

## Managing the risks when using lithium-ion rechargeable batteries

The widespread use of lithium-ion batteries has continually increased since they were first deployed in consumer products in the early 1990s. They are now a dominant feature in the mobile electrical devices sector in units like smartphones, tablets or keyboards – and they are now the number one selection for use in electrical vehicles too.

Their benefits are very obvious: their specific energy, cell voltage and degree of efficiency are high – and the loss of performance is low as a result of the undesirable memory effect or automatic discharge. However, there are increasingly frequent indications that the enhanced energy density in the lithium-ion technology can create fire risks. If a lithium-ion rechargeable battery does not provide its energy in a controlled and targeted manner as intended, thermal energy is released. The rechargeable batteries heat up and the potential risk of fires or explosions increases. The reason for the uncontrolled release of energy may be an internal short circuit as a result of faulty production or even mechanical damage or overheating through incorrect use, storage or transport. Then there is the fact that the electrolyte solutions in lithium-ion rechargeable batteries are naturally combustible.

We use lithium-ion rechargeable batteries in various technical devices; this usually involves mobile keyboards and input devices with data transmission by radio waves. We perform specific measures that are described below in order to minimize the well-known risks. Our goal is to achieve the greatest level of safety for users and the maximum possible serviceable life for the devices.

### The risk of damaged separating layers

One well-known weak spot is the thin separating layer in the batteries: the so-called separator. This separates the minus and plus poles from each other. If this kind of separating layer is inserted wrongly or is damaged, this can create a short circuit and the battery can catch fire or explode.

#### Our preventive measures are:

- We only select batteries that take into account the requirements for use in the planned device. This enables us to avoid any excess performance or shortfalls from the outset.
- We guarantee a high level of quality by using strict qualification standards for suppliers. We only purchase batteries from authorized sources.

## The risk of deep discharge or excess charging

If a technical device with a lithium-ion battery is discharged to the extent that it switches itself off and is then not used for a long time, this may lead to what is known as deep discharge. However, it is possible that the control electronics will still continue to consume power. The same applies to any excess charging of the battery.

Even if this is unlikely, this may lead to damage in the battery cell in both cases.

### Our preventive measures are:

- GETT uses charging ICs that have been developed in line with the latest findings. The batteries are used defensively – to guarantee a long serviceable life. Neither the upper nor the lower voltage thresholds are exceeded in normal operations.
- We check the electronic components carefully.
- If deep discharge has taken place, charging takes place gently until the standard levels have been reached and charging can take place in the normal mode.

## The risk of damage to the battery by the user

It is possible that the battery may also suffer from unintentional damage to the case. Any storage, use and charging at temperatures, which are outside the specified range, can also have a negative effect.

In these cases, observe the battery's behavior carefully; the user is responsible for exercising care.

### Our preventive measure here is:

We cannot influence any damage caused by the user. We therefore mention usage scenarios that should be avoided in detail in our user manual. As a result, users must guarantee proper deployment to actively contribute to minimizing risks in their own interest.

## The risk of a reduced serviceable life

In order to extend the serviceable life, the charge level in devices that are regularly used should be kept above 20 percent and below 80 percent. To preserve the battery for longer, it should not be fully charged. The following generally applies: **Ambient conditions that avoid extremes and low levels of stress are the best guarantee for a long serviceable life.**

### Our preventive measure here is:

- We guarantee careful treatment for the batteries as regards charging and use through our charging concept. We also specify the ideal conditions for deploying the units in our manual. ■

If you have any other questions, please contact our service and support department.  
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