# BES LITE SERIES

**3014-8347**
*Issue 1*

## Battery Safety Electrolyte Detector

Compact Design | Highly Sensitive & Selective | Analog Three-State Output

## DESCRIPTION

BES LITE is a cost-effective, low-profile, light-weight battery safety detector that uses Honeywell proprietary gas sensing technology to selectively detect battery electrolyte vapor, an indicator of thermal events. This provides an advanced warning of potential thermal runaway in Lithium-Ion battery packs.

BES LITE detects battery electrolyte vapor that is typically released during the "First Vent" event of a lithium-ion cell and throughout the thermal runaway process. This event has been observed to occur 5 to 15 minutes prior to single-cell thermal runaway. Early detection may vary based on factors such as the nature of cell abuse and its severity, state of charge, and other variables. Detecting thermal runaway early can help mitigate the loss of life and property when the right countermeasures are implemented. BES LITE allows compliance with international regulations and guidance by providing a deterministic detection of thermal runaway events.

BES LITE is compatible with all lithium-ion battery chemistries and cell types, making it versatile for use in industrial lithium-ion battery packs. Engineered to support a ten-year lifespan, it aligns with the typical operational life of industrial equipment. As concerns over lithium-ion battery safety continue to rise, BES LITE stands out as the ideal battery safety detector, ensuring the protection of both personnel and assets.

## DIFFERENTIATION

- **First vent and thermal runaway detection:** BES LITE detects first vent events, providing a significant safety advantage by maximizing the critical period between the onset of cell degradation and irreversible thermal runaway
- **Selective response to battery electrolyte vapor**: BES LITE's selective response to battery electrolyte vapor significantly reduces the risk of false alarms, making it ideal for use in environments where interference gases may be present
- **Efficient & safe design:** BES LITE employs simple electronics for easy integration and minimal power consumption. Unlike other gas sensing technologies, it operates without an internal heating element, making it ideal for explosion-proof environments and applications requiring extended battery life
- **Agnostic to Li-Ion chemistry & battery type:** Works with various Li-ion battery types including prismatic, pouch & cylindrical, as well as different chemistries such as NMC, LFP, LTO, and more.

## APPLICATIONS

- Lithium-ion battery modules in battery energy storage systems (BESS)
- Defense/aerial applications such as UAM/UAV
- Micro-mobility lithium-ion battery packs including two and three wheeled vehicles
- Portable and mobile lithium-ion battery packs including electric lawn mowers, medical devices, campsite battery generators

## FEATURES

- Detects initial venting events before thermal runaway
- Provides early warning of thermal runaway events
- Selectively responds to electrolyte vapor
- Intrinsically safe with no internal heating element
- Inbuilt diagnostics functionality
- Low-profile, compact design
- Three-state analog output
- Customizable to specific application needs
- Compatible with all Lithium-ion battery chemistries and cell types
- Ten-year sensor life
- Resistant to common contaminants
- Highly resistant to siloxane poisoning
- Optimized for industrial applications

## VALUE TO CUSTOMERS

- **Enhanced asset protection:** Battery electrolyte vapor detection enables early detection of thermal events, allowing enhanced asset protection
- **Selective detection:** Detects only electrolyte vapor. The selective response and high sensitivity to electrolyte vapor allows for the mitigation of false alarms
- **Reliability in critical environments:** Resistant to cross-gas interference & siloxane poisoning, ensuring reliable performance across demanding environments
- **Ease of installation:** The low-profile construction & mounting flanges enable installation even in tight spaces. The 3-state output simplifies integration

## PORTFOLIO

The BES LITE Series joins the Battery Monitoring Suite. To view the entire product portfolio, click here.

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# BATTERY SAFETY ELECTROLYTE DETECTOR
# BES LITE SERIES

## TABLE 1. GENERAL SPECIFICATIONS

| Characteristic | Parameter | |
|---|---|---|
| Detection principle | Electrochemical sensing | |
| Dimensions [mm] W × L × H | 31,8 × 23,5 × 9,9 | |
| Startup time | 1 second to valid output | |
| Response time[1] | < 2 seconds (typical) | |
| Detected media (Typical battery electrolytes) | Ethyl methyl carbonate (EMC)<br>Dimethyl carbonate (DMC)<br>Propylene carbonate (PC) | Diethyl carbonate (DEC)<br>Ethylene carbonate (EC) |
| Operational life[2] | 10 years | |
| Storage life[3] | 3 years | |

## TABLE 2. ENVIRONMENTAL SPECIFICATIONS

| Characteristic | Parameter |
|---|---|
| Operating temperature range | -20°C to 70°C [-4°F to 158°F] |
| Storage temperature range | -40°C to 85°C [-40°F to 185°F] |
| Humidity[4] | 10 %RH to 90 %RH (non-condensing) |
| Ingress protection | IP30 |
| Vibration | Sine wave (logarithmic) sweep, 7 Hz to 200 Hz, 1 g to 8 g, 3 h per axis |
| Shock | 50 g, 11ms (all axes) |
| EMC | As per AIS 004 Part 3 |
| ESD (unpowered) | ±8 kV contact discharge (ISO 10605 - 2022)<br>±8 kV air discharge (ISO 10605 - 2022) |

## TABLE 3. ELECTRICAL SPECIFICATIONS

| Characteristic | Minimum | Nominal | Maximum | Unit |
|---|---|---|---|---|
| Supply voltage | 4.5 | 5.0 | 5.5 | Vdc |
| Current consumption | – | – | 3.0 | mA |
| Output type | Three-state output[5] | | | |
| Output (nominal) | 2.00 | 2.50 | 3.00 | Vdc |
| Device fault (diagnostics) or no power condition | – | 0.0 | <0.5 | Vdc |
| Output for first vent event | 4.25 | – | 5.00 | Vdc |

## TABLE 4. INSTALLATION

| Characteristic | Parameter |
|---|---|
| Device enclosure material | Acetal (POM) |
| Connector | Amphenol® connector P/N:10114830-11103LF (on device) |
| | Mating connector: Amphenol® P/N 10114826-X0X03LF |
| | Crimp terminal P/N:10114827 (28 AWG) |
| Weight | 4.5 g |
| Mounting | Two M3 screws with flat washers (recommended); installation torque[6] 0.45 Nm ±0.05 Nm |
| Interface circuit recommendation | Recommended filter capacitor at output: 0.001 µF to 0.22 µF |
| | Minimum input impedance of load: 850 Kohms |
| | Use of a buffer circuit to isolate the sensor output from input devices/circuits with low input impedance (less than 1 MΩ) is recommended |

[1] The response time refers to the duration required for the device to detect a change in an input physical parameter or stimulus and to produce a corresponding or predetermined change in output. The response time indicated here is based on data obtained under controlled laboratory test conditions. It should be noted that actual response times may vary depending on the specific conditions of the application.

[2] At ambient operating conditions ranging from 25°C to 40°C.

[3] At storage conditions ranging from -10°C to 50°C.

[4] Refer to Table 5 for the temperature-relative humidity combinations within the application boundary.

[5] Three-State Output – The device provides a constant analog voltage output signal of 2.50 Vdc during normal operating condition. When a first vent event is detected, the output rails to high (5 Vdc). If the internal diagnostics detects a fault in the device, it produces a constant low (0 Vdc) output. Output is ratiometric to supply voltage; 10 % variation is applicable in all output conditions.

[6] WARNING – Do not over-torque. Tightening beyond the recommended torque value will damage the mounting flange.

# BATTERY SAFETY ELECTROLYTE DETECTOR
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**Figure 1. Product Dimensions (for reference only), mm**

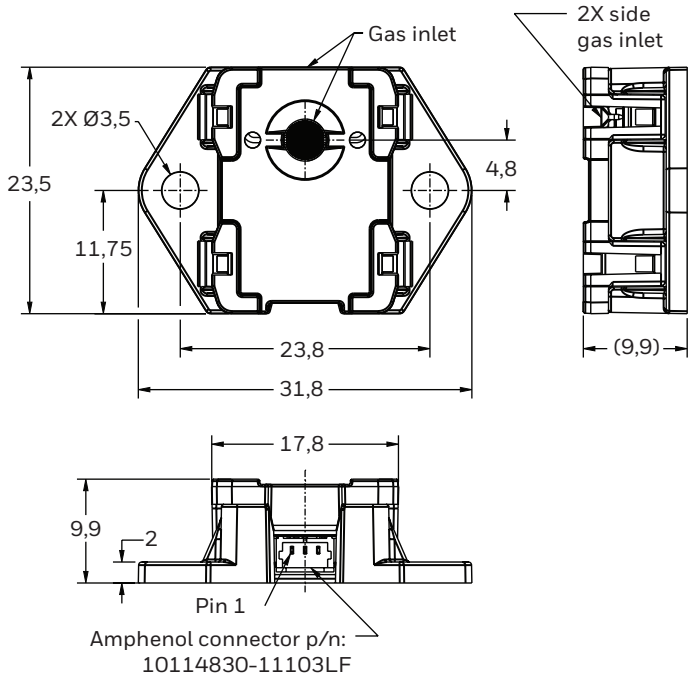



**TABLE 5. TEMPERATURE – RELATIVE HUMIDITY MATRIX**

| Temperature → Humidity ↓ | 25°C | 40°C | 65°C | 70°C |
|---|---|---|---|---|
| 10 %RH | | | | |
| 15 %RH | | | | |
| 65 %RH | | | | |
| 85 %RH | | | | |
| 90 %RH | | | | |

**TABLE 6. PIN OUT**

| Pin | Designation | Function |
|---|---|---|
| 1 | $V_{CC}$ | Supply voltage |
| 2 | GND | Ground |
| 3 | $V_{OUT}$ | Output |

**Figure 2. Electrical Connection**

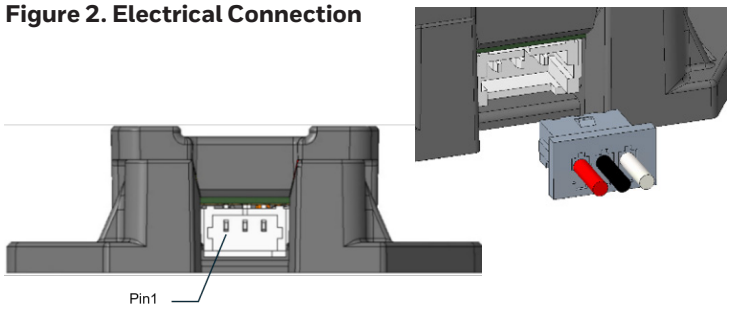
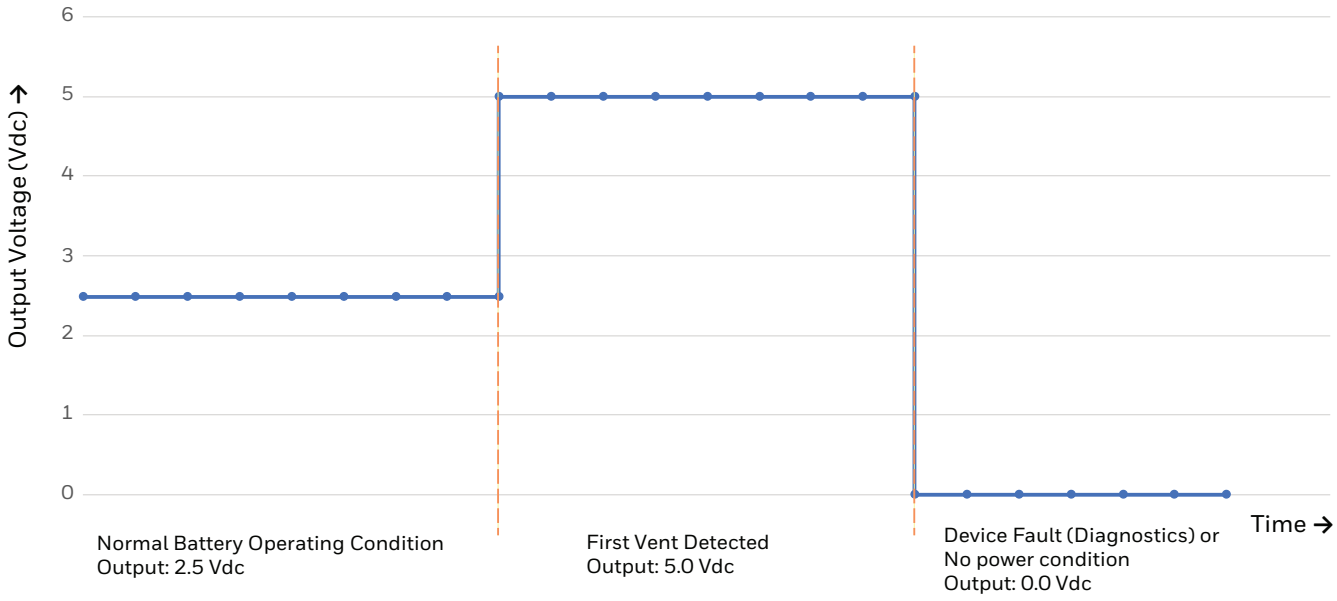



**Figure 3. Illustration of the Three-State Output**



## ⚠WARNING
## PERSONAL INJURY

DO NOT USE these products as safety or emergency stop devices or in any other application where failure of the product could result in personal injury.

**Failure to comply with these instructions could result in death or serious injury.**

## ⚠WARNING
## MISUSE OF DOCUMENTATION

- The information presented in this product sheet is for reference only. Do not use this document as a product installation guide.

**Failure to comply with these instructions could result in death or serious injury.**

## WARRANTY/REMEDY

Honeywell warrants goods of its manufacture as being free of defective materials and faulty workmanship during the applicable warranty period. The Honeywell standard product warranty applies unless agreed to otherwise by Honeywell in writing; please refer to your order acknowledgment or consult your local sales office for specific warranty details. If warranted goods are returned to Honeywell during the period of coverage, Honeywell will repair or replace, at its option, without charge those items that Honeywell, in its sole discretion, finds defective. **The foregoing is buyer's sole remedy and is in lieu of all other warranties, expressed or implied, including those of merchantability and fitness for a particular purpose. In no event shall Honeywell be liable for consequential, special, or indirect damages.**

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