

Datev in Nuremberg: permanent fault monitoring paves the way for safe, uninterrupted operation and replaces periodic testing.



## Permanent monitoring of electrical installations and equipment

# Uninterrupted security

Testing and monitoring electrical installations and equipment at regular intervals is very costly and time-consuming. In addition, many systems cannot be switched off as they must be continuously available. A visit of the editorial staff to Datev quickly revealed that the permanent ground-fault monitor from Bender combines personnel protection, fire protection and system availability.

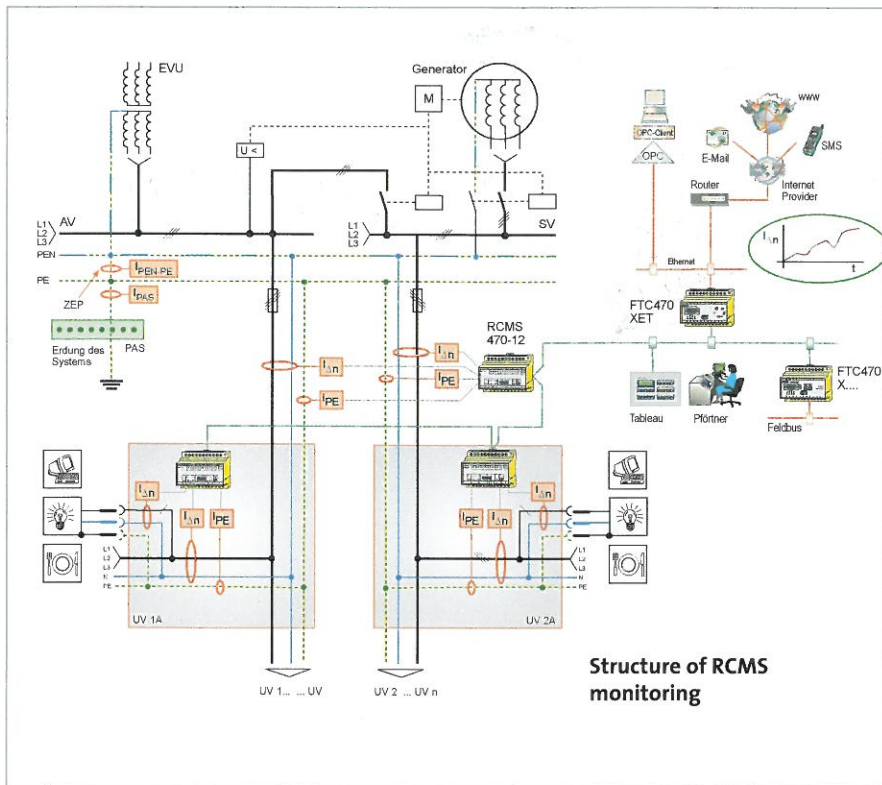
► Electrical installations and equipment must be tested at least every four years to ensure that it is in good working order. When one considers that PCs, monitors, printers, radios, photocopiers and coffee machines are also included here, you quickly get a rough idea of how many insulation tests need to be carried out in larger companies. Added to this is the fact that it is not particularly purposeful to carry out tests only sporadically and hence, the results only relate to a particular moment in time. Furthermore, the service life of many modern office devices is

shorter than the specified testing intervals. The fact that production has to be interrupted to conduct detailed insulation tests poses yet another problem. After all, many systems – such as the electronic data processing center at Datev – have to be available 24 hours a day. For operational safety reasons, ground fault circuit breakers have not been installed as even low levels of leakage current could lead to an uncontrolled breaking of the circuit. So, how can you keep a system running and at the same time maintain a high level of fire and personnel protection?

### Signalling instead of switching

Matthias Greim, the group leader for building installations at Datev who, together with 8 colleagues is responsible for planning the heating, ventilation and air conditioning facilities, the electrical installations and the building services management systems was faced with this question. Bender provided the appropriate answer. The RCMS system from

▶ **AUTOR**  
Frank Nolte, Editor of IEE



Structure of RCMS monitoring

COMPACT

In addition to indicating fault currents, the residual current monitors offer the functionality of residual current circuit breakers. Here, however, the installation is not shut down in the event of a malfunction. As the system indicates low fault current levels together with their value and exact time at which they occur, the source of the fault can easily be determined. Hence, the permanent monitoring of electrical plant and equipment is also suitable for preventative maintenance. Moreover, it enhances system availability and offers a high level of personnel and fire protection. Given that the system has been approved by the Employers' Liability Insurance Association, the operational equipment and electrical installations do not have to be tested every four years.

the specialists for electrical safety in the area of power supply has already proved itself in practice on several occasions. It continuously monitors the residual current of an electrical system and generates a warning message when the adjustable fault current level is exceeded. Günther Prenzel, the member of the Bender sales staff responsible for Northern Bavaria and hence, for Datev, explains: „To achieve an optimal solution, our engineers adapt the system in an application-oriented manner in line with the specific requirements of the cus-

tomers. In the case of the pilot system, these requirements focused, above all, on high system availability as well as on fire and personnel protection.“ Matthias Greim emphasises: „In this way, we implemented the functionality of a residual current fault circuit breaker without having to switch off the equipment. Moreover, this was realized in an operator-friendly but very well structured device.“ The complete savings potential could, however, only be realized if the utilization of this device were to result in the discontinuation of the regular tests. This, however, requires the approval of the appropriate Employers' Liability Insurance Association. Matthias Greim continues: „Convincing the Employers' Liability Insurance Association in Munich of the capabilities of the system proved to be the most difficult step in the implementation process. Bender provided great support in gaining the required

approval, above all, through its direct contact to the Employers' Liability Insurance Association in Cologne.“ After a two-month test operation phase with fault simulation, the system was approved as a permanent measuring device. The Employers' Liability Insurance Association only imposed one condition, namely that the electrical system be serviced and updated by qualified electricians. The Service department at Datev, which comprises a team of 10 employees, will take care of this. In the meantime, 114 RCMS measuring devices each with 12 inputs are monitoring all the distribution systems – including the UPS and prime power applications – in the electronic data processing center, the service center as well as in the printing and dispatch center. In addition, the fault current is measured at the central grounding point.

Commissioning, with practically no down-time

According to Günther Ruschig, who is responsible for the planning of building installations and electrical systems at Datev, the installation of the RCMS systems did not cause any problems what-

Günther Ruschig, who is responsible for the planning of building installations and electrical systems at Datev: „All the measurement results and faults that occur are displayed on our computers without the utilization of special software.“



## COMPANY DETAILS

Datev, which was founded in 1966 and has approx. 39,000 members and 5,400 employees, reported sales in the amount of EUR 571 million in fiscal 2003 and is one of the largest information service providers and software houses in Germany. Services focus, above all, on the areas of accounting, business consulting, taxation, enterprise resource planning (ERP) as well as organisation and planning for auditors, tax consultants and attorneys. User systems connect up to the mainframe databases at the electronic data processing center via data transmission approx. 500,000 times every day.



Günther Ruschig, Matthias Greim, Helmut Muhm and Günther Prenzel (l. to r.) are keen to continue the successful cooperation and have the system installed at further Datev locations.

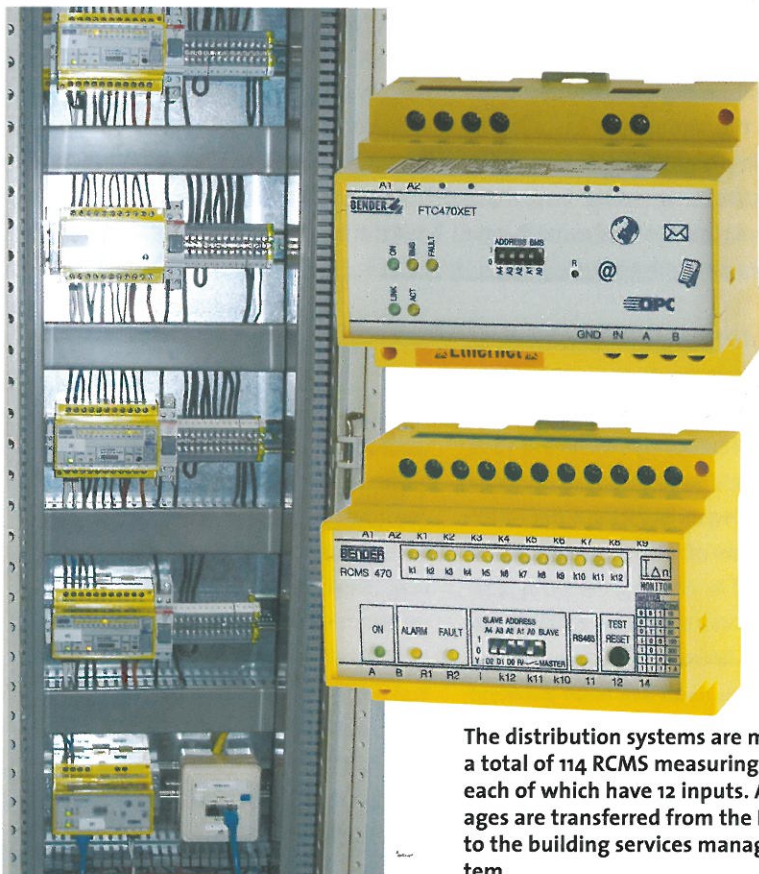
Here, the members can access more than 420,000 documents on taxation, commercial and corporation law. The host systems in the electronic data processing center have a capacity of 8213

MIPS. Together with the automated cassette archive, which has a capacity of 362592 GB, they guarantee that evaluations and assessments can be created very quickly.

soever: „In the printing and dispatch center Datev III, we installed, for example, 2,5 km of transformer and bus

cables in 400 working hours. Split-core type measuring current transformers were only used for systems such as the

EDP systems, which could not be switched off under any circumstances. This also helped to reduce costs. The remaining circular type current transformers were installed outside of the production times.“ During the implementation phase, great attention had to be paid, above all, to the existing type of distribution systems as Datev, similar to many other production and administration buildings, uses both 4 and 5-conductor systems. The Nuremberg-based information service provider opted not to convert from a 4 to a 5-conductor system on account of the costs in the amount of EUR 3.5 million. Günther Ruschig explains: „The only minor difficulties encountered from time to time during installation were caused by an occasional shortage of space in the control cabinets. But, needless to say, we did manage to accommodate all of the measuring current transformers in the end.“



The distribution systems are monitored by a total of 114 RCMS measuring devices each of which have 12 inputs. Alarm messages are transferred from the FTC gateway to the building services management system.

#### Adjustable threshold value

The RCMS system measures the residual current between all the active conductors and the earth in the distribution systems. The RCMS system is monitored

separately to ensure that the PE is not current-carrying. Matthias Greim reports: „During the commissioning phase we were quite surprised at the how steadily current flowed via the PE. By checking the alarms generated when the defined level for fault current was exceeded we were able to eliminate many error sources such as PE/N bridges and insulation faults. A number of ‘faults’ that occur sporadically, such as the switching on or off of the outside lighting or the starting of a photocopier can, however, not be eliminated. We have therefore adjusted the fault current level at which an alarm should be generated in the subdistribution boards where such faults regularly occur.“ As a time delay can also be adjusted in addition to the response value, it is possible to ‘mask out’ known error sources and short-term faults.

#### Suitable for preventative maintenance

As soon as the insulation resistance in the monitored system drops – due, for example, to electrical, mechanical or environmental influences – resulting in the measured residual current exceeding the defined value, the RCMS470 generates an alarm message via a gateway in the building control system. The fault is displayed on the monitoring PC and indicated in the security center. Plant security informs the appropriate employee who identifies the cause and subsequently eliminates the source of the fault. No software is required for visualization. A standard browser is quite sufficient. The visualisation computer has a history memory for 650 alarms which, according to Günther Prenzel, is more than adequate based on an average of one fault

#### ▼ TECHNICAL SPECIFICATIONS OF THE RCMS470 SYSTEM

- ▶ Monitoring of max. 720 measuring points with split-core and flexible measuring current transformers
- ▶ Adjustable response value for each measuring point: 40...400/1000 Hz, 0.01 to 10 A
- ▶ Programmable early warning and main alarm
- ▶ Adjustable time delay of 0 to 25 s
- ▶ Centralized display, operation and visualization of all measured data via Internet gateway
- ▶ Documentation of historic data, data logger function,
- ▶ OPC interface for communication with higher-level control systems
- ▶ Display of real-time curves.
- ▶ Dispatch of e-mail in the event of an alarm and system malfunctions
- ▶ Remote access via LAN, WAN or Internet

per week. For safety reasons, all faults are saved in the measuring device. Günther Ruschig explains: „The exact time of the alarm message is indicated and hence, the cause of most of the fault can be identified by approaching the employees on site. In cases where it is necessary to search for the source of a fault, we use a residual current monitoring device for mobile applications.“ In this way, the system can also be used for preventative maintenance. By way of example, the hot plates in a film welding installation at Datev generate a high level of fault current due to the age of the installation. After changing the boards, it was determined that the fuse would have been triggered and the system would have been idle in 12 operating hours.

#### Savings potential

Helmut Muhm, product manager for residual current monitors at Bender emphasises: „To further optimise the functionality of the devices, we also maintain close contact with our customers after the completion of the project. The im-

provements suggested by Datev with regard to user-friendliness and display optimisation will be implemented in the near future.“

Matthias Greim is, however, convinced that the permanent device monitoring system is already a complete success at the current stage of development: „The tests that would normally be required are no longer necessary and this alone saves us two man-years of working time every four years. Moreover, our electrical fitters can now work even more meticulously as the system indicates every little fault.“ Thanks to the positive experience with the measuring system at Datev, other locations are now also being equipped with this system.

#### ▼ COMPACT

Bender Netzschutztechnik  
www.bender-de.com

Dipl.-Ing. W. Bender GmbH & Co. KG, Londorfer Str. 65, 35305 Grünberg, Germany  
Phone: 06401/807-0, Fax 06401/807-259,  
Internet: www.bender-de.com, E-Mail: info@bender-de.com