Best Practice Guide

The security of the EPS data centre container, the space-saving solution for data centres, is guaranteed thanks to Bender technology.

High-availability high-security wing

With the **DC CONT** data centre container, EPS Rechenzentrum Infrastruktur GmbH now offers a modular and mobile server room solution. Similar to a standard data centre, the data centre container comprises all active IT1) systems and the complete physical infrastructure in a closed system. This needs to be monitored and managed just like any other electrical system in a data centre. As in many other electrical installations, electrical safety presents a challenge.

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DC CONT
– the IT security container for data centres and server rooms

DC CONT, the data centre container, is a modular and mobile high-security room which is set up inside a stable steel container. This system was designed specifically for outdoor use but can also be used inside, if necessary. The data centre container from EPS provides exceptional fire and heat resistance, protects against vandalism and minor detonations and is also dust and waterproof. DC CONT is particularly well suited for outdoor server and network systems but is also ideal for back-up locations within the plant premises.

The mobile IT[1)] security cell and/or the IT security container DC CONT "moves" with your needs and, as such, in addition to the necessary maximum level of IT availability, it also guarantees investment security.

The security, maximum availability and cost effectiveness of this application are a must for most companies today. The trouble-free power supply has become of crucial importance. By continuously monitoring the electrical system of the DC CONT IT security container, malfunctions or even failures can be detected and prevented in advance.

Data centre technology managers are constantly faced with the challenge of ensuring a highly available power supply. Even short interruptions lasting milliseconds can have serious and far-reaching consequences. An essential aspect here is not only the protection via corresponding redundant supply routes, emergency power systems and UPS systems, but also the complete cabling infrastructure. However, the absolutely indispensable basis for the trouble-free operation of modern EDP systems and the support systems required for their operation is an EMC-compatible power supply.

[1)] IT stands for information technology

The basis for high availability and safety

In accordance with EN 50600-2-2:2014 and DIN VDE 0100 444:2010-10, only TN-S systems are to be used in data centres. In the publications on the standards and specifications as well as on the IT baseline protection developed by the BSI (Federal Office for Information Security), the importance of an EMC-compliant installation is always stressed in this context in order to avoid disturbances from stray currents and damage to devices and conductive building components. The fundamental basis, without which all further measures are futile, is a power supply system designed as a TN-S system with a central earthing point.

With regard to TN-S systems, DIN VDE 100, Part 444.4.3.2 states: “Installations in new buildings must be set up as TN-S systems from the point of supply. In existing buildings which contain or will probably contain important IT resources and which are supplied by the public low-voltage distribution system, a TN-S system should be set up from the start of the installation system.”

For older systems (TN-C, TN-C-S)[2], conversion to a TN-S system is necessary (fire hazard, protection of material assets, protection of persons etc.). Furthermore, the proper condition of the new installation must be maintained on a permanent basis, as even an unintentional bridge between an N and PE conductors can result in unforeseen disturbances.

Following the entry into force of the new EMC Directive 2014/30/EU, the stricter specifications have been binding since 20 April 2016 at the latest.

Implementation with Bender residual current and energy monitoring

A truly reliable statement regarding the state of the power supply is only possible through continuous system monitoring and analysis. Various values are thus measured in real time at important nodes in the power supply and recorded for subsequent evaluation. These measurements enable further important conclusions to be drawn as to the operating condition of the TN-S system. Uncontrolled residual currents (leakage currents and fault currents due to insulation faults) can impair system and operational safety.

The technical managers at EPS Rechenzentrum Infrastruktur GmbH have recognised the challenges and employ Bender technology to record residual currents and monitor energy in the electrical distribution.

[2] TN-C: The functions of the neutral conductors and the protective conductors are combined in a single conductor in the entire system.
TN-C-S: The functions of the neutral conductor and the protective conductor are combined in a single conductor in one part of the system.

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The goal:

- Professionally and correctly readjusting, evaluating and tracking the changes in the leakage currents in the system
- Ensuring electrical availability
- Detecting and analysing utilisation and consumption
- Reducing the effort required for periodic verification in accordance with DGUV (German Social Accident Insurance) Regulation 3
- Standard-compliant operation without RCD with RCM and the necessary administrative measures.

"A truly reliable statement regarding the state of the power supply is only possible through **continuoussystem monitoring and analysis**."

None of this happens by itself, as this type of system monitoring represents a complete change in the way an electrical system is operated.

- In order to adjust the specific process chain to the demands of continuously effective residual current and energy measurement. Who does what in the event of a fault and by when?
- In order to interpret the measured values more effectively.

The realisation that the path to the safety of an electrical system does not only require one step, but many steps of different dimensions, is important for the continuous improvement of safety and verifiability.

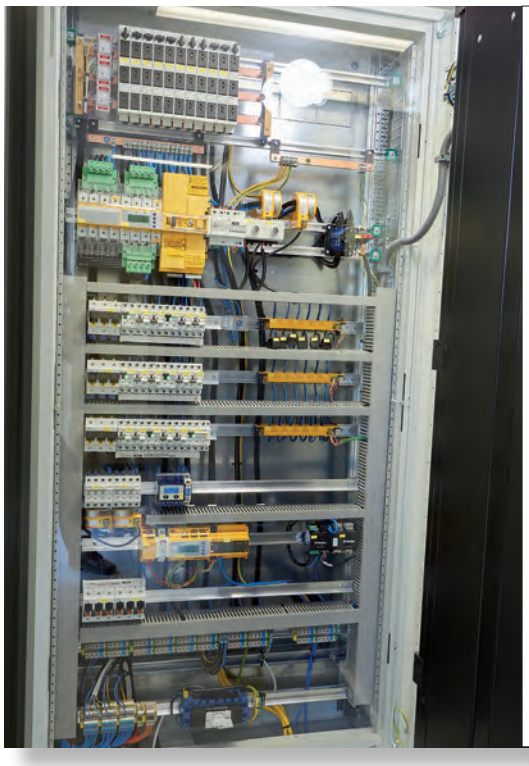
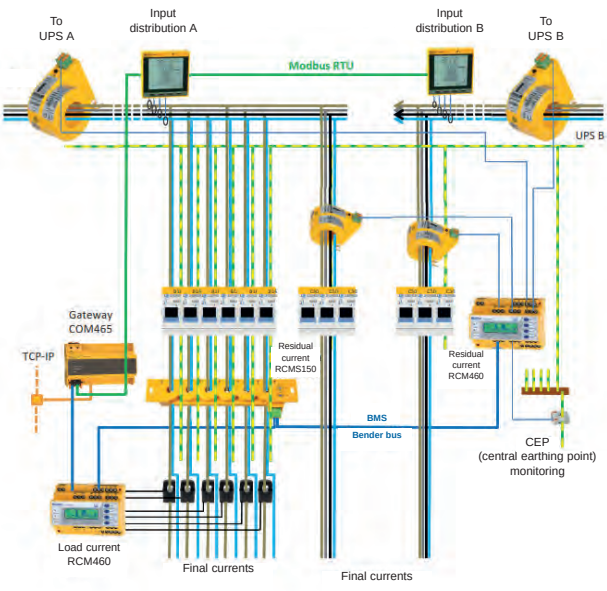
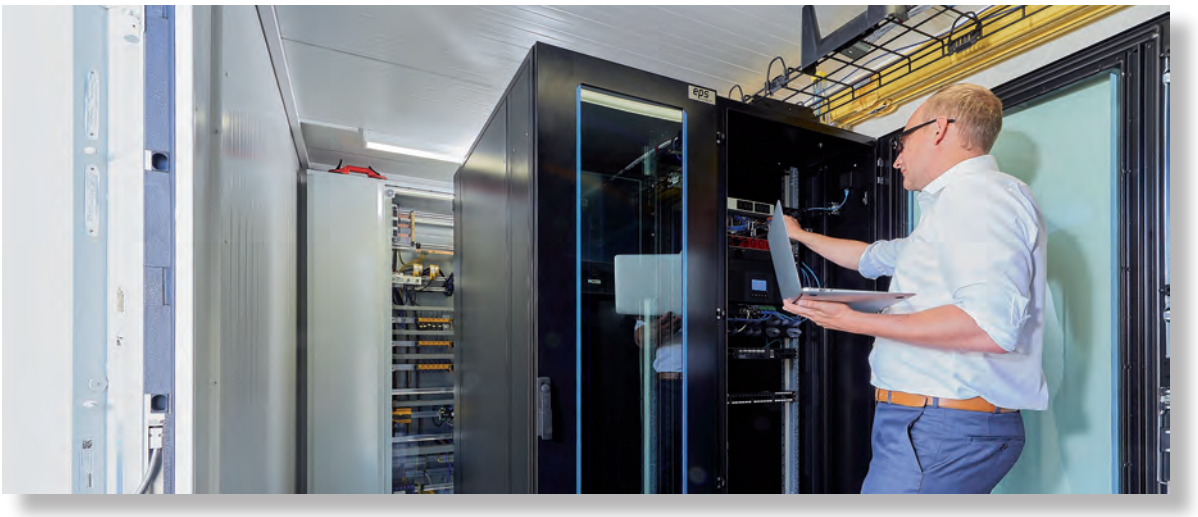


FIG. 1:
Wiring diagram





Small data centres with the most demanding requirements

For **EPS** customers, maximum availability is an important success factor, since daily business activities, constant competitive and cost pressure, and comprehensive operational availability – around the clock – require maximum electrical safety in the power supply system. Continuous monitoring of safety-relevant circuits for fault, residual and operating currents as well as stray currents generates information at an early stage about looming critical operating states and therefore avoids possible failures.

Despite standard-compliant execution by planners and building owners, modern loads such as servers, routers, switches, cooling systems, fans, etc. are increasingly causing disruptions in data centres.

COMTRAXX® Gateway solution
Condition Monitor CP700

With the installation of Bender residual current and energy monitoring in power distributions and at the central earthing point in conjunction with a COMTRAXX® gateway solution, a central system for monitoring and control as well as simultaneous management of alarms and documentation could be implemented at many locations.

"The **detection of insulation faults** or PEN bridges in the TN-S system is particularly important."

Benefits of Bender technology

On one hand, these solutions make it possible to monitor the status of all system components in real time in order to enable early fault detection and guarantee the highest standards of reliability. On the other hand, it enables the user to monitor the electrical system remotely during operation to evaluate any changes that occur and detect faults in good time so that data can be quickly and reliably provided for a decision in the event of a fault.

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The detection of insulation faults or PEN bridges in the TN-S system is particularly important. These can then be remedied without having to shut down the systems or without malfunctions affecting performance.

There are also requirements as to which data is to be connected to the central control system or a DCIM system. What makes sense? Who needs which information? Where are the contact partners based? Do external partners have to be involved? Together with the specialists from Bender and EPS, these questions can be clarified accordingly, and the processes can be implemented.

At the same time, continuous residual current monitoring can lead to an effective reduction in the time and costs involved in monitoring and periodic verification as per DGUV Regulation 3 and also increase IT availability.

If an RCM is used on a granular basis, the use of RCDs as per DIN VDE 0100-410:2007-06 is not necessary. The prerequisite here is the development of a reporting chain and timely troubleshooting by an electrically skilled person.

CONCLUSION

With the multi-channel residual current monitoring system and energy measurement, AC, pulsed DC and AC/DC sensitive monitoring of fault and residual currents, operating currents, stray currents and currents in N and PE conductors at key points of the power supply is possible. These solutions make a significant contribution to ensuring the high availability of the power supply and also reduce IT expenses and maintenance costs.

Bender's RCM solution replaces the RCD, eliminating the need for planned shutdowns due to necessary tests and unplanned shutdowns as a result of load faults. ■

BENDER
The Power in Electrical Safety©

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