Design the future of energy

Edition 2026

MONITOR

BENDER



Monitored and future-proof: ROSSMANN's data centers

Protecting Critical Infrastructure – Security Concepts and Solutions

80 years safe and dependable electricity


BENDER



Michael Fischer (CTO), Michael Breuer (CEO)

Dear readers,

We are currently experiencing profound changes, with geopolitical tensions, growing cyber risks and new regulatory requirements are converging with the energy transition, electrification and a rapidly increasing system complexity. The use of AI and data-driven technologies is also bringing about further dynamic change.

In times like these, trust, resilience and safety are becoming increasingly important. To master the current challenges that we face, we need orientation, courage and clear objectives. We have defined these objectives in our new corporate strategy. They include consistently expanding our position as an electrical safety specialist, further developing our strengths in application knowledge and measurement technology and using data in a targeted manner with an uncompromising focus on our customers to achieve lasting customer benefits.

This MONITOR issue also focuses on change. The increasing complexity of electrical infrastructures, growing regulatory demands and networked threat scenarios underline just how essential robust protection concepts are for critical infrastructures. Within this context, special attention should be paid to the requirements of new frameworks such as NIS 2, the Cyber Resilience Act and the Cybersecurity Act. For us, this means taking responsibility and considering safety comprehensively, from planning to operation and right through to continuous support.

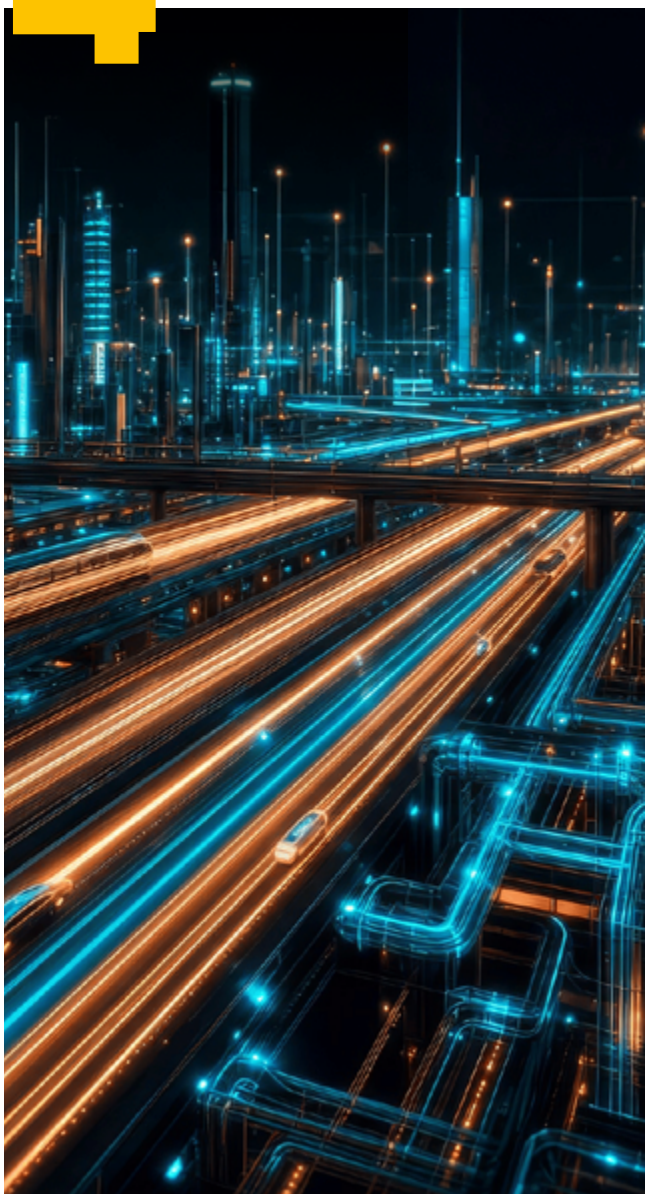
In this MONITOR, you can read about how our solutions are already protecting critical applications in the fields of energy, IT and electrical infrastructure, as well as mobility and medical technology. You can also find out how we use intelligent data evaluation, functional safety and measurement technology to increase the network stability and availability of complex systems.

The years ahead will also be challenging with regard to the safety and availability of electrical infrastructures. Nevertheless, they also offer excellent opportunities, and we want to make the most of these prospects together with our customers and partners. After all, together we can make a big difference.

We would like to invite you to join us on this journey and to help us shape the future.

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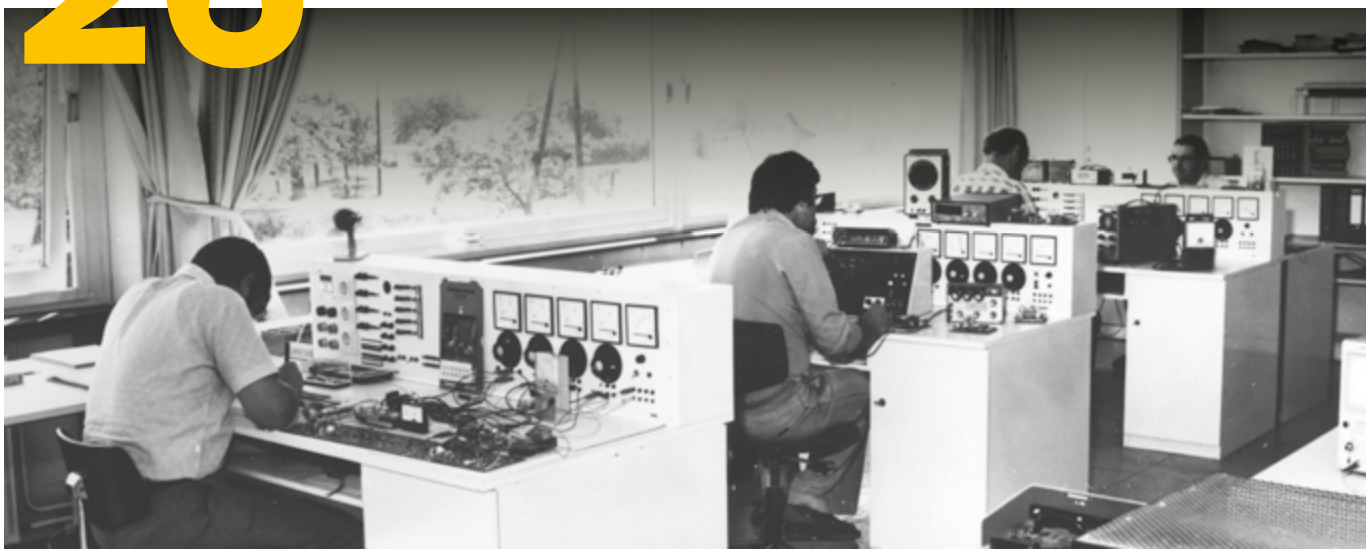
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Making critical infrastructure fit for the future

Electricity is a central pillar of modern civilisation. It allows us to use light, communication, medical care and much more. It is just as essential in private households and industrial facilities as it is in public institutions. When it comes to critical infrastructure in particular, a power failure can have extensive consequences. It is therefore important to protect critical infrastructure as effectively as possible and to ensure that it remains future-proof.



Warning, blackout!
Events in several regions worldwide have already demonstrated what happens when a power failure occurs in critical infrastructure.

Europe: Since the beginning of the war in Ukraine, targeted attacks have been carried out on power plants and other critical infrastructures with the aim of destroying the nation's logistics and bringing social life to a standstill. The massive flooding in the Valencia region caused extensive power failures in Spain and shut down wastewater pumping stations and sewage treatment plants. As a result, the wastewater could not be diverted and treated, which in turn led to hygienically and ecologically dangerous conditions.

Asia: At the end of 2024, a large-scale cyberattack targeted the remote monitoring system of Japan's photovoltaic industry in an attempt to destabilise the power supply or cause a blackout.

America: The bombing of the Murrah Federal Building in Oklahoma City in April 1995 revealed the vulnerability of the USA. In response, the government at the time made the far-reaching, future-oriented decision to strengthen its protection of key infrastructures and organisations.

Protecting critical infrastructures:

The term "critical infrastructure" applies to plants, systems and organisations that play a fundamental role in maintaining central societal functions. Depending on the definition, this includes systems that serve a large number of people and whose failure would lead to lasting supply shortages, a risk to public safety or other dramatic consequences if they were to fail. The precise elements of critical infrastructure vary in different locations around the world, but its core generally covers the following industries and sectors:

- Energy supply
- Information and telecommunication technology
- Traffic and transport
- Health
- Water supply and wastewater
- Nutrition
- Municipal waste disposal
- Finance and insurance
- Government and administration
- Media and culture

Threats facing critical infrastructure

Disturbances to critical infrastructure can stem from a variety of causes. Occurrences in which extreme weather events such as flooding, storms and torrential rain disable parts of critical infrastructure are becoming increasingly common. Furthermore, critical infrastructure has also become an increasingly prominent target for acts of war, hybrid warfare and terrorist attacks. Deliberate disturbances and failures in critical infrastructure are additionally used to politically destabilise countries, influence stock markets and impair international trade flows. Regardless of the causes, any failure in critical infrastructure usually has widespread consequences.

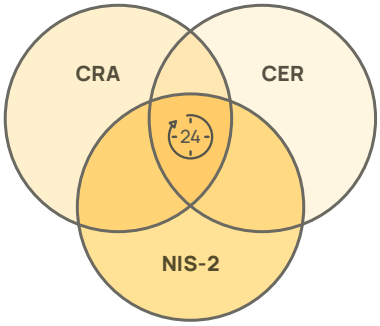
Making the infrastructure resistant

The protection of critical infrastructure is governed by various laws and guidelines worldwide. The main aim of these requirements is to identify the stakeholders connected to critical infrastructure, to specify what responsible parties need to do to protect critical infrastructure and to determine how they should react in the case of a failure or disruption in order to limit the consequences and what they should do to resolve a failure or disruption as quickly as possible. One example of such guidelines is the security concept for the physical resistance and cybersecurity of critical infrastructure that the EU adopted in cooperation with its member states.



The EU security concept

Advancing digitalisation and data transmission via the Internet makes critical infrastructures more susceptible to cyberattacks, as well as to physical attacks and their consequences. In many countries, government institutions and authorities are also becoming increasingly prominent as targets of cybercrime and sabotage attacks. To effectively counter these dangers and minimise risks, the safety concept of the European Union, for example, comprises three supporting pillars:



Cyber Resilience Act (CRA) – contains cybersecurity requirements that concern both networked and non-networked products. These generally include products that have a communication interface. Manufacturers of such products are required to guarantee their cybersecurity throughout the entire product life cycle. The CRA introduces a conformity assessment system that complements existing regulations on CE markings.

Critical Entities Resilience (CER) – aims to strengthen the resilience of physical safety to physical threats. Affected companies are required to conduct a risk assessment and to register with a government authority. Countermeasures must then be implemented continuously to eliminate the vulnerabilities defined in the risk assessment. Emergency and recovery scenarios are also defined.

Network and Information Security Directive 2 (NIS 2) – is designed to improve cybersecurity standards in the EU and to define uniform minimum standards for safety measures. By introducing reporting obligations, audits and resulting measures for operators of essential services and critical infrastructures, the directive aims to increase resilience to cybersecurity threats.

Bender protects critical infrastructure

Beyond the applicable regional and national frameworks, Bender has already been active in a wide variety of fields concerning the electrical safety of critical infrastructure for many decades. After all, Bender devices and solutions are typically required and used in situations where a reliable power supply and the high availability of systems and plants are particularly essential. Bender therefore offers extensive subject-specific expertise and can draw on many years of application knowledge.

Some of the critical infrastructure areas in which Bender is active include:



Bender monitoring as a basis for high availability

Insulation and residual current monitoring devices from Bender help ensure reliable operation of large-scale PV installations and wind power plants, as well as connected battery energy storage systems (BESS). In hospital engineering, Bender's IT systems and remote alarm indicator and operator panels are used in a multitude of operating theatres. The use of ISOMETER®s and other devices is prominent in the shipping industry, where they can even be found on the world's largest hospital ship.

Bender devices also safeguard the energy supplies of water and sewage treatment plants and ensure the operational reliability of IT data centres and communication hubs. Bender also helps ensure the electrical safety of electric vehicles and makes the charging infrastructure intelligent. To ensure that Bender solutions can continue to make critical infrastructures safe and resilient in the future, it is essential that these solutions are CRA-compliant. This is the focus of a special CRA team that performs risk assessments and optimises products where needed.

Solutions for all system types

In terms of technology, Bender offers ISOMETER®s and other devices for unearthed IT systems, residual current monitoring solutions for earthed TN systems and selected devices for resistance-earthed HRG systems. Regardless of the application area and system type, all Bender products are designed to ensure maximum safety from the development right through to the update. This is particularly important for solutions used in critical infrastructure, helping them secure a reliable and sustainable energy supply.

"Our dependence on electricity has caused critical infrastructure to become increasingly important, and its significance will continue to grow. With our intelligent solutions and safe processes, we help guarantee the electrical safety that is urgently needed."

Tilo Püschel,
Market Segment Manager Manufacturing,
Business Unit Industrial Solutions –
Business Development



Looking to the future

In the future, cybersecurity and resilience will have an even greater impact on product developments and applications. Measurement technology, targeted monitoring and the entire range of solutions will become even more important and will contribute towards stabilising the power network and safeguarding critical infrastructure. Customers will use risk analyses to define requirements for applications and products, which will be incorporated into corresponding safety requirements. Bender is ready and willing to actively tackle future challenges and to use new ideas and tried-and-tested solutions to play a central role in securing critical infrastructure.

Visualising ROSSMANN's data centres



A new service improves transparency and safety

When it comes to guaranteeing the high availability and fail-safety of data centres, monitoring their electrical installations is an important requirement. Bender's new visualisation now enables ROSSMANN to keep a consistently close eye on all installations in many different locations.


ROSSMANN

Europe's leading chain of health and beauty stores

ROSSMANN is one of the largest health and beauty retailers in Europe. In Germany alone, the company headquartered in Burgwedel employs over 41,500 people in more than 2,300 stores. Across a total of more than 5,200 stores in its nine national subsidiaries, ROSSMANN generated revenues of €16.6 billion in 2025. Bender has been a close technical partner of ROSSMANN for more than eight years, and the number of data centres at ROSSMANN's logistics hubs equipped with Bender technology has now reached double figures. When a uniform visualisation solution was required for these centres, Bender was therefore the first port of call.

"We have had an outstanding partnership with Bender for many years. The company is extremely good at understanding our demands and always finding the ideal solutions."

Rainer Engelke, Product Owner at ROSSMANN

Retrofitting a uniform visualisation solution

Bender's latest project for ROSSMANN involved providing more transparency for the installed measurement technology and recording the local characteristics of the data centres in different locations. The retrofitted visualisation was required to identically map the electrical installations and make them structurally identical in terms of how they are operated. By doing so, it aimed to improve the overview of the installations and further improve their fail-safety as a result. The new uniform visualisation is designed to cover the entire sensor technology of the installations. Together with the spatial representation of the devices, the visualisation provides an optimal overview of all devices and rooms that enables the company to detect occurring faults at an early stage, define them clearly and correct them rapidly – long before an installation fails.

Visualisation for installation transparency

The visualisation, which was developed in close cooperation with ROSSMANN, provides identical mapping of installations at the different locations down to the finest detail. When coming up with the visualisation solution, Bender was required to meet a multitude of customer-specific demands – not only regarding the required values and a technical summary and overview of the different rooms but also in the form of graphic specifications such as the integration of the company logo or grouping data based on rooms and parts of the installation.

"Working with templates enables us to implement every customer request both quickly and efficiently."

Norman Wagner, Technical Consultant at Bender

Viewing faults with a single click

The visualisation uses transparency to achieve safety. In accordance with the customer's specifications, alarm groups were created before the visualisation, and we defined whether only measured values were required or the installation structure should also be monitored. The simple and clear display of the entire data centre infrastructure in the building provides electrically skilled persons with a comprehensive overview at all times. Any events that occur are shown in an alarm bar in the visualisation. Electrically skilled persons can then view the point of failure directly with a single click. The alarm bar also displays all standard information regarding an alarm, for example a description of the device and channel concerned and the measured value. Another advantage comes in the form of the individually visualised installation overview, which can also contain additional individual information if desired. Users can also choose between two different views. While the alarm bar shows all faults from the entire system, the individual visualisation enables users to view devices with their channels and measured values. As a result, the complex and time-consuming tasks of reading out the alarm history and searching for corresponding installation locations are now a thing of the past.

The visualisation structure

In technical terms, the visualisation is divided into different levels. The first level concerns the public areas, for example access points to the server rooms, where compact CP305 displays have been installed. These use a green and red display to signalise whether it is safe to enter the room. The server rooms themselves contain larger CP907 displays, which allow the responsible electrically skilled persons to locally access further information on the state of the installation. As a result, they instantly know in which rack and outgoing circuit a fault has occurred and which measures need to be implemented – without even having to connect their laptops. A gateway provides global access to the installation data at all times via VPN access. What's more, the uniform visualisation means that no conversions are required for users in different locations.

A new planning and implementation process

Up until now, visualisations were only possible if the devices were physically available and installed. This also applied when setting the parameters of the devices. As a result, visualisations tended to be produced directly on the construction site – a



process that was time-consuming and prone to faults. Now, the visualisation can be implemented at a much earlier stage, namely when the devices are still being produced or delivered and the assembly is still being constructed. Once everything is available and has been installed on site, the digital configuration, including the visualisation, can be transferred to the physical hardware at the press of a button at the start of operation. This saves time and significantly improves both the process and the result.

Digital twins enable a new service

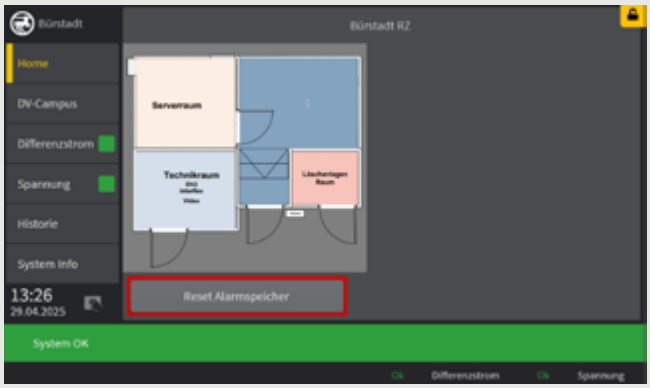
Working with digital twins forms the technical basis for this new service. These twins enable the entire installation to be mapped virtually and each individual device to be displayed with its own function and in interaction with the other devices. The digital twins therefore enable users to gain a comprehensive overview of the installations and plan any necessary changes at an early stage. According to Norman Wagner, “we want to use our visualisations to accelerate and improve both planning and commissioning by increasing transparency, reacting to customer requests more flexibly and implementing changes in the initial phase more rapidly. We also aim to improve the ease of use and adjust it according to the users’ needs.”



Recording and monitoring the power supply

To ensure an uninterruptible power supply for data centres at all times, it is important to record and monitor the power supply data – and the COMTRAXX® system by Bender is the ideal solution. This system enables users to connect and visualise both their own measurement technology and third-party devices. In connection with the web-based Powerscout solution, it also allows specific values to be analysed and visualised and reports to be generated automatically.

The combination of operating current technology and monitoring both voltage and power data also enables users to visualise the relationship between the load current and the operating current. Furthermore, when combined with the installation documentation, the permanent condition monitoring of the electrical installation is relevant for compliance with the specifications of DGUV Regulation 3. Depending on the version, the system can also be used to extend test cycles or, for example, to fully eliminate the need for the Riso test. This makes the testing process much easier and saves both time and money.



The new visualisation provides ROSSMANN with the perfect overview of all locations and devices at all times.



Transparency stretching as far as each individual device reduces the time and effort involved in monitoring and makes work much easier.



A safe power supply for a floating hospital

The hospital ship Global Mercy™ is one of the largest civilian hospital ships in the world. It is home to six operating theatres, eight intensive care beds and nearly 200 beds for medical care for individuals who often have no access to health care in their home countries. For the secure operation of the medical facilities on board the ship, a reliable, highly available power supply is absolutely essential.


Mercy Ships
ps.org



Dorothea Bender Fernandéz, Chair of Bender's Advisory Board, and Benjamin Greiff, Global Market Segment Manager Maritime, visited the ship while it was docked in the port of Cádiz, Spain. Here, they spoke to the lead electrical engineer on the Global Mercy™, Renier Marx, about the special challenges facing the electrical infrastructure of a floating hospital, with a particular focus on ensuring a safe power supply for medical areas.

Electrical safety is the foundation of medical care

Whether the hospital is a permanent structure or a ship, electrical energy is an essential prerequisite for virtually all medical processes. Lighting, medical devices, monitors and operating systems all depend on a stable power supply at all times. Even the smallest disturbances can significantly impair their operation and, in the worst-case scenario, even endanger patients.



Earth and insulation faults posed a central challenge on board the Global Mercy™. These occurred particularly frequently in the initial stages of the ship's operation after it was launched during the COVID-19 pandemic. Although the system originally installed on the ship detected the occurrence of faults, it did not enable them to be specifically localised.

Complex fault location during ongoing operation

The lack of transparency in fault location led to significant problems in technical operations. To pinpoint the source of the fault, users had to switch off entire circuits or systems one by one. During full-capacity hospital operation, however, such an approach is only possible to a limited extent because medical procedures cannot be interrupted.



As a result, fault location work took an extremely long time, sometimes even weeks or months. Faults occurred sporadically and could not always be reproduced. For the technical team, this resulted in a great deal of work under significant pressure in terms of both time and safety.

Targeted fault localisation thanks to modern monitoring technology

This problem was alleviated by using modern devices for insulation monitoring and targeted earth fault localisation. With the implemented solution, the technical team on board the ship was not only able to detect occurring insulation faults but could also precisely localise them for the first time, making its work much easier. Instead of complex switching-off procedures, the team was able to identify and correct faults directly. As a result, maintenance work became easier to plan and the risk of failure was significantly reduced.



More operational reliability in critical applications

The example of the Global Mercy™ demonstrates the high value of continuous monitoring of electrical safety in medical areas, especially in complex, sensitive applications such as those in maritime medical technology. The combination of early fault detection and precise localisation plays a significant role in ensuring that hospital operations continue to run smoothly and reliably, even under challenging conditions.

For floating hospitals like the Global Mercy™, such a solution is not only a technical advantage but also a fundamental prerequisite for safe patient care.



A clear insight when planning and building charging stations

The world of e-mobility is dynamic, but it can sometimes be obscure. It therefore demands flexibility from manufacturers of charging stations. To ensure that their solution can keep up with all developments, these manufacturers need to make it as easy as possible to adapt. Against this background, the specialists at Bender have developed a product line comprising operating interfaces (HMI), power modules and charge controllers.
The modular components reduce the complexity involved in developing charging stations. They enable manufacturers to efficiently implement different types of charging points and user scenarios, and to adapt them flexibly to new requirements. This results in a practical modular system for bespoke charging points, particularly wallboxes.


Image: AI-generated

The challenges facing manufacturers

When it comes to the charging infrastructure for electric cars, charging points must offer a range of functions to accommodate various scenarios. A charging point for charging a single vehicle in a private garage, for example, can be simple and therefore low-priced. A garage may, however, have a charging system for several vehicles that is connected to a photovoltaic installation and offers dynamic electricity tariffs billed by the employer or another authority. In this case, the system needs to offer more functions than the first, simpler charging point. The need for elements such as dynamic load management, solar DLM for disconnection during phases in which the PV installation only generates a small amount of energy, connection to a backend via OCPP and an integrated meter for billing, as well as possibly a Plug & Charge system for convenient charging without requiring a charging card, makes finding the ideal solution a real challenge for charging station manufacturers.

Economical and future-proof

Given the dynamic changes in technical and regulatory conditions, it is impossible to reliably predict the future of technology. To gain the best possible insight into what's to come, Bender has been actively involved in several relevant standardisation groups for many years and therefore has its finger on the pulse of the future technical requirements facing charging points. When developing its new products, Bender constantly incorporates this expertise into its work to offer customers solutions that are as future-proof as possible. Regular software updates help to improve safety, including with regard to cybersecurity, and introduce new features to active charging points. The new Bender product line, which comprises a user interface (HMI), charge controllers and power modules, enables all common user scenarios to be efficiently mapped in various combinations. The main highlight of the line is that the mechanical mounting points remain the same across all product variants. As a result, a single enclosure design opens up a multitude of options for the cost-efficient installation of an entire product line, creating charging points for various use scenarios.

An easy-to-scale platform

The Bender product line enables manufacturers to successively design and establish a product portfolio that meets the demands of different requirements and markets. The provision of fully developed and approved products from Bender enables them to focus their complete attention on the mechanical integration and final approval of their products. In addition, they can make the most of fewer expenses and a future-proof product portfolio that can also be easily adapted at any time in the future, without requiring any changes to the mechanical design. To put it in a nutshell, the Bender product line transforms the unpredictable adventure of charging point development into a clear investment with planning reliability.

Five elements for future-proof charging points

The enclosure

With attachment parts such as charging cables, displays and plugs, enclosures entail a great deal of development work and significant expenses for manufacturers of charging stations. The question is: why does each variant need its own enclosure model? A simpler, better and more economical solution is to use a standardised enclosure for all charging station variants, from home charging solutions right through to public charging stations with card payment or with a Plug & Charge function in the future.

The electronics

The charge controller is the beating heart of every charging solution. This IoT device is able to communicate with meters, RFID readers, energy management systems, the vehicle and the backend. When doing so, it provides necessary functions such as authentication, condition monitoring and controlling the charging process. An HMI module displays the user status and handles user input, for example authentication via smartphone or RFID card.

The software

The software is closely interwoven with the hardware. All of the functions of a charge controller are controlled via the charge controller software, for example when, how and by whom a charging process can be activated and how it is billed.

Software updates can also be used to keep the systems up to date in terms of cybersecurity and to add new functions. As a result, charging points can be set according to new standards and protocols, or a series can be adapted to suit new intended uses, target markets and functions, all without any mechanical work on the enclosure.

Power module

Power modules form the foundation of every wall box. They ensure electrical safety in accordance with the requirements of applicable standards and can also optionally control the connection and disconnection of phases when charging with solar power from the PV installation. Depending on the requirements of the user scenario, power boards can also be combined with different charge controller variants and HMI modules.

The support

Between the technical requirements, normative specifications and electrical safety, there is a lot to consider when planning a charging point. After all, faults can rapidly have expensive consequences.

Bender supports charging point manufacturers from the initial planning sketch to needs-based and market-oriented system configuration and right through to the establishment of end-of-line tests in production, certification compliant with legal calibration

requirements and the future integration of new functions. Customers can select the precise support they require at any given point in time. Moreover, regular software updates also ensure that active systems are kept up to date by aligning them with the latest state-of-the-art technology. As a result, customers can benefit from several advantages such as functions like Plug & Charge, which can even be added to systems that have been active for as long as ten years via a software update.


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Bender-Service
worldwide



Long-term benefits for charging point manufacturers and users

Ralph Müller-Eberstein is an expert on charging infrastructures and e-mobility at Bender. In our interview, he explains the key aspects involved in developing charging points.

How would you describe the Bender product line for charging points?

It's like a construction set that can be used to build a simple charging point for a garage or a more complex charging point for use in public spaces. Customers do not need to handle the electronics but can instead focus their full attention on the mechanical integration and final approval of their product.

How does the Bender solution differ from those available from other manufacturers?

Our solution is far more than just a charge controller. It is a closed product portfolio featuring an HMI module, a charge controller and a power module, and it can be used to develop charging point product lines that cover all conceivable use scenarios. We have always placed value on the resulting flexibility and scalability, which enable us to offer manufacturers a solution that is economical, sustainable and therefore future-proof, especially in light of dynamic market developments. In addition to the flexibility and scalability of the hardware, we also consider the provision of software updates to be crucial in ensuring that the solution remains future-proof. The concrete meaning of this focus is evident in our charge controllers, which were introduced to the market nearly ten years ago and have been in use ever since. Nowadays, these charge controllers can still be provided with state-of-the-art upgrades via simple over-the-air software updates.

How would you describe a future-proof approach in concrete terms?

The answer is actually very simple: The software can be used to install virtually all updates introduced in recent years and all updates yet to come, for example dynamic load management for large charging centres and PV excess charging. This latter option is interesting in all situations involving the use of PV power from rooftop installations to charge electric cars. Another extremely topical subject is that of Plug & Charge with the standard ISO 15118-2, which facilitates the automatic identification of electric cars at the charging point.



Image: AI-generated



“Charge controllers that were launched nearly ten years ago and can now still be easily given state-of-the-art upgrades via over-the-air software updates are a prime example of such future-proof solutions.”

Ralph Müller-Eberstein
Expert on charging infrastructures and electro-mobility at Bender

Smart energy management systems



Monitoring, analysing and optimising energy use

Energy consumption is one of the main contributors to global carbon dioxide emissions, and buildings alone account for nearly 40 % of global energy consumption. The growing demand for electricity among industries, data centres and infrastructure makes optimising how energy is used and monitored an urgent requirement. Smart energy management systems (EMS) such as the Graphene platform help meet this requirement both reliably and intelligently.



Image: AI-generated

Reducing costs and complying with standards

An EMS is a powerful tool that allows businesses to monitor, analyse and optimise their energy consumption in real time. By combining energy usage data with power quality analytics, an EMS not only helps to reduce operating costs but also ensures compliance with international energy standards such as ISO 50001, EN 50160, IEC 61000 and IEEE 519.

Reducing downtimes and CO_2 emissions

More importantly, a well-implemented EMS identifies hidden inefficiencies and potential faults before they cause downtime or equipment failure. With automated reporting and intelligent insights, companies can make data-driven decisions to reduce their carbon footprint while maintaining high operational performance.

Monitoring various systems

In addition to the EMS, other monitoring solutions can be used to make systems more efficient, safer and more reliable.

Building management system (BMS):

visualises and centrally monitors building conditions and uses remote control to improve maintenance response times and overall efficiency.

Electrical safety management system (ESMS):

integrates insulation and residual-current monitoring to protect critical environments such as hospitals. It ensures early detection of insulation faults and insulation level deterioration and enables predictive maintenance without compromising safety or system operation.

Data centre infrastructure management (DCIM):

provides full-stack, real-time visibility into data centre operations, helping to monitor, protect and optimise the entire IT infrastructure around the clock.

Together, these systems offer a holistic approach to smart facility management, thus minimising risks, maximising performance and supporting sustainability goals.

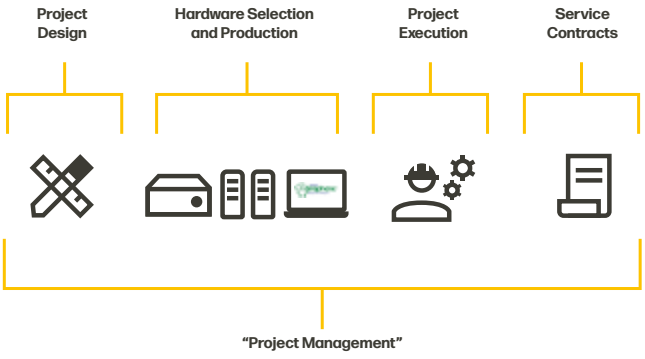
The Eetarp Graphene platform

Eetarp Graphene is a modular, scalable and flexible platform for smart building management. It covers and combines the various monitoring solutions (EMS, BMS, ESMS and DCIM) and it is individually configured for each application. The platform is used in locations such as data centres, shopping centres and office buildings.

Eetarp Graphene combines:

1. sensors and measuring instruments that record all relevant parameters of electrical power systems, for example current, voltage, frequency, harmonic oscillations, energy consumption and many more
2. servers on which all data regarding the electrical installation are centrally compiled
3. software that analyses the data and provides system optimisation recommendations based on the data analysis

Eetarp Graphene transfers data from several locations and different systems to a central server. Installations such as additional building management systems, lighting management systems, photovoltaic systems or cooling plant monitoring systems can all be integrated into the platform. The platform is complemented by active project management support and consulting services.



More than a software platform

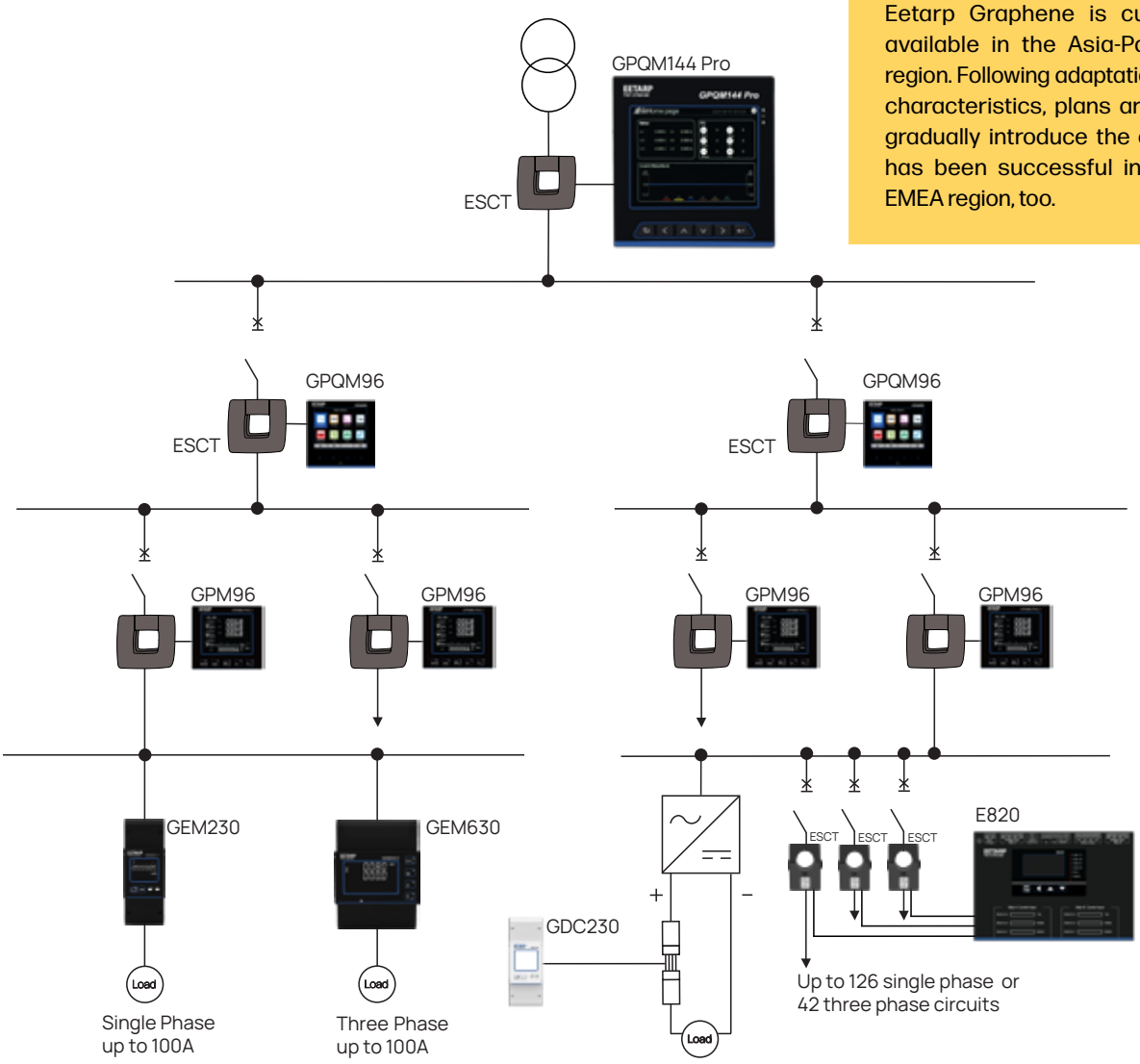
Eetarp combines consulting, project design, integration, project execution and long-term service support with the Eetarp Graphene platform.

This end-to-end approach is backed by more than 20 years of experience delivering energy, infrastructure and facility management solutions for commercial buildings, healthcare facilities, manufacturing sites and data centres across the Asia-Pacific region.

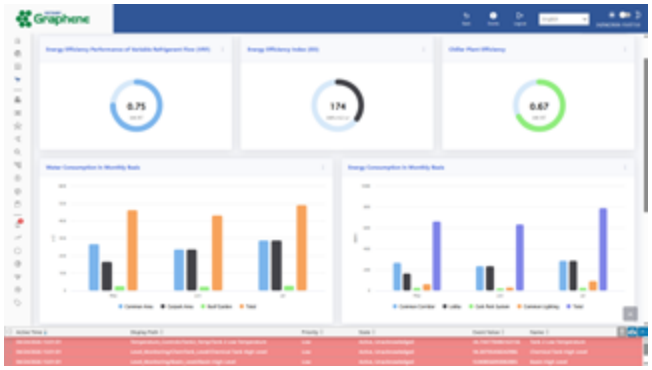
An overview: energy measurement in electrical installations with Eetarp Graphene

From Asia into the world

Eetarp Graphene is currently only available in the Asia-Pacific (APAC) region. Following adaptation to regional characteristics, plans are in place to gradually introduce the concept that has been successful in Asia to the EMEA region, too.



(Please note: The devices shown are currently only available in Asia and will be gradually adapted for other regions as well.)



A clear visualisation of energy consumption and energy efficiency



Overview of the structure of the electrical system


BENDER
80
Safe and
dependable
electricity since 1946



80 years of Bender. Safe and dependable electricity since 1946.



Anniversaries are opportunities to stop and reflect. They shine the spotlight on what has grown over the years and provide a clear insight into what is yet to come. On the occasion of its 80th anniversary, Bender is looking back on a history that has been shaped by a clear focus since 1946: making electrical energy safe and dependable for people, machines and sensitive applications worldwide.

What started out in the German town of Grünberg in 1946 has gradually developed into an internationally operating corporate group. Our subsidiaries all represent regional strength, an understanding of the market and shared values. This is particularly reflected in recent anniversaries: In 2025, for example, we celebrated 10 years of Bender Chile, the 25th anniversary of Bender Benelux and the success story of the company Optec, which now dates back 25 years. Further milestones are occurring in 2026, with Bender Canada and Bender UK each looking back on 30 years of corporate history and Bender Iberia celebrating its 25th anniversary. Optec is additionally celebrating 10 years as part of the Bender Group.



2025: 10 years Bender Chile

Congratulations!
These anniversaries are more than just numbers; they stand for people, trust and long-standing partnerships. They show how local proximity and global responsibility lead to sustainable strength. This year, we are teaming up both to celebrate this history and to look to the future under the motto of **"80 years of Bender. Safe and dependable electricity since 1946."**
In this MONITOR issue, we take the same approach in our joint interview with Bender's Senior Partner, Dirk Christian Bender, and the Chair of the company's Advisory Board, Dorothea Bender Fernandéz. They tell us more about what has defined Bender for decades, namely listening, understanding and developing solutions, from the company's origins right through to the present day.



2025: 25 years Bender Benelux

25 years of OPTEC
A look back at key milestones on the OPTEC website.

https://www.optec.ch/en/optec/25-jahre-optec



2026: 30 years Bender Canada



2026: 30 years Bender UK

Listen, understand and solve: the Bender principle for eight decades



Insights into 80 years of electrical safety

It all began on 2 January 1946, when Walther Bender walked into the mayor's office in the German town of Grünberg and registered his laundry room as business premises. Eight decades later, what started out as a modest venture has since become a globally operating family company with around 1,300 employees, 18 foreign subsidiaries and more than 130 representatives worldwide. One thing, however, has remained the same: The company's production activities are still based in Germany.

On the occasion of the company's 80th anniversary, we met up with Dorothea Bender Fernandéz, the Chair of the Advisory Board of the Bender Group, and Dirk Christian Bender, the company's Senior Partner and son of its founder. Read our interview and find out more about the origins of Bender, its role in critical infrastructure, why Walther Bender wrote letters to NASA and what technical curiosity has to do with a future-oriented approach.

80 years of Bender – a span of time from the post-war period right through to artificial intelligence. When you look back on this journey in the present day, what does this anniversary mean to you personally?

Dirk Christian Bender:
"I often think back to the early days of the company. It was a time of significant change and new beginnings following the war. My father approached his work with his typical values of humility and modesty, which were extremely good for the company.

Strong family values also had a strong impact on our relationship with employees and the company right from the start, and I still consider them to be very important in the present day."

Dorothea Bender Fernandéz:
"When I think about the anniversary, my thoughts mainly focus on the many chances and opportunities that lie ahead – all the wonderful things that we can help shape in the future.
Here at Bender, we work in areas that are truly relevant, from hospitals to mining and right through to data centres and many other applications. It means a lot to me to know that I play a small role in this development, especially because I represent the third generation of my family at Bender."



The world has changed radically. What value of Bender's founder, Walther Bender, is still going strong in the company today?

Dirk Christian Bender:
"My father wanted to make the invisible danger of electricity controllable so that people could work safely. This idea of using monitoring to protect both people and systems has been the foundation of Bender right through to the present day."

Dorothea Bender Fernandéz:
"Yes, using technology in a targeted manner to make improvements and achieve safety still shapes our company and our work. We want to use the current opportunities available to us – be it AI or other technologies – to make people's lives even safer. This is precisely what my grandfather did, and we continue to pursue his goals."

"Technology in a targeted manner to make improvements and achieve safety still shapes our company and our work"

What customer promise from the early days of the company is now more relevant than ever in 2026?

Dorothea Bender Fernandéz:
"Interestingly enough, this is precisely the question that we recently addressed on an internal level when consciously redefining our understanding of our corporate mission: 'We're here to understand your challenge and solve it. We take responsibility from the first question to the final answer and do not let go until it works.'"

Dirk Christian Bender:
"And that is exactly what our company promised right from the start. Our customers were able to rest assured that we would listen to them and give them what they needed. In many cases, this was not a standard device but a solution precisely customised to suit their systems. This is what made us stand out from major providers, which simply said: 'Here are three devices, take your pick.' We, on the other hand, asked our customers: 'What is your task, and what do you need?', before coming up with a solution that conformed with all standards. Our employees knew exactly what was important, and this is still the case in the present day."

Let's picture an imaginary scenario: What would Walther Bender say if he were to run into the CEO, Michael Breuer, at the company headquarters today?

Dorothea Bender Fernandéz:
"They're actually very similar, aren't they, Dad?"

Dirk Christian Bender:
"Oh yes, and he would say exactly what he said to me back in the day: 'Son, watch out, you have a huge responsibility.'"

What aspect of the present-day company would surprise Walther Bender the most?

Dorothea Bender Fernandéz:
"My grandfather would probably be surprised about how current some topics still are. Dad, tell them the story about Granddad and NASA!"

Dirk Christian Bender:
"In 1967, the Apollo 1 test mission ended in catastrophe: While the three astronauts were sitting in the capsule on the launch pad, an electrical spark from a defective cable under an astronaut's seat ignited an explosion in the 100-percent oxygen cabin atmosphere. Given that the huge internal pressure blocked the inward-opening hatch, there was no way out. All three astronauts died. After the incident, my father wrote a letter to NASA informing them that an earthed system caused the problem. He explained that it needed to be isolated and monitored and he claimed that all other approaches would be grossly negligent. But he never received a response."

Dorothea Bender Fernandéz:
"When you recently told me this story, it instantly struck a nerve – because this is a highly topical issue. In fact, right beforehand, I was sitting in a meeting with a colleague who works in precisely this area: standardisation for electrical safety in aircraft and potentially also in space flight. We are pretty much working on exactly the same thing! That definitely would have surprised my grandfather. And by the way, my colleague has written to NASA too …"

Dirk Christian Bender:
"Has he received a response?"

Dorothea Bender Fernandéz:
"Not yet, but who knows what the future holds …"

This anniversary issue focuses on the topic of "critical infrastructure". What do you have to say about this topic?

Dirk Christian Bender:
"To put it in a nutshell, the show must go on. When it comes to critical infrastructure, no interruptions whatsoever are allowed. In the fields of automation and data technology in the present day, in particular, it is essential that there are no power failures whatsoever – that would be a catastrophe! We therefore need to ensure that systems work perfectly at all times. As a company, we have the very important responsibility of monitoring their fully functioning operation."

> *"When it comes to critical infrastructure, no interruptions whatsoever are allowed."*

Dorothea Bender Fernandéz:
"Absolutely, and that is demonstrated very clearly in this issue of MONITOR. The topic is extremely important for Bender, especially now, when more and more systems are being electrified. The challenge does not actually lie in electrification itself, but in the complexity that arises when a multitude of different systems are all connected at the same time.

A very good example from our practical experience is a sewage plant in Canada. Instead of relying on conventional insulation monitoring, the operators asked us to fit the plant with an advanced system to protect against a second earth fault. The essential factor behind this solution is that if a second fault occurs, the system does not immediately shut down the entire network. Instead, it isolates the electric circuit with the lower priority. Thanks to this intelligent release strategy, the critical operating processes remain online with no interruption to the network, thus ensuring the continued stable operation of the plant. As a result, maintenance and repair work can be planned in a targeted manner, leading to huge gains for the customer in terms of both time and reliability."

Many markets are still very volatile. How does Bender successfully perform the balancing act between tradition and agility?

Dirk Christian Bender:
"We have been actively involved in the development of standards in Germany, Europe and worldwide for a number of decades. This means that even before the official provisions came into force, we had already learned about the significance of electrical safety in various contexts. This pioneering approach is deeply rooted in our company and provides us with stability, especially in volatile markets. As Henry Ford once said: 'The secret to success is understanding the other person's point of view.'"

> *Henry Ford once said: "The secret to success is understanding the other person's point of view.'"*

Dorothea Bender Fernandéz:
"Another important factor in this 'balancing act' is the innovative strength of our team. Let's take aviation as an example: We have a colleague who studied aerospace engineering before joining Bender. Instead of telling him how to do his work, we gave him plenty of scope to explore the topic of electrical safety in aviation independently. This enabled him to start to develop his own ideas individually.
Before standards, committees or specifications became relevant, he investigated the significance of electrical safety for aviation and looked into how we can offer solutions in this field here at Bender. This enables us to acquire knowledge and understand systems and dangers before presenting our solutions to the outside world. This established expertise soon becomes apparent without us having to apply any pressure – people come to us of their own accord."

Dirk Christian Bender:
"The situation is similar when it comes to ships. In this field, we have an expert who deals with electrical safety on ships worldwide – both commercial and military. Thanks to this work, he is an internationally recognised expert who is always consulted and invited to get involved when expertise in this field is required.

Dorothea Bender Fernandéz:
"I joined this expert on a ship assignment last year. It's something you truly have to experience! The speed at which he can identify and solve problems is something that no technology in the world can match.
Let me summarise our thoughts: We have true experts working on our behalf, be it in the Benelux states, the UK, Singapore, the

USA, Germany or further afield. These individuals are extremely important to Bender. This is why we want to intensify our focus on giving our employees the freedom they need to develop their expertise at their own pace, test new ideas and explore markets. This freedom leads to innovation."

> *"Up to now, 'Design the future of energy' has mainly been about our technology. But it's also about our employees behind this technology: We lay the foundation for them to freely use and develop their own energy."*

Dirk Christian Bender:
"Up to now, 'Design the future of energy' has mainly been about our technology. But it's also about our employees behind this technology: We lay the foundation for them to freely use and develop their own energy."

If you think about the years ahead and the advancement of globalisation, are there other factors that play a key role in making Bender fit for the future from your perspective?

Dorothea Bender Fernandéz:
"I think that there are two essential factors for the future. The first is the motivation to learn things quickly and to pursue constant further development. It is no longer enough to simply complete training and rest on this knowledge throughout your entire working life. Requirements are constantly changing, and we are already seeing what is possible when people actively use new technologies – such as AI – and how quickly they can learn with such technologies. This approach is becoming a critical prerequisite – not only for employees, but also for companies. Anyone who is unwilling to develop further will be left behind in the long run.

The second factor is not just to talk about having a global presence, but to actively pursue and use it. After all, actions speak louder than words. We now have nearly as many employees abroad as in Germany, and this internationality must come to the forefront even more. One important step involves Michael Breuer and the international management team. This team manages to work and listen on an equal footing across borders while appreciating other perspectives. We can all benefit from this approach. If we want to be truly global, we have a lot of work ahead of us – but we are doing it."

Dirk Christian Bender:
"I completely agree. I was initially driven by my desire to share my father's idea with the world. This was the cornerstone of our development from a German venture to a global company. Now, it's all about deepening this globality. I don't know what my father would say about that, but as he always loved freedom, I'm sure he'd be a fan – even if such an approach wasn't always a matter of course in the past."

Let's end by closing our eyes and thinking 20 years ahead, celebrating "100 years of Bender". What does the company look like in the year 2046?

Dirk Christian Bender:
"Electrical engineering will still be needed and will be even more complex. Global power connections, automation and robotics will continue to grow and will all require intelligent monitoring. Faults will no longer lead to red or green lamps; instead, they will demand concrete recommended courses of action.
Building on the last question, we will be more strongly anchored in individual countries – including those in which we are currently not yet active. We will develop products on site to meet the specific demands. Maintaining our strong family values despite globalisation will continue to be essential."

Dorothea Bender Fernandéz:
"That reflects my thoughts: In 20 years, Bender will have a different structure. It will probably no longer have a classic headquarters, but instead a number of stronger, country-specific units that develop solutions tailored to their respective markets. In terms of content, our role will have a stronger focus on consulting and complete solutions. Customers will come to us not only for a product but also because we understand and solve their problems. Our responsibility in this role will grow. Despite all the change, however, our core will remain the same: We listen to our customers and do not let go until we have found the ideal solution."

Dirk Christian Bender:
"Yes, our customers will still be pleased that we listen to them 20 years from now."

> *"Yes, our customers will still be pleased that we listen to them 20 years from now."*

From training to practice

As part of a training visit that spanned several days, Bender teamed up with its local distributor to share its expertise with the national railways in Slovenia and Croatia. The training sessions initially focused on theory, introducing participants to the technical possibilities of Bender products. In the subsequent practical units, concrete measurements were recorded – and some of the results obtained were quite surprising indeed.

A long-standing partner for the Balkans
The company BEKER, which is based in Slovenia, has been a reliable partner for Bender in the Balkans for many years. One of the company's main focuses is the electrical safety of railway applications. Given the strong interest among local qualified electricians, BEKER organised an exclusive training tour in consultation with Bender. The tour was held by Matthias Rohner, Market Segment Manager Railway, on behalf of Bender.

A training offer with a positive response
Training opportunities with practice-based content play a crucial role in the exchange of experiences concerning electrical safety in railway applications. A total of nearly 30 specialists from the local national railways – maintenance workers, engineers, systems managers and technicians – therefore participated in the training sessions in both Slovenia and Croatia. With content including a presentation on the possibilities of insulation monitoring in IT systems and the basic principles of residual current monitoring using RCMs, the training generated great interest among participants. When discussing residual current monitors, it placed a special focus on their benefits in the railway sector, especially in terms of ease of handling and automatic fault location. During the tour, the experts at Bender were able to answer many questions and incorporate practical examples from their long-standing experience in railway projects into the training.

A live demonstration with portable EDS cases
After completing the theory units, the training participants were taken directly to the systems, where they measured insulation resistance and located faults. At the relatively new signal control centre in Slovenia, the insulation resistance measurements recorded no abnormalities. As a result, an insulation fault was instead simulated so that the fault location could be demonstrated with the help of a portable EDS case.



In the railway sector in particular, Bender ISOMETER® devices help to improve safety and increase network availability.



"We are delighted that the topics of electrical safety and insulation monitoring received such a positive response from the participants."

Jure Oblak
Managing Director of BEKER

Tracking down the insulation fault

In contrast, the next day in Croatia involved a practical test with very different results. Here, the measurement revealed a low insulation resistance of 5 kOhm, which indicated the presence of an insulation fault. The trainer and participants therefore had to measure all lines, from the main line right through to the final loads. This approach enabled them to rapidly locate an insulation fault on a derail, which was verified by disconnecting the derail from the network and repeating the measurement. The result of this second measure confirmed the assumption, with the insulation resistance increasing back to 50 kOhm once the derail was disconnected. After reliably identifying the point of failure, the participants were then able to correct the fault.



The practical training session at the station in Croatia led to the detection of an insulation fault.

Satisfied users

The training participants were impressed by the speed and simplicity of the insulation fault location, so much so that they apparently passed on the information to their respective decision-makers. After all, just a short time after the training, we received a corresponding request that resulted in an order for five portable EDS cases for insulation fault location as part of a public call for tenders. The Croatian national railway can therefore now make the most of a new fast and efficient tool that will help to increase the availability of its network and reduce downtime significantly. In addition, further discussions on the other days of the training visit focused on the installation of modern insulation monitoring devices and suitable replacements for the IT networks installed at the stations. For Bender, the training tour once again underlined the importance of presenting technical solutions live and in person in order to improve future electrical safety on location.



"It is always a great experience to use the practical demonstration of insulation fault location to show just how quickly and easily the system functions."

Michael Miowitz,
Regional Manager EMEA
of Bender

"We were impressed to see how rapidly and easily insulation fault location can be performed. This is why we decided to purchase five EDS cases."

Tomislav Rendulić, Head Engineer for the maintenance and modernisation of devices for level crossings at HŽ INFRASTRUKTURA, Croatia

New Products from Bender

Modular residual current devices (MRCD) for reliable operation where conventional RCDs reach their limits

Bender introduces three new modular residual current devices (MRCD) for industrial installations. Developed in accordance with DIN EN 60947-2, Annex M, they are intended for applications where conventional residual current devices (RCDs) cannot be used.

Operating principle: The MRCDs measure residual currents via external measuring current transformers and evaluate them using adjustable response values. If a threshold is exceeded, they trigger the circuit breaker and initiate the automatic disconnection of the power supply.

The new devices cover different applications: The LINETRAXX® SmartDetect **MRCDB425-D** and **MRCDB425-L** are designed for measuring and monitoring all-current-sensitive residual currents in a frequency range up to 20 kHz (tripping characteristic type B/B+). With the LINETRAXX® SmartDetect **MRCD410R**, Bender also offers an MRCD for alternating and pulsed currents in a frequency range from 42 to 72 Hz (tripping characteristic type A).

All three devices combine measuring, alarming and protecting in one compact solution. They trigger the circuit breaker without delay at a response value of 30 mA; for response values >30 mA up to 3 A, a time delay can be set. In addition, early warning thresholds can be configured to trigger an alarm without switching off the monitored circuit.

The MRCDs are suitable for personal, fire and system protection in installations with high load currents, such as welding systems, crane systems, industrial lifts, medical systems or DC charging stations. A Modbus RTU interface and NFC parameterisation via the Bender Connect app support straightforward integration into existing monitoring systems.

https://www.bender.de/en/products/residual-current-monitoring/linetraxx-smartdetect-mrcdb/





Remote Control Panel RCP115 – local transparency for condition monitoring

The Remote Control Panel RCP115 complements the COMTRAXX® EDGE500IP with a local display directly at the installation. As a touch-based display unit, it accesses the web-based user interface of the EDGE500IP via Ethernet – without the need for additional software or external computers. Status, measurement and alarm information is therefore available exactly where fast decisions are required. This simplifies fault finding and supports higher system availability in day-to-day operation.

https://www.bender.de/en/products/communication/comtraxx-rcp115

COMTRAXX® EDGE500IP – flexible, clear and networked

As a smart interface for systems, COMTRAXX® EDGE500IP secures a simple and reliable connection to existing networks. It uses common protocols such as Modbus, SNMP, PROFINET or MQTT to centrally record, evaluate and visualise device statuses, measured values and alarms – directly in the web browser. COMTRAXX® EDGE500IP is operated via an integrated web interface, which grants users access to their systems at all times, even via remote access. Last but not least, its range of functions also includes three switching elements and eight digital inputs.

https://www.bender.de/en/products/communication/comtraxx-edge500ip





A new ISOMETER®

The device line welcomes the high-performance iso415R-1

With the ISOMETER® iso415R-1, Bender has now added a new solution to the range of its smallest insulation monitoring devices. The iso415R-1 can be used in unearthed systems up to AC/DC 400 V. It is powered by a DC 12...48 V supply and it is also suitable for monitoring de-energised systems.

Potential applications for the new device range from small AC/DC control circuits to DC 400 V networks in telecommunications systems.

The parameters of the ISOMETER® iso415R can be set using either the potentiometer embedded in the front of the device, the Modbus RTU interface or the Bender Connect App via the available NFC interface.

https://www.bender.de/en/products/insulation-monitoring/isometer-iso415r/

The new RCMS425 four-channel residual current monitors



With the LINETRAXX® SmartDetect RCMS425, Bender offers two new residual current monitors for earthed power supply systems. The devices, which were developed in accordance with the standard DIN EN 62020-1, can monitor four channels simultaneously and feature a Modbus RTU interface.

They are therefore ideal for monitoring electrical installations in buildings and industrial applications.

The monitors also contain a built-in wide-range power supply unit, eliminating the need for an external power supply.

The device parameters can be set both via the Modbus RTU interface and with the Bender Connect App via the existing NFC interface.

The RCMS425 is available in two variants: The RCMS425-L comes equipped with coloured LEDs that show the current status of the electrical installation, while the RCMS425-D features a coloured LCD display that provides even more information for an even quicker overview.

Both models are just 36 mm wide (2 HP).

https://www.bender.de/en/products/residual-current-monitoring/linetraxx-smartdetect-rcms/

Seminars and exhibitions



Image: AI-generated

At seminars and the following trade fairs, you are invited to exchange ideas with the electrical safety experts in person. Find out about the current events in the respective regions online.

Seminars for Electrical Safety

- Safe Power Supply in Earthed Systems
- Unearthed Systems in Building Services Engineering and Industry
- Safe Power Supply for Medical Locations
- Testing of Medical Electrical Devices
- Symposia

Seminars:
https://www.bender.de/en/seminars/

Trade fairs and events:
https://www.bender.de/en/company/exhibitions/

We also offer customised in-house training and, in conversation with you, determine your individual training content.

Please contact us at:
global.contact@bender.de

A social-electrical project in Ethiopia creates real prospects for the future

Five years ago, we initiated our ongoing cooperation with the relief organisation SELAM to support the vocational training of young people at the Technical Vocational College (SDR-TVC) in Addis Ababa, the Ethiopian capital. We recently had the opportunity to meet some of the young individuals at the college in person and ask them about their experiences.

Better opportunities to secure good jobs

The primary objective of our involvement in the project in Ethiopia is to provide young people with genuine prospects for the future, particularly given that vocational training is by no means the norm in the African country. The courses provided by Bender@SELAM offer young men and women significantly better opportunities to secure good jobs, enabling them to build a solid future for themselves and their families.

Vocational training in two disciplines

The trainees participating in the Bender@SELAM project can choose between two specialisations: Building Electrical Installations (BEI) and Industrial Electrical Engineering and Control Technology (IEECT). The regular courses take place over a period of one to four years. The project additionally offers a variety of short-term training programmes lasting just six months. Our donations are primarily used to purchase teaching materials, tools, equipment and consumables for the college.

A multitude of successful qualifications

Since the project was first launched, a total of 18 long-term and 27 short-term participants have successfully completed their vocational training. Thirty-nine young people embarked on their training programmes in 2024, and currently, 74 long-term trainees are completing level 4 of the various training phases (levels 1 to 4).

Visiting the heart of the project

While visiting the learning facility in Addis Ababa in person, we had the opportunity to speak with some of the trainees about their training and their aspirations for the future. These chats soon confirmed that their time at SELAM is the ideal preparation for their future careers, above all thanks to the project's well-equipped workshops, teaching with a practical focus and committed instructors.

Plans both big and small

Many of the trainees already know exactly what their futures should hold: After qualifying from their training programmes, they first want to earn money as employees before going on to complete further training. They ultimately want to establish their own companies so that they can, in turn, create jobs for others. Other trainees plan to head to university to complete their chosen degree.

If you would like to find out more about the project, be sure to take a look at the personal videos of the trainees in the Bender@SELAM class. You can find the videos here:

https://www.bender.de/en/company/corporate-responsibility/selam/

"My dream for the future is to run a large company that will allow me to offer jobs for many disadvantaged individuals."

Kaleab Hailemeshel,
19 years old





"I like the teaching methods used by our instructors. We are always learning something new, especially during the practical units."

Amanuel Kefalew,
20 years old

Background information: young people and employment in Ethiopia

Ethiopia has a population of around 126.5 million. The nation's economy has experienced continuous growth in recent years, but is still facing a major challenge in the form of a high unemployment rate among young people. In fact, in the capital city Addis Ababa, approximately 33 % of the population is aged between 10 and 24 years old, and 29 % of these residents are currently unemployed.

Although Addis Ababa offers technical and vocational education and training (TVET) programmes, young people from low-income families are often unable to afford the training fees. Furthermore, some TVET institutions also struggle due to outdated equipment, limited internet access and insufficiently trained staff and are therefore unable to offer training opportunities with close links to practice. Factors such as rapid population growth and mass migration into cities only exacerbate the competition for vacant positions within Addis Ababa.

Ethiopia's young population also represents a significant opportunity for economic growth. However, further targeted investments in qualified vocational education are required to lastingly improve employment prospects for all young people.

"The training standard is high. SELAM provides us with good vocational training and allows us to acquire knowledge that other schools do not offer."

Helagenet Fiseha,
19 years old





"My dream for the future is to complete further training and become a qualified electrical engineer."

Natnael Mesfin,
21 years old



Critical infrastructure has to function reliably at all times – examples from practice

The term “critical infrastructure” covers a multitude of extremely varied installations, systems and devices, for example large-scale solar installations and battery energy storage systems (BESS); hospitals and waterworks; and data centres and trains. All of these systems have to function reliably at all times. Bender solutions help to ensure an uninterruptible supply by making electrical installations both intelligent and safer.

Water and sewage treatment plants: simplified DGUV V3 inspections

Inspections of electrical installations pursuant to the German DGUV V3 regulation are demanding in terms of both time and personnel. Plants that form part of the critical infrastructure also face the huge problem of having to put their systems in an idle state during the inspection, which can, in the worst-case scenario, take several days.

The water supplier Wasserverband Süderdithmarschen has now taken steps to significantly simplify its DGUV V3 inspections: As part of a modernisation process, it integrated residual current technology by Bender into its system for the permanent monitoring of its electrical installations. This monitoring replaces the time-consuming RISO measurements performed during the DGUV V3 inspection, enables early detection of insulation faults and increases the transparency of the entire electrical installation.

You can read more about this electrical safety project for the critical infrastructure on the Bender website:

https://www.bender.de/en/know-how/applications/simpler-periodic-inspection-in-water-and-sewage-treatment-plants/

Battery energy storage systems (BESS): detecting earth faults more rapidly

BESS play an important role in the integration of renewable energies and the stabilisation of power networks. In turn, they also make an important contribution towards the energy transition. Electrical safety is a key factor for efficiency, fail-safety, fire protection and workplace health and safety when using battery energy storage systems.

In the Bender blog, you can read more about the importance of detecting earth faults rapidly, the solutions that Bender has developed to achieve this and the advantages provided by these solutions.

https://www.bender.de/en/blog/post/why-an-insulation-fault-can-jeopardise-your-large-battery-storage-system/





Railway: fire protection thanks to certification

Severe train accidents are rare, and thankfully, accidents in which trains catch fire are even more uncommon. This is partly thanks to the strict fire protection regulations that are in place. The international standard EN 45545, for example, regulates fire protection on railway vehicles and stipulates that only non-flammable or extremely flame-resistant components are permitted in trains.

Bender products for railway vehicles are certified according to EN 45545. In the Bender blog, you can read more about fire protection in trains and discover the advantages that Bender's certified railway products offer railway vehicle manufacturers and their suppliers.

https://www.bender.de/en/blog/post/safe-rail-travel-with-fire-protection-certification/

Residual current monitoring to the final circuit: more safety for complex installations

Monitoring via residual current technology is a proven solution wherever an uninterruptible power supply is required, but an unearthed power network (IT system) cannot be used. Differentiated and precise monitoring of complex installations such as data centres – right up to the final circuit – plays an essential role in electrical safety.

To achieve this, Bender has developed special residual current monitoring systems that can be used to detect leakage currents and fault currents of individual loads in electrical installations at an early stage. You can find out more about residual current monitoring to the final circuit on the "Know-How" pages of the Bender website.

https://www.bender.de/en/know-how/technology/residual-current-monitoring-to-the-final-circuit/

Large-scale solar installations: increasing fail-safety with insulation monitoring

Solar power is a central pillar of a sustainable energy supply and therefore forms part of the critical infrastructure. To detect and prevent failures caused by weather influences or animals at an early stage, insulation monitoring is a prescribed requirement for large-scale photovoltaic power plants with unearthed networks (IT systems).

As a leading renewable energy specialist, the company BayWa r.e. operates a total of 94 renewable energy projects with an installed power of more than 870 MW in Germany alone. When running its solar power plants, it puts its trust in customised insulation monitoring devices made by Bender.

Read more about why BayWa r.e. uses the Bender ISOMETER® isoPV1685DP here:

https://www.bender.de/en/know-how/applications/solar-power-plants/





Hospital ship: Electrical safety on board

A stable power supply is important in hospitals to protect both patients and staff against possible harm. The importance of electrical safety increases even more when the hospital in question is located on a ship, for example the Global Mercy™, a hospital ship of the aid organisation Mercy Ships.

To avoid recurring insulation faults, Bender comprehensively retrofitted the ship's electrical infrastructure with transformers, ISOMETER® and ISOSCAN® systems. As a result, the responsible specialists on board can now instantly identify the location of a fault and work to correct it, instead of having to switch off the system and search for a long time.

Here you can read more about how the retrofitting was carried out and how it increased on-board safety:

https://www.bender.de/en/electrical-safety-on-the-global-mercy-hospital-ship-bender/



Interview Michael Breuer

Managing Director and CEO

Professional background
Michael Breuer has been working for Bender for more than 15 years. After completing his dual programme of study and training to achieve a bachelor's degree in Electrical Engineering and finishing his master's degree in Business Administration, he initially worked in service, sales and product management. In 2019, he moved to Singapore, where he worked with the team to further develop the APAC region. He returned to Grünberg as our new CEO in mid-2025.

My electrical safety experience
The birth of my son was an extremely moving experience in more ways than one. In the operating theatre, I saw a control panel made by Bender, and – especially given the intensity of the situation – it was good to know that electrical safety was guaranteed. This gave me a sense of calm in an otherwise rather hectic experience. It yet again reminded me of the responsibility involved in our day-to-day work.

What is it like being back in Grünberg after six years in Singapore?
It is good to be back. I am pleased that I still know so many people here and I am enjoying getting to know all the new faces.

What experience have you brought back with you?
Openness, tolerance and above all humility. In Singapore, I learned that there is often more than one way to approach a task. And I understand how important it is for a company to speak the language of its customers and for employees to communicate effectively with one another within a globally operating organisation. Of course, communication starts with language, which is why a key objective of our international cooperation must be to strengthen English as our shared working language: to make communication easier across borders, to break down silos and to offer our employees more international development and career prospects.

Not everyone will be a fan of this change. Is that a problem?
No, but we are not aiming to please everyone. It is about securing our future. The world keeps on turning, and as a result, the demands that we face as a company have changed. We need to meet these demands to make our company fit for the future. I do, of course, understand that change can be unpleasant at first, even if it makes sense.

To what extent have the demands changed?
The environment, technologies and Bender itself have changed. Innovation is becoming increasingly networked and data-based. At the same time, Bender – like every other company – faces the challenge of permanently adapting its processes and approaches to suit the current environment and the size of the company. As a result, it is often the case that things that once functioned perfectly suddenly no longer work and instead cause chaos. It is therefore important that we precisely observe and analyse how we can provide our customers with the best possible support and how we need to adapt.

At the age of 38, you are quite young for a CEO. Is that a problem?
Age alone does not manage a company. Instead, experience, attitude and the ability to build strong teams all play a key

role. Whether I am good or bad at my job depends on these factors rather than my age. I have been working for the company for more than 15 years and I have already held international responsibilities and managed large divisions. This gives me a solid foundation. At the same time, I provide energy and a fresh approach. I consider this combination to be a strength.

How do you want to change Bender?

"From this, we will develop a plan, step by step. We will actively approach anything that brings us closer to our objective and reject anything that does not."

For me, the first step is not only to secure a sustainable, competent management level but also to incorporate the group strategy across all divisions in a uniform, comprehensible way. This starts with our vision and extends to what we will specifically offer the market in the future and how Bender will look in this environment. From this, we will develop a plan, step by step. We will actively approach anything that brings us closer to our objective and reject anything that does not. Our current focus and actions need to be based precisely on this plan.

Do you have any concrete examples?

Yes. We have already clearly defined our strategic objectives and we are currently working on shaping our long-term corporate strategy. We aim to conclude this work this autumn.

What do you think about the latest technological developments?

We are currently experiencing an extremely dynamic period. Disruptive technologies such as AI are leading to extensive changes. The effects of these changes are also impacting us, meaning that we will need to make disruptive decisions, for example in our portfolio, in our business models and in how we cooperate within the company. This is not about change for the sake of change, but about becoming faster, setting clearer priorities and using technologies in a targeted manner, precisely where they provide our customers with real added value. We therefore need to listen to our customers carefully and ask them what they need.

"This is not about change for the sake of change, but about becoming faster, setting clearer priorities and using technologies in a targeted manner, precisely where they provide our customers with real added value."

And what is your opinion of the market development?

It clearly involves more competition, especially when it comes to individual components, growing expectations placed on systems and companies, standards changing more rapidly and much more. At the same time, our customers still want to receive one thing: real benefits. Nowadays, these benefits often arise from what we do with the information provided by current devices and systems. Our devices will continue to play a central role in the future. Simultaneously, it is becoming increasingly important not only to process the data generated efficiently but also to analyse it intelligently and translate it into concrete added value.

Does that mean that Bender is facing an upcoming technology leap?

Yes, this is likely, and we view it as our objective. Bender needs to reinvent itself, above all with regard to how we want to create added value for our customers. We have always been known for our strong consulting skills as experts in our field, and this will remain the case in the future. The difference lies in how customers expect to receive these benefits from us and how we provide them.

That means evolving from a component supplier to a system partner?

Exactly. With our solutions, we are part of a larger system, which we need to view as a whole. This is why we are gradually expanding our expertise and working intensively to process the data volumes available to us in such a complex system. This is an extremely exciting development because the need for safe and efficient electrical systems is sure to continue to grow in the future.

Does that apply to critical infrastructure, too?

Definitely. Take AI and the exponential increase in its use, for example. As a result, increasing server performance is required in data centres, and electrical safety and energy efficiency must be maintained at all times. Technical solutions are therefore required to reliably guarantee this performance. With our sensors, software and measuring instruments, we are at the source of the information and we can deduce the next steps. This is a huge and extremely exciting task.

To wrap up, what does Bender mean to you?

To me, Bender means trust.

"To me, Bender means trust."



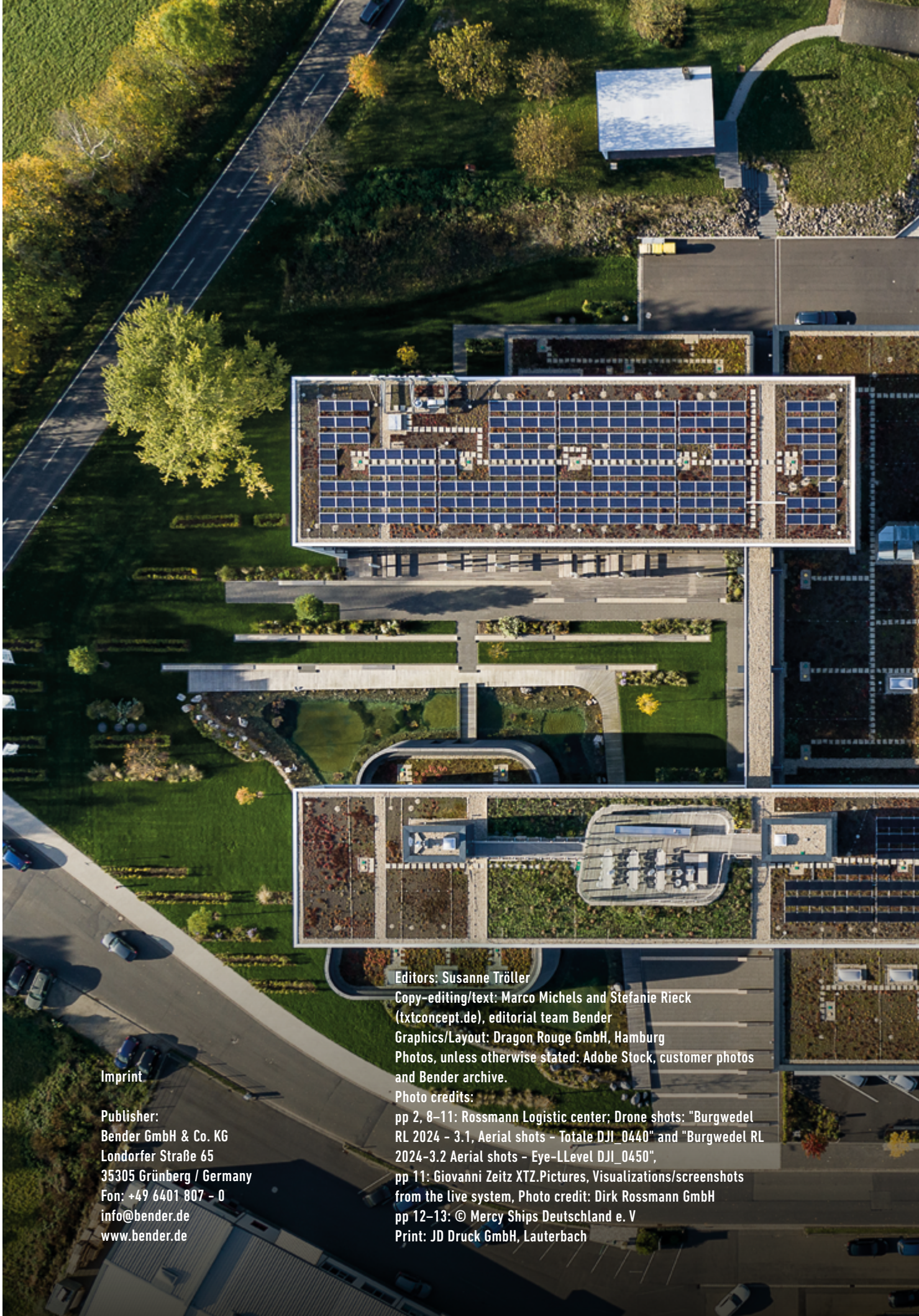
Dorothea Bender Fernandéz,
Chair of the Advisory Board of Bender

Electricity is dangerous. So is no electricity.

When it comes to the electrical monitoring of complex systems, we are right by your side – and that is precisely what we want to show you in this MONITOR issue. After all, we consider the topic of critical infrastructure to be essential, as is reflected in our corporate mission: Where there is electricity, there is Bender. That's why at Bender, we develop intelligent solutions that allow you to use it safely. Reducing the risks and trying to predict the unpredictable is our way of having a positive impact on the world.
This has always been the case – and will continue to ring true in the future.

80 years. One DNA.
When reading this issue, you will also find out that this mission is firmly anchored in the Bender philosophy. Although technology and systems have undergone significant changes over the past 80 years, our core focus has remained the same since our company was founded: using monitoring solutions to protect people from the risks of electricity. The fact that this DNA has remained the same right through to the present day makes me feel very close to my grandfather, Walther, and my father, Dirk Christian.

1,300 employees. One future.
In fact, I feel this close connection not only with my family but also with the entire Bender team. This may sound a bit cheesy, but that is fine by me: I am often so impressed by what our employees make possible. For me, having so many intelligent minds in so many different corners of the world working to further develop Bender on a day-to-day basis is by no means the norm. I am extremely grateful for this – and delighted to look forward to the future with a positive outlook. After all, we remain committed to the same goal: working with our customers and partners to develop solutions that will continue to make electrical safety controllable across the globe.



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