

LI-ION TAMER®

LITHIUM-ION BATTERY RACK MONITORING SYSTEM



MAKE GREEN POWER,
SAFE POWER.

- DETECT LI-ION BATTERY FAILURES
- PREVENT THERMAL RUNAWAY
- PROTECT PEOPLE AND PROPERTY
- MAINTAIN BUSINESS CONTINUITY

PROTECT YOUR BATTERY ENERGY STORAGE SYSTEM AGAINST THERMAL RUNAWAY

Lithium-ion (Li-ion) Battery Energy Storage Systems (BESSs) are critical to the ongoing transition to a low-carbon economy. They are playing a key role in the development of greener, smarter, and more reliable power grids.

But, without appropriate safety measures, Li-ion batteries can be a serious fire hazard. The main culprit is thermal runaway, an exothermic reaction that can occur in Li-ion cells and quickly escalate into a destructive fire. Luckily, Li-ion Tamer[®] from Xtralis can help.

The Li-ion Tamer Battery Rack Monitoring System detects the early signs of thermal runaway (venting phase), giving you time to take preventive action. This way you can minimize or even avoid the effects of thermal runaway, protecting people and property, and ensuring your business continuity is maintained.

WHY IS PREVENTING LI-ION FIRES SO CHALLENGING?

Detecting the early signs of thermal runaway is key to preventing fires in Li-ion BESSs. But traditional detection and suppression technologies are simply not designed to do this.

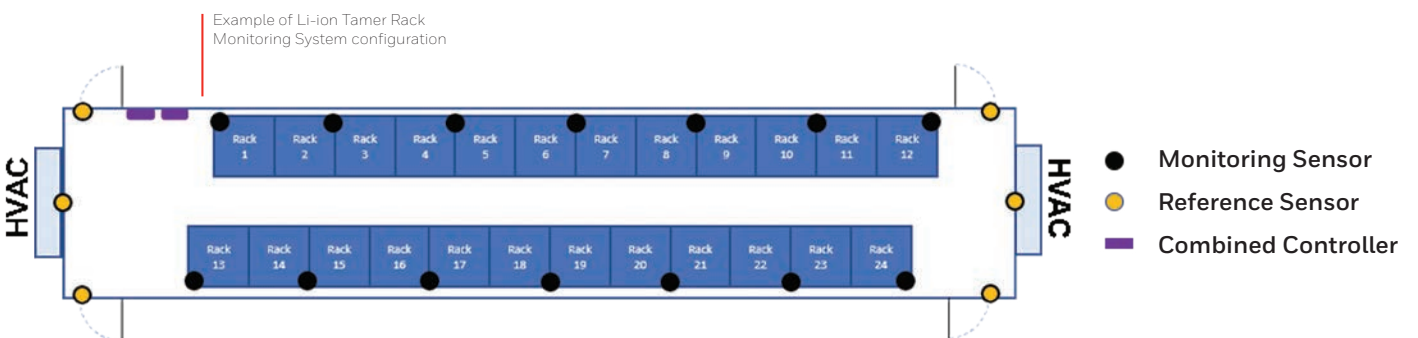
- Battery Management Systems cannot monitor single-cell temperatures or voltages, meaning they may not detect hot spots preceding thermal runaway.
- Traditional detection technologies do not activate until after thermal runaway has started, which is when smoke or gases like carbon monoxide and hydrogen are present in large enough concentrations.
- Fire suppression methods are, by definition, only effective after a Li-ion battery has already caught fire.

WHY IS LI-ION TAMER OFF-GAS DETECTION DIFFERENT?

What sets Li-ion Tamer apart from other detection technologies is that it alerts you to the earliest signs of impending thermal runaway. It activates as soon as a single Li-ion cell starts venting gases, a process known as 'off-gassing' that often precedes thermal runaway. A distributed network of strategically-placed gas sensors gives you the earliest indication of failure so that you can intervene to prevent the worst outcomes.

The Li-ion Tamer Rack Monitoring System can be tailored to the specifics of a BESS, including geometry, volume, cell type, spatial layout, and air flow patterns. The system brings you comprehensive off-gas detection coverage thanks to:

- Monitoring sensors installed at the battery racks to monitor off-gas events.
- Reference sensors installed to monitor the ambient environment and air inlets to avoid false positives (false alarms).
- Controllers for aggregating sensor signals.



THE EARLIEST WARNING OF LI-ION THERMAL RUNAWAY

Li-ion Tamer helps you detect a potential battery cell failure, way before it enters thermal runaway. A recent study by DNV12 showed that, unlike other detection technologies, Li-ion Tamer activated, on average, just 10 seconds after off-gassing started, and more than six minutes before thermal runaway occurred.

	Off-Gas Release	Off-Gas Sensor	Thermal Runaway	Cell Voltage	LEL Sensor
Average time of occurrence relative to thermal runaway (seconds)	-381	-371	0	+7	+28

Average responses from different sensors and indication mechanisms tested in cell level tests (source: DNV¹²)

Key features and benefits

- Simple installation with multiple mounting options to suit most Li-ion battery rack designs.
- Easy commissioning and maintenance thanks to calibration-free sensors and easy bump test with liquid battery electrolyte compounds (diethyl carbonate).
- Extended lifetime, comparable to that of a Li-ion BESS.
- Compatibility with all Li-ion battery form factors and chemistries
- Highly reliable output signal
- Low power consumption
- Auto diagnostic capabilities
- Configurable communication protocols including digital outputs and Modbus serial communication

APPLICATIONS

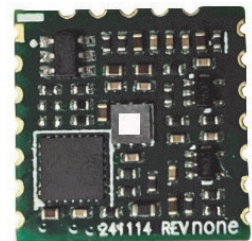
- Power utility-scale BESSs
- Commercial and residential BESSs
- Industrial BESSs
- Data Center UPSs



OEM Board

The Li-ion Tamer OEM board monitor is a low-power compact device that monitors lithium-ion batteries for increased safety. It is installed within battery modules and provide cell level detection of electrolyte solvent vapours during the initial venting (off-gassing) stage of a failing battery.

The OEM board can be directly integrated onto a battery management system and will indicate when a single cell within a battery module has experienced an off-gassing event. It provides an entirely redundant perspective on the batteries without electrical or mechanical interrogation.



TECHNICAL SPECIFICATIONS

Specifications

Controller specifications	
Dimensions [mm]	210 (W) x 113 (L) x 63 (H)
Input power range	12 - 28 VDC
Max sensors per controller	15
System outputs	Digital outputs/MODBUS
Power consumption specifications	
Controller (no sensors)	2.4 W (@ 24VDC) 1.4 W (@ 12 VDC)
Sensor	275 mW (@ 5 VDC)
Controller (fully populated, 15 sensors)	6.6 W (@ 24 VDC) 5.6 W (@ 12 VDC)
Fuse Rating	3.5 A
MODBUS communication specifications	
Baud rate	9600
Parity	None
Stop bit	One
Hardware	RS232 3-wire (TX, RX, ground)
Product life specifications	
Target lifetime	> 10 years
Warranty	1 year
Gas detection specifications	
Target gases	Lithium ion battery off-gassing compounds
Min. detection threshold	< 1 ppm/sec
Response time	5 seconds
Fault detection	Single cell failure
Environmental specifications	
Temperature	-10 to +60°C
Humidity	5 to 95% RH
Max temperature change	8.6°C/min
Digital output specifications	
Connector type	2x 10-pin Molex
Signal type	Digital
Signal level, normal	HIGH, 12 - 28 VDC (Input voltage) 100mA max per channel
Signal level, alarm	LOW, ~0 VDC

Ordering Information

Ordering Code	Description
LT-SEN-M	Monitoring sensor
LT-SEN-R	Reference sensor
LT-CTR-C	Combined controller
LT-ACC-PCL	10' Power Cable
LT-ACC-DCL	10' Digital Output Cable
LT-ACC-MCL-25	25' Monitoring Sensor Cable (RJ45 Black)
LT-ACC-MCL-50	50' Monitoring Sensor Cable (RJ45 Black)
LT-ACC-MCL-100	100' Monitoring Sensor Cable (RJ45 Black)
LT-ACC-RCL-25	25' Reference Sensor Cable (RJ45 Blue)
LT-ACC-RCL-50	50' Reference Sensor Cable (RJ45 Blue)
LT-ACC-RCL-100	100' Reference Sensor Cable (RJ45 Blue)
LT-ACC-CCL-1	1' Controller Daisy Chain Cable (RJ45 Grey)
LT-ACC-CCL-3	3' Controller Daisy Chain Cable (RJ45 Grey)
LT-ACC-CCL-25	25' Controller Daisy Chain Cable (RJ45 Grey)
LT-ACC-CCL-50	50' Controller Daisy Chain Cable (RJ45 Grey)
LT-ACC-CCL-100	100' Controller Daisy Chain Cable (RJ45 Grey)
LT-ACC-IPA	MODBUS TCP/IP Adapter
LT-ACC-RLY	Form C Relay
LT-ACC-TST	DEC Bump Test Bottle
LT-ACC-BKT-PK5	Sensor Mount Kit Spare - 5x brackets 10x nuts
LT-ACC-SCL-MF	6' MODBUS Serial Cable Male to Female
LT-ACC-OEM	Li-ion Tamer - OEM Board

Product Certifications

- ETL listed to UL 61010 and CSA 22.2 NO. 61010 for product safety
- EN 61326 for EU Directive (2014/30/EU)
- RoHS 3 EU 2015/863



ABOUT XTRALIS



Xtralis is a leading global provider of powerful solutions for the very early & reliable detection of smoke, fire, and gas threats. Our technologies prevent disasters by giving users time to respond before life, critical infrastructure or business continuity is compromised.

We protect highly-valued and irreplaceable assets and infrastructure belonging to the world's top governments and businesses.

To learn more, please visit us at www.xtralis.com