



Technical Datasheet



Product Description:

The AWARE - Module Level product is a low-power and compact device that monitors lithium ion batteries for increased safety. The monitor is integrated into lithium ion battery modules and provides a signal that indicates whether or not a single cell within the module has experienced an off-gassing event.

Our products provide value through gas sensing that is acutely sensitive to battery electrolyte solvent vapors. This sensing ability is paired with proprietary algorithms and creates a product that can detect a single cell failure without electrical interrogation of cells or mechanical contact at the earliest possible indication - sometimes ahead of battery management systems and well ahead of thermal runaway.

The utilization of the Li-ion Tamer AWARE creates a completely independent perspective of battery health that can be used to provide an extra layer of safety for your lithium ion battery systems.

Key Features:

- Compatible with all lithium ion battery form factors and chemistries
- Parts-per-million level detection threshold
- Calibration-free product
- Distributed sensing network provides localized gas detection
- Provides early warning of lithium ion battery failures
- Long product lifetime
- Fast response time to off-gassing events
- Highly reliable output signal
- Low power consumption
- Several mounting options
- Unobtrusive sensor with easy installation
- Independent and redundant perspective on battery health



Physical description:

The AWARE Module Level product consists of an off-gas monitor with several mounting options, intended to be placed within a battery module. The product then offers sensing capability of gas space around the battery module and will have the capability to provide early warning of battery failures.

*Custom cable lengths/connectors are available.

Physical specifications

Part	Dimensions
Sensor	Ø 28.6 x 25.4 [mm]
Monitor cable	165 [mm]*
Connector type	Bare wire leads*
Wire type	Red (POWER +)
	Black (SIGNAL -)
	White (SIGNAL +)

Environmental description:

The AWARE product is intended to be integrated into spaces with lithium ion batteries and, therefore, has very similar specifications to that of a standard lithium ion battery system.

Environmental specifications

Condition	Specification
Temperature	-10 to +80°C
Humidity	5 to 95% RH
Max temperature change	8.6°C/min

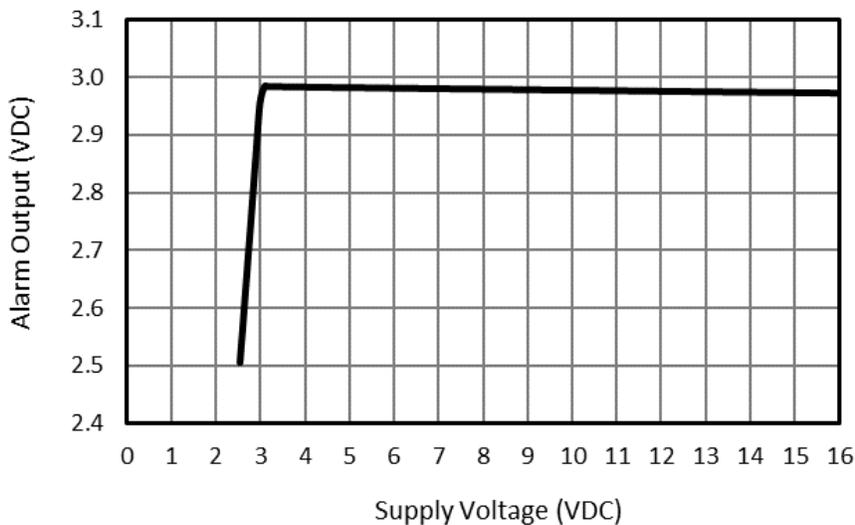
Electrical description:

The AWARE product provides signals specific to the battery module where it is installed. With this localized signal, you will be able to know not only when your battery module is experiencing a problem, but also you will have early warning of a fully developed lithium ion battery failure. Signal outputs from the AWARE can be tied into a BMS or other controller.

Electrical specifications

Detail	Specification
Controller power input	3 - 16 VDC
Power consumption	75 mW (@ 5VDC and 25°C)
Output signal (warm up)	0.25 VDC
Output signal (OK)	0.50 VDC
Output signal (alarm)	3.0 VDC (see graph below)

ALARM OUTPUT vs SUPPLY VOLTAGE



Gas detection description:

The AWARE is equipped with a sensing element that is acutely sensitive to lithium ion battery electrolyte solvent vapors. This acute sensitivity is how this product is able to provide indication of a single cell battery failure without electrical or mechanical contact of battery cells.

Gas detection specifications

Detail	Specification
Target gases	Lithium ion battery electrolyte solvent vapors
Min. detection threshold	45 ppb/second
Response time	5 seconds
Fault detection	Single cell failure

Product life description:

The associated algorithms provided an extended lifetime product that does not require calibration. The product is intended to have comparable lifetime to lithium ion battery systems.

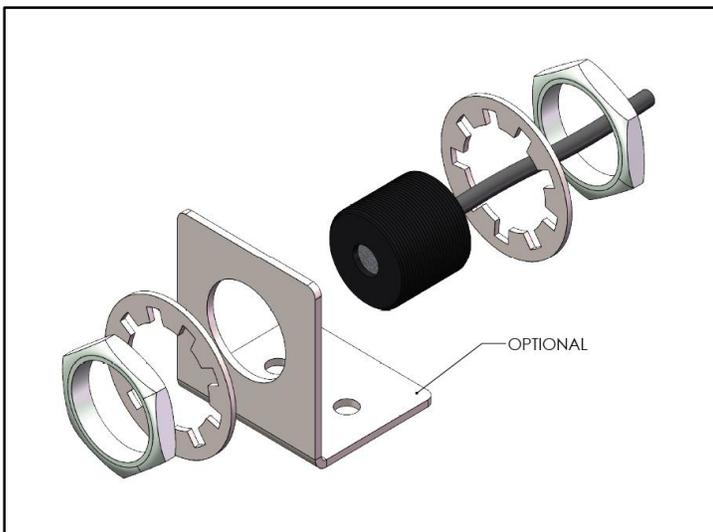
Product life specifications

Detail	Specification
Target lifetime	5 - 10 years
Warranty	1 year

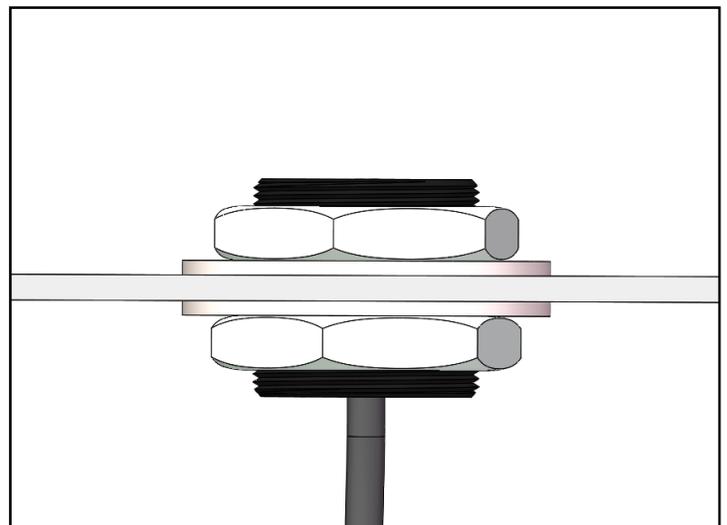
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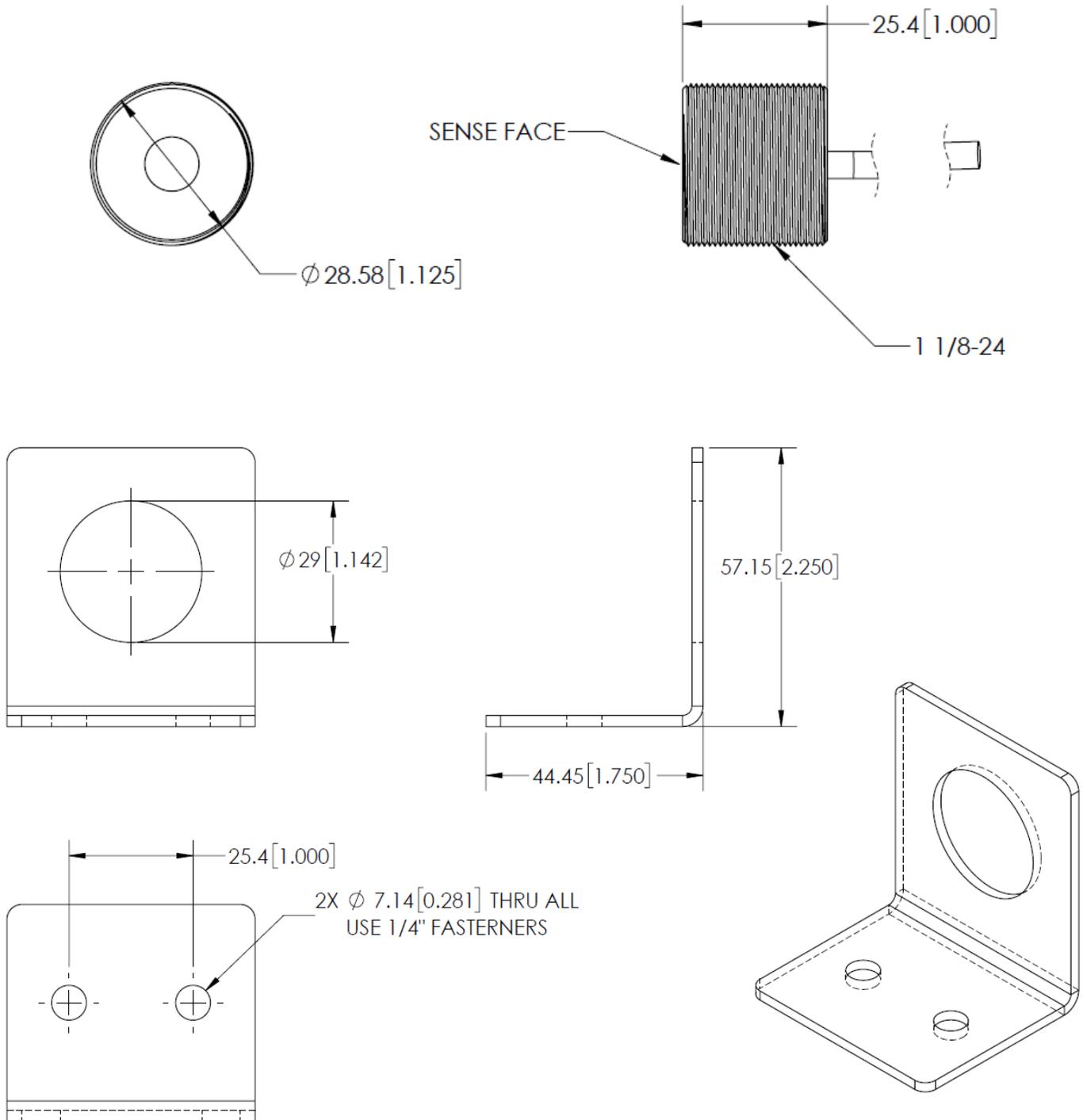
Detail	Certification
Hazardous Location EX classification	Class I B T2
Hazardous Location EX Zone	Division 2 / Zone 2 / Category 3
EMC	IEC 61000-4-2 through IEC 61000-4-6
Shock	MIL-STD-901D
Vibration	MIL-STD-167-1A

Mounting bracket



Through-wall mount





NOTICE: This device detects off-gas from lithium ion batteries. It does not prevent fires or thermal runaway. This device is not a stand alone 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.