

SMART ENGINEERING

Projects and products for
measurement and control technology.



Renewable
energies



Laboratory
and medical
technology



Industrial
solutions and
machinery



Defense
industry



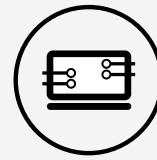
Semi-conductor
industry



Aerospace



REAL-TIME FRAMEWORK



ELMAR
REAL-TIME FRAMEWORK

Architecture with vision.

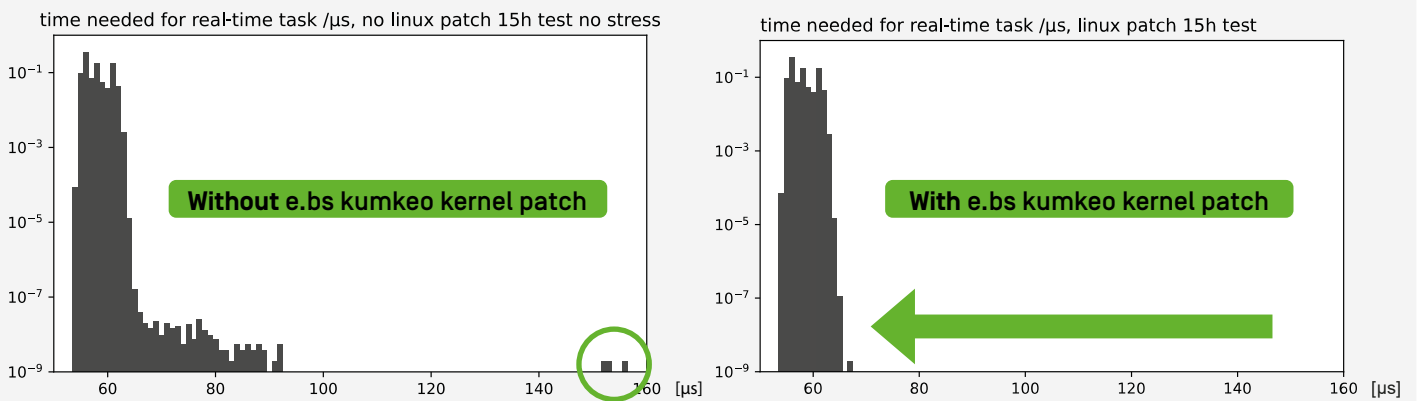
Maximum performance through 40,000 hours of development - Be three years ahead of the competition

ELMAR is more than just a platform for real-time applications - it is the result of 40,000 hours of specialised software development. This sophisticated real-time architecture for AMD® Zynq® UltraScale+™ MPSoCs enables low-latency control algorithms (optionally based on Simulink®) to run in parallel with an embedded Linux distribution. A lightweight hypervisor ensures a clear separation between management and real-time control. The inter-core communication (ICC) developed in-house optimises data exchange between the ARM® cores. With ELMAR, you benefit from three years of development expertise - and are a decisive step ahead of your competitors.

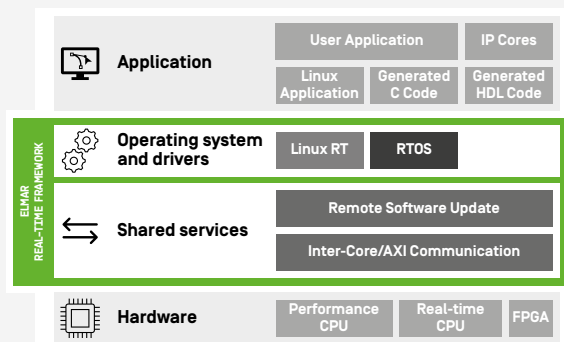
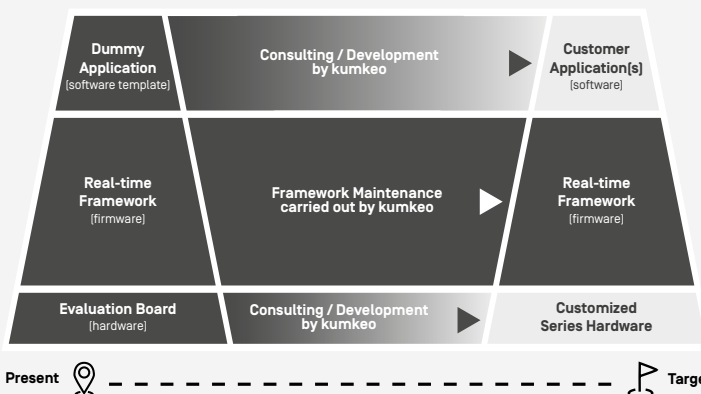
- ✓ **Powerful, embedded control platform**
- ✓ **Designed for lowest latencies and hard real-time conditions**
- ✓ **Flexible framework for control applications**

Performance

With our **kernel patch** specially designed for the AMD® Zynq® UltraScale+™, we guarantee stable **10kHz inter-core communication** between the real-time cores. This is verified using a complex industrial Simulink® control algorithm.



Architecture



Overview of specific features



INTER-CORE COMMUNICATION MECHANISM

Synchronized communication of the process image between the ARM® cores on the basis of configurable and prioritization-capable channels.



VIRTUAL NETWORK AND PRIORITIZATION

Option to use a single IP interface outwardly for all ARM® cores. Prioritization according to EtherType via priority queues.



PARAMETER MANAGER

Centralized parameter management in Linux. Editable via web interface or primary controller. Persistent storage on SD card.



HW AND SW WATCHDOG

Configurable watchdog for real-time cores and Linux. Logging of reset reason.



CENTRALIZED LOGGING AND EVENT LOGGING

Central logging of all ARM® cores through syslog in Linux. Expandable to include configurable event messages.



SCALABLE

Our framework runs on all versions of the AMD® Zynq® UltraScale+™ MPSoC series, e.g. AMD® KRIA boards.



REMOTE SOFTWARE UPDATE

Remote controllable A/B update mechanism: signing and encryption support. Automatic rollback in case of error.



SIMULINK® TARGET

Use of a dedicated Simulink® target to support the real-time cores. Complete integration into Simulink®; no need to use VITIS®. Supports external mode.



WEBSERVER UND IOT SUPPORT

Provision of a web server and REST-API. Touch-optimized web interface for system information and configuration. Ready to connect to cloud/IoT platform.



SECURE BOOT

Optimal protection against compromised software through the use of Secure Boot.



ELMAR
EVALUATION BOARD
>>>
Block diagram

Your benefits



TURNKEY FRAMEWORK FOR INTEGRATING AN APPLICATION

Our real-time framework is immediately available and primed for integration of your application. The framework encompasses an example application that can be used as a template.



COMBINES THE BENEFITS OF BOTH ENVIRONMENTS

Isolation of Linux from the real-time cores through the use of a hypervisor means that the advantages of both operating systems can be exploited in parallel. Hypervisor latency is <3µs.



PREQUALIFIED AND DEPLOYABLE EVALUATION BOARD

Our evaluation board is immediately available and can be used as a development platform or within test benches, prototypes and small batch production.



FRAMEWORK MAINTENANCE CARRIED OUT BY KUMKEO

We continually enhance our real-time framework and make updates available in regular cycles. In the case of security patches, we provide a rapid response.



FOCUS ON CORE COMPETENCIES

While you concentrate on developing your application, we undertake the development of and any necessary adjustment to the real-time framework and also support you in a consulting role throughout the entire process.



EXPERIENCE GAINED THROUGH WORK IN THE FIELD

Our real-time framework is already in productive use in a sector industrial application and is currently being rolled out in series.

YOUR CONTACT
ALEXANDER BAUMANN

Head of Project Management, PMP



Supported by:

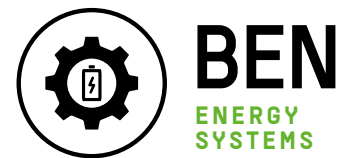


on the basis of a decision
by the German Bundestag



ENERGY SYSTEMS

The innovative storage.



Modern energy systems are the backbone of our sustainable future. They integrate renewable energy sources such as solar and wind power to reduce CO₂ emissions and protect the environment. Applying its technical expertise in the development of battery and battery management systems, e.bs kumkeo provides customized **solutions for efficient energy storage** to effectively support the sustainable and reliable energy supply of tomorrow.

Currently available are various configurations of the **BEN Energy System** in a variety of voltage classes, capacities and cell chemistries for the real-time monitoring and analysis of battery data.

Your benefits

- +** **VERSATILE APPLICATION OPTIONS**
Scalable for a broad range of voltages and capacities.
- +** **FUTURE-PROOF**
The customization capability of the BMS ensures that future requirements can be met as technologies and use cases evolve.
- +** **SIMPLE EXPANSION**
Additional batteries and system components can be added with ease to meet growing requirements.
- +** **OPTIMIZED ALGORITHMS**
Battery life and performance maximized through customized algorithms.
- +** **MODULAR DESIGN**
Modular hardware and software design that enables simple expansion and customization.
- +** **MULTI-PROTOCOL COMPATIBILITY**
Supports multiple communication protocols (e.g. CAN, PROFINET, PROFIsafe) to enable a comprehensive range of applications.
- +** **HIGH-RESOLUTION MONITORING**
High-resolution monitoring of cell parameters for a more detailed insight and greater precision in terms of management.
- +** **TEMPERATURE MANAGEMENT**
Integrated, intelligent temperature management for enhanced performance and safety.

BATTERY MONITORING SYSTEMS



Data recorded, security guaranteed.

The **BEN OM01 Battery Monitoring System** comprising a battery monitoring unit and balancer board, enables real-time monitoring and analysis of battery data, including voltage, temperature and state of charge, to provide a detailed insight into battery performance. Over 10,000 installed systems are safeguarding critical applications in the renewable energy sector.

Battery Monitoring Unit BEN OM01 – top features

- ✓ Monitoring of battery parameters
- ✓ Calculation of charging current
- ✓ Calculation of state of charge (SoC)
- ✓ Calculation of battery state of health (SoH)
- ✓ Fault and critical condition reporting
- ✓ Fieldbus communication, e.g. PROFINET with central controller



BENOM01
BATTERY
MONITORING
UNIT
>>>
Data sheet

Balancer Board BEN OM01 – top features

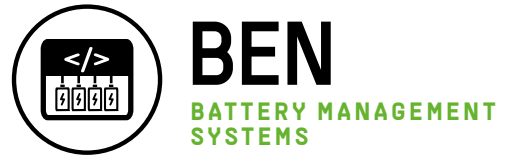
- ✓ Data acquisition of up to 18 battery cell voltages and 4 temperature sensors
- ✓ Compensation of battery cell voltage differences (balancing)
- ✓ Daisy chain isoSPI communication to BMU and other balancers



BENOM01
BALANCER
BOARD
>>>
Data sheet



BATTERY MANAGEMENT SYSTEMS



Your key to intelligence.

The **BEN Battery Management System** is a subsequent development of the Battery Monitoring System and was developed to provide optimal flexibility when adapting to different cell chemistries, cell interconnection capacities and voltage classes without compromising on safety. This is achieved through modularization of the **Battery Control Unit, Battery Disconnect Unit and Cell Monitoring Unit.**

Three versions are currently available featuring different voltage classes, capacities and cell chemistries.

BEN **BM01**
BATTERY MANAGEMENT SYSTEM

614 V | LFP | 14.4 Ah



BENBM01
BATTERY MANAGEMENT SYSTEM
>>>
Data sheet

BEN **EB01**
BATTERY MANAGEMENT SYSTEM

540.0 V | NMC | 81.2 Ah



BENE01
BATTERY MANAGEMENT SYSTEM
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Data sheet

BEN **EB02**
BATTERY MANAGEMENT SYSTEM

460.8 V | LFP | 100.0 Ah

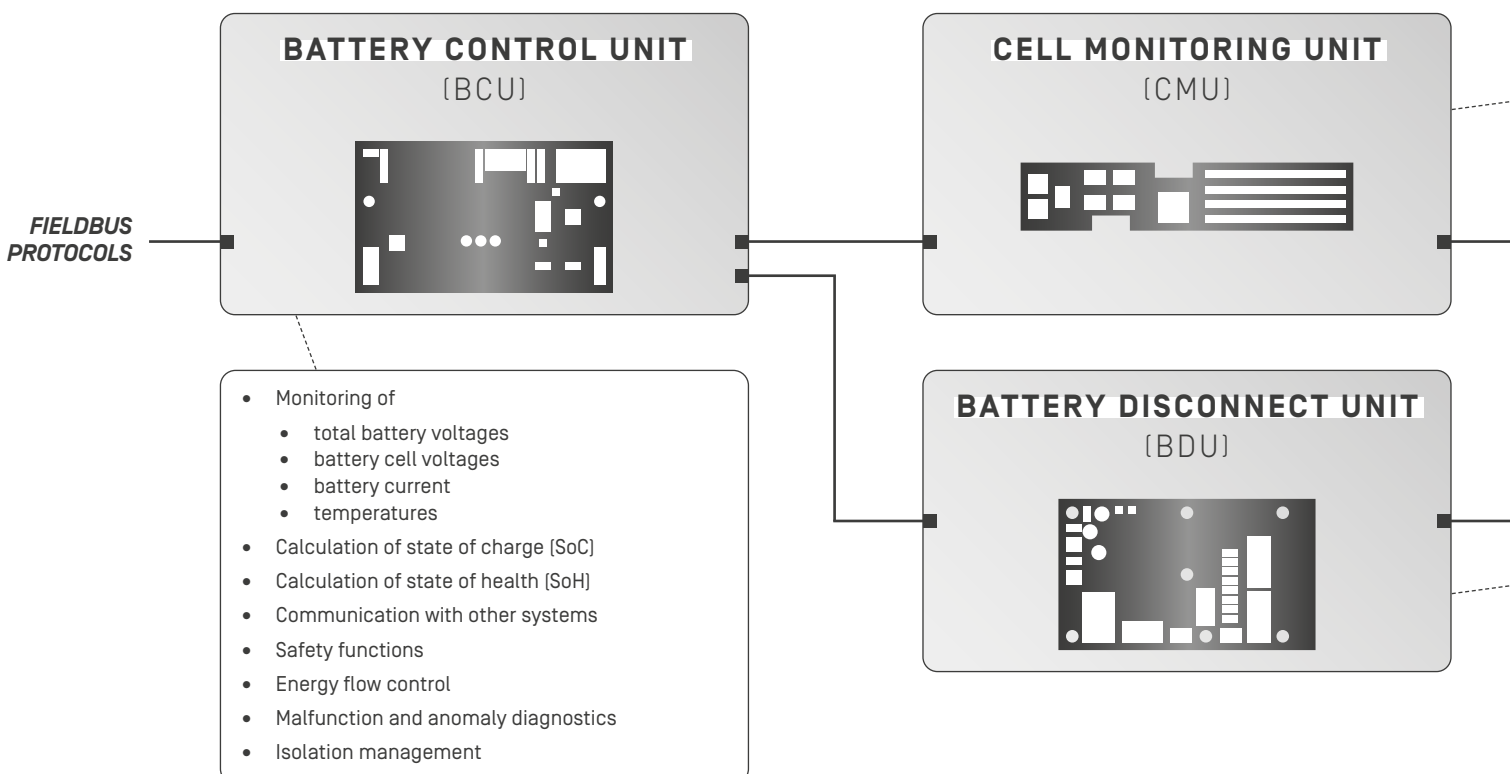


BENE02
BATTERY MANAGEMENT SYSTEM
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Data sheet

Top features

- ✓ Surge voltage resistance up to 6.0 kV
- ✓ Can be used at working altitudes of up to 4,000 m
- ✓ Extended temperature application range -18°C to 65°C
- ✓ High DC ripple stability up to 4 kHz

Battery Management System architecture



BATTERY SYSTEMS

For tomorrow's electromobility.



In addition to the development of battery management systems, e.bs kumkeo also develops its **own batteries** in collaboration with leading partners. Such cooperation facilitates customized energy storage solutions that harmonize perfectly with BMS technologies. This combination of technical expertise and partnerships results in **reliable and efficient battery solutions** that will help shape the sustainable energy supply of tomorrow.

We offer both standardised and customised energy storage solutions with scalable technical properties and optimum integration of our BMS technology.

This combination results in reliable and efficient battery system solutions for industrial applications.



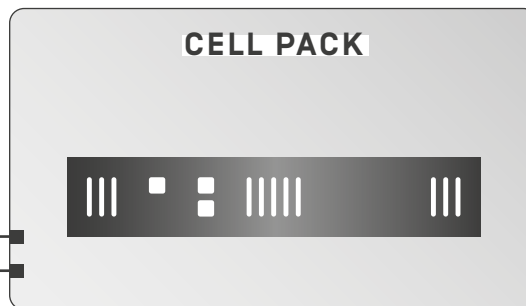
- ✓ **Universally deployable**
- ✓ **Robust aluminum casing**
- ✓ **Various protection classes possible**



YOUR CONTACT
MICHAEL SCHENK
Head of Product Management



- Measurement of
 - cell voltages
 - temperatures
- Battery cell balancing
- Communication with BCU
- Measurement synchronization
- Energy saving mode
- Self-diagnostics
- Isolation management

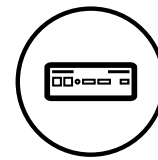


- Battery switching
- Overcurrent protection
- Short circuit protected
- Fault protection
- Contactor protection
- Total voltage and measurement
- Communication with BCU
- Isolation management

- Power supply
- Cell connection
- Cooling and heat dissipation
- Structural integrity
- Isolation management
- Modularity and maintainability
- Environmental stability
- Weight and spatial efficiency

PROTOCOL CONVERTER

Utilised in real-time,
innovation controlled.



PAT
PROTOCOL
CONVERTER

Our high-performance **PAT Protocol Converters** are based on a scalable netX 90 platform. Using this multiprotocol SoC allows us to develop protocol converters for a broad range of applications within short development cycles.

Top features

- ✓ Shorter development cycles due to an adaptable platform
- ✓ Fast customization of all interfaces possible
- ✓ Maintenance-free, designed for continuous operation
- ✓ DIN-rail installation



BiSS-Gateway



PAT
PROTOCOL
CONVERTER
Bi-PS



PATBiPSGW
PROTOCOL
CONVERTER
BISS-GATEWAY
>>>
Data sheet

The **BiSS-Gateway** facilitates the connection of up to two sensors that implement the BiSS safety protocol. Data received is provided by the BiSS gateway to a PROFINET IO Controller via PROFINET and PROFIsafe. This enables more abundant and precise data to be made available with fewer sensors. The outcome is longer and optimized application operation at a lower cost.

EnDat-Gateway



PAT
PROTOCOL
CONVERTER
ED-PS



PATEDPSGW
PROTOCOL
CONVERTER
ENDAT-GATEWAY
>>>
Data sheet

In the **EnDat-Gateway** the data received via EnDat 2.2 from up to two sensors or actuators are made available to a PROFINET IO Controller via PROFINET and PROFIsafe.

Supply Voltage 24 V DC \pm 20%

BiSS-Gateway 24 V BiSS Safety > PR



PN1

PN2

PN1 RDY

PN2 RUN

Maximum compatibility and flexibility: Our PAT Protocol Converters seamlessly and effortlessly connect your systems and protocols.

YOUR CONTACT

MICHAEL SCHENK

Head of Product Management

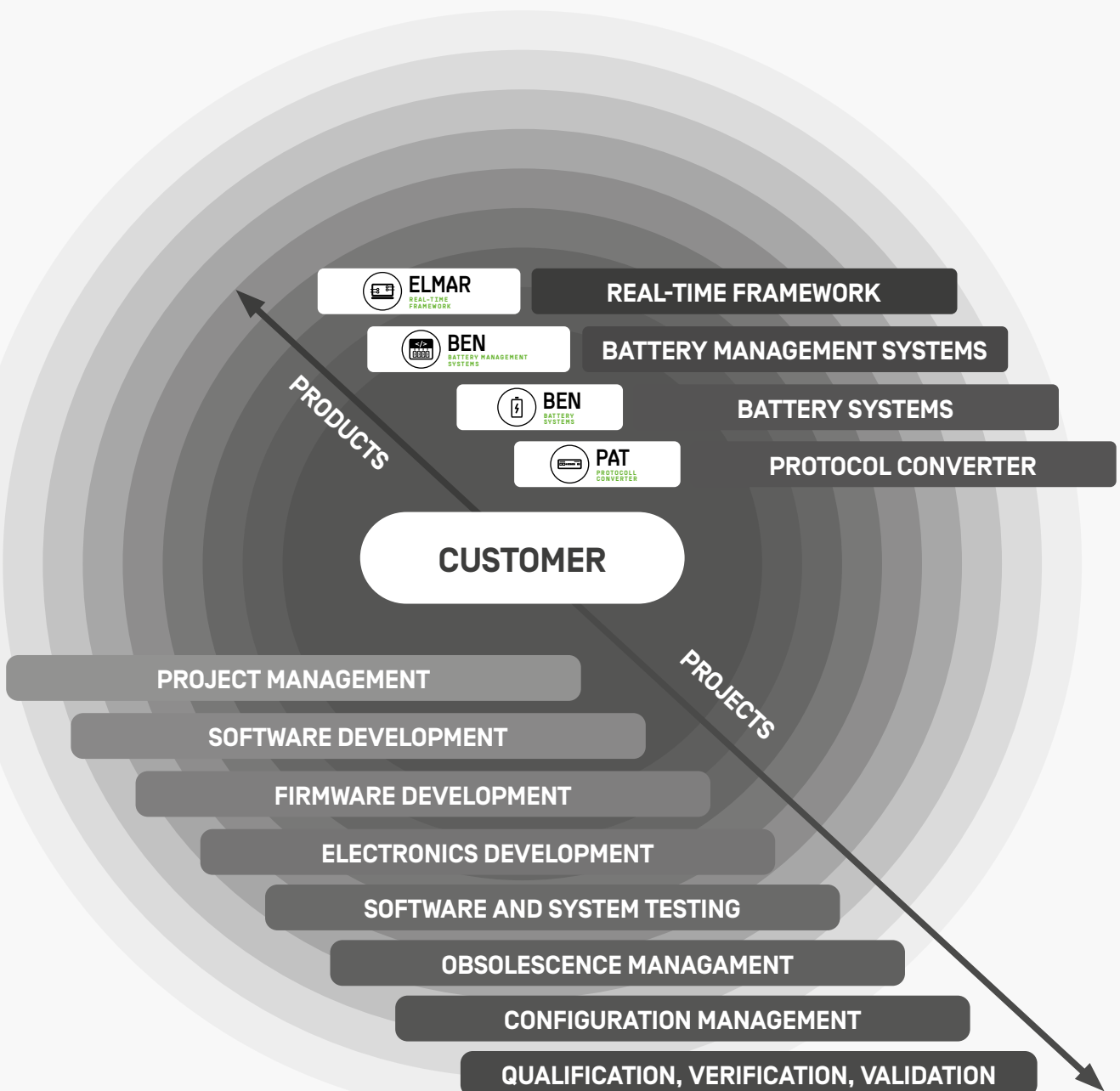


ABOUT US

Applying future-proof technologies, we develop **smart solutions** for you with passion and commitment. Competence, an appetite for risk and innovation are at the very core of our mission. Our **market-driven flexibility** enables us to recognize and creatively exploit potentialities. Through agile and targeted collaborative work, we take a smart approach to create **sustainable added value** for you.

kumkeo was established in Hamburg in 2009. Our facilities are specially equipped for implementing **highly sensitive projects** and meet Federal Office for Information Security (BSI) requirements. We also constantly invest in the measurable quality and security of our services.

Since November 2024, we have been part of **e.battery systems AG** (e.bs), a leading provider of innovative battery systems and energy solutions. This strategic partnership enables us to combine our know-how in hardware and software development with the expertise of e.bs to develop pioneering technologies for sustainable energy systems.





OUR PROMISE

At e.bs kumkeo, our primary **focus is on you**, the customer. Our very first discussion will quickly provide you with a clear insight into the quality of our work. We steadfastly realize your visions and assume responsibility for your development projects from the outset. Our **practical concepts** support you throughout the project planning phase and every phase of implementation, always fully in line with your specific requirements and under application of our sound expertise.

e.bs kumkeo offers you a great deal more than just technical performance. Through experience gained in countless projects and our crystal clear and efficient communication, we work in **close cooperation** with you to develop optimal solutions.

We are there for you - always



Dipl.-Ing.

**BERND
SAGER**

Chief Sales Officer



Dipl.-Ing.

**MICHAEL
SCHENK**

Head of Product Management



M.Sc.

**ALEXANDER
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B.Sc.

**CHRISTIAN
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Head of Research & Development

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