

# Industry Applications



For Healthcare Facilities, Manufacturing,  
Oil & Gas, Energy Storage, Rail, EV, Harbors &  
Vessels, Data Centers, Mining, and more

Design the future  
of energy



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**Design the future  
of energy**

For over 75 years, our mission has been to make electrical power safe. Our wide portfolio of cutting-edge electrical safety and monitoring products are used in virtually every industry – healthcare, solar, oil and gas, electric vehicle, mining and many more.

With offices in over 70 countries around the world, Bender provides standard and customized solutions and services to meet our customers' individual needs.

## Commercial Kitchens



- 1 PowerGuard\***  
Ground fault protection and interruption for personnel and equipment protection
- 120, 208, and 240 VAC applications providing ground fault protection with interruption
  - Designed with robust filtering to reduce nuisance tripping without compromising safety
  - Wall mountable adjacent to appliances for easy access to test and reset functions
  - Designed for personnel protection in wet areas with single- or 3- phase equipment such as fryers, ovens, and dishwashers

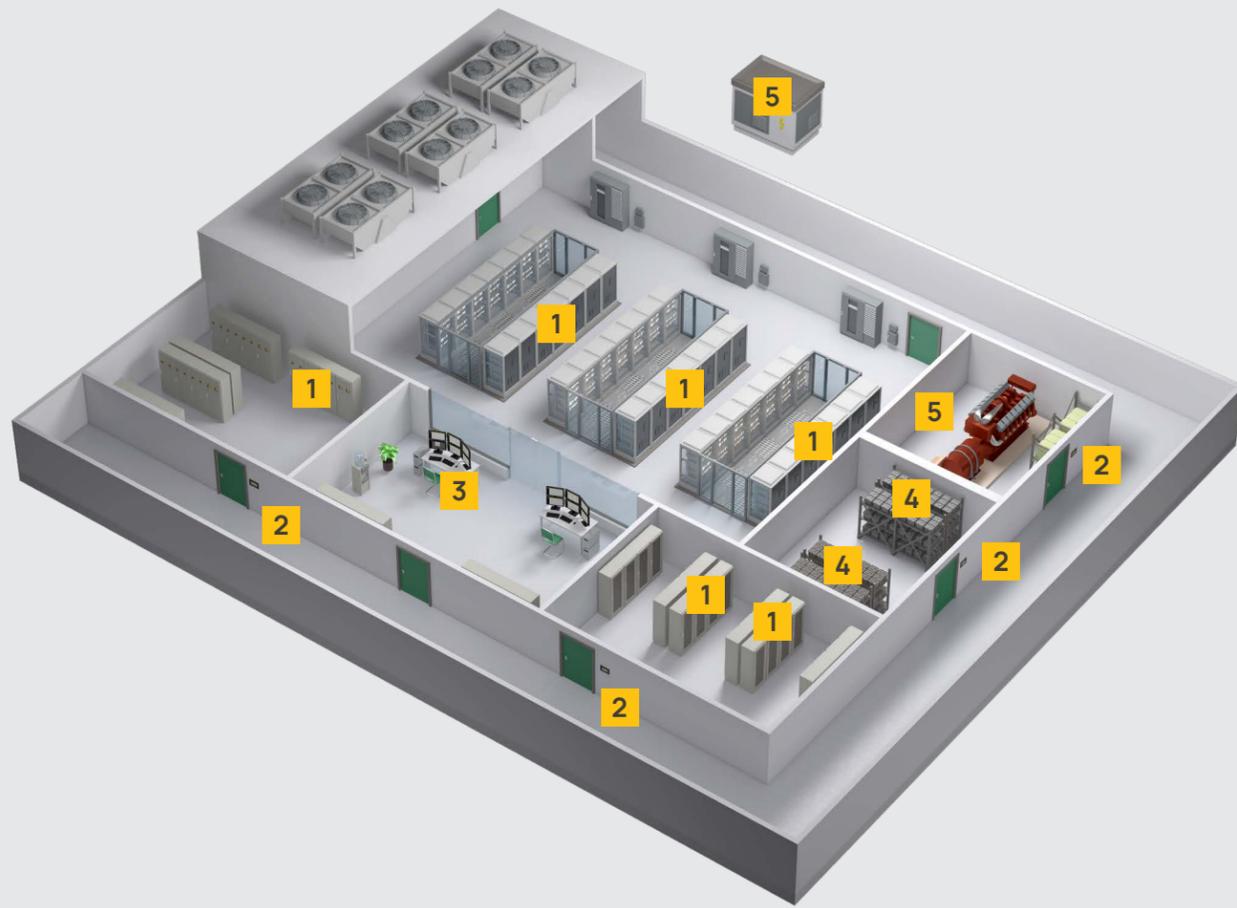
*\* Availability planned Q1 2025*

In commercial kitchens, the combination of a wet environment, stainless steel equipment, conductive surfaces, and combustible materials increase the risk of electrical shock incidents and fires. Adherence to sanitation standards necessitates the mobility of cooking and cleaning equipment, leading to the use of plug-and-cord connections. The cords used for this purpose are

susceptible to damage over time and exposure to moisture, making them vulnerable to ground fault and shock risks. The use of GFCI protection in a commercial kitchen where liquid, heat, and electricity are used simultaneously is critical. PowerGuard provides a proactive way to isolate hazards in commercial kitchen environments and eliminate shock risk.



# Data Centers



Data centers are designed to operate without interruption and guarantee system availability through built-in redundancy. A data center demands high performance and optimal use of resources in a way that is economically efficient. A failure of these critical systems can entail significant costs.

These failures can be immediately recognized and mitigated if the electrical power system is continuously monitored. Bender devices are permanently installed and monitor critical electrical systems to ensure safe and continuous operations.

**1** **Residual Current Monitors (RCM, RCMA, RCMS and RCMB Series)**  
\* Monitor AC and DC Solidly Grounded and Resistance Grounded Systems

- Recognizes, locates, and prevents destructive ground-fault conditions for service entrance equipment, automatic transfer switches, and power distribution units
- Minimizes unplanned outages and eliminates the need to interrupt power to identify faulted circuits
- Monitors a wide range of frequencies and filters select harmonics that can cause nuisance tripping or damage

**3** **Powerscout® (Monitoring Software)**  
Cloud-based software solution to monitor critical power systems

- Offers a fully customizable dashboard to monitor and troubleshoot all connected Bender devices
- Optimizes continuity of service and reduces costs associated with equipment downtime by analyzing, predicting, and reporting potential causes of electrical failure

**5** **High Resistance Grounded Systems (HRG Series)**  
Improve electrical safety and reliability of grounded generators and substations

- Reduces the probability of an arc-flash incident by limiting the current of the initial phase-to-ground fault
- Enables continuous operation of critical loads during a ground fault to minimize system interruption
- Ensures system reliability by actively monitoring for short-circuit and open-grounding-resistor conditions

**2** **Condition Monitors (CP Series)**  
Human Machine Interface that allows the connection of Bender and third-party devices

- Offers centralized testing and monitoring of all connected Bender and third-party devices
- Enables quick and easy access to reporting functions
- Allows for remote troubleshooting, programming of settings, and running system diagnostics

**4** **Insulation Monitoring Devices for Battery Backup Systems (iso Series and EDS Series)**  
\* Monitor AC and DC Ungrounded Power Systems

- Minimizes unplanned outages and eliminates the need to interrupt power to identify faulted circuits
- Allows for proactive planning of system maintenance by trending insulation deterioration over time
- Eliminates labor-intensive fault location procedures and automatically identifies faulted circuits



\* This symbol indicates the product technology has unique features either patented by or exclusive to Bender

# Electric Vehicles



From inside the car to charging stations, Bender devices provide a complete solution for mitigating risks of electric shock, equipment failure, and fire damage. Our devices are designed specifically for integrating into electric vehicles, as well as level 2 and level 3 (fast DC) charging stations. Designed in compliance with requirements such as UL 2231, NEC article 625, and SAE standards, our equipment provides a simple, easy-to-integrate solution for your electrical safety requirements.



## 1 Insulation Monitoring Devices & Isolation Monitor Interrupters (iso175)

\* Isolation detection in electric vehicles

- Allows for continuous monitoring of the entire electrical system for loss of isolation, enhancing knowledge of EV's electrical safety status at all times
- Compatible with all electric vehicles currently present on the market, allowing for easy interfacing with any EV
- Superior measurement for the entire circuit - from battery to the drive train, providing accurate readings that allow for precise decision making
- Adapts fully to varying Y-caps, eliminating the headaches the Y-cap poses for proper functioning of an IMI

## 3 Insulation Monitoring Devices (isoEV425 & ISOCha425)

\* Isolation monitor interrupter for level 3 DC fast chargers

- Fulfills UL, SAE, and Chademo requirements, automating the compliance process for the required standards
- Provides electrical safety from shock hazards, eliminating risk and potentially saving lives
- Fully compliant with local and international standards, enabling smooth integration in accordance with the requirements
- Accurate monitoring and interrupting of high-voltage circuits, providing more functional safety

## 5 Residual Current Monitors (RCMB104-xx)

CCID5 & 20 ground-fault functionality for fast interrupting

- Fulfills UL & IEC requirements for ground-fault interruptions in EVSE, making it universally applicable
- Capable of accepting various larger current transformer sizes that are adjustable to any power configuration
- AC & DC capable, enabling handling of a wide range of currents and power
- High accuracy over a wide temperature band, providing stable readout in all conditions

## 2 Electrical Vehicle Charge Controllers (CC613)

Charge controller for level 2 chargers

- Combines electrical safety requirements of AC charging points with the vehicle charging requirements, offering true functional safety and all encompassing charge operations in one unit
- Compatible with all electric vehicles currently present on the market, enabling the client to create a universal charge solution
- Fully functional interface and compliant with OCPP protocols allowing for easy interconnection to any backend
- Enables advanced load management functionality for intelligent power management
- Provides ability to create a fully functional charging network, eliminating the need for constant upgrades

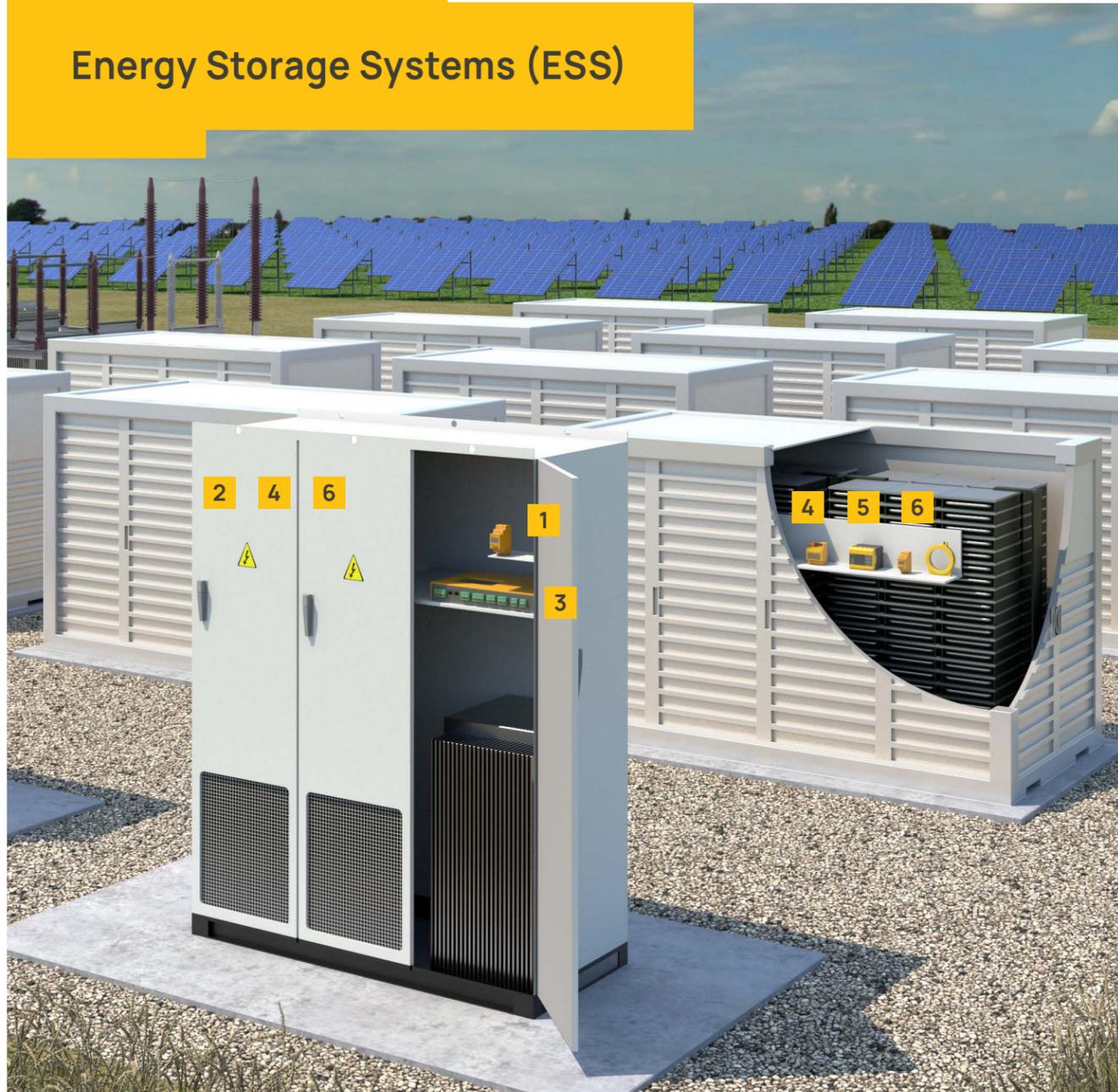
## 4 Residual Current Monitors (RCMB121-xx)

\* CCID5 & 20 ground-fault functionality for fast interrupting

- Fulfills UL & IEC requirements, offering global compliance
- Charge current interruption on ground faults leading to added safety for the operator
- AC & DC capable, capturing all currents and fulfills the EU DC directive
- High accuracy over a wide temperature band, providing stable readout in all conditions
- Sensors incorporate all necessary electronic circuitry, simplifying the electronic design by pre-integrating all necessary functions

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# Energy Storage Systems (ESS)



As power generation around the world evolves to meet demand, more smart grids require efficient, environmentally-friendly methods of generating and storing electricity. Advances in photovoltaics and battery storage systems bring new challenges in proper protection of personnel and equipment.

Smart grids demand smart electrical safety. Bender monitoring equipment uses the latest technology to ensure accurate, quick readings on arrays and battery systems of virtually all sizes. With a wide range of communication options, Bender devices integrate easily into industrial networks – including Ethernet and Modbus.

**1** **Insulation Monitoring Device for Inverters (isoPV425 + AGH420)**  
Monitor AC and DC Ungrounded Power Systems ( $\leq 100$  kW)

- Protects essential inverters from damaging ground-fault incidents and potential fire damage for systems up to 1,000 VDC
- Offline monitoring feature prevents the inverter from energizing into a ground-fault condition

**3** **Insulation Monitoring Device for Inverters (isoPV1685)**  
\* Monitor AC and DC Ungrounded Power Systems ( $\geq 1$  MW)

- Protects essential inverters from damaging ground-fault incidents and potential fire damage for systems up to 1,500 VDC
- Eliminates labor intensive fault location procedures by isolating faulted circuits automatically
- Offline monitoring feature prevents the inverter from energizing into a ground-fault condition
- Communicates all recorded values directly to personnel with Modbus® RTU or CAN bus protocol

**5** **Insulation Monitoring Device for Battery Storage Systems (iso685-D-P) + Earth Detection System (EDS 44x Series)**  
\* Monitor AC and DC Ungrounded Power Systems with Automatic Fault Location

- Minimizes unplanned outages and eliminates the need to interrupt power to identify faulted circuits
- Eliminates labor intensive fault location procedures by isolating faulted circuits automatically

**2** **Insulation Monitoring Device for Inverters (isoPV + AGH-PV)**  
Monitor AC and DC Ungrounded Power Systems ( $\leq 1$  MW)

- Protects essential inverters from damaging ground-fault incidents and potential fire damage for systems up to 1,100 VDC
- Offline monitoring feature prevents the inverter from energizing into a ground-fault condition

**4** **Residual Current Monitors (RCM, RCMA, RCMS, RCMB Series)**  
\* Monitor AC and DC Solidly Grounded and/or Resistance Grounded Systems

- Recognizes, locates, and prevents destructive ground-fault conditions for power conversion equipment
- Minimizes unplanned outages and eliminates the need to interrupt power to identify faulted circuits
- Monitors a wide range of frequencies and harmonics that contribute towards nuisance tripping or damage

**6** **Ground Loop Monitor for Battery Storage Containers (GM420)**  
Monitor and Detect deterioration of a grounding conductors

- Safeguards grounding and bonding connections to containers which are often overlooked during initial design
- Creates a safer working environment by reducing the risk of voltage potential on a storage container



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## Harbors & Vessels



Bender has a history of offering comprehensive know-how and solutions for safer power for maritime applications, including civilian, commercial, military, cranes and container handling systems. Our extensive experience in this industry has allowed for the development of devices which can withstand extreme environmental conditions. Bender works in close cooperation with the manufacturers of gantry crane systems to optimize protection against electrical faults and guarantee the safety of the operating personnel.

Additionally, today's recreational marinas and docks are filled with many potential electric hazards such as refrigerators, lighting, electric motors and pumps. Electrocutation is the leading cause of death, injury and equipment damage in marinas and docks. Bender MarinaGuard® products help alert, locate, and de-energize faulted circuits which reduces the potential for Electric Shock Drowning (ESD) in fresh or salt water applications.

### **1** **\*** **Insulation Monitoring Device for Shore and Ship Power Systems (iso685-D-P) + Earth Detection System (EDS 44x Series)** Monitor AC and DC Ungrounded Power Systems with Automatic Fault Location

- Minimizes unplanned outages and eliminates the need to interrupt power to identify faulted circuits
- Safeguards critical motors and pumps while improving continuity of service
- Eliminates labor-intensive fault location procedures by identifying faulted circuits automatically

### **3** **High Resistance Grounded Systems (HRG Series)** Improve electrical safety and reliability of emergency generators and shipyard cranes

- Reduces probability of an arc-flash incident by limiting current of the initial phase-to-ground fault
- Minimizes system interruption and enables continued operation of critical loads during ground-fault conditions
- Ensures system reliability by actively monitoring for short-circuit and open-grounding-resistor conditions

### **5** **\*** **Protection against electric shock drowning (MarinaGuard®)** Sensitive ground-fault protection for marinas and docks

- Protects against hazardous ground-fault current to comply with NEC Article 555 and CEC Clause 78-052 requirements
- Type 4X enclosure with a high visibility strobe that flashes when an electrical hazard has been detected

### **2** **Ground Continuity Monitoring (GM420, RC48C)** Monitor and detect deterioration of grounding conductors

- Reduces the risk of shock potential by monitoring grounding and bonding connections for shipyard cranes and shore-to-ship conductors
- Actively monitors for ground and cable deterioration in corrosive saltwater environments
- RC48C termination device meets the IEC/IEEE 80005-1 equipotential bonding specification for high voltage shore connections

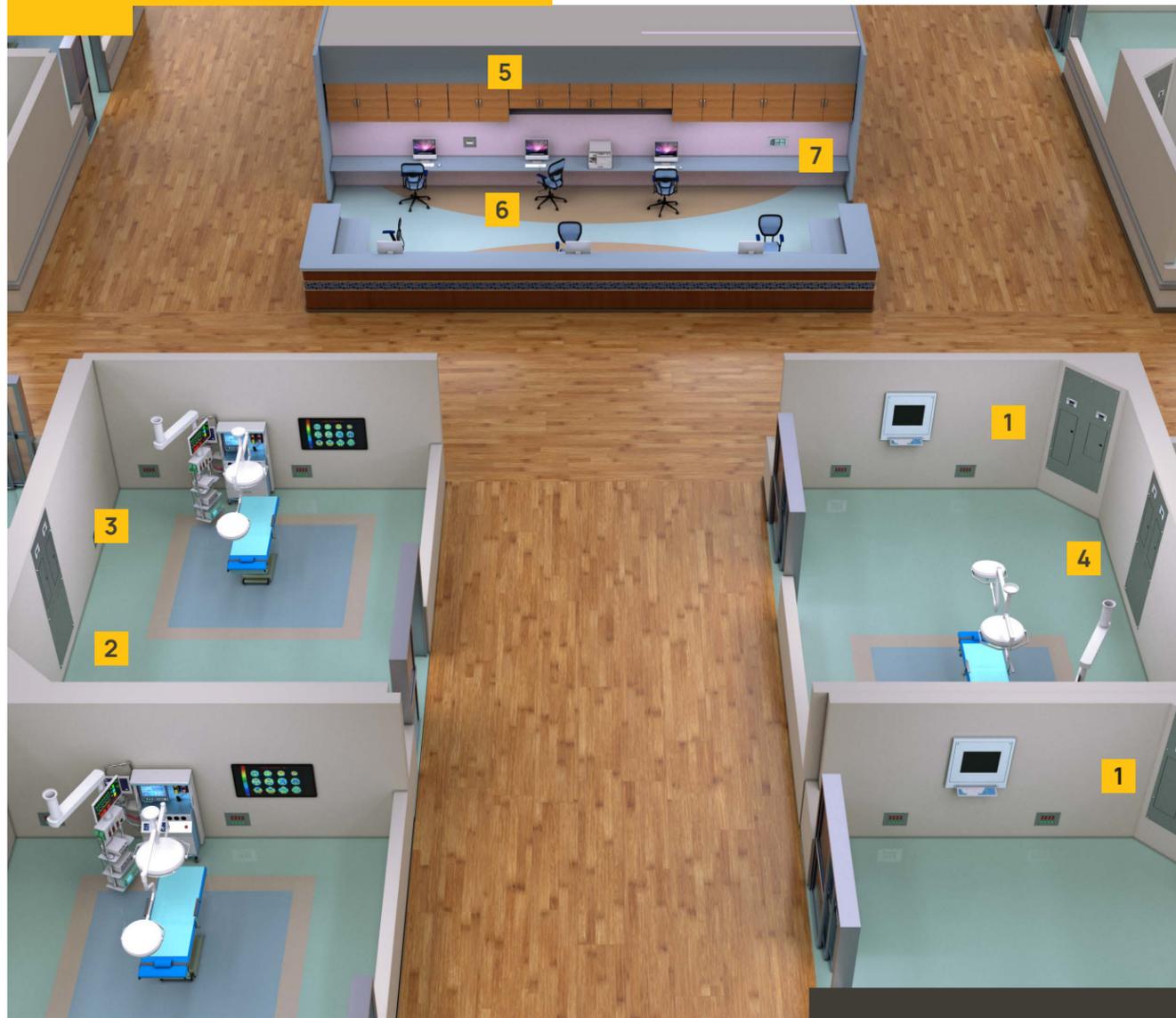
### **4** **\*** **Residual Current Monitors (RCM, RCMA, RCMS, RCMB Series)** Monitor AC and DC Solidly Grounded and/or Resistance Grounded Systems

- Detects and locates ground faults in power conversion equipment
- Minimizes unplanned outages and eliminates the need to interrupt power to identify faulted circuits
- Monitors a wide range of frequencies and harmonics that contribute towards nuisance tripping or damage



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## Healthcare – General



Standards such as NFPA 99 and CSA Z32 require isolated power systems in all areas deemed “wet procedure locations” in healthcare facilities. Isolated power systems offer an invaluable advantage – early detection of ground faults allowing for critical systems to remain online in a single fault condition.

Bender isolated power panels provide power to electrical systems in operating rooms and other critical care areas. Utilizing the newest technology and complying with the latest standards and code requirements, Bender equipment ensures that electrical ground faults are detected and located quickly and automatically.

### 1 Modular Isolated Power Panels (MIP, MIE, MIX, MIC, MID Series) Monitor ungrounded power systems

- Protects against electrical shock, keeping patients and staff free from harm while maintaining uptime
- Guarantees continuity of power throughout the isolated system inside the room during single-fault condition
- Convenient, modular design allows end-users to upgrade to advanced features on-site, eliminating the need to utilize a factory or send away for upgrading
- Continuous ground-fault monitoring, providing advanced warning of faulty medical equipment

### 3 Ground-Fault Location System (EDS441/EDS151) \* Locate ground faults on isolated power systems

- Improves patient and staff safety by empowering staff to easily diagnose issues rather than temporarily silencing the alarm and continuing under a potentially hazardous condition
- Provides exact circuit detection, saving cost by reducing downtime of critical care rooms and reducing maintenance hours spent troubleshooting

### 5 Communications Gateway (COM465IP) \* Gateway for Bender devices to Ethernet-TCP/IP networks

- Allows Bender panels to communicate with remote panels and building management systems (BMS), providing system condition values to facilities and maintenance staff
- Provides a convenient way to connect third-party devices into the hospital BMS without additional gateways

### 7 Monitoring and Control Station (CP9\* Series) \* Human Machine Interface that allows the connection of Bender and third-party devices

- Allows hospital staff to view and control all Bender devices as well as third-party devices (HVAC, surgical lights, etc.) from a centralized location

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### 2 Line Isolation Monitor (LIM2010) Monitor isolated ungrounded system

- Measures the system's leakage impedance to ground to ensure safe leakage levels per code requirements
- Eliminates interference with electrical medical equipment connected to the isolated power panel
- Allows for interfacing with other Bender devices to provide a complete system solution

### 4 Current Monitoring System (CMS460 & STW3) \* Circuit current monitoring for isolated power systems

- Eliminates risk of unexpected loss of power and loss of critical devices connected due to tripping of mainbreaker
- Prevents unexpected tripping of branch circuit breakers, improving continuity of power and patient outcomes

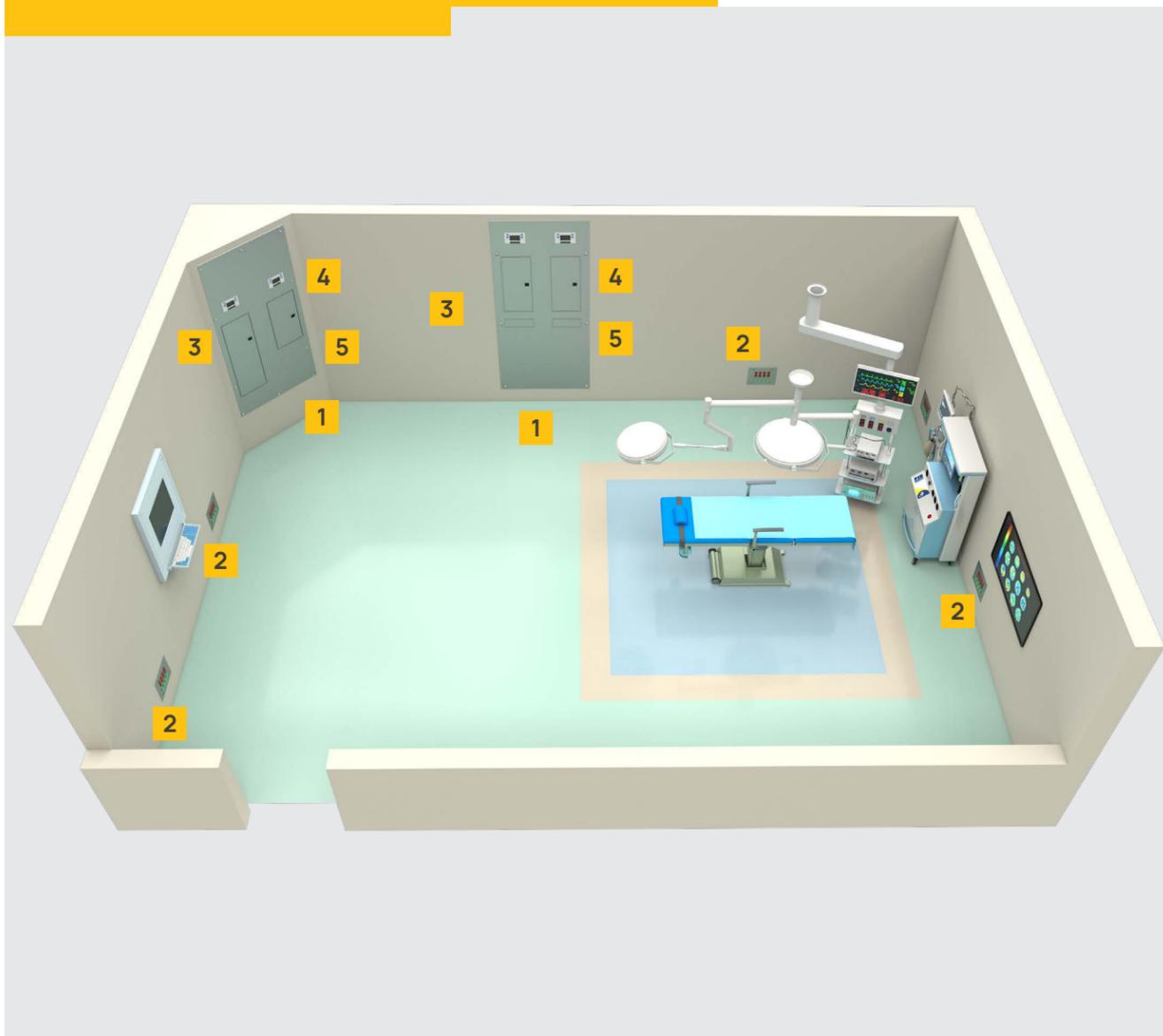
### 6 Remote Indicator Station (CP305) \* Indication system for Bender devices in hospital nurse stations

- Easy to read back-lit LCD display with indication of system status and alarms for all Bender devices connected in the same system network
- Provides monitoring of multiple LIM's statuses to nurse's station or other room where information is needed

### 8 Healthcare Field Services Commissioning and Testing Programs

- Capable of maintaining and retrofitting equipment from any manufacturer
- Specialized, around the clock services with 100+ years of combined experience in isolated power systems
- Highly skilled technicians that can perform annual and/or bi-annual testing on any make or model of isolated power panel per NFPA 99 requirements

# Healthcare – Operating Rooms



Bender Isolated Power Systems are depended on by thousands of healthcare facilities in more than 40 countries. Isolated Power Panels, Line Isolation Monitors (LIMs) and Accessories are installed in NFPA 99 defined “wet procedure locations” including Operating Rooms, ICUs, Cardiac Catheterization Labs, LDRs, and more.

Isolated power systems offer an invaluable advantage – early detection of ground faults have the potential to save medical facilities operating budget and patient lives.

## 1 Modular Isolated Power Panel (MIP, MIE, MIX, MIC, MID series) Monitor ungrounded power systems

- Convenient, modular design allows end-users to upgrade to advanced features on-site, eliminating the need to utilize a factory or send away for upgrading
- Guarantees continuity of power throughout the isolated system inside the room during single-fault condition
- Continuous ground-fault monitoring, providing advanced warning of faulty medical equipment

## 3 Line Isolation Monitor (LIM2010) Monitor isolated ungrounded systems

- Measures the system’s leakage impedance to ground to ensure safe leakage levels per code requirements
- Allows for interfacing with other Bender devices to provide a complete system solution

## 5 Current Monitoring System (CMS460 & STW3) Circuit current monitoring for isolated power systems

- Eliminates risk of unexpected loss of power & loss of critical devices connected due to tripping of mainbreaker
- Prevents unexpected tripping of branch circuit breakers, improving continuity of power and patient outcomes

## 7 Healthcare Field Services Commissioning and Testing Programs

- Capable of maintaining and retrofitting equipment from any manufacturer
- Specialized, around the clock services with 100+ years of combined experience in isolated power systems
- Highly skilled technicians that can perform annual and/or bi-annual testing on any make or model of isolated power panel per NFPA 99 requirements

## 2 Ground Power Modules (GPM Series) Power receptacles for critical care areas

- Provides a convenient combination of hospital-grade power receptacles and/or ground jacks to satisfy the requirements of general and critical care areas

## 4 Ground-Fault Location System (EDS441/EDS151) \* Locate ground faults on isolated power systems

- Improves patient and staff safety by empowering staff to easily diagnose issues rather than temporarily silencing the alarm and continuing under a potentially hazardous condition
- Provides exact circuit detection, saving cost by reducing downtime of critical care rooms and reducing maintenance hours which are typically spent troubleshooting

## 6 Remote Indicators (MK series) \* Remote Indicators for Line Isolation Monitor

- Easy to understand remote indication of Line Isolation Monitor for nurses and hospital staff

(Note: Typically installed inside the operating room when the Isolated Power Panel is installed outside the room.)



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# Manufacturing



**1** Insulation Monitoring Devices for Ungrounded Equipment (iso Series)  
\* Monitor AC and DC Ungrounded Power Systems

- Minimizes unplanned outages and eliminates the need to interrupt power to identify faulted circuits
- Proactively plan system maintenance by trending insulation deterioration over time

**2** Earth Detection System (EDS Series)  
\* Fault Location System for AC and DC Ungrounded Power Systems

- Minimizes unplanned outages and eliminates the need to interrupt power to locate faults
- Eliminates labor intensive fault location procedures by isolating faulted circuits automatically

**3** Residual Current Monitors (RCM, RCMA, RCMS, RCMB Series)  
\* Monitor AC and DC Solidly Grounded and/or Resistance Grounded Systems

- Recognizes, locates, and prevents destructive ground-fault conditions for service entrance equipment, automatic transfer switches and power distribution units
- Safeguards sensitive manufacturing equipment by detecting low level ground-fault currents
- Monitors a wide range of frequencies and harmonics that can cause nuisance tripping or damage

**4** High Resistance Grounded Systems (HRG Series)  
Improve electrical safety and reliability of emergency generators for critical loads

- Reduces probability of an arc-flash incident by limiting current of the initial phase-to-ground fault
- Enables operation of critical loads to continue during a ground-fault and minimizes system interruption
- Ensures system reliability by actively monitoring for short-circuit and open-grounding-resistor conditions

**5** Measuring and Monitoring Relays (VMx, GMx and CMx Series)  
Voltage and Ground Measuring and Monitoring Relays for AC and DC Systems  
Current Measuring and Monitoring for AC Systems

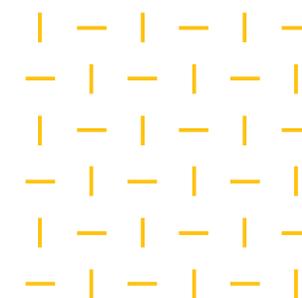
- Small and cost-effective solution for voltage, current, phase and frequency detection
- Reduces downtime and prevents hazardous conditions for both single- and three-phase applications
- Safeguards ground-continuity for critical motors in manufacturing environments and avoids electrical shock hazards

**6** Condition Monitors (CP Series) & Powerscout® (Monitoring Software)  
Human Machine Interface that allows the connection of Bender and third-party devices  
Cloud-based software solution to monitor critical power systems

- Centralized testing and monitoring of all connected Bender and third-party devices
- Enables quick and easy access to reporting functions
- Offers remote troubleshooting, programming of settings and running of system diagnostics without entering hazardous environments

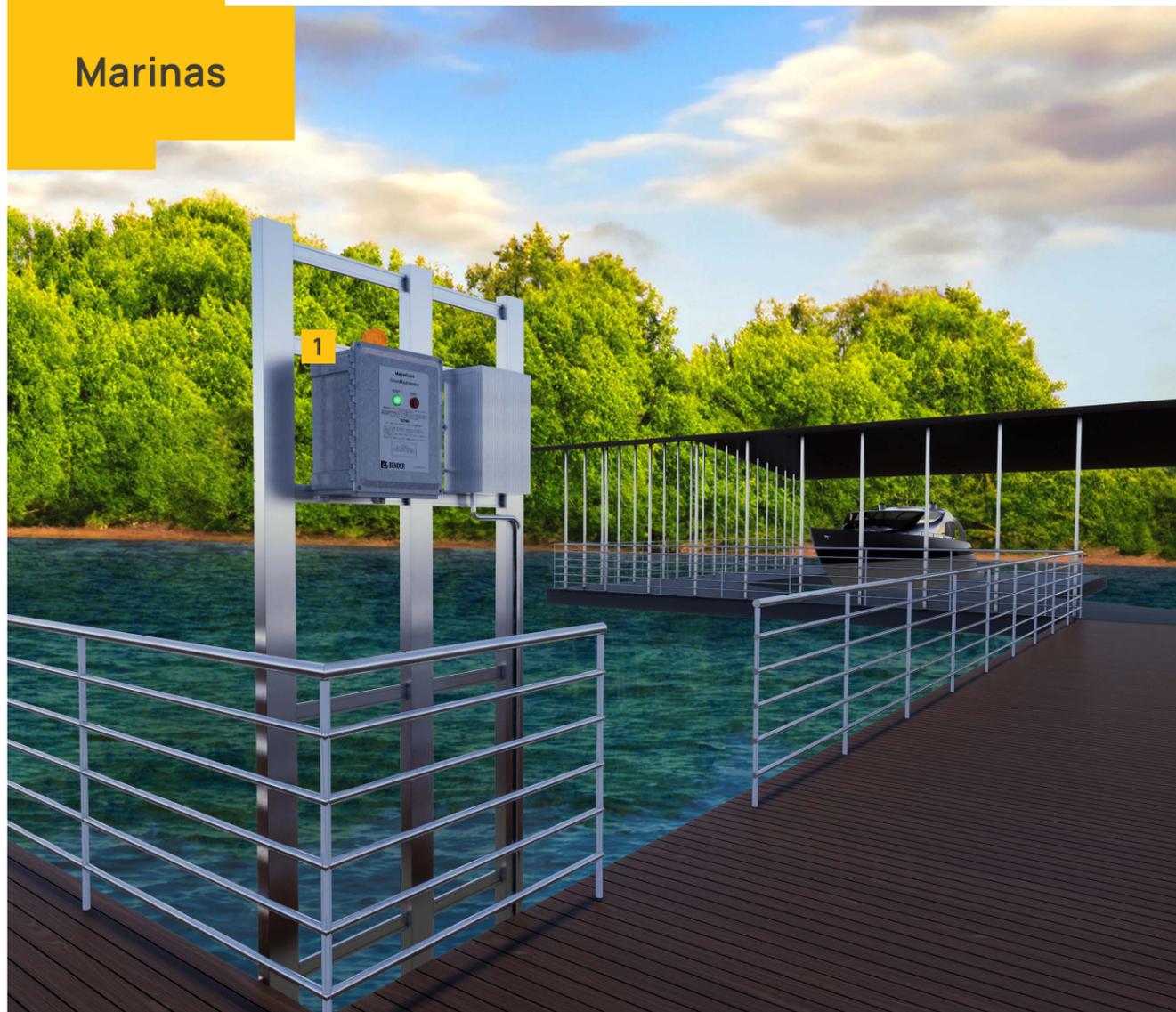
Bender products are used in a wide range of industrial facilities to protect personnel, equipment, maintains continuity of service and easily integrate into predictive maintenance programs. Bender provides ground-fault monitoring devices that are compatible with AC, DC, and mixed AC/DC systems, including systems with power conversion equipment. Modern electric motors and pumps are commonly controlled by

soft starters and variable frequency drives (VFD). These types of power conversion equipment can cause problems with traditional ground-fault monitoring techniques, including DC or low-frequency AC signals, harmonics and carrier frequencies. Using Bender ground-fault monitoring technology allows operators to detect and report accurate ground-fault readings throughout the entire manufacturing process.



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# Marinas



## 1 MarinaGuard \* Ground-fault protection in marinas, boatyards and floating buildings

- Monitor for ground faults in feeder and branch circuits supplying electrical systems in marinas, boat yards, docking facilities, and similar locations
- Satisfies the monitoring requirements of NEC 555.35, 555.53 & 682.15 (2020 & 2023 editions), and CE Code requirements

Electric shock drowning (ESD) can happen in any body of water. This is why Bender provides electrical safety solutions for marinas and harbors. Since marinas are typically equipped with electrical devices and services such as electrical outlets, shore power to boats, lighting, boat lifts,

and more, they can be a hazard for people to experience ESD. Boats that are connected to marina shore power can also create an ESD hazard through defective onboard wiring. If powerful enough, the shock will paralyze swimmers, leaving them unable to swim.



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# Mining



With our roots founded in the mining industry over 80 years ago, Bender has become a global leader in ground-fault protection and electrical safety equipment. Our years of technical experience and broad portfolio of products, utilizing the latest in protection technology, ensures the development

of the best solutions to meet your needs. Our worldwide network of support staff ensures that your system remains in peak condition. Our products help you safeguard your personnel, equipment, and processes, while reducing your costs, maintenance, and downtime.

**1 High Resistance Grounded Systems (HRG Series)**  
\* Limit ground-fault current to minimize equipment damage and maximize safety

- Enables continued operation of critical loads during ground-fault conditions
- Enhances safety with NGR's to limit fault current to control touch potential on portable loads
- Offers multiple options for simple substation mounted resistors to integrated packages that save time and money in locating ground faults in refining and processing areas

**3 Ground-fault Ground-check Monitors (GM420, RC48C)**  
Trailing cable ground-continuity and ground-fault detection

- Enhances safety by ensuring ground connection to portable loads and rapidly clearing ground faults
- Lowers installation costs with easily installed DIN rail mounted relay
- Enables automatic tripping of loads that are faulted with either undervoltage release or shunt trip-compatible contact operation
- Monitor bonding of fixed equipment for safety with GM420

**5 Insulation Monitoring Devices (iso Series and EDS Series)**  
\* Monitor AC and DC Ungrounded Power Systems with automatic fault location

- Quick and efficient alarm to notify of insulation failure in AC or DC circuits
- Detects trending insulation deterioration, eliminating larger problems down the road
- Enables remote access to system data, eliminating need to enter hazardous environments
- Accurately stores system health information, saving money over time and allowing for most effective use of maintenance resources

**2 Neutral-grounding Resistor Monitors (NGRM Series, RC48N)**  
NGR failure detection to ensure system grounding

- Enhances system safety with full frequency ground-fault detection and active monitoring of open and shorted grounding resistors
- Offers programmable filtering in order to prevent nuisance operation on harmonic-rich systems
- Utilizes remote access to ground-fault and NGR health information, saving time and minimizing need for human interaction
- Enables use at remotely-located mine sites, including high altitude-rated versions

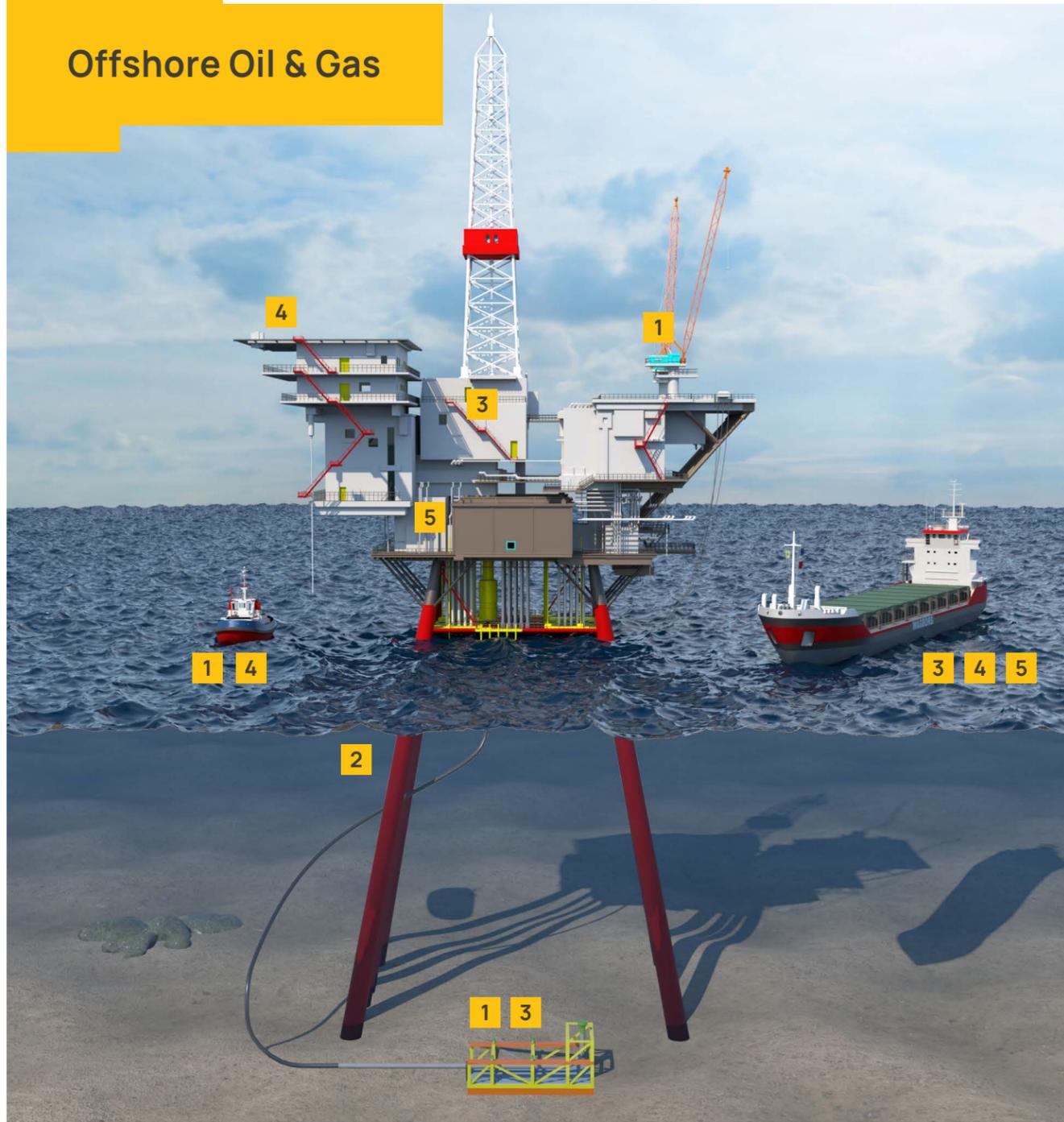
**4 Residual Current Monitors (RCM, RCMA, RCMS, RCMB Series)**  
\* Monitor AC and DC Solidly Grounded and/or Resistance Grounded Systems

- Offers small footprint for monitoring of up to 12 circuits with automatic tripping and alarming
- Recognizes, locates and prevents destructive ground-fault conditions for service entrance equipment, automatic transfer switches and power distribution units
- Minimizes unplanned outages and eliminates the need to interrupt power to identify faulty circuits
- Monitors a wide range of frequencies and filters select harmonics that contribute toward nuisance tripping



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# Offshore Oil & Gas



Bender offers solutions for multiple areas in the oil & gas industry – onshore, offshore, underwater systems, transport, refineries, maintenance, and more. All of these areas utilize production systems that are required to operate around the clock and should not be shut down due to minor electrical faults.

The use of ungrounded systems (floating systems) with appropriate monitoring devices from Bender can guarantee this. Insulation monitoring devices (iso685 Series) allows for real-time measurement of critical equipment and cabling. All recorded information can be accessed remotely to a centralized control point.

## 1 Insulation Monitoring Devices (iso685 Series) \* Monitor AC and DC Ungrounded Power Systems

- Minimizes unplanned outages and eliminates the need to interrupt power to identify faulted circuits
- Proactively plan system maintenance by trending insulation deterioration over time

## 3 Insulation Monitoring Device (iso685-D-P) \* Monitor AC and DC Ungrounded Power Systems with Automatic Fault Location

- Safeguards critical motors and pumps for offshore applications while improving continuity of service
- Eliminates labor-intensive fault location procedures by identifying faulted circuits automatically

## 5 High Resistance Grounded Systems (HRG Series) Improve electrical safety and reliability of emergency generators for critical loads

- Reduces probability of an arc-flash incident by limiting current of the initial phase-to-ground fault
- Enables operation of critical loads to continue during a ground-fault and minimizes system interruption
- Ensures system reliability by actively monitoring for short-circuit and open-grounding-resistor conditions

## 2 Insulation Monitoring Device for Subsea (isoHR685W) \* Monitor AC and DC Ungrounded Subsea Umbilical Cables

- Monitors and protects expensive subsea umbilical cables with measuring ranges up to 10 GΩ
- Predicts umbilical cable failure years in advance with high resolution trending analysis
- Offers high accuracy and stable measurements in situations with excessive vibration, temperature and humidity

## 4 Earth Detection System (EDS3090 Series) \* Portable Ground Fault Detection System

- Fault location clamps available in 20, 52, and 115 mm diameter that easily fit various conductor sizes
- Offers selectable operating mode for insulation fault location or residual current measurement



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# Rail & Transit



Improving electrical safety and increasing availability are essential elements of a smooth railway operation. This applies to signal bungalows, signal systems, operational buildings, tunnels and bridges, and to all rolling stock, such as locomotives and rail cars. Bender rail system solutions predictively reduce downtime by continuously monitoring electrical system conditions for equipment on all types of rail applications. Trending allows for advanced notice and predictive maintenance, which reduces traditional scheduled maintenance costs and downtime.

## 1 Insulation Monitoring Devices for Signaling Bungalows (iso Series) Monitor AC and DC Ungrounded Power Systems

- Protects and monitors life safety signaling equipment for destructive ground-fault conditions
- Reduces labor intensive preventative maintenance procedures by continuously monitoring insulation integrity
- Enables remote troubleshooting and monitoring of signaling bungalows by utilizing built-in communication protocols

## 3 Residual Current Monitors (RCM, RCMA, RCMS, RCMB Series) Monitor AC and DC Solidly Grounded and Resistance Grounded Systems

- Detects and locates ground faults in power conversion equipment
- Minimizes unplanned outages and eliminates the need to interrupt power to identify faulted circuits
- Monitors a wide range of frequencies and harmonics that contribute towards nuisance tripping or damage

## 5 Measuring and Monitoring Relays for Rolling Stock (VMx, GMx and CMx Series) Voltage and Ground Measuring and Monitoring Relays for AC and DC Systems Current Measuring and Monitoring for AC Systems

- Small and cost-effective solution for voltage, current, phase and frequency detection
- Reduces downtime and prevents hazardous conditions for both single- and three-phase applications
- Safeguards ground-continuity for critical motors in manufacturing environments and removes electrical shock hazards

## 2 Earth Detection System (EDS44x Series) Ground Fault Location System for AC and DC Ungrounded Power and Control Systems

- Automatically identifies fault location of branch and load circuits when paired with iso685-D-P
- Minimizes unplanned outages and eliminates the need to interrupt power to identify faulted circuits

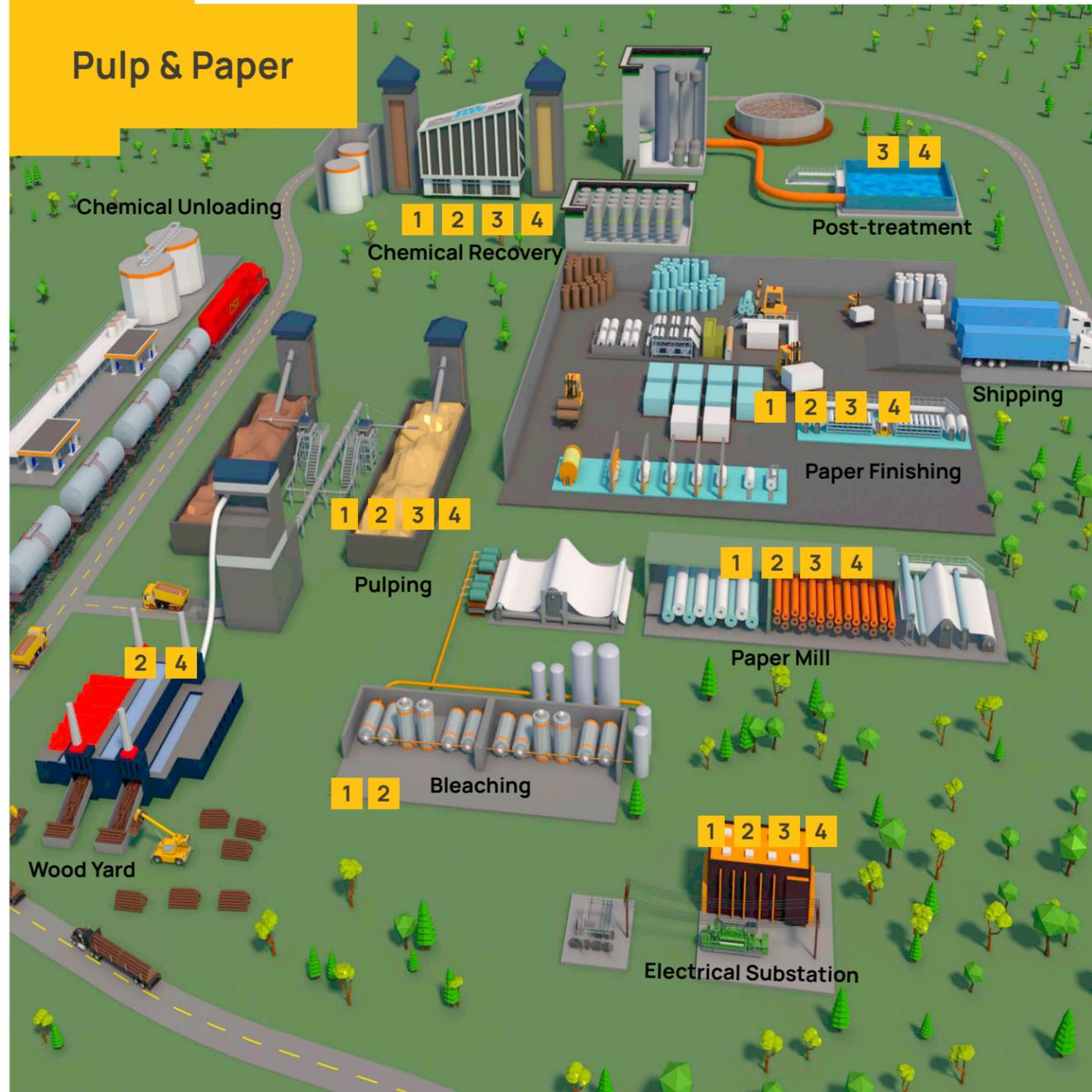
## 4 Insulation Monitoring Device for Track Heating and Switching Equipment (isoRW685W-D) Monitor AC and DC Ungrounded Power Systems

- Minimizes unplanned outages and eliminates the need to interrupt power to identify faulted circuits
- Proactively plan system maintenance by trending insulation deterioration over time
- Provides highly accurate and stable measurements in situations with excessive vibration, temperature and humidity

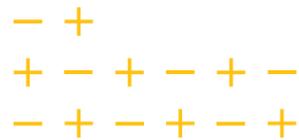


\* This symbol indicates the product technology has unique features either patented by or exclusive to Bender

# Pulp & Paper



Bender ground-fault protection equipment provides advanced personnel, equipment, and fire protection to pulp, paper, and forest product manufacturing facilities. Quickly identify, trend, and locate ground faults to minimize manufacturing downtime and troubleshooting costs. Bender ground-fault monitoring systems provide an advanced level of protection and can be included in turnkey ground-fault packages.



## 1 Insulation Monitoring Devices for (iso Series) Monitor AC and DC Ungrounded Power Systems \*

- Protects and monitors paper machine equipment for destructive ground-fault conditions
- Reduces labor intensive preventative maintenance procedures by continuously monitoring insulation integrity
- Enables remote troubleshooting and monitoring of the entire facility by utilizing built-in communication protocols

## 3 LINETRAXX Residual Current Monitors (RCM, RCMA, RCMS, RCMB Series) Monitor AC and DC Solidly Grounded and Resistance Grounded Systems

- Detects and locates ground faults in power conversion equipment
- Minimizes unplanned outages and eliminates the need to interrupt power to identify faulted circuits
- Monitors a wide range of frequencies and harmonics that contribute towards nuisance tripping or damage

## 2 Neutral-grounding Resistor Monitors (NGRM Series, RC48N), HRG Series 1-3 \*

- NGR failure detection to ensure system grounding
- Enhances system safety with full frequency ground-fault detection and active monitoring of open and shorted grounding resistors
- Offers programmable filtering in order to prevent nuisance operation on harmonic-rich systems
- Utilizes remote access to ground-fault and NGR health information, saving time and minimizing need for human interaction
- Capable of monitoring high and low-resistance grounding systems

## 4 Measuring and Monitoring Relays for Paper Mills (VMx, GMx and CMx Series) Voltage and Ground Measuring and Monitoring Relays for AC and DC Systems Current Measuring and Monitoring for AC Systems

- Small and cost-effective solution for voltage, current, phase and frequency detection
- Reduces downtime and prevents hazardous conditions for both single- and three-phase applications
- Safeguards ground-continuity for critical motors in manufacturing environments and removes electrical shock hazards
- Phase unbalance, phase failure, and phase sequence monitoring

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# Water & Wastewater



Water and wastewater facilities are prone to hazard due to the high levels of electricity needed to power these plants. Modern designs use variable frequency drives (VFDs) that require special setups to be adequately protected. Bender RCM and NGRM products provide this advanced level of protection and can be included in turnkey HRG packages. Their ability to detect shallow fault current allows pre-warning of ground faults that can cause significant damage to capital equipment.

## 1 High Resistance Grounded Systems (HRG Series)

\* Limit ground-fault current to minimize equipment damage and maximize safety

- Enables continued operation of critical loads during ground-fault conditions
- Enhances safety with NGR's to limit fault current to control touch potential on portable loads
- Offers multiple options for simple substation mounted resistors to integrated packages that save time and money in locating ground faults in wastewater treatment facilities
- Customized retrofit kits for easily retrofitting old water treatment plants to latest code and reliable technology
- Provides second ground fault protection with feeder priority for critical operations in water treatment facilities

## 3 Residual Current Monitors (RCM, RCMA, RCMS, RCMB Series)

\* Monitor AC and DC Solidly Grounded and Resistance Grounded Systems

- Recognizes, locates, and prevents destructive ground-fault conditions for power conversion equipment
- Minimizes unplanned outages and eliminates the need to interrupt power to identify faulted circuits
- Monitors a wide range of frequencies and harmonics that contribute towards nuisance tripping or damage

## 5 Condition Monitors (CP Series)

Human Machine Interface that allows the connection of Bender and third-party devices

- Centralized testing and monitoring of all connected Bender and third-party devices
- Enables quick and easy access to reporting functions
- Offers remote troubleshooting, programming of settings and running of system diagnostics without entering hazardous environments

## 2 Neutral-grounding Resistor Monitors (NGRM Series, RC48N)

NGR failure detection to ensure system grounding

- Enhances system safety with full frequency groundfault detection and active monitoring of open and shorted grounding resistors
- Offers programmable filtering in order to prevent nuisance operation on harmonic-rich systems
- Utilizes remote access to ground-fault and NGR health information, saving time and minimizing need for human interaction

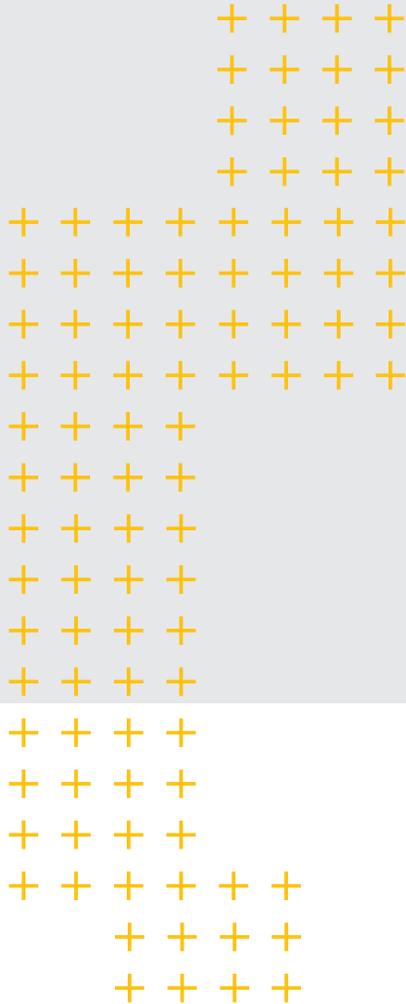
## 4 Insulation Monitoring Device for Track Heating and Switching Equipment (isoRW685W-D)

Monitor AC and DC Ungrounded Power Systems

- Minimizes unplanned outages and eliminates the need to interrupt power to identify faulted circuits
- Proactively plan system maintenance by trending insulation deterioration over time
- Monitors loads that are off-line/disconnected for extended period of time to ensure health before they are required
- Monitors secondary side of 6, 12 or 18 pulse drives that have a floating delta secondary used in large HP drives in wastewater treatment plants



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