BMZ

THE BATTERY EXPERTS

Leading System Supplier for Intelligent Mobile Energy Solutions

Battery Centre of Excellence

Sven Bauer
Managing Director

Batterien-Montage-Zentrum (BMZ) in Karlstein / Germany, as system supplier specialising in intelligent Mobile Energy Solutions, has developed over the last 14 years into one of the Leading European Battery Experts in design and manufacture for custom Battery Systems.

Custom batteries manufactured at BMZ range from solutions for gardening tools, toys, drills and screw drivers to many other products requiring high energy in a small space.

Founded in 1994, over 600 employees worldwide at BMZ ensure a timely production whilst maintaining the highest level of quality. Proudly European and focused in maintaining both technical and production excellence there, BMZ also have their own manufacturing site in Asia for appropriate projects. Cells used are delivered by major manufacturers which include A123Systems, BYD, GP, LG, Panasonic, PSE, Saft, Sanyo, Sonnenschein, Varta and many others.

BMZ is providing support to your requirements of new primary or rechargeable battery packs starting from concept level. BMZ will also provide any additional design work, from generating the drawings, functional samples, and pre-production, UN, UL and CE test submittal through to full production.

As experts in customized battery pack manufacturing, all technologies are utilised. Today's market is particularly focused on Lithium Ion, High Current Lithium Ion Manganese & Lithium Polymer but also Nickel Cadmium and High Current Nickel Metal Hydride are also available. BMZ provides complete custom solutions, reliably designed and manufactured to your needs for power devices with primary or rechargeable energy.

In House competence and close co-operation with other specialists required in battery solutions, design, safety electronics, charger development, plastic materials and stamping technologies for cell connections ensure a quick turn around of all components and services involved in your project.

Our success is based on the high level of quality and flexibility we supply in our products and services providing customers with Innovation and a quick time to market.

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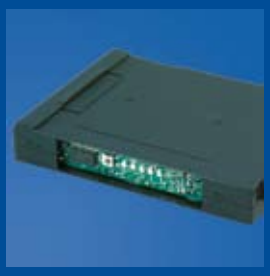


We have the suitable solution

- Batteries
- Rechargeable Battery Packs
- Charger Technology

Standard cell and customer specific products from the one-cell-pack to the intelligent rechargeable battery pack.

Lithium-Ion-Mangan-Cells for

- Power Tools
- Golf Caddies
- E-Bikes
- Electric Drive Systems

All further technologies available for

- Back-up Systems
- Mobile Systems
- Medical Technology

Customized Manufacture of Batteries

1. Design drawings including technical data
2. Price quotation based on the layout
3. Design approval by the customer
4. Series production upon customer's approval

Excellent know-how in development and production backed by state-of-the-art test equipment is key to meeting our customers most exciting requirements.

BMZ – Innovative Strength and Expertise.

Standard and Customized Chargers

BMZ offers a wide range of battery chargers fitting to all different battery technologies from Lead Acid to Nickel Metal, Hydride and latest Lithium Ion batteries.

- Single and Multi Charger
- High reliability
- Intelligent charging method
- SM-Bus control optional
- Wide AC input range
- Customized housing upon request

Useful things to know about Batteries

Types & Sizes

Package / Cell Siz	Height	Diameter	EC Type
AAA = Micro	44.5	10.5	KR1 1/45
AA = Mignon	50.5	14.7	KR15/51
A = Special Size	49.0	17.0	KR1 7/50
C = Baby	50.0	2U	KR26/50
D = Mono	61.5	33.0	KR33/62
N = Lady	30.0	12.0	KR12/30
F = Special Size	33.0	90.08	

others = special sizes

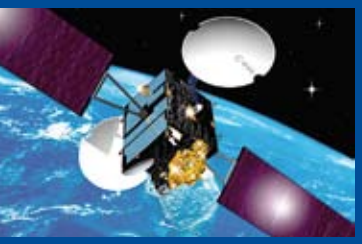
Terms & Units

Capacity:	Measured in Ampere hours (Ah) Milliampere hours (mAh)
Voltage:	Ni-Cd / Ni-MH = 1.2 V Li = 3 V and 3.7 V
Cell size:	Micro / Mignon / Baby / Mono / Lady
Primary cell:	Non-rechargeable
Secondary cell:	Rechargeable

Product Applications

The high-tech products developed and designed by BMZ are used worldwide in the mobile power supply. Renowned manufacturers trust in the reliable experience of BMZ.

A summary of our product range:



Aerospace Industry:

- Satellites
- Rocket Launching Systems
- Probes
- Crewed Spaceflight

Communication:

- PC's
- Radio Units
- Route Guidance Systems
- Alarm Systems

Defense:

- Unmanned Vehicles (air, sea, ground)
- Weapons with directed energy
- Robots
- Portable Energy Supplies

Emergency Systems:

- Emergency Lightings
- Parachute Emergency Systems
- UPS for base stations and small crosspoints

Gardening Tools:

- Garden Trimmers
- Hedge Trimmers
- Lawn Trimmers
- Lawn Robots

Household:

- Vacuum cleaners
- Kitchenware
- Electric Brooms
- Electric Shavers
- Hair Clippers

Industry:

- Scanners
- Bar Code Scanners
- Handhelds
- Touchscreens
- Mobile Data Entries
- Cash Systems
- Label Printers
- Wireless Order Systems

Medical Technology:

- Dentistry
- Wheelchairs
- Portable Diagnosis Devices
- Defibrillators
- Sickbeds
- Operating Tables

Power Unit:

- Wind-powered Devices
- Boat Engines
- Starter Batteries
- Parking Heaters

Professional Electronics Applications:

- Professional VCRs
- Professional Cameras
- Mobile Phones
- GPS & Tracking

Renewable Energy Sources:

Battery resource for

- Solar Energy
- Wind Turbine Power

Sports and Leisure:

- Bicycles
- Golfcaddies
- Toys

Tools:

- Cordless Screwdrivers
- Drilling Machines
- Chain Saws
- Electrical Saws
- Paint Spraying Guns
- Blind Rivet Tools

Transportation:

- Hybrid Cars
- Busses
- Trolley-Cars
- Electric Bicycles
- Electric Motorcycles
- Motor Gliders

Lithium-Ion

The Lithium Ion Principle

Lithium ion rechargeable batteries do not use metallic lithium for the negative electrodes. Instead they use a carbon substance that can dope (absorb) and undope (desorb) lithium ions. The operating principle of the lithium ion rechargeable battery differs fundamentally from that of the lithium metal rechargeable battery in that the lithium ions merely travel back and forth between the positive electrode and the negative electrode during charging and discharging; no material change takes place in the electrodes themselves.

Battery Reaction

When charging and discharging, the chemical reaction that takes place in the lithium ion rechargeable battery is generally represented by the following formula.

High Energy Density

The ultra high density per unit volume and mass enables a lighter and smaller product.

High Rate Discharge

Lithium-ion batteries permit a discharge 2 CmA, enough to power a notebook computer's spinning hard disk or digital video camera's motor.

No Memory Effect

Lithium-ion batteries have a high charging capability with no memory effect, which reduces charging capacity over time from repeated charging and discharging.

High Voltage

The output operating voltage of our lithium-ion battery is 3.7 V per cell, at least three times higher than that of Ni-MH or Ni-Cd batteries.

High Safety

Certified by the UL-1642, safety standard our batteries feature a 5-step safety system to prevent overcharging.

Long Cycle Life

Lithium-ion batteries last over 500 repeated charges and discharges and offer outstanding economy.

Fast Charge

Fast charging is possible with a special charger for the lithium-ion batteries. (1 CmA, 4.2V CC-CV)

Minimal Self-discharge

The self-discharge rate per month is less than 10%.

Environment Friendly

Does not use restricted toxic substances such as cadmium, lead and mercury.

Excellent Storage

The recovery rate after being shelved for 3 months is higher than 95%.

Reliability Quality

Our 6 Sigma quality control program assures superior product reliability.

Protection Circuit Module

If the peck voltage of each cell during charge exceeds 4.5 volts, gas may be generated due to the dissociation of electrolytes. This may cause the pressure inside the cell to rise, and the pressure release vent (safety vent) opens and by which electrolytes leak out. Also, if the cell voltage drops too low (below 10 V), the copper collector of the negative electrode begins to dissolve into electrolytes, and the cell's performance deteriorates. The cell must be used as a battery pack equipped with a protection circuit module that performs the following functions.

- Overcharge Prevention: Prevents over charging of either battery above 4.35 V + 0.05 V (25°C).
- Reset of overcharge Prevention: Cancels charge prevention for all batteries at 4.0 V + 0.15 V or less.
- Over-discharge Prevention: Prevents discharging of batteries at 2.3 V + 0.15 V or less.
- Reset of over-discharge prevention: Cancels discharge prevention when the cell is recharged to 2.3 V + 0. 15 V or greater.
- Discharge overcurrent protection: Prevents discharge when the current exceeds a specified value.
- Overcurrent protection cancellation: Automatic resetting when load is removed.

We request that our lithium ion rechargeable batteries be supplied as battery packs equipped with the protection circuit module.

As the lightest material Lithium owns the highest electrochemical potential and considers the highest energy density per weight. The aim of using this high energy potential for portable power solutions was the beginning of a new technology age which gets more and more important. As its high capacity of 3.86 Ah/g is an advantage for portable products, it has its disadvantages as well.

To use high energy density on a rechargeable basis, battery manufacturers had to search for other chemical compounds and configurations. By using graphite as negative electrode and ionised lithium as a positive counterpart, lithium-ion technology was founded.

Advantages

- nominal capacity = double of NiMH
- nominal voltage = triple of NiMH
- no need for formatting or periodical care for a long life time
- no memory effect

Useful things to know about lithium-ion ...

- better cost-performance ratio for battery packs than for single cells
- best stored at a 30% state of charge

Disadvantages

- all lithium-ion technologies need a protection circuit
- aging depends on storage conditions

Comparison data of various lithium-ion technologies

	Manganese	Cobalt	Phosphate
Safety	+	- -	+ +
Cycle life	+	+	+ +
Power weight density	+	+ +	-
Long term cost	+	+ +	-
Temperature [°C]	-20 / +60	-20 / +60	-30 / +70

Lithium-Ion Technologies

Lithium-Ion Cobalt

As the oldest lithium-ion technology the cobalt type is the most developed version with a huge range of varieties.

	Voltage	Capacity
Cylindrical cells	3.6 V, 3.7 V	150 mAh to 40,000 mAh
Prismatic cells	3.6 V, 3.7 V	190 mAh to 5,900 mAh
Polymer cells	3.6 V, 3.7 V	110 mAh to 200,000 mAh

Applications

- medical equipment
- power tool- POS terminal
- PDA, Palmtop, Organizer
- solar device
- scanner

Features

- no memory effect
- light weight
- high cycles
- long shelf life
- good load performance

- polymer:
- slim design, flexible form factor

Lithium-Ion Manganese

The lithium-ion manganese is the first advancement which fulfils the requirements of higher safety. Additionally it offers the use of cells without a protection circuit for several applications.

Our focused lithium-ion manganese cells for battery pack manufacturing are defined as follows:

Diameter [mm]	Lenght [mm]	Voltage [V]	Capacity [mAh]	Weight [g]	Cycle Performance
14.15	49.3	3.7	680	20	60% of initial capacity at 500 cycles
18.35	65.1	3.7	1.600	44	75% of initial capacity at 500 cycles

The following cells are used in high current applications:

Diameter [mm]	Lenght [mm]	Voltage [V]	Capacity [mAh]	Weight [g]	Cycle Performance
18.35	65.1	3.6	1.080	41	90% of initial capacity at 500 cycles
26.45	65.6	3.6	2.500	90	90% of initial capacity at 500 cycles

Applications:

- domestic equipment
- power and gardening tool
- electric drive system
- measuring instrument
- POS terminal

Lithium-Ion Phosphate

Its huge discharge rate is the main feature of this technology.

Diameter [mm]	Lenght [mm]	Voltage [V]	Capacity [mAh]	Weight [g]	Cycle Performance
18.2	64,95	3.3	1,100	39	90% of initial capacity at 1.000 cycles
25.96	65.15	3.3	2,300	70	80-90% of initial capacity at 1.000 cycles

Applications:

- hydrid electric vehicle
- home appliance
- medical device
- power backup for communication station
- robotics
- gardening tool
- electric drive system
- military equipment

Lithium-Ion Standard Rechargeable Battery Packs

Lithium-Ion Standard Rechargeable Battery Packs plus Charger

BMZ has the availability of a wide range of new Lithium-Ion standard rechargeable battery packs and now offers also a small batch production with special verified chargers. Based on common standard cells BMZ manufactures a multiplicity of Lithium-Ion standard rechargeable battery packs for an easy design-in. Capacities of 2.000 mAh to 8.000 mAh with cells connected in serial and in parallel will guarantee the correct battery support for every application.

The special developed BMZ charger is very compact and laid out optimal for Lithium-Ion packs. Developers of all fields, as for example medical technology and metrology as well as the portable communication technology will appreciate this wide solution.

Compact energy supply with aligned charging unit for an easy design-in

Lithium Primary

Introduction

The kinds of equipment that require batteries are rapidly increasing, and many use lithium batteries. To meet this demand, various lithium batteries have been developed.

The selection of batteries is an important step in the development of equipment. The features of various lithium batteries are described in this catalog as a reference for you design of equipment.

Elements of Battery Quality

For batteries, especially lithium batteries, good quality is exemplified by excellence in the following characteristics:

Leakage resistance

Batteries should be free from leakage of liquids, which can damage equipment and spoil the contact at terminals, making the operation of equipment unstable.

Storage characteristics

During long-term storage, battery capacity gradually diminishes due to self-discharging. The less capacity lost, the higher the quality of the batteries.

Discharge characteristics

Whereas it is desirable that more energy can be drawn from a battery of limited capacity, it remains essential for the battery to satisfy such electrical characteristics as the voltage and current required by the equipment.

Temperature characteristics

The performance of a battery generally varies with temperature. The less the variation, the better the battery.

Reliability

While batteries should meet various requirements,
it is also important that they have the same performance, based on uniform quality, at all times, regardless of where or when they are purchased.
A battery of high reliability is a battery of high quality, not being likely to fail.

The correct choice of non-rechargeable batteries depends on your requirements, as the different chemical compounds used in this technology greatly change the cells performance. The main cell features and chemical compounds are …

- Li-SO voltage ~3.0V with high continuous current
- Li-MnO voltage ~3.3V with higher nominal capacity
- Li-SOCl voltage ~3.6V with temperature up to +85°C
  huge nominal capacities (Ah) but low continuous current

	Button cells	Cylindrical cells
Voltage	1.5 V · 3.0 V	3.0 V · 3.3 V · 3.6 V
Capacity	5 mAh - 1,600 mAh	1 mAh - 18,500 mAh

Applications:

- radio equipment
- automatic camera
- emergency lighting
- water, gas, electricity meter
- memory backup power source
- clock, memory
- power supply, PCB
- medical equipment
- memory backup power source
- electronic key fobs

Features

- ultra long shelf life
- high reliability
- wide operating temperature range
- extended operating life
- ultra long shelf life
- high reliability
- wide operating temperature range
- extended operating life

Safety Warnings and Cautions

- **Cylindrical type lithium batteries (BR and CR)**
- **Coin type lithium batteries (BR and CR) and Pin type lithium batteries**
- **Rechargeable coin type lithium batteries (VL, MT and ML)**

Please be sure to observe the following warnings.
If misused, batteries may leak or rupture, causing injury or damage to equipment.

1. Do not charge, short, disassemble, deform or heat batteries. Do not throw batteries into fire (an exception is to pass batteries through dipping solder). Abuse as described here may cause heating, rupture, or ignition of batteries because of flammable substances contained within such as lithium and organic solvents.
2. Be sure to connect the (+) and (-) electrodes correctly.
3. Do not connect the (+) and (-) electrodes to each other with metal or wire. Do not carry or store batteries together with a metallic necklace, etc.
4. Do not charge rechargeable batteries with higher voltage than specified. Do not charge primary batteries.
5. Do not bring batteries into contact with metal or other batteries. This may cause batteries to heat, rupture, or ignite.
6. Avoid mixed use of batteries, i. e. new, used or different types.
7. Avoid direct soldering to batteries.
8. Keep batteries away from direct sunlight, high temperatures, and high humidity.
9. When discarding batteries, insulate the terminals by wrapping them with tape, etc.
10. Keep batteries out of reach of small children. Should a child swallow a battery, consult a physician immediately.

Nickel-Metal-Hydride

Nickel-metal-hydride batteries achieve a higher energy density than their Ni-Cd cells, an advantage that has proved its worth numerous applications, such as cordless and mobile phones. We also differ high-power Ni-MH systems for hybrid drives.

Fields of Applications:

- Notebook / Computer
- Power Tool / Bicycle
- Mobile / Cordless Phone
- Camcorder, Digital Camera
- Shaver, etc.

Safety Parts for Accumulators

NTC (negative temperature coefficient) Thermistor

- Temperature increase – Resistant decrease
- For temperature measurement
- Different values e. g. 6,8 KW / 25 °C

PTC (positive temperature coefficient) Thermistor (Polyswitch)

- Temperature increase – Resistant increase
- Good for short circuit
- Reversible, like a temperature switch
- Can use for 1A to 7A (at about 20 deg. C)
- Current shut down about 90°C to 135 °C
- improved PTC from Raychem (VTP-series)
- Discharge the battery with a small current (case of short circuit)

Breaker

- Bimetal (is better for temperature)
- Switch at 70 °C to 84 °C (4-6A)
- Also for short circuit
- New – Breaker include PTC from Texas Instruments –
- Disadvantage – weld together after about 100 cycle

Melting Fuse

- Normally for NiMH
- Switch at high temperature about 90 °C (last chance)

Quick Charge Control Methods

1. Detection of peak battery voltage (peak voltage control)
2. Detection of the temperature rise occurring when the battery becomes fully charged (dT/dt control) e.g. 1 °C / minute
3. Detection of the difference between the ambient temperature and the battery temperature when the battery becomes fully charged (Delta T control) e.g. 20 °C
4. Detection of the time at which the battery voltage drops by a certain value after having reached a peak (-DeltaV control, e.g. 10mV/cell)
5. Control based on the elapse of a certain amount of time after beginning charging (charging time control: timer control, e.g. 130% of the nom. capacity)
6. Detection of the time at which battery temperature rises to a certain level (TCO; battery temperature control, e.g. stop charging at 45 °C)
7. Detection of the time at which battery voltage rises to a certain value (fixed voltage control) (e.g. stop at 1.6V/cell)

Nickel-Cadmium

Charge Current

- Be sure to fully charge the batteries with current levels and charging times specified.
- If charged at a higher than specified current level, the gas recombination rate will not match the gas generation rate at the end of overcharging.
- This increases battery internal pressure leading to activation of the safety vent, and finally to deterioration in performance and possible electrolyte leakage.
- Fast charging with a current higher than specified requires circuitry that controls the charging current to avoid overcharging.

Charging Temperature

- Always charge within specified temperature range. Ambient temperature affects charge efficiency.
  The optimum temperature range for efficient charging is from 5 to 30°C
- Charging at temperature below 0°C increases the gas pressure within the cell and sometimes causes the safety vent to operate.
- Charge efficiency decreases at temperature above 45°C and cell materials may deteriorate if charging is performed at high temperature.

Reverse Charging

- When CADNICA batteries are charged with poles inverted, the batteries generate heat which may damage the safety vent function.

Discharging Current

- Discharging at high current levels will decrease discharge efficiency and cause the battery to heat.

Discharge Temperature

- Discharging should be within the specified temperature range.
- When discharging at low temperatures, internal impedance will rise and discharge reaction speed will decrease. This also causes rated battery voltage and capacity to decrease.
- Discharging at temperatures exceeding +60 °C causes battery materials to deteriorate.

Over-discharging

- When cells of different capacities are connected in series and discharging at high current levels, the smaller capacity cells polarity may be inverted.
- Prolonged over-discharging may cause temporary decrease in charge efficiency due to cell inactivation and can cause leakage.

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PTC (positive temperature coefficient) Thermistor (Polyswitch)

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- Can use for 1A to 7A (at about 20 deg. C)
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Melting Fuse

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- Switch at high temperature about 90°C (last chance)

Sealed Lead-Acid

Charge Method

High performance and long service life of batteries depend upon correct charging. Incorrect charging modes or inadequate charging equipment result in decreased battery-life and/or unsatisfactory performance. Any of the conventional charging techniques may be used, but to obtain maximum service life and capacity, along with acceptable recharge time, constant current/constant voltage charging is recommended.
A charge quantity of 105-120% of the previous discharged quantity is needed for fully charging the battery. The charging voltage of battery decreases with increasing temperature and increases with decreasing temperature. At a temperature below 5°C (41°F) or above 35°C, (95°F), the temperature compensation for charging voltage is necessary. At ambient temperature the compensation will not be necessary.
Overcharging should be avoided: As a result of too high a charge voltage, excessive current will flow after reaching full charge, causing decomposition of water in the electrolyte and leads premature aging.
Undercharging should also be avoided: If too low a charge voltage is applied, the charger current output will essentially stop before the battery is fully charged. This allows some of the lead sulphate to remain on the plates which will eventually reduce capacity.

Handling Instruction

Do not short the terminals.
Do not place the battery near or in fires.
Do not use the battery in a container or bag without proper ventilation.
Operate at a temperature between -15°C to 50°C. But for cycle use, the 5°C to 35°C temperature range is recommended.
To properly store the battery, remove battery from equipment or charger and store in a dry and cool place.
Immediately recharge after discharging.
If sulfuric acid from the battery is spilled on skin or clothing, wash immediately with water, if acid comes in contact with eyes, flush with large amounts of water and immediately see a doctor.
To obtain maximum life, the ripple current at the r.m.s current of the charger should be regulated to less than 0.1 C (A).
Avoid mixed use of batteries. Different capacities, histories, or manufacturers of batteries may cause damage to the batteries or other equipments.

High performance, long service life and a huge weight are known for lead-acid batteries. BMZ supports three different types of sealed lead technologies: lead-acid, lead-fleece and lead-gel.
Lead-acid as the oldest lead technology is mainly used for high current rates within a short time. Additionally to lead and acid it contains water to cool the battery whilst warming-up because of pulling high current rates and to avoid the inflammableness.
A similar structure to lead-acid has the lead-fleece technology: lead plates are separated by fleece plates. This type offers high current rates for a short while as well but its disadvantage is that the fleece gets dry and porous that is why the cycle life can be shorter with this type.

Lead-gel batteries are for non-portable products only. The gel desiccates slowly which supports a longer life time. By too much movement of the cell the gel creates air bubbles which are bad insulators. As a consequence they course the warming-up inside the cell and make it useless for the long-term usage.

General Types	Voltage	Capacity
general type	2 V to 24 V	1.2 Ah to 200 Ah

norm for emergency power: EU = 12 V, US = 6 V
higher capacity rates for telecommunication available

Special Types	Voltage	Capacity
high rate type	12 V to 36 V	5 Ah to 50 Ah
high power type	12 V	3 Ah to 135 Ah
special type	4 V to 12 V	0.5 Ah to 3.5 Ah
general type exit light	4 V to 12 V	2.5Ah to 8 Ah

Applications

- emergency power
- medical device
- solar system
- emergency lighting
- telecommunication
- electric drive system
- vending machine

Charger Technology

The loading technology shown here represents only a small variety from our product range.
Together with our partners we supply for almost every application the correct charging technology.

Chargers for Lithium Technology

Input Voltage	230 V	50 Hz
Number of Cells	1 - 2	
Max. Charging Current	500 mA	

Chargers for Lithium Technology

Input Voltage	110 - 240 V	50/60 Hz
Number of Cells	1 - 10	
Max. Charging Current	450 - 2000 mA	

Chargers for Lithium Phosphate Technology

Input Voltage	100-240 V	50/60 Hz
Number of Cells	2-8	
Max. Charging Current	1000 - 2500 mA	

Chargers for Lithium Technology

Input Voltage	230 V	50 Hz
Number of Cells	4 - 10	
Max. Charging Current	2000 - 5000 mA	

Chargers for Lead Acid Batteries

Input Voltage	100 - 240 V	50/60 Hz
Max. Charging Current	1000 - 8000 mA	

Individual Customer Designed Solutions

Solutions with external charging cradles can be designed and produced to a customer's specification, as well as charging circuits for implemtation within the customer's service.

As system supplier in intelligent Mobile Energy Solutions BMZ provides the total design of the entire system of battery and charging unit for the customer's specific project.

Quality in accordance with ISO Standard

BMZ is certified according to the new DIN EN ISO 9001:2000.

The scope extends to configuration, development and production of customized battery- and accumulator systems. This will assure and improve our high quality standard and opens new chances in the market for us.

Process oriented quality management and quality assurance are the main points since establishment of our company. In the German Institute for Standardization EN ISO 9001:2000 the quality assurance rules are defined to produce high-quality products at standardized default values.


ZERTIFIKAT

MOODY INTERNATIONAL

BMZ GmbH

Am Sportplatz 28-30, D-63791 Karlstein

DIN EN ISO 9001:2000

Geltungsbereich:

Konfiguration, Entwicklung und Produktion kundenspezifischer Batterie- und Akku-Systeme

IAF

ESD protected area at plant BMZ 3

We have extended our production area in January, 2007 with a 3rd building about 400 m²:

Our new ESD building, which we are very proud of.

The BMZ 3 is a closed ESD protected zone equipped with the latest ESD working equipment, from ESD protected bottom covering, ESD-capable assembly areas, teaching aids to the entire ESD-clothing - we have thought on everything and manufacture our Lithium Ion battery packs, with PCB, now in a continuous ESD-protected production process. The feared damage of electronic components by electrostatic discharge - often noticeable much later - is impossible in our production.

ESD (Electro Static Discharge) is the electrostatic discharge and describes the processes and impacts at the adjustment of electric charges between two differently loaded materials. If these come in contact, positive and negative electric charges will be exchanged.

Electrostatic discharges cause yearly damages in the economy running into millions. Best-known in history is the fire at the zeppelin „Hindenburg". With the development of the MOS technology in the microelectronics an increasing complexity of the semiconductor construction elements associates with much higher clock rates. A rising sensitivity comparing to ESD impulses results from that, so its high voltage or high current peaks.

Today it is assumed that 10% of the ESD-stressed semiconductor construction elements cause mistakes. These can be a total loss or much the worse a damage of the device. The latter often remains unrealized and can cause expensive recalls. Therefore, today the protection of electrostatic discharges (ESD protection) is essential in all areas of the microelectronics.

Based on a substantiated current state analysis to the risk potential, there is a fundamental ESD protection strategy to be drawn, which should consist "internal" safety measures ("tempering" of the construction elements against ESD), "external" safety measures (prevention of uncontrolled discharges) and organizational safety measures.

With regard to external safety measures the German Institute for Standardization EN 61340-5-1 f. is relevant.

BMZ
THE BATTERY EXPERTS

Batterien-Montage-Zentrum GmbH
Am Sportplatz 28-30
63791 Karlstein/Main
Germany
Telephone +49 (0)6188 9956-0
Telefax +49 (0)6188 9956-900
mail@bmz-gmbh.de
www.bmz-gmbh.eu