

The Power in Electrical Safety Product overview



BENDER Group

Electrical safety for man and machine

Bender monitoring devices have a key role to play in this respect

Safety for man and machine comprises failure-free power supply in order to ensure uninterrupted operation.

The convincing benefits for operators of electrical installations are

- Higher operational safety by early detection of potentially critical plant conditions
- Comprehensive protection of personnel and equipment against electrical hazards
- Higher productivity
- Considerable reduction of operating costs
- Time and cost-optimised maintenance



Bender monitoring devices to reduce costs in the long term

For every application - to suit any requirement

Maximum electrical safety and the associated fault-free operating processes belong to the central tasks of the technical management. The increasing demand for power quality and operational reliability goes hand in hand with the increase of disturbing factors:

- Humidity
- Ageing
- Temperature
- Chemicals
- Dust
- Mechanical stress
- Voltage peaksHarmonics

Mechanical damage

Overvoltage and

undervoltage

Voltage drops

Bender monitoring systems are your reliable partners when control and maintenance of electrical lines or power quality monitoring are concerned.

Electrical safety

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Fault currents

Leakage currents

Earth fault

ISOMETER® Insulation monitoring devices

For unearthed power supplies (IT systems)



Insulation monitoring devices for control



Insulation monitoring devices for

main circuits



Insulation monitoring devices for medium-voltage systems

Insulation monitoring devices for signalling earth faults in IT systems at an early stage.

Unearthed power supplies offer an invaluable advantage – a first fault does not lead to a disconnection, operating procedures are not interrupted.

Therefore, IT systems with insulation monitoring are used in situations that call for a high degree of safety and reliability. The centrepiece of every IT system is the insulation monitoring device ISOMETER[®].

Mode of operation:

circuits

The insulation monitoring device ISOMETER[®] continuously monitors the insulation resistance between system and earth and immediately signals when a specific values is undershot. This early warning system provides sufficient time for the cause of the fault to be eliminated - before a critical operating state has a chance to develop!

Examples of application:

- Power supplies of complex production processes
- Control circuits in safety applications
- Variable-speed drives in rolling mills, conveyor systems
- Mobile power generators
- Traffic signalling systems
- Offline loads (pumps, motors)
- Medical locations
- Control circuits in power plants and substations
- Power supplies on ships
- Photovoltaic systems and much more



Insulation monitoring in a AC/DC main circuit



Information edge for increased safety and system availability



Bender solutions allow simple design of complex and/or coupled systems using the ISONet function for controlling the measuring authorisation of several IRDH575. This has the advantage that no auxiliary contacts for a coupling switch is required.

Convincing benefits:

- Highest possible availability and reliability for power supplies
- Increased protection against fire and accidents
- Precise measurement by a patented AMP measurement method
- Practical solutions for all applications
- Significant cost reductions for servicing and maintenance



ISOSCAN® Equipment for insulation fault location

For unearthed power supplies (IT systems)

Insulation fault location on expanded IT systems is a timeconsuming and costly affair. The solution: Insulation fault location systems (EDS).



Insulation monitoring device with integrated equipment for insulation fault location



Portable equipment for insulation fault location

Stationary and portable equipment for fast insulation fault localisation.

The basis of ISOSCAN[®] is the insulation monitoring device ISOMETER[®] with integrated locating current injector.

Mode of operation:

In the event of an insulation fault, insulation fault location will automatically be started. The locating current injector generates a locating current signal which flows back via the current path and the PE conductor. The locating current signal is detected by all measuring current transformers on this circuit and signalled to the respective insulation fault locators.

By assigning the measuring current transformer to the respective circuit, the point of fault can easily, quickly and reliably be detected via the screen by an electrically skilled person.

For installations with sub-circuits, portable insulation fault location systems are available.

Current clamps are placed around the wires of the relevant outgoing circuits and the locating current signals are checked and in this way the faulty outgoing circuit/location can be identified.

Convincing benefits:

- Automatic insulation fault location during operation without disconnection
- Significantly lower outlays in terms of personnel and time due to precise insulation fault location
- Modular system concept for optimal adaptation to the electrical installation
- Central administration via LAN/WLAN network
- Early fault detection allows scheduled maintenance





Operating principle equipment for insulation fault location

Examples of application:

Main and control circuits

- in industrial installations
- in power plants and substations
- in the food industry
- in medical locations
- on ships
- on offshore platforms
- in the chemical industry
- in photovoltaic systems



LINETRAXX® Measuring and monitoring relays

For earthed power supplies (TN and TT systems)

- Detecting and signalling disturbances – in compliance with the standards due to adjustable response values.

Measuring and monitoring relays

Parameters being monitored:

- Voltage
- Current
- Frequency
- Phase sequence
- Phase failure
- Unbalance
- Loop resistance
- Earth fault
- Vector shift
- ROCOF (df/dt)

Measuring and monitoring relays for monitoring electrical parameters in electrical installations

Bender measuring and monitoring relays monitor different parameters in main and auxiliary circuits. They provide the necessary information sufficiently well in advance to detect and signal faults and disturbances early on or to disconnect the system immediately in the event of critical system statuses. That reduces operational interruptions, damage to property and damage to the system and reduces the costs substantially.

Convincing benefits (420 series):

- Two separately adjustable response values/alarm relays
- Analogue interface with nominal signal 4-20 mA/0-10 V
- Automatic pre-parameterisation (PreSet function)
- Measured value memory for displaying the first operating value
- Flexible start-up, response and release times
- Continuous self monitoring
- Password protection for device setting
- Compact design due to a two-module enclosure (36 mm)

Application examples loop monitoring:

- Loop monitoring for motors
- Loop monitoring for PE conductor interruptions in electrical installations
- Monitoring of earthing systems

Solution for the photovoltaic industry: Network and system protection (NS protection) acc. to CEI 0-21, VDE-AR-N 4105, BDEW guideline, DIN V VDE V 0126-1-1/A1, C10/11, G59/2, G59/3 and G83/2 (LINETRAXX[®] VMD460)

Application examples current monitoring:

- Current consumption of motors, such as pumps, elevators, cranes
- Monitoring of lighting circuits, heating circuits, charging stations
- Monitoring of emergency lighting
- Monitoring of screw conveyors, e.g. in sewage plants

Application examples voltage and frequency monitoring:

- Monitoring of voltage-sensitive electrical installations
- Switching on and switching off function at a certain voltage level
- Monitoring of stand-by and emergency supply systems
- Supply voltage monitoring of portable equipment
- Protection of three-phase motors against phase failure and phase sequence
- Transformer protection by detection of non-symmetrical loading
- Mains decoupling electricity generation systems (NS protection)



LINETRAXX® Power Quality and Energy Measurement

For transparency in electrical installations

Monitoring of the power quality and collection of relevant data for energy management systems.

The digital universal measuring devices PEM are suited for recording and displaying electrical parameters of electricity networks. The scope of measurements ranges from currents and voltages through energy consumption and performance to total harmonic distortion for voltage quality assessment.

Convincing benefits:

The collection and evaluation of the measurement parameters is carried out by the Condition Monitor COMTRAXX[®] CP700.

- A platform for unified operation and parameterisation of a wide variety of devices
- Intuitive use
- Interactive help systems instead of operating manuals
- Automatic adaptation to your installation
- Guided support in fault analysis and for immunisation
- User-defined filtering of the relevant information

Makes system interactions visible – to ensure a high availability of your installation.





LINETRAXX[®] Residual current monitors

For earthed power supplies (TN and TT systems)



Residual current monitor with measuring current transformer



AC/DC sensitive residual current monitoring modules

Residual current monitors RCM, RCMA for earthed power supplies (TN/TT systems)

Monitors residual currents and fault currents in all situations where continuous operation

must be ensured.

RCM residual current monitors monitor electrical installations for residual currents resp. fault currents, display the current measured value and signal when a preset response value is exceeded.

They can be used either for signalling or for switching. The devices are primarily used in applications where, depending on the load structure,

switching off would be undesirable or problematic, e.g.:

- Fire and property protection in industrial and functional buildings
- Uninterruptible power supply systems
- Cooling equipment, air conditioning systems
- Variable-speed drives
- Lighting circuits
- Medical locations
- Safety circuits
- Computer systems and many others

Distinguishing features

RCM series:

Type A residual current monitors for monitoring AC currents (42...2000 Hz) and pulsating DC currents up to 6 mA.

RCMA series:

Type B residual current monitors for monitoring AC currents, pulsating and smooth DC currents (0...2000 Hz).

RCMB series residual current monitors:

Measuring current transformers and evaluation unit in a single module for monitoring AC currents, pulsating and smooth DC currents (0...500 and 0...1000 Hz). Optionally available with 2 changeover contacts or analogue interface 4...20 mA.

Convincing benefits:

- Significant cost reductions as a result of higher availability and minimal maintenance costs
- Higher degree of fire and property protection
- Universal versions for monitoring AC currents as well as pulsating and smooth DC fault currents
- True r.m.s. value measurement (TRMS), therefore unrelated to waveform



Operating principle Residual current monitor RCM

LINETRAXX® Residual current monitoring systems

For earthed power supplies (TN and TT systems)





Monitoring of up to 1080 measuring points, at a maximum scanning time of 200 ms.

Residual current monitoring system

Measuring current transformers

Residual current monitoring system RCMS for earthed power supplies (TN/TT systems)

To ensure effective preventive maintenance and a high level of operational and plant safety

- a fault currents resp. residual currents,
- operating currents,
- stray currents and
- currents in N and PE conductors

must be monitored continuously, the point of fault must be localised quickly and the service personnel needs to be given comprehensive information. The solution for this task: The multi-channel residual current monitoring system RCMS. The system records the currents AC pulsed DC and AC/DC current sensitive as true r.m.s. value. The measured values are stored in the history memory and are available there for evaluation purposes. A total of 1080 measuring points can be monitored, whereby the maximum scanning time for all channels is 200 ms. This makes it easy to monitor even time-critical applications that require a shutdown. Data is exchanged between the devices via a time-efficient and cost-effective RS-485 interface. Interfaces with higher-level systems via Ethernet or other field bus systems can be set up easily.

Typical applications:

- Data processing centres, computer systems
- Industrial, residential and functional buildings
- Office and administrative buildings
- Power supply and distribution
- Technical communication systems
- Traffic engineering
- TV and radio stations

Convincing benefits:

regulation BGV A3 (Germany)

- Continuous monitoring of electrical installations in compliance with
 Betriebssicherheitsverordnung (German ordinance on industrial safety and health) and the accident prevention
- High standard of property, fire and plant protection
- High level of efficiency achieved by avoiding unexpected downtimes and production stoppages
- Significantly lower outlays in terms of personnel and time due to precise insulation fault location
- Modular system concept for optimal adaptation to the electrical installation
- Low maintenance costs achieved by ensuring that failure-prone components are replaced in good time
- Continuous monitoring of TN-S power supplies with high EMC
- Modular principle that allows systems to be configured in accordance with application and requirements
- Central administration via LAN/WAN network



Operating principle residual current monitoring

The safety solutions for medical locations

according to IEC 60364-7-710



Insulation monitoring device



Alarm indicator and test combinations



Isolating transformer

The medical IT system acc. to IEC 60364-7-710 consists of an isolating transformer, a monitoring device to monitor insulation resistance, transformer load and temperature and a remote alarm indicator and test combination, installed in the operating theatre, or at a manned nurse station, nearby. Continuous insulation monitoring ensures that a deterioration in insulation resistance is immediately detected and signalled but (this is the decisive factor) there is no power supply interruption and continuity of operation is guaranteed.

The IT system transformer

In accordance with IEC 61558-2-5, the rated output of the transformer shall not be less than 0.5 kVA and shall not exceed 10 kVA. Single-phase transformers have to be used. If the supply of three-phase loads is also required, a separate three phase transformer shall be provided – secondary voltage must not exceed AC 250 V.

The insulation monitoring device

The insulation monitoring device isoMED427P is a vital unit to ensure the availability of the IT system. Connected between system and earth, it continuously monitors the insulation resistance. The integrated AMP measuring principle allows insulation faults with DC components to be precisely recorded and indicated.

Simultaneously, the ISOMETER[®] isoMED427P monitors the load current and the temperature of the transformer. Additionally it meets the requirements of IEC 61557-8.

In addition, the isoMED427P includes a feature allowing insulation fault location, i.e. detecting online the faulty load (socket) in an intensive care unit or operating theatre in combination with the insulation fault locator EDS151.

Continuous insulation monitoring for immediate detection without power supply interruption.



MEDICS® – the safety solutions for medical locations

according to IEC 60364-7-710 and DIN VDE 0100-710 (VDE 0100-710)



Transfer switching and monitoring devices, 2-pole



Remote alarm indicator and operators

MEDICS® - to ensure safe and reliable power supply

MEDICS[®] is a comprehensive, tried and tested system that is able to realise each task on hand in order to secure the safe and reliable power supply for medical locations.

Convincing benefits:

- Monitoring and control of
 - Normal power supply (AV)
 - Safety power supply (SV)
 - Battery-supported safety power supply (e.g. UPS) in compliance with the standards
- Designed in accordance with the requirements of applicable standards and monitoring of medical IT systems
- Contains complete features of isoMED427P (Insulation monitoring device with integrated load and temperature monitoring and locating current injector)
- User-oriented information for technical/medical personnel with clear instructions to be followed
- Comprehensive range of services throughout the entire life cycle of the system
- Intelligent networking with information and communication technology – centrally on-site, decentrally with the SCADA system or monitored by the manufacturer
- Additional safety advantage by ready-to-connect complete solutions with voluntary testing by TÜV Süddeutschland
 - Confirmation that the requirements of the standard DIN VDE 0100-710 (VDE 0100-710) are met
 - Certification of the functional safety (SIL2) in accordance with DIN EN 61508-... (VDE 0802-...)

Typical applications:

- Hospitals, clinics
- Sanatoriums and health clinics
- Residential homes for the elderly, nursing homes

Floor-standing

cabinet

- Outpatient surgery in doctors' surgeries
- Medical care centres



Changeover for intensive care units with integrated insulation fault locator (EDS)

The safety solutions for medical locations

according to ANSI/NFPA 99 and CSA Z32



Isolated Power System with Line Isolation Monitor for hospitals and other critical care areas.

Isolated power systems offer an invaluable advantage: Early detection allows for critical systems to remain online in a single fault condition. Bender Isolated Power Panels provide isolated power to electrical systems in operating rooms and other critical care areas.

Utilizing the latest in line isolation monitoring technology, the LIM2010 provides advanced warning of faults to help reduce downtime and increase operational efficiencies.

The Bender LIM2010 Series LIM complies with UL 1022 in the U.S. and CSA-C22.2 No. 204-M1984 in Canada. The intent is to include the LIM as part of an isolated power system that conforms with the applicable requirements of ANSI/NFPA 99 and ANSI/NFPA 70 in the U.S. and in accordance with CAN/CSA-C22.2 No. 29-M1989 in Canada.



Isolated Power Panels

Convincing benefits:

- No interference with electrical equipment
- Special phase-locking circuitry for ultimate stability and repeatability
- Provision for Remote Indicators
- Easy to clean rugged front foil
- Digital & Analog Bar Graph Displays
- Automatic self-calibration and self-check
- Audible alarm volume adjustable via menu
- Transformer Load Monitoring (optional)
- Transformer overtemperature monitoring (optional)
- RS-485/BMS communication port
- Several LIMs can be controlled by one Remote
- Additional communication devices available: Web server, eMail client
- Insulation fault location system available (optional)

Bender isolated power system equipment are designed in strict compliance with UL 1047, UL 1022, UL 50 and CSA Z32.



UNIMET® test systems



Light-weight safety tester for mobile applications



Test system for electric beds and electrical equipment acc. to BGV A3

The user-friendly one amongst the safety testers for simple testing prior to first use, periodic testing, ...

Test systems for the electrical safety of medical electrical devices and electrical equipment

Electrical safety is a key concern when using medical electrical equipment and portable equipment. To protect users against any potential electrical hazards, there are various regulations and laws in place that make regular testing mandatory.

With the UNIMET[®] safety testers initial verification at the manufacturer's plant; periodic testing and testing prior to first use and tests following maintenance and repairs can be carried out with ease.

Convincing benefits:

- Simple operation thanks to user guidance
- Updating of test dates and multi-client capability
- Time savings thanks to automated test procedures
- Device under test classified in accordance with regulations
- USB printer interface and TFT display, straightforward documentation via printer or PC

Standard compliant tests acc. to:

- IEC 60601-1, 3rd edition (optional)
- IEC 62353:2007-05
- DIN EN 62353 (VDE 0751-1):2008-08
- ÖVE/ÖNORM EN 62353:2009-01
- DIN VDE 0701-0702:2008-06
- ÖVE E8701-1:03-01







COMTRAXX® System components

Central display, alarm indicator and operator units

Access to all necessary information – always and everywhere via PC.



Display, alarm indicator and operator unit – Web server, gateway and local display



Gateway with web server

Signalling, operation, communication – Overview of your system

Despite the increasing presence of technology in today's society – people retain a crucial role. These people need to be provided with the right information, in the right place and at the right time, so that they can take prompt and appropriate action.

The Condition Monitor CP700 meets these central requirements. It is the central display, alarm indicator and

operator unit from which various devices can be operated and parameterised in a uniform way, from the ISOMETER® through RCMS to Power Quality Monitoring – intuitive to use and supported by an interactive help system. This is possible through a built-in touchscreen and the integrated web server.

In addition, the Condition Monitor CP700 and the gateway COM460IP serve as data providers for higher-level systems.



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Convincing benefits:

Overview of the entire system

- Active alarm generation
- Simple, direct access to all details relating to the devices in use
- Guided support in fault analysis
- Easy documentation of measured values and device parameters
- User-definable visualisation
- Displaying an overview the contents of which takes up mo
- Active alarm

-

- Access to inf and at all tin
- Integration of the second s
- Viable for the and expand means of so

A variety of solutions:

- Use of existing IT infrastructure
- Provision of messages and measured values for higher-level systems

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Representation of device data on the touch screen (COMTRAXX® CP700)

Support at all stages

All-round service for your installation: Remote, by phone, on-site

Competent service for maximum safety and high availability of your installation

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From planning to modernisation – Our know-how and our expertise is at your disposal in all project phases.

Furthermore, our first-class service ensures you the maximum safety for your electrical installations.

The service we offer range from telephone support through repairs to on-site service – with state-of-the-art measuring devices and professional employees.

Many service activities, fault clearance, but also analysis and inspections, can be carried out by remote maintenance – no technician needs to be on-site, saving you time and money.

Convincing benefits:

- High availability of your installation by responding faster to fault messages
- Automatic control, analysis, correction, readjustments/updates are possible
- Competent assistance on changing settings and with updates
- Regular checking of your installations/power quality/monitoring devices
- Significant cost reduction by reduced downtimes and shorter service times

eration & Maintenance

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Bender worldwide

Argentina Italy Australia Japan Jordan Austria Bahrain Kuwait Bosnia and Herzegovina Latvia Brazil Lebanon Bulgaria Lithuania Canada Macedonia Chile Malaysia China Moldova Colombia Montenegro Croatia New Zealand Czech Republic Norway Denmark Oman Pakistan Egypt Estonia Poland Finland Portugal France Qatar Romania Germany Great Britain Russia Saudi Arabia Greece Hong Kong Serbia Hungary Singapore Iceland Slovakia India Slovenia Indonesia South Africa South Korea Iran Spain Iraq Ireland Sri Lanka Israel Sweden

Switzerland Syria Tadzhikistan Taiwan Thailand The Netherlands The Philippines The United States of America Turkey United Arab Emirates Uruguay Venezuela Vietnam



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