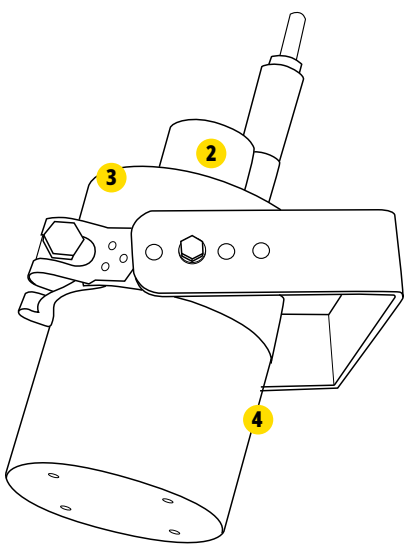
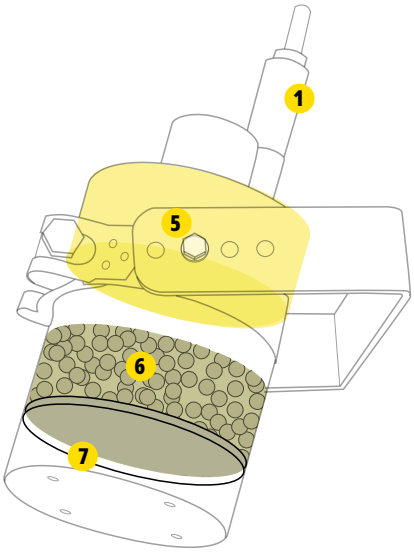
ISO 15276 ISO 15779 UL 2775 NFPA 2010

HOW OUR INTERNAL FIRE EXTINGUISHER FUNCTION AGAINST LITHIUM-ION FIRES





1. Automatic triggering by Thermal bulb
2. Thermal connection
3. Stainless steel lid
4. Stainless steel hull
5. Solid component
6. Mineral resin
7. Watertight closure + filter

THE FIRE TRIANGLE ▼

TECHNOLOGY

The aerosol fire-extinguishing agent comes in the form of a solid solution using the latest condensed generation, composed mainly of potassium salt, without any pyrotechnic materials such as nitro-guanidine or nitro-cellulose.

On activation, the component transforms into a highly effective volatile solution («cloud») which spreads evenly throughout the protected enclosure using the momentum generated during the transformation process.

The aerosol agent is suitable for fire classes A, B, C & F (according to EN2 Classification) and A, B and C (according to NFPA10 Classification).

CHEMICAL REACTIONS IN A FIRE

A fire is a chemical reaction in which three elements must be present for combustion to occur.

What is the fire triangle?

- Combustion is an exothermic redox reaction. It's a chemical reaction between a fuel and an oxidizer. This reaction produces energy (heat) and combustion products. A fire is combustion that develops uncontrolled in time and space.
- For a combustion reaction to start, three elements are required: fuel, oxidizer and activation energy. This combination is symbolically represented as a triangle.
- Fuel: This is the material likely to burn. It can be a solid (including dust and shavings) such as wood, paper or cardboard; a liquid (or liquefiable solid) such as gasoline, alcohol, etc.; a gas, such as butane, propane or hydrogen; or a metal or cooking oil. This is the reducing agent in the redox reaction. These fuels are categorized by fire classes.
- Oxidizer: The oxidizer is the second reactant in the chemical reaction. Except in very special cases, oxygen (O2), naturally present in ambient air (21%), is the main oxidizer.
- Activation energy: To initiate combustion, a supply of energy is required. Electric arc, thermal radiation, temperature rise and friction are the main sources of energy needed to trigger the combustion reaction.

ISO 15276 ISO 15779 UL 2775 NFPA 2010

EXTINGUISHING PRINCIPLE

Conventional extinguishing generally works by two methods:

- Suffocation or asphyxiation: depletion of oxygen in the air below 15% of normal levels puts pressure on the fire and extinguishes it.
- Cooling: liquid solution to ensure heat absorption.

For both these methods, the fire triangle is no longer respected, ensuring that the flames are extinguished.

The aerosol fire extinguishing agent extinguishes fire by inhibiting the chemical chain reactions present in combustion, at the molecular level.
It eliminates free radicals from the flames and extinguishes the fire without depleting oxygen. In a typical fire, a molecular reaction develops between atoms and unstable fragments in the presence of oxygen. This process continues until the fuel is exhausted.
When the unit is activated, the solid agent composed of the elements below is diffused onto the fire, following the natural convection currents of combustion.

- Potassium nitrate: 77%
- Potassium carbonate: 4% (potassium carbonate)
- Magnesium: <1%
- Polymer resin: 18%

The solid particles of potassium salt, just a few microns in size, are suspended in an inert gas with an extremely high surface area. This increases efficiency and has the advantage of dispensing less extinguishing agent.
When the solid agent reaches and reacts with the flame, potassium radicals (K) are formed mainly from the dissociation of K2C03. These K particles combine with other hydroxyl free radicals (OH) to form stable products such as KOH. This action extinguishes the fire without depleting or absorbing the ambient oxygen content. KOH also reacts in the presence of C02 to form K2C03. The solid particles of potassium carbonate (K2C03) are less than five micrometers in diameter and remain suspended in the protected chamber/enclosure for at least 30 minutes.
The aerosol fire-extinguishing agent is used as a total flooding agent in fire protection. However, unlike conventional gaseous agents, the total flooding effect is achieved without increasing the pressure in the protected enclosure. This makes it possible to protect any enclosure from a few cm3 to several hundred m3.

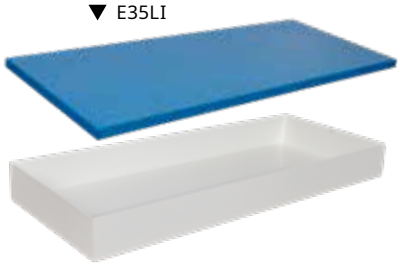
AVANTAGES

- Certified 15-year life cycle.
- Environmentally friendly.
- Non-corrosive.
- Non-toxic.
- Fully automatic activation system.
- Self-actuating agent at 300°C.
- Electric or manual activation.
- No piperack piping.
- No extinguishing agent storage cylinders.
- No pressurization: negligible maintenance.
- Low investment cost: electrical installation only.

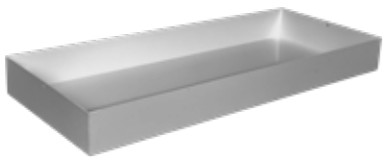
Ref.	Description	Dimensions H x Ø (mm)	Operational unloading time	Weight (kg)
EX100LI	Internal fire extinguisher for lithium battery	150 x 84	10 seconds	1,3
EX200LI	Internal fire extinguisher for lithium battery	185 x 84	10 seconds	1,8
EX500LI	Internal fire extinguisher for lithium battery	295 x 84	10 seconds	3,3

SHELVES & RETENTION BINS

▼ E35LI



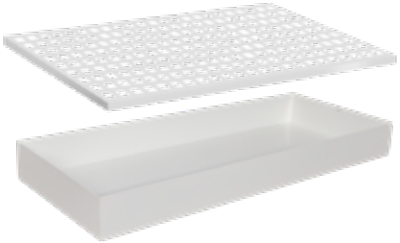
▲ B235



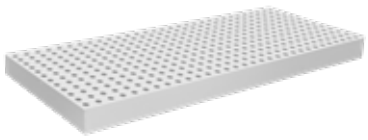
▲ ESE300

▲ R2FLI

▼ E06LI



▲ GL06



▲ C300

ADVANCED SECURITY SOLUTIONS

▼ **VIG190 - Security and alarm package comprising (or VIG590) :**


Visual and audible alarm


Control box


Automatically triggered smoke detector


Special lithium extinguisher


PINTOLI cable duct

WIFI ALARM AND DATA LOGGER SYSTEM

- Data transmission via WiFi.
- All measurement data available anywhere, anytime, on any device.
- **Alarm when thresholds are exceeded.**
- Free online data hosting on Cloud.

The WiFi data logger system is the modern solution for monitoring temperature values in storage and work cabinets. The system is easy to install via a browser. WiFi data loggers reliably record temperature values at adjustable intervals
and transmit the measured values directly via a WiFi network to the Cloud. Recorded measurement values can be accessed anytime and anywhere via an Internet-connected tablet or PC. **Limit violations are immediately notified by e-mail, or optionally (by SMS as a push message)**. In this way, critical processes are always under control, even when you're not on site. Thanks to its long battery life, the system is virtually maintenance-free.

▲ SED

ADDITIONAL FEATURES


SERCODE


SERCODE 14


ONDULI


EX100LI / EX200LI / EX500LI


PEXTBALI


PEXTBALI14


PEXTBALI50


PRISELI

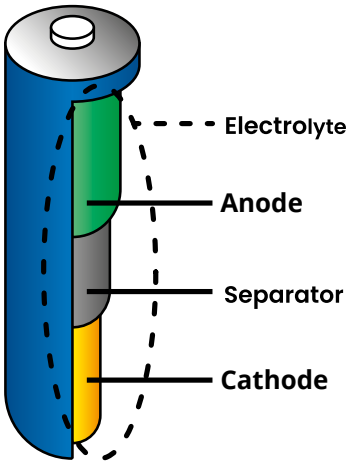

ALARMWI

SED

RISKS ASSOCIATED WITH LITHIUM-ION BATTERIES

WHAT IS A LITHIUM-ION BATTERY?

A Li-ion battery, or Li-ion accumulator, consists of two electrodes (cathode and anode) and an electrolyte that ensures the ion exchange of the system.
During the discharge (use) of the battery, ions move from the anode to the cathode. During charging, the reverse occurs. These two electrodes are insulated by a separator to prevent a short circuit.



WHAT ARE THE DANGERS ASSOCIATED WITH THESE BATTERIES?

Of the 50 potential accidental scenarios identified by INERIS (Institut National de l'Environnement Industriel et des Risques) during the various stages of the battery life cycle, 12 were considered critical. They concern in particular the storage, recharging and use stages. The most problematic outcome of these risks concerns battery fire (or metal fire). This is a significant risk because the fire caused by Li-ion batteries cannot be extinguished in a conventional way, as the battery itself generates the oxygen molecules and heat needed for combustion. It can only be extinguished with the help of special powders, all in a confined environment (with the risk of the powder losing its effectiveness).

HOW DO THESE BATTERY FIRES ORIGINATE?

By thermal runaway due to overcharging or exposure to excessive temperatures

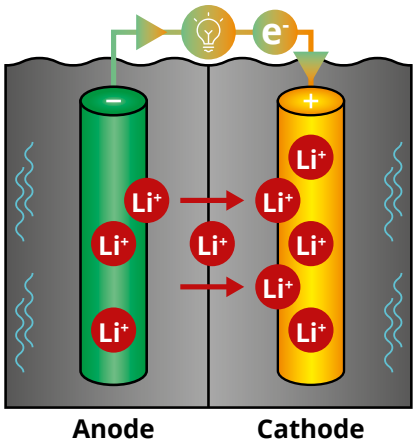
A battery usually delivers the chemically stored energy on discharge as electrical energy. However, not all of the energy may be delivered as electrical energy, but may cause overheating that can be as much as 7 to 11 times the electrically stored energy. Given the structure of the battery, the reaction itself becomes stronger and causes critical overheating. The materials of the battery also release bound oxygen, which further fuels the fire.

By full discharge

The full discharge associated with not using the battery for too long periods can damage the battery. If the battery is then exposed to temperatures that are too cold, this can cause a change in the physical and chemical properties of the electrolyte liquid and lead to the formation of flammable gas. The absence of the liquid breaks down the protection of the battery, leading to a short circuit or fire.

By mechanical damage

Shocks or misuse can damage the internal structure of the battery and lead to deterioration of the battery separator, leading to a short circuit or fire.



Top, components of a Li-ion battery.
Below, how a Li-ion battery works in use.

HOW TO STORE THEM SAFELY?

Storage recommendations depend on the size and power of the battery:

Low power lithium batteries (less than 100 Wh per battery)

Those are the small batteries contained in mobile phones or computers, for example.
No special safety requirements apply here, as long as all the manufacturer's instructions and safety locations are followed.
For larger quantities stored (volume over 7 m3) the guidelines for medium capacity lithium batteries applies.

Medium capacity lithium batteries (approx. 100 Wh per battery and 12 kg gross per battery)

Batteries in this category are used in electric bicycles, electric scooters or similar small vehicles. They should be stored in separate fire-resistant enclosures (e.g. a fireproof room or safety cabinet).
They should not be stored with other products and this area should be constantly monitored.
For larger quantities stored (area occupied at 60 m2) the guidelines for high power lithium batteries applies.

High capacity lithium batteries (more than 100 Wh per battery and 12 kg gross per battery)

Batteries in this category are mainly used in electric cars and large stand-alone appliances.
The recommendations for the storage of medium power batteries should form the basis for consideration. However, safeguards should be put in place on a case-by-case basis after consideration.

- If the storage space is large, fire protection must be adapted.
- If the use of sprinklers is allowed, it should be as localised as possible and it is recommended that the batteries are separated and stored in a confined environment to prevent a fire outbreak.