

High-technology Power Packs for Pedelecs



Power Pack Solutions

Go-anywhere, all-weather battery packs

VARTA power units keep

Convenience, mobility, enjoyment, freedom: riders have many reasons for choosing to buy a pedelec. But pedelec users all over the world know what quality and performance mean: the ability to go wherever they want to go, whenever they need to travel. So reliable power is a fundamental requirement of a high-quality pedelec.

This is the promise of a VARTA Power for Pedelecs battery: whether the sun is shining or there is snow on the ground, riders trust a VARTA battery to keep them moving. And that's because everything in a VARTA power pack is designed for the ultimate in performance and reliability.

Powerful, time-tested cells

The design of every high-performance battery pack starts with the cells: in VARTA Microbattery's case, this means the world's most advanced Lithium-Ion (Li-Ion) rechargeable cells in the cylindrical 18650 form factor.

Li-Ion cells support the peak current outputs required to drive a pedelec up the steepest hills. Yet because they offer high power density, they can provide long range in a unit that is smaller and lighter than any other cell type of a comparable cost.

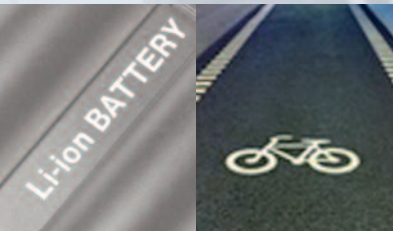
The 18650 Li-Ion cells inside VARTA Power for Pedelecs are in widespread use, and the data about their operation and lifetime are based on millions of charge/discharge cycles. So when you use specifications from a VARTA datasheet in your design planning, you know you can rely on them.



Go further, faster with VARTA's smart electronics

Every VARTA Power for Pedelecs battery comes with integrated control electronics, ensuring it operates at high efficiency and is protected from unsafe usage. These smart systems are implemented by VARTA as a standard element of every power pack.

- Accurate fuel-gauging using Impedance Tracking™ technology tells the rider exactly how much power remains in the battery
- Advanced cell balancing ensures every cell is evenly charged and discharged, and maximises power output from every charging cycle
- Safe-use software – the battery is automatically protected against damage if a user attempts to charge or discharge it in unsafe operating conditions
- Flexible power output – by connecting multiple lithium-ion cells together, VARTA power packs can meet high peak- and constant-power requirements. Hill-climbing and long journeys are easily handled by a powerful VARTA battery.



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pedelecs moving even in the harshest conditions

Perfectly adapted for harsh conditions outdoors

Plunge a VARTA Power for Pedelecs battery in water, smear it in mud or blast it with dust: it will still work perfectly. VARTA Microbattery power packs are housed in high-quality casings, using materials that are rigorously tested for resistance to cold, heat, moisture and UV radiation.

The complete battery pack comes with at least an IP64 rating, which means that it is water- and dust-resistant.

Pedelecs spend large amounts of time outside in the heat of the sun or attacked by frost, and splashed by dirt and mud from the road. VARTA Power for Pedelecs batteries are designed to cope with everything the environment can throw at it.

German engineering

VARTA Microbattery has its headquarters in Ellwangen, near Stuttgart in Germany, and its primary and rechargeable cells are manufactured there. Ellwangen is also the home of VARTA's extensive R&D engineering teams, based in the distinctive Innovation Tower.

Working within the German tradition of quality manufacturing and engineering know-how, VARTA is a name you can trust when you require high quality and high performance.

How to evaluate VARTA power packs for your pedelec design

There are two easy ways to find out more about VARTA Power for Pedelecs battery packs.

1. Contact a regional sales adviser: visit www.varta-microbattery.com/cellpacbike for details. Our sales team can help advise you on power pack configurations suitable for your design, and provide samples.
2. Visit www.varta-microbattery.com for more information about the VARTA company, product data and specifications and much more.

Power for pedelecs: a power pack designed and made for you

Every pedelec is different. Some pedelecs are large, heavy and robust, designed to carry a rider and accompanying baggage. Others are lightweight and highly maneuverable for riding at high speed or in crowded city streets. In some pedelecs, the emphasis is on style and sleek design.

In every case, the power pack needs to fit the individual requirements of the pedelec. This is what the Power Pack Solutions service from VARTA Microbattery delivers: a high-quality battery, optimized just for you. We go through a four-stage process to deliver a custom power pack to you.

1. Design requirements

A pedelec's design results in certain requirements of the battery, in terms of peak power, range, size and shape, charge-cycle lifetime, usage conditions and cost.

VARTA Microbattery's power pack specialists can help you define a detailed specification that fits your requirements. By involving VARTA's engineers at this early stage of the design process, you might gain unexpected improvements in your design. That's because VARTA can help you take into account the electrical, mechanical and thermal properties of Lithium-Ion power packs.

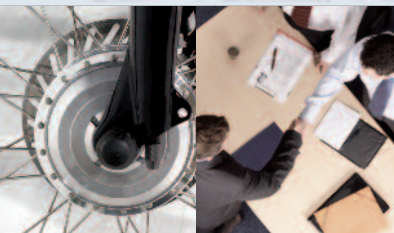
This stage in the process is not just about finding out what you want – it's about helping you get the best possible battery.

2. Prototype design

VARTA Microbattery's design engineering project team now designs a prototype that fits the design requirements outlined in stage one. At the heart of the power pack are proven, compact Lithium-Ion 18650 cylindrical cells. By combining cells in series, a power pack can provide the 36V output required by most BLDC electric motors used in pedelecs. The final number of cells in the pack will depend on your requirement for peak and continuous power output.



Also at this stage, VARTA designs a control electronics circuit board, providing functions such as fuel-gauging, over- and under-voltage/temperature protection and cell balancing. And mechanical engineers will design a housing for the cells and electronics that provides protection from the elements. This housing has a minimum IP64 rating, and is constructed so as to prevent moisture and dust from entering the power pack.



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3. Prototype testing and user acceptance

VARTA Microbattery manufactures samples of the power pack prototype at its dedicated assembly plant in Batam, Indonesia. A battery of tests confirms the pack's conformance with the design requirements you specified. This includes tests for mechanical durability, electrical performance and safety.

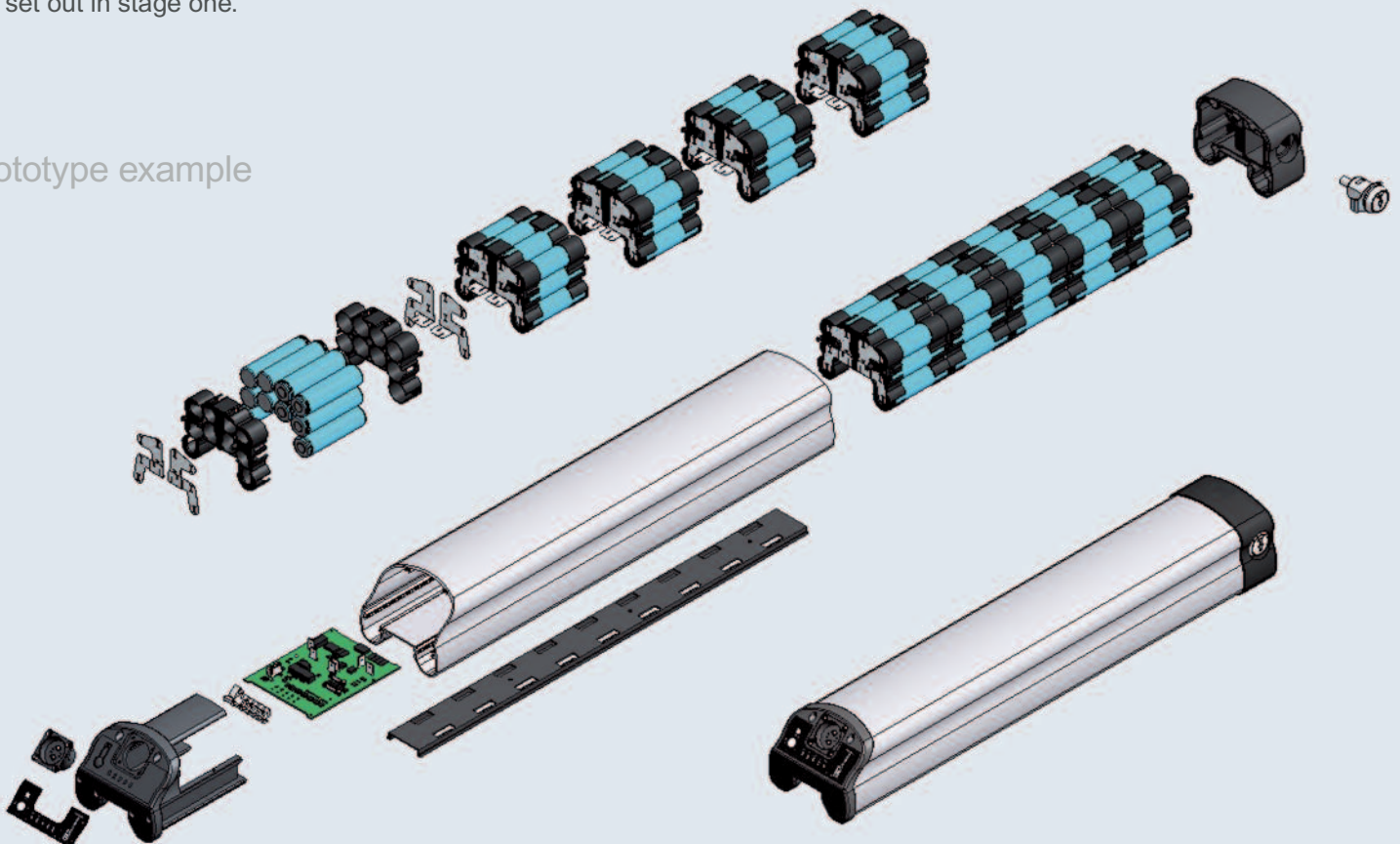
The prototypes are then delivered to you to undergo your testing procedures. At this stage, you will have the comfort of knowing that the power pack meets the specifications you set out in stage one.

4. Shipments of volume production parts

Before the initial engagement in stage 1, you agreed a unit price with VARTA Microbattery for production volumes. Now VARTA will begin shipping finished packs to your assembly operation, in accordance with the original agreement.

VARTA Microbattery is a trusted supplier of high-volume power packs to customers in industry sectors such as industrial, medical and automotive. The company's manufacturing operations have a long track record of meeting its customers' requirements for quality and volume.

Prototype example



VARTA: a trusted name for high-quality power packs

The VARTA brand was introduced in Germany in 1904, and ever since then, it has been a hallmark of quality, performance and reliability.

The reputation of VARTA is the result of a combination of engineering excellence, innovations in the chemistry of battery cells, a single-minded commitment to quality and the flexibility to adapt products to fit customers' needs.

Advanced chemistry – the product of a sustained investment in research

VARTA Microbattery invests continuously in researching and developing new technologies for innovative products and systems, as well as for new product lines and quality assurance processes.

More than 100 scientists and engineers are employed in the Innovation Tower at VARTA's headquarters in Ellwangen, Germany. There is a particular emphasis on new Li-Ion technology for electric mobility, and VARTA's joint venture with Volkswagen is developing new high-capacity, lightweight Li-Ion batteries.

VARTA researchers are also exploring new technologies in the areas of:

- Nanomaterials and nanotechnologies
- The micro fuel cell – a small, high-density energy storage unit
- Energy harvesting – converting and storing energy from the environment, vibrations, light and heat
- Printed batteries – an ultra-thin battery technology for the future

Repeatable quality – building batteries to last

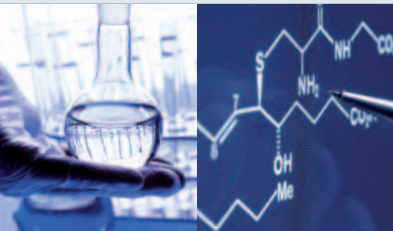
VARTA Microbattery is a trusted supplier of batteries to many of the world's largest electronics product companies. Its reputation is based on an unbending commitment to quality, from the initial design of a battery pack through to its final assembly.

All of VARTA's manufacturing and assembly operations have full ISO9001 certification. In addition, VARTA is approved to supply batteries for medical devices under the US Food and Drug Administration's (FDA) rigorous quality-testing regulations.

The commitment to quality is maintained at every level of the company. Individual production areas are responsible for ensuring the quality of their individual products. They are supported by human resources, service units and process and document guidance.



For the rider of a pedelec, this commitment to quality means that, if their battery has the VARTA name on it, they can be sure it will work reliably, day after day after day.



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Exhaustive testing for your complete peace of mind

Every battery that VARTA ships is rigorously tested before it is released from the factory. It is not enough that VARTA's factories use state-of-the-art equipment, proven processes and highly trained personnel. For your peace of mind, VARTA checks each unit on every important parameter, including voltage levels, operation of protection features and communications.

The exhaustive end-of-line testing is complemented by monitoring processes that begin as soon as raw materials enter the factory. The flow of materials through the production process is monitored through various inspection procedures, including incoming goods inspections, in-production checks, automated output inspection and long-term testing of products in the field.



VARTA Microbattery: a world-leader in battery development and manufacturing

VARTA Microbattery GmbH is a leading international manufacturer of OEM and retail batteries, with more than 100 years of experience. We develop and produce batteries of all electrochemical system types and sizes in Ellwangen, Germany. With professional teams in the fields of engineering, production, logistics and distribution, we meet the requirements of customers around the world.

As a global systems supplier, we are capable of offering effective, customer-specific battery solutions. We invest continuously in research and development to maintain our position as an innovation leader. Our focus is on providing high-quality products that guarantee maximum customer satisfaction.

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