ANSMANN

SYSTEM SUPPLIER FOR MOBILE ENERGY SOLUTIONS

ANSMANN


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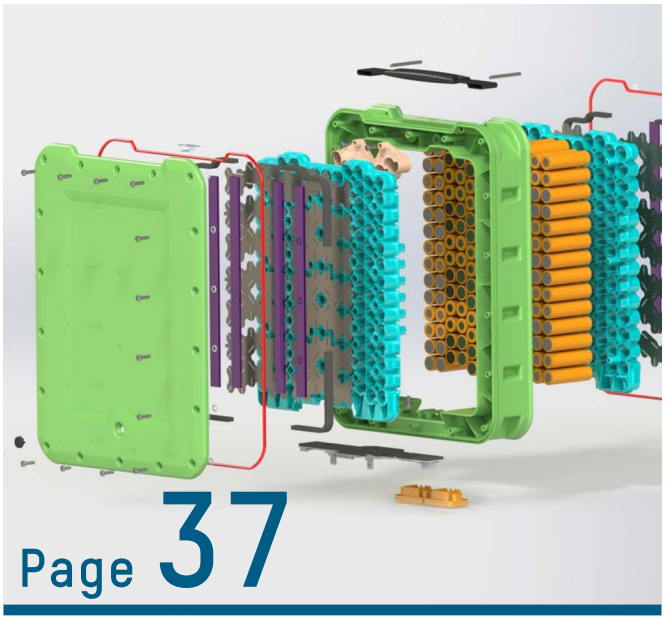
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CONTENT

ANSMANN

IT ALL STARTED IN A GARAGE

It all began as a one-man company in Edgar Ansmann's own garage in Assamstadt. With the foundation of the company in 1991, Edgar Ansmann laid the cornerstone for what is now a globally active company: He wanted to make the future mobile with his ideas. This was the starting point for the extremely successful development of our company. In this time the number of employees has increased just as quickly as the floor space at the company headquarters in Assamstadt (Baden-Württemberg) and the scope of our product range. Our skilled employees ensure that „the energy flows" - quite literally.

Today, ANSMANN is one of the leading international technology companies in the fields of mobile battery, charging and lighting technology.

Rechargeable batteries	**Quality**
Chargers	**Competence**
Mains adapters	**Sustainability**
Service	**Innovation**

30 YEARS

Experience in **RESEARCH & DEVELOPMENT**

6

Subsidiary companies

GLOBAL

China, Hong-Kong, UK, Nordics, Benelux, France

BioBattery

Natural fibre reinforced bio-based plastics

WINNER

BIOECONOMY INNOVATION AWARD

OVER **400** EMPLOYEES

PROCESSED CELLS

Per year

>28 Million

WE ARE THE MARKET LEADER

WORLDWIDE

fast and flexible

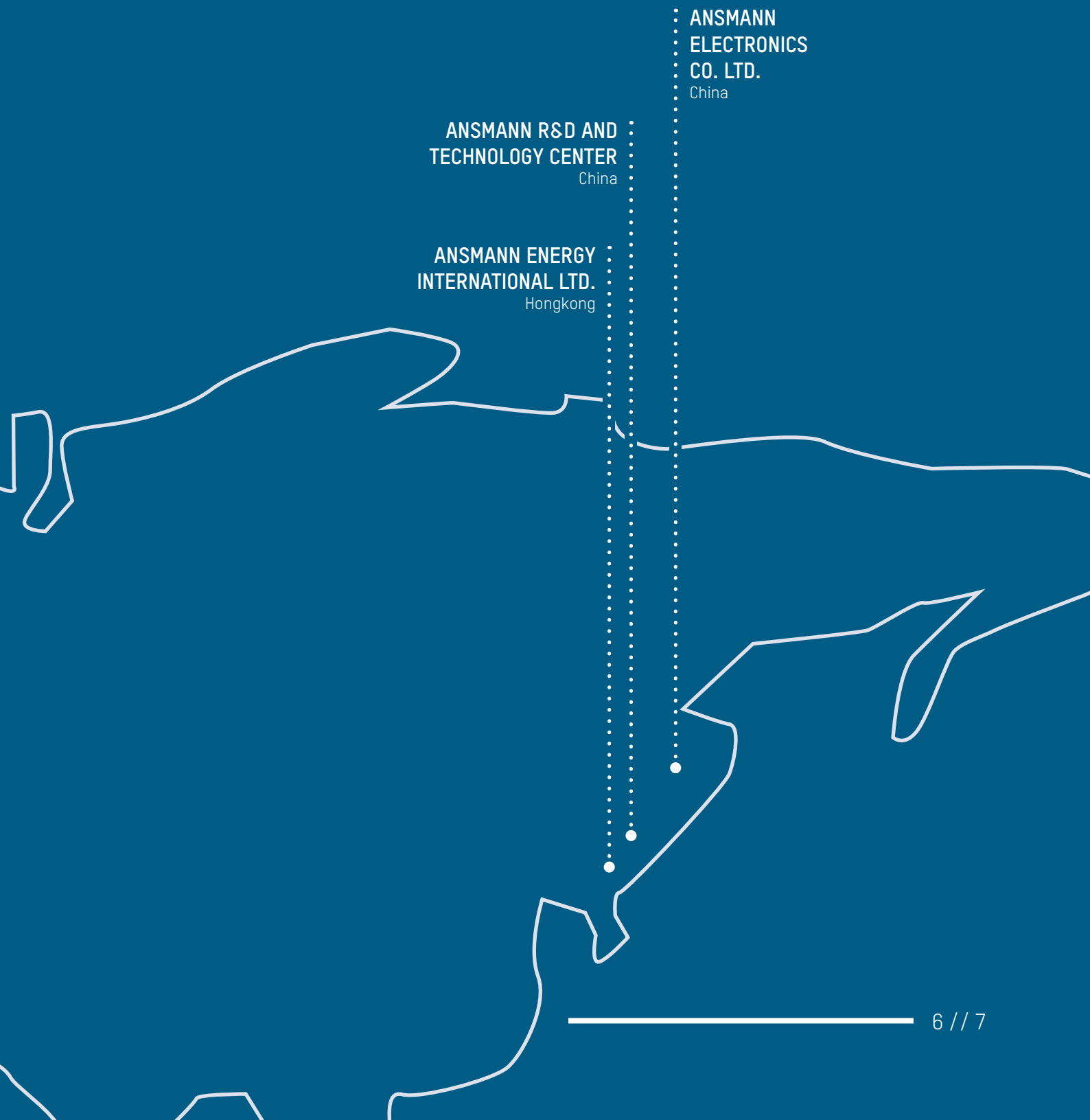
ANSMANN NORDIC AB
Partille
Sweden

ANSMANN AG
Headquarters
Assamstadt
Germany

ANSMANN ENERGY FRANCE
Paris
France

ANSMANN UK LTD.
Harlow, Essex
United Kingdom

As a globally active company, with over 400 employees, production sites and branch offices in the UK, France, Hong Kong, China and Sweden, and with over 50 World Sales Partners, ANSMANN is one of the leading providers for mobile energy. With our modern logistics centres in Europe and Asia, we have created the best logistics prerequisites for optimum availability of goods.



We are the

MARKET LEADER

in the Industrial and Consumer Solutions Business segment

Vision

Mobile energy -
when and wherever you need it.

Mission

We are forward thinkers,
we are enablers,
we are a technology company

1

SUCCESS

IS NO ACCIDENT

Our energy specialists deal with all aspects of mobile energy, in two divisions. Experienced specialists develop customer-specific solutions for mobile power supply for industry. Our comprehensive consumer range also encompasses chargers and Light solutions alongside re-chargeable batteries and standard batteries.

- Innovation management
- 3D CAD design
- Industrial engineering
- Field application support
- Software / Hardware
- Cooperation with universities & institutes
- Project management
- Over 40 developers & designers

INNOVATION & QUALITY

RESEARCH & DEVELOPMENT

MANUFACTURING

MADE IN GERMANY & CHINA

We guarantee the highest quality. Only high-quality materials – certified and developed per DIN standards – guarantee our standards.

Our production facilities in Germany and China guarantee maximum availability and flexibility. These are important prerequisites to maintain the high quality standards of our products.

Our customers can also expect top quality when it comes to the materials used. We work exclusively with materials that are approved, high-quality, free of harmful substances and supplied by renowned manufacturers.

All working steps are subject to our high internal standards as well as the strict rules of DIN EN ISO 9001 : 2015, in accordance with which the ANSMANN quality management has been certified.

A further logical step was certification per DIN EN ISO 13485 : 2016. This medical standard defines the guidelines for a comprehensive management system for the design and manufacturing of high-quality medical products.

Sustainability and social responsibility form key pillars in our actions. For this reason, our manufacturing in Asia is checked and certified per SA8000.

Innovation

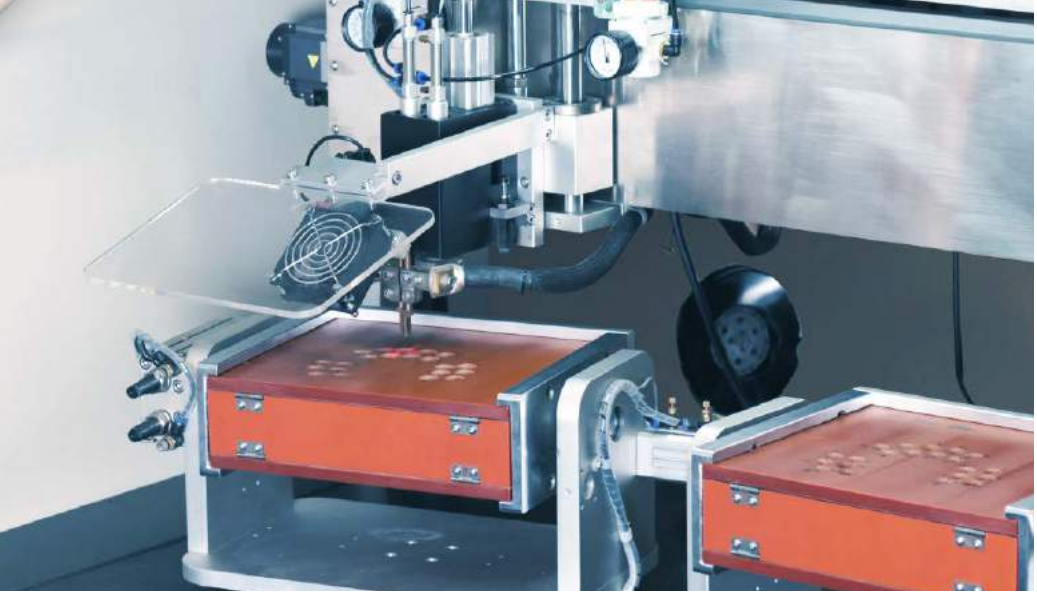
Technical Development

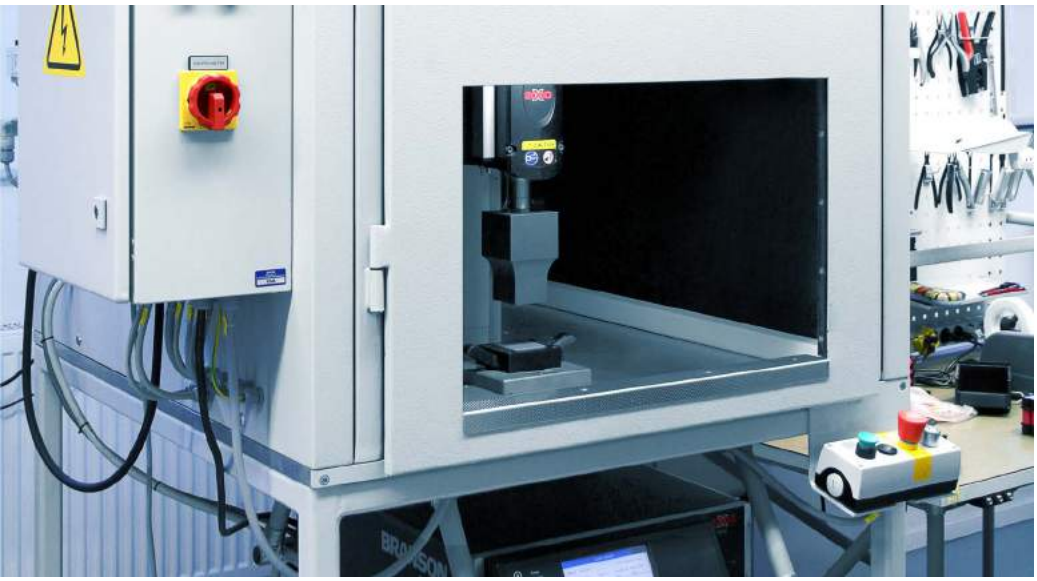
Tests and Optimisation

Certificate Management

Product Safety

IEC62133, Environmental testing



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Automated Test Procedures

Test centre for battery and environmental tests

ISO 9001 : 2015 (DQS)

ISO 13485 : 2016 (DQS med)

Globally high STANDARDS

QUALITY AND DEVELOPMENT

ANSMANN stands for quality and safety. We rely on a process-oriented quality management system in order to be sure that it stays that way. Our mission is to carry out our daily work in compliance with the strict rules of ISO 9001:2015 - throughout the world and without compromise. The absolute determination to continually improve ourselves, coupled with our passion to manufacture great products with the highest quality is the basis for our operationally effective standards.

In addition, specific requirements are also integrated into our processes for special sectors. A good example of this is ISO 13485 (Medical), according to which we are regularly audited and certified.

Quality and SAFETY

TESTED AND CERTIFIED

Quality and safety are always our top priorities. Each product is subjected to the strictest testing and continuous checks in our in-house ANSMANN Test Centre. This enables us to offer the safety that you can expect from a first-class product.

The tests and checks are carried out on all products in all areas of production, regardless of the manufacturing site.

In particular we simulate various different hazardous situations for rechargeable batteries and standard batteries in six test procedures in our own UN test centre. With the help of cutting-edge equipment, ANSMANN takes the cells to the limits of their performance. The products are only approved for transportation after thermal tests, short-circuit and overload tests, high altitude simulations and vibration and shock tests.

UN38.3

IEC62133

Environmental testing

Customer specific tests

The particularly high requirements of medical technology are our standard.

ZERTIFIKAT

ANSMANN AG

ISO 9001 : 2015

DQS GmbH

ZERTIFIKAT

ANSMANN AG

ISO 14001 : 2015

DQS GmbH

CERTIFICATE

This is to certify that the company

ANSMANN AG

Industriestr. 10
97959 Assamstadt
Germany

has implemented and maintains a **Quality Management System**.

Scope:
Packing, installation and sales of battery packs for medical devices.

Through an audit, documented in a report, performed by DQS Medizinprodukte GmbH, it was verified that the management system fulfills the requirements of the following standard:

EN ISO 13485 : 2016

Certificate registration no.	518906 MP2016
Certificate unique ID	170709893
Effective date	2018-04-23
Expiry date	2020-11-20
Frankfurt am Main	2018-04-23

DQS Medizinprodukte GmbH

Sigrid Uhlemann
Managing Director

Dr. Thomas Feldmann
Head of Certification Body

August-Schanz-Straße 21, 60433 Frankfurt am Main,
Tel. +49 (0) 69 95427-300, medical.devices@dqs-med.de

DIN EN ISO 9001 : 2015
Quality management

DIN EN ISO 14001 : 2015
Environmental management

DIN EN ISO 13485 : 2016
Medicine

TEST CENTRE FOR BATTERY AND ENVI-RONMENTAL TESTS

SAFETY STANDARDS

Various hazardous situations that could befall a rechargeable battery or standard battery during transport, are simulated in six test processes. In doing so, short-circuit and overload tests as well as an altitude simulation (aircraft transportation) are carried out alongside a thermal test. After successfully passing all of the tests, a certificate per UN Manual 38.3 is issued.

UN-TRANSPORTVORSCHRIFT 38.3

- Height simulation
- Thermal testing
- Vibration test
- Shock test
- Short-circuit test
- Overcharge test

IEC62133-2:2017

- Vibration test
- Shock test
- Short-circuit test
- Free fall
- Overcharge test
- Case stress

APPROVALS

SAFETY STANDARDS

All ANSMANN devices are CE-compliant. Furthermore, most of the standard devices also have additional international approvals. Additional approvals can be obtained on request. Various international approval procedures can be carried out for individual customer solutions.

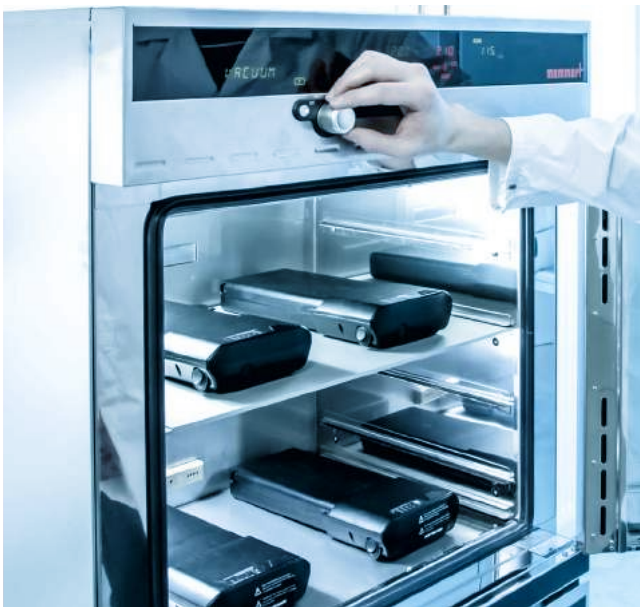
Also as a service for our customers.

ROHS
TEST STATION

ROHS, EMC, IN-CIRCUIT

At the RoHS test station, hazardous substances such as heavy metals in devices and components are detected with the help of X-ray radiation. Equally important is the testing of the electro-magnetic compatibility (EMC testing). The ATE test station is able to carry out extensive and fully automated testing of recharge-able battery packs and the associated circuitry.

- EMC Testing
- Burn-in Test
- In-circuit Test
- Fully Automatic Test System
- UN Test



The future of mobile energy

COMMUNICATIVE RECHARGEABLE BATTERIES

WELCOME TO THE INTERNET OF MOBILE THINGS

Sensitive li-ion rechargeable batteries are increasingly equipped with intelligent battery management systems in order maximise operational safety and the service life of the rechargeable battery. These rechargeable batteries are used in intelligent applications, in which they communicate with the end-device or with the charge station and exchange information such as current, voltage, remaining capacity, temperatures and charge cycles, for example.

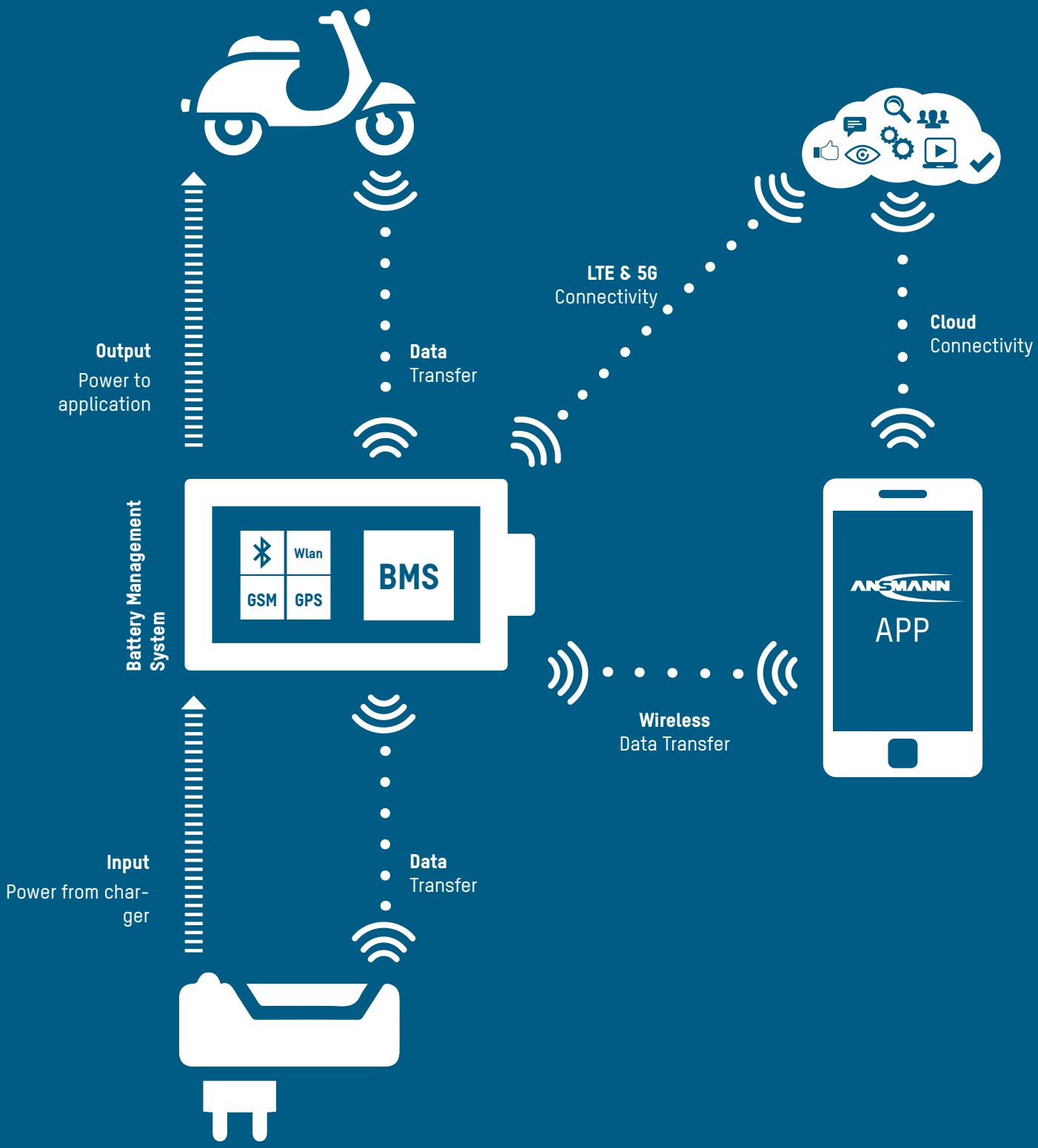
Now the incorporation of a Bluetooth module opens up comprehensive new opportunities for manufacturers and end-users. So, the integration of the BT module in the rechargeable battery, as a central unit of a battery-operated application, enables not only access to data and parameters in the rechargeable battery but also to information in the end-application and in the charger. Even firmware settings and updates are possible wirelessly over the BT connection and the processing of service cases becomes child's play.

#IomT

GSM & GPS

ENERGY BECOMES NETWORKED

Welcome to the Internet of Things! The data for the rechargeable battery can also be processed on central servers via cloud connections and the connection to mobile networks. This opens up various possibilities in order to be able to offer tracking and safety functions, but also for the remote maintenance of your devices or vehicles. In addition, when coupled with a GPS module, you will always be up to date about where your system is currently located.


Output
Power to application
Data
Transfer
LTE & 5G
Connectivity
Cloud
Connectivity
Battery Management System
Wlan
GSM
GPS
BMS
ANSMANN
APP
Wireless
Data Transfer
Input
Power from charger
Data
Transfer

Customer-specific
SOLUTIONS

EVERYTHING FROM A SINGLE SOURCE

As a system supplier with over 30 years' experience in the development of electronic assemblies, we offer custom solutions for every application, tailored to suit the customer's requirements.

From development through to distribution – our department for industrial solutions offers the complete spectrum from standard systems through to user interfaces with CANBUS, SMBUS, PMBUS, I²C.

Our specialists develop all components, the hardware and software and the mechanical systems themselves – even in the field of E-Bike motors and drives. The manufacturing of the complete solutions is carried out at two sites.

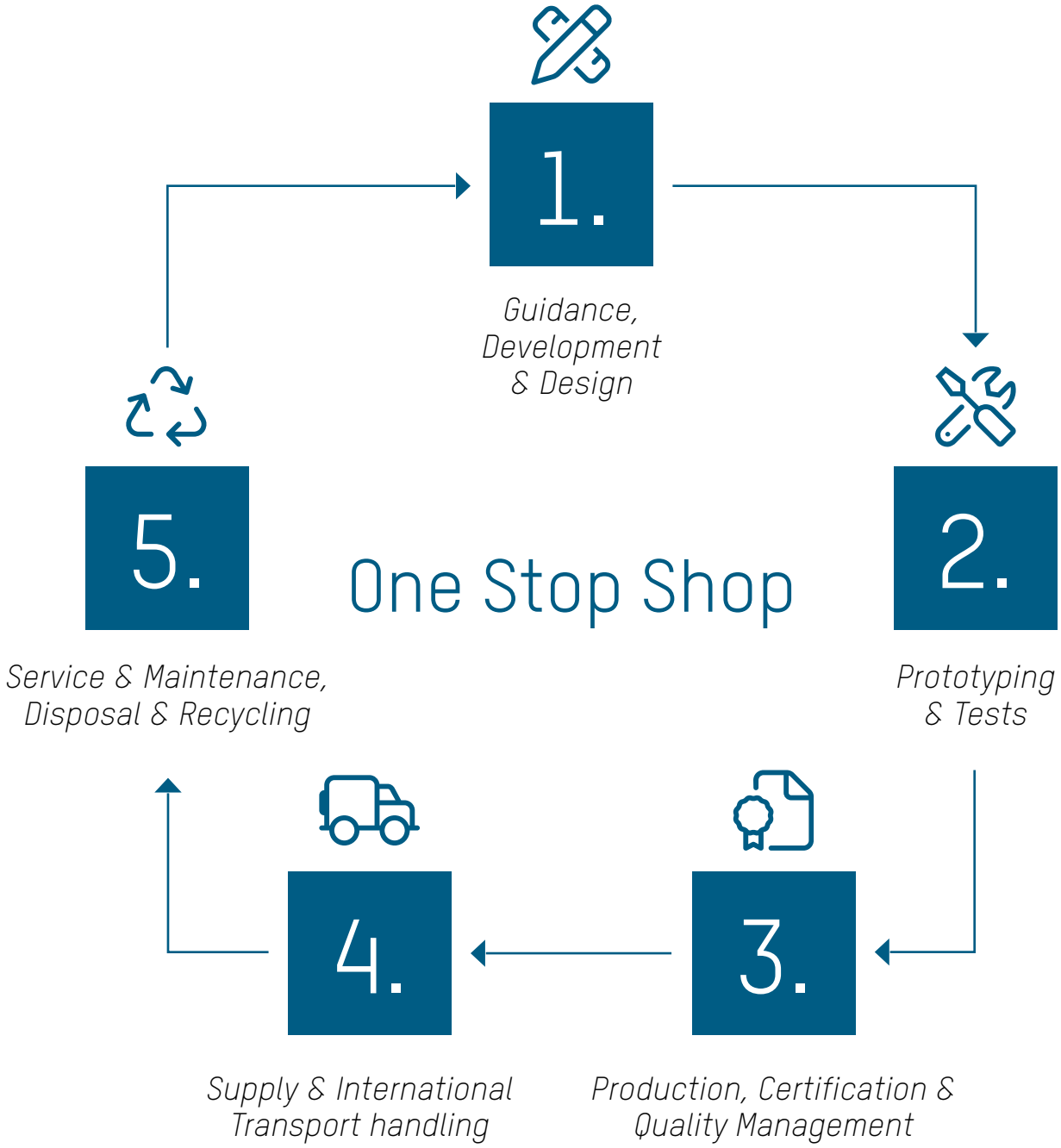
System provider

Global project management

Worldwide support

Risk management

Authentication & certification



WE ARE YOUR **SYSTEM SUPPLIER**

E-MOBILITY

MEDICAL TECHNOLOGY

MECHANICAL ENGINEERING & CONTROL TECHNOLOGY

LOGISTICS

MEASUREMENT & TEST EQUIPMENT

HOBBY & LEISURE

HOME & LIVING

OPTICS & ACOUSTICS

BUILDING & SECURITY

GARDEN & TOOLS

Customer-specific
BATTERY PACKS

DEVELOPED IN ACCORDANCE WITH YOUR WISHES

Planning a new development or a redesign of a rechargeable battery or charger?

ANSMANN is your partner from the initial idea through the planning, design, development and manufacturing stages and on to serial manufacturing. Based on your application and the requirements, we can guide you with professional advice for the selection of the correct cells, the capabilities of the necessary protective circuitry, compliance with standards and certification (as early as in the development phase), the first prototypes as STL parts and the first measurements. We can support you through all of the important steps towards your final decision.

We can take on the design and manufacturing of the housing parts and the injection and stamping tools required for this. Single-source delivery and manufacturing guarantees optimum interaction between rechargeable battery, BMS and charger. The cells we use are supplied by well-known manufacturers, such as LG, Panasonic, Samsung, Murata, Yuasa and other manufacturers who produce their cells 100% fully automatically.

Development, design, manufacturing – everything from a single source.

No compromises

Service from A to Z

YOUR IDEAS

AND

INDIVIDUAL REQUIREMENTS

TURNED INTO

YOUR

INDIVIDUAL PRODUCT

TOGETHER WITH OUR

ANSMANN TECHNOLOGY

Individual ANSMANN

CHARGE TECHNOLOGY

FOR ANY APPLICATION

The new IPC charger series is the latest innovation in the field of quick-charging. The universal chargers have integrated communication and support all popular communication protocols, such as CAN, I2C, SM, LIN, HDQ.

Li-ion rechargeable battery packs from 24 V to 48 V will be automatically detected. Once the E-BUS charger has made contact with the rechargeable battery, an extensive diagnostics procedure is started. The intelligent chargers identify the rechargeable battery voltage, the charge current is adapted and the charge process started. The output power here is up to 300 W. This enables the shortest possible charge times with simultaneous exchange of parameters to be realised with applications such as in drive systems, power tools or medical equipment. With the IPC 300W we are delighted to present a universal charger that can adapt to all lithium ion rechargeable battery systems. A veritable artist that communicates with the rechargeable battery, charges it sensitively and yet can still be used throughout Europe.

Intelligent

Fast

Powerful

Safe

IPC SERIES

CHARGE TECHNOLOGY FOR EVERY APPLICATION

The right charger for every application. With sophisticated charge technology, automatic switch-off and charge display. Easy to use and makes overcharging rechargeable batteries impossible. All chargers have a wide range input and are universally programmable according to customer requirements.

12W 30W 50W 80W

	IPC 12	IPC 30	IPC 50	IPC 80
INPUT VOLTAGE	100-230 VAC	100-230 VAC	100-230 VAC	100-230 VAC
FOR CHARGING THE FOLLOWING BATTERY CONFIGURATIONS	1S-4S Li-Ion 1S-10S NiMH 1S-6S Lead Acid	1S-4S Li-Ion 1S-10S NiMH 1S-6S Lead Acid	3S-10S Li-Ion 6-25S NiMH 4-16S Lead Acid	4S-10S Li-Ion 11-24S NiMH 6-18S Lead Acid
MAX. POWER	12 W	30 W	50 W	80 W
MAX. CHARGING CURRENT	2.4 A	2 A	1.9 A	2 A
TYPE	Plug-In Charger	Plug-In Charger	Desktop Charger	Desktop Charger

Primary cables / connectors are available for EU, UK, US and AUS. Customised secondary connectors can also be realised.

E-BUS charger

IPC 200W | 300W

INNOVATIVE TECHNOLOGY

CAN lin LOCAL INTERCONNECT NETWORK e3

Communication via BUS standards.

Including: CAN, I2C, SM, LIN, HDQ.

IPC30

THE UNIVERSAL 30W CHARGER

Special configuration (charge current / switch-off voltage) possible. Wide-range input 100-240 V / 50-60 Hz. Interchangeable primary plug for US, UK, Australia, IEC320 desk adapter. Approval for USA UL 1310 / Australia / FCC. Variable configuration of secondary plug. Customer-specific, available in small quantities from stock at any time.

1-4 Li-Ion cells up to 2 A charge current

3/6 lead cells up to 2 A charge current

1-10 NiMH cells up to 2 A charge current

Pre-configured battery packs

Universal charge technology

Quality products

OUR RANGE

SUITABLE STANDARD PRODUCTS

A customer-specific new development is often not necessary. You can rely on our comprehensive standard range where you can select freely from over 20 pre-configured rechargeable battery variants. You can also select from our matching mature charge technology, which is available in the form of universal mains adapters in various power classes. This way you can use our modular principle to construct your optimum energy solution, without needing to plan for tooling costs or development costs.

High product quality

BATTERY PACKS

STANDARD RECHARGEABLE BATTERY CONFIGURATIONS

ANSMANN has a broad range of li-ion standard rechargeable battery packs, which can also be delivered in small series.

Based on the customary standard cells (e.g. Li 18650 and 21700), there is a multitude of li-ion standard rechargeable battery packs available to simply be designed in. These rechargeable battery packs have all been subjected to an in-house UN transport test (UN 38.3). Different versions with parallel or serial connection guarantee the right energy supply for almost any application.

With low annual quantities, it is often not worthwhile to develop new products – the development time is too long or the costs are too high. ANSMANN has many standard units for rechargeable battery and charge technology in their portfolio. We can provide these for you at short notice and costeffectively as applications or complete systems.

Large selection

High cycle stability

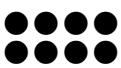
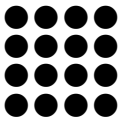
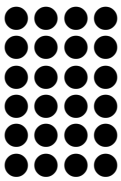
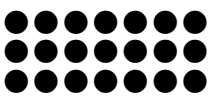
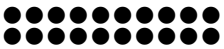
Tested quality

High energy density

LITHIUM ION

STANDARD BATTERY PACKS

Li-ion rechargeable batteries are the energy source of the future. With around twice the energy density of NiMH cells and very low self-discharge, this technology is the optimum energy source for all types of applications – from drive technology to medical technology. Li-ion rechargeable battery packs are thermally stable, extremely cold-resistant and have no memory effect.

Desig-nation	Configuration	Nominal voltage	Nominal capacity	Dimensions (ca. in mm)	Weight (ca. in g)
1S1P		3.6V	2.6Ah	70 x 20 x 20	48
		3.6V	2.6Ah	70 x 20 x 20	49
		3.6V	2.85Ah	70 x 20 x 20	48
		3.6V	3.5Ah	70 x 20 x 20	50
2S1P		7.2V	2.6Ah	37 x 70 x 20	100
		7.2V	2.6Ah	37 x 70 x 20	100
		7.3V	2.85Ah	37 x 70 x 20	100
		7.2V	3.5Ah	37 x 70 x 20	101
3S1P		10.8V	2.6Ah	57 x 70 x 20	145
		10.8V	2.6Ah	57 x 70 x 20	151
		10.9V	3.5Ah	57 x 70 x 20	145
4S1P		14.4V	2.6Ah	74 x 70 x 20	190
		14.4V	2.6Ah	74 x 70 x 20	190
		14.7V	2.85Ah	74 x 70 x 20	190
		14.5V	3.5Ah	74 x 70 x 20	190
		14.4V	2.6Ah	70 x 37 x 37	190
		14.5V	3.5Ah	70 x 37 x 37	190
1S2P		3.6V	5.2Ah	37 x 70 x 20	100
		3.6V	7Ah	37 x 70 x 20	100
2S2P		7.2V	5.2Ah	70 x 37 x 37	196
		7.3V	7Ah	70 x 37 x 37	196
		7.2V	5.2Ah	74 x 70 x 20	190
3S2P		10.8V	5.2Ah	70 x 57 x 37	280
4S2P		14.4V	5.2Ah	74 x 70 x 37	370
		14.5V	7Ah	74 x 70 x 37	390
1S3P		3.6V	7.8Ah	57 x 70 x 20	140
		3.6V	10.5Ah	57 x 70 x 20	148
4S4P		14.4V	14Ah	74 x 70 x 74	800
4S6P		14.8V	15.6Ah	141 x 70 x 66	1.192
7S1P		25.4V	3.5Ah	150 x 70 x 35	TBD
		25.6V	2.8Ah	150 x 70 x 35	TBD
7S3P		25.9V	7.8Ah	129 x 74 x 67	1.045
7S4P	Housing	25.2V	10.4Ah	127 x 127 x 74	1.450
10S2P		36V	7Ah	210 x 70 x 55	TBD
		36V	5.7Ah	210 x 70 x 55	TBD

All cells constructed with branded cells

Everything needs the right

CHEMICAL

A SOLUTION FOR EVERYTHING

Long service life, high energy density, best safety – these are the yardsticks by which we select rechargeable battery cells from the ranges of renowned manufacturers. The high-quality products offer a long and stable provision of energy.

In an extensive process, we test each individual cell before it is installed in one of our rechargeable battery packs. This guarantees the consistent high product quality and process reliability for seamless and rapid production.

LG Chem

YUASA

GUIDANCE

FOR YOUR APPLICATION

As a rechargeable cell specialist, we offer you the best selection with regard to your application – energy density, weight, price/performance, safety – with us you have the right partner with the right skills at your side.

- Li-Ion
- LiFePO4
- Li Primary
- NiMH / NiCd
- Lead
- Alkaline

Ideal Solution

PRIMARY BATTERIES

ALKALINE AND LITHIUM

A primary battery pack is the ideal solution if energy is required sporadically but over a long period of time.

The advantage of the primary battery (li primary or alkaline primary) compared to a rechargeable battery is the higher energy density in relation to weight and volume. A primary battery pack requires no maintenance and yet has a long service life. This makes this type an ideal backup battery.

Good low-temperature characteristics

High discharge currents

Long storage times

ALKALINE

MICRO AAA | LR03

1.5V
PU: 10 pcs.
Art. no.: 1501-0009

MIGNON AA | LR6

1.5V
PU: 10 pcs.
Art. no.: 1502-0006

BABY C | LR14

1.5V
PU: 10 pcs.
Art. no.: 1503-0000

MONO D | LR20

1.5V
PU: 10 pcs.
Art. no.: 1504-0000

PP3 (BLOCK) E | 6LR61

1.5V
PU: 10 pcs.
Art. no.: 1505-0001

LITHIUM

MICRO AAA | FR03

1.5V
PU: 10 pcs.
Art. no.: 1501-0010

MIGNON AA | FR6

1.5V
PU: 10 pcs.
Art. no.: 1502-0005

PP3 (BLOCK) E | 1604LC

9V
PU: 5 pcs.
Art. no.: 1505-0002

YUASA
LIM Li-ion

The LIM50EN and LIM25H lithium-ion modules are used in driverless transport systems (AGVs, Automated Guided Vehicles), in warehouse logistics and in container cranes for energy recovery. Due to the very high acceptance of charging, they are particularly suitable for storing regenerative energy in order to use it again.

- Integrated battery monitoring unit (ACS)
- Highest number of cycles
- High loading and unloading density
- Maintenance-free
- Safe components

YUASA
PRO-SPEC DEEP CYCLE

The deep-cycle batteries of the Pro-Spec series are used in floor conveying, cleaning machines or lifting platforms. They have been designed in particular for very high depths of discharge. A novel plate separator design minimises self-discharge during storage and maximises the number of cycles during operation. Thanks to a housing made of PP resin, it is particularly shock-resistant and acid-resistant, and also reduces its heat generation. The Pro-Spec series is characterised by its long durability and service life and is available in eight model variants.

- Deep-Cycle
- Low maintenance bleed valves
- AGM/porous rubber separator
- Three types of clamps available
- Longer life cycle

The green energy store

GREENPACK 2.0

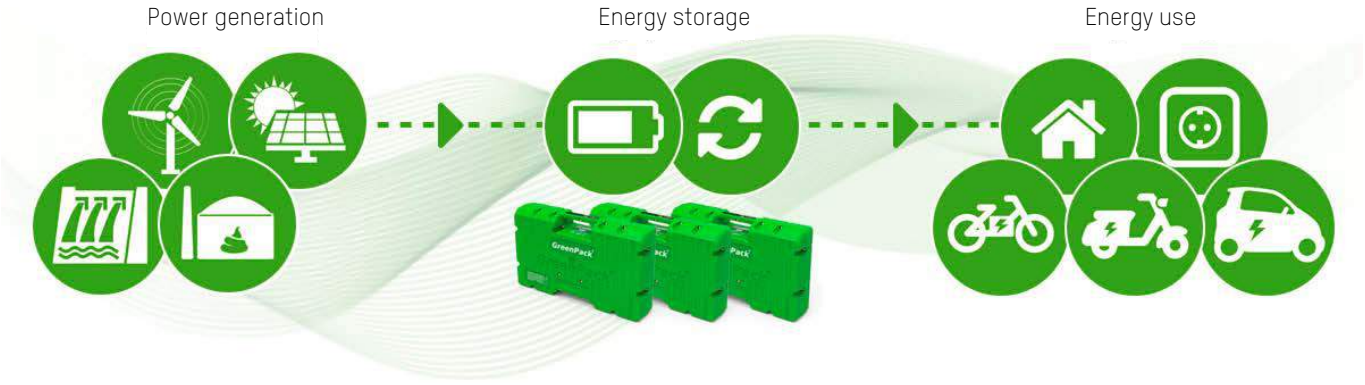
URBANER WECHSELAKKU

With the GreenPack exchangeable rechargeable batteries, you can safely store and transport renewable energy and use it for a wide range of mobile applications.

50.4 V

41.4 Ah

2.1 kWh



Cargo bikes

E-scooters

Pedelecs

AGVs - Automated guided vehicles

Cleaning machines

Mobile energy solutions

We are E-Mobility

COMPLETE SOLUTIONS

FOR YOUR E-BIKE IDEA

Alongside standard solutions in the area of motors and drive sets, as a system supplier ANSMANN also offers individual solutions tailored to the customer's needs.

ANSMANN guarantees compliance with all relevant quality standards. Thanks to our development sites in Germany and China as well as the direct harmonisation with the customers, the development of customer-specific motors and rechargeable battery packs becomes almost child's play.

With ANSMANN you get the design, engineering and tools all from a single source.

Since all the manufacturing is carried out in our own sites, any type of finishing for the rechargeable battery packs can be accommodated.

We develop and manufacture complex rechargeable battery packs with individual protective circuitry and the matching battery management for all popular applications.

Customer-specific adaptations of the motors are likewise possible in terms of housing form, colour and performance.

Rechargeable batteries

Chargers

Motors

Displays

YOUR IDEA

YOUR POSSIBILITIES

Our bestseller is satisfaction. Because what could be better than being able to pass on a task to a well-trusted and experienced specialist who will take care of it. We are committed to your requirements for energy solutions, from rechargeable battery to charger.

For the development of your own E-Mobility models, ANSMANN can provide everything from motors to rechargeable batteries - everything you need to bring your personal idea to life.

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