 89mm 41mm -89mm

Monitoring Sensor Reference Sensor Hub, Direct Power Ethernet Switch, 5 port Controller, GEN 3

#### **Kev Features**

- Early warning of lithium-ion battery failures enable thermal runaway prevention with proper mitigating actions
- Single cell failure detection without mechanical or electrical contact to the cells
- Scalable deployment for cost effective protection of a wide range of battery storage systems
- · Temperature and humidity monitoring at each sensing node
- Extended product lifetime
- Calibration-free product with highly reliable output signal
- Compatible with all lithium-ion battery form factors and chemistries
- Easy installation
- Independent and redundant perspective on battery health
- Auto diagnostic capabilities
- Reduction/removal of false positive signals
- Communication protocols including relays and Modbus serial

### **LI-ION TAMER® GEN 3**



#### **Specifications**

Contro	Controller Specifications	
Dimensions (LxWxH)	115mm x 82mm x 34mm	
Input Power Range	12 VDC	
Max Sensors per Controller	100 *	
Power Consumption Specifications		
Controller	3 A (36 W @ 12 VDC)	
Hub (Fully Populated)	0.5 A (6.0 W @ 12 VDC)	
Additional Hardware	See User Manual (Doc. 37141) for details	
MODBUS Output Specifications		
Hardware	TCP/IP Ethernet	
Relay Output Specifications		
Connector Type	Screw Terminals	
Signal Type	16 SPDT Form C Relays See User Manual (Doc. 37141) for details.	
Product Life Specifications		
Target lifetime	> 10 years	
Gas Detection Specifications		
Target gases	Lithium-ion battery electrolyte solvent vapours	
	Lithium-ion battery electrolyte solvent	
Target gases	Lithium-ion battery electrolyte solvent vapours	
Target gases Min. Detection Threshold	Lithium-ion battery electrolyte solvent vapours < 1 ppm/sec	
Target gases  Min. Detection Threshold  Minimum Response Time  Fault Detection	Lithium-ion battery electrolyte solvent vapours < 1 ppm/sec 5 seconds	
Target gases  Min. Detection Threshold  Minimum Response Time  Fault Detection	Lithium-ion battery electrolyte solvent vapours < 1 ppm/sec 5 seconds Single cell failure	
Target gases  Min. Detection Threshold  Minimum Response Time  Fault Detection  Temperature M	Lithium-ion battery electrolyte solvent vapours < 1 ppm/sec 5 seconds Single cell failure easurement Specifications	
Target gases  Min. Detection Threshold  Minimum Response Time  Fault Detection  Temperature M  Measurement Range  Measurement Accuracy	Lithium-ion battery electrolyte solvent vapours  < 1 ppm/sec  5 seconds  Single cell failure  easurement Specifications  -40 to 125°C (-40 to 257°F)	
Target gases  Min. Detection Threshold  Minimum Response Time  Fault Detection  Temperature M  Measurement Range  Measurement Accuracy	Lithium-ion battery electrolyte solvent vapours  < 1 ppm/sec  5 seconds  Single cell failure  easurement Specifications  -40 to 125°C (-40 to 257°F)  ± 0.4°C from 5 to 60°C (41 to 140°F)	
Target gases  Min. Detection Threshold  Minimum Response Time  Fault Detection  Temperature M  Measurement Range  Measurement Accuracy  Humidity Mea	Lithium-ion battery electrolyte solvent vapours  < 1 ppm/sec  5 seconds  Single cell failure  easurement Specifications  -40 to 125°C (-40 to 257°F)  ± 0.4°C from 5 to 60°C (41 to 140°F)  asurement Specifications	
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Target gases  Min. Detection Threshold  Minimum Response Time  Fault Detection  Temperature M  Measurement Range  Measurement Accuracy  Humidity Measurement Range  Measurement Range  Measurement Range	Lithium-ion battery electrolyte solvent vapours  < 1 ppm/sec  5 seconds  Single cell failure  easurement Specifications  -40 to 125°C (-40 to 257°F)  ± 0.4°C from 5 to 60°C (41 to 140°F)  asurement Specifications  0 to 100% RH (non-condensing)  ± 2.0% RH from 20 to 80% RH	

<sup>\*</sup> Expandable up to 500 sensors per controller in future release.

#### **Ordering Information**

#### **Product Certifications**

- ETL listed to UL 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





Ordering Code	Description
LT-SEN-M3	Monitoring Sensor, Gen 3
LT-SEN-R3	Reference Sensor, Gen 3
LT-ACC-HUB-PWR	Hub, Direct Power, Gen 3
LT-ACC-HUB-POE	Hub, PoE, Gen 3
LT-ACC-HUB-MKT	Hub DIN-Rail Mount Kit
LT-CTR-SML	Controller, Gen 3
LT-CTR-SML-DMK	Controller DIN-Mount Kit, Gen 3
LT-ACC-POE-4	Ethernet Switch PoE, 4 Ports
LT-ACC-POE-24	Ethernet Switch PoE, 24 Ports
LT-ACC-POE-24-ADR	PoE Switch 24 Ports, IEC Power Adapter
LT-ACC-ETS-5	Ethernet Switch, 5 Ports
LT-ACC-ETS-8	Ethernet Switch, 8 Ports
LT-ACC-ETS-16	Ethernet Switch, 16 Ports
LT-ACC-ERO-16	Ethernet Relay Module, 16 Ports
LT-ACC-ERO-MKT	Relay Output DIN-Rail Mount Kit
LT-ACC-PWR-12	Power Supply, 12VDC
LT-ACC-PWR-48	Power Supply, 48VDC
LT-ACC-NCL-3	3' (~1m) Network Cable (RJ45), Gen 3
LT-ACC-NCL-5	5' (~1.5m) Network Cable (RJ45), Gen 3
LT-ACC-NCL-10	10' (~3m) Network Cable (RJ45), Gen 3
LT-ACC-NCL-25	25' (~7.6m) Network Cable (RJ45), Gen 3
LT-ACC-NCL-50	50' (~15m) Network Cable (RJ45), Gen 3
LT-ACC-NCL-100	100' (~30m) Network Cable (RJ45), Gen 3
LT-ACC-TST	DEC Bump Test Bottle
LT-ACC-SAK	Spare Kit - 4x Terminators 1x Screw Terminal Adapter

#### **Demo Kit**

Ordering Code	Description
LT-DKT	Li-ion Tamer Gen 3 Demo Kit