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Residual current monitoring in one of the largest industrial power grids in Germany

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Dear Reader,

This time I'd like to utilize our editorial to inform you about a special topic:

September 21 in Wiesbaden, the capital city of the state of Hesse, Germany, I presented Bender – as one of more than 70 applicants – to a jury searching for the 'Hessen Champion 2011'. By means of country maps from all over the world scattered with flags representing hospitals using our technology I was able to produce an impressive picture of the company's importance in the global market. This point was highlighted by citing many more examples of market segments where we are holding a leading position like cruise liners, submarines and military vessels, industrial plants, large drives, metal smelters, nuclear power plants, oil platforms, generators and data centers. Furthermore as exotic segments as the world's largest luxury yachts, humongous trucks being used by the tar sand industry, gigantic tunnel boring machines, the world's most spectacular water fountains and Hollywood movies like 'Pirates of the Caribbean'. Obviously our new growth markets like photovoltaic, electrical vehicles and charging stations needed to be mentioned as well.

The variety of applications and the overall market position of Bender convinced the jury consisting of 25 experts declaring Bender winner in the category "World Market Leader".

October 25 Prime Minister of Hesse Bouffier, Minister of Economic Affairs Posch and President of the Hessian Industrial Association Prof. Weidemann awarded Bender with the price during a ceremony joined by more than 1.000 representatives of Hesse's commercial landscape. The following live-interview in the evening news was opened by Sebastian Kisters with the words: "What is the world market leader winning this award actually doing? He is producing a system saving lives!"

It's an achievement we can all be proud of. My special appreciation goes to those who made this success possible: Our employees and our customers and partners!

Yours

Dirk Pieler
CEO

IMPRINT

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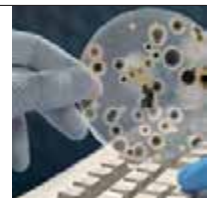
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Concepts for the prevention of nosocomial infections must also be followed on medical PCs

Computer hygiene

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Only with comprehensive and strictly observed hygiene concepts can nosocomial infections be stemmed. As ever more information technology is used in hospitals, it is clear that computer systems must also be taken into account on this issue. Especially as these devices are mostly in the immediate vicinity of the patient or pass through many hands ...



Electrical safety on charging electric vehicles

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The monitoring of the insulation resistance is particularly important for the prevention of damage and injury, and for the reliability of electrical systems. The insulation resistance also serves as an important indicator for the condition of an electrical installation. This statement also applies to the area of e-mobility ...



St. Vincenz-Hospital was a trailblazer: holistic therapy concept in orthopaedics

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Pioneer project for hips and knees: patients become mobile again faster with Joint Care®.

As a general, non-profit private hospital the St. Vincenz-Hospital Limburg has a total of 15 specialist departments with 477 beds ...





Concepts for the prevention of nosocomial infections must also be followed on medical PCs

Computer hygiene

Only with comprehensive and strictly observed hygiene concepts can nosocomial infections be stemmed. As ever more information technology is used in hospitals, it is clear that computer systems must also be taken into account on this issue. Especially as these devices are mostly in the immediate vicinity of the patient or pass through many hands.

Nosocomial infections are one of the most common complications related a patient's stay in hospital. Even now every year up to 600,000 people become infected with to some extent aggressive and highly infectious bugs, for instance *Clostridium difficile* associated diarrhoea (CDAD). And that with often dramatic results: up to 15,000 die from the consequences of an infection picked up in hospital. And the number continues to rise. The hospital bugs that are now most feared and widespread include methicillin-resistant or multi-drug resistant *Staphylococcus aureus* (MRSA).





Figure 1: Medical PCs make paper-less documentation possible and make data accessible also outside the isolation areas.

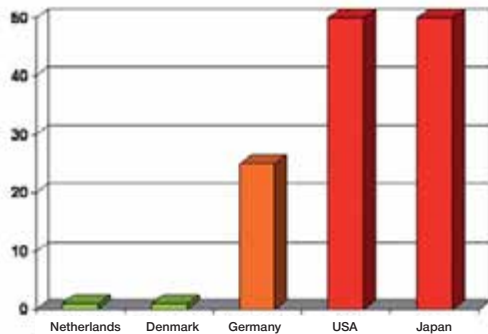


The portion of MRSA has increased significantly in Germany in recent years. While at the start of the 1990s, only one to two percent of the *Staphylococcus aureus* pathogens were resistant to several groups of antibiotics, in the mean time every fourth strain is “immune” to many common preparations according to a study by the Paul-Ehrlich-Gesellschaft. In intensive care wards the portion is already around 35%. On average MRSA is now responsible for every fourth serious infection in German hospitals. As current studies show, although the number of new MRSA infections remains static, it continues to remain at a high level. There is therefore no reason to lower the guard. Especially as the number of other infections, e.g. with vancomycin-resistente enterococci (VRE), are continuing to increase.

MRSA: high patient suffering, high cost pressure

Although an infection is not immediately life-threatening for healthy people, for people with a weakened immune system, such as is often the case in intensive care wards and nursing wards, it can most definitely be life-threatening. MRSA is also life-threatening if it enters the blood stream directly. A risk that is present above all in the operating theatre. Around 1,500 people die every year as a consequence of this bacterial infection. Apart from the patient suffering, MRSA also causes significant additional costs for the health system. The costs for a patient who has contracted MRSA are euro 6,000 – euro 20,000; the total annual expense for treating the pathogen is around 300 million euros. The costs of all nosocomial infections together are as much as 1.5 billion euros per year.

GRAPH 1: THE NETHERLANDS ARE PIONEERS ON FIGHTING MRSA.



Portion of resistant bugs (MRSA) among *Staphylococcus aureus* infections in percent (date 2005, adapted from Witter and Heuck)

The Netherlands as a role model

Hospital bugs like MRSA are not an inevitable plague and nosocomial infections are not an evil that must be simply accepted. On the contrary: studies show that at least a quarter of all nosocomial infections are avoidable. Rigorous action is therefore required. The main cause of the spread of these bugs is insufficient or incomplete hygiene concepts. The Netherlands has already proven that it is possible to stem the insidious hospital plague. (See Graph 1) In the Netherlands less than 1% of the infections with *Staphylococcus aureus* involve the multi-drug resistant variants. Furthermore, in 2007 the rate of new infections in our neighbour dropped below 0.1 percent for the first time, in Germany it is more than twice as high. The recipe for success in the Netherlands: holistic, strict hygiene concepts.

Blind spot: medical information technology

There already exist many concepts and guidelines that are intended help to stem the spread of nosocomial infections. These include regular disinfection of the hands, regulated antibiotics prescription, the isolation of infected patients, and even requirements on water and air supply systems. As detailed as many hygiene concepts may be, they often still have a blind spot: the medical information technology systems and medical PCs. This is a particularly important topic, as medical PCs are used, for example, for monitoring vital signs predominantly where the risk of infection is the highest: in the operating theatre or surgery and in intensive care. Compared to other wards in a hospital, patients here are subjected to a risk of a fatal nosocomial infection that is three times higher. It is therefore all the more important that everything is done there to prevent an infection.

Paper cannot be disinfected

As one of the most effective measures against the spread of pathogens like MRSA within a hospital, the strict quarantine of infected patients is particularly important. This statement seems to be borne out by the success in the Netherlands where, among other measures, by strict compliance with this strategy appreciable successes in the battle against MRSA have been achieved. The key here is that the quarantine room is sealed off, only entered with protective clothing, and is only allowed to be left again after thorough disinfection. This applies to people as well as to objects. This guideline has a significant impact on the documentation: no documents or even no ballpoint pens that are taken from the exterior into the isolation room are allowed to leave the room again without prior thorough disinfection. The disinfection of paper forms is however a problem. Nevertheless, the data from the form must be transferred to the database. Here medical PCs now come into play: these data can be integrated, e.g., into PACS or KIS networks in a hospital via data connections, such as Ethernet or WLAN, and therefore remain in the patient room but are nevertheless also made available to the personal outside the room. In this way the results of examinations at the patient's bed can be viewed, changes to medication and care documented, or food ordered digitally. Documentation no longer takes place at the patient's bed, but instead directly on-line in the electrical patient file. (see figure 1)

Medical information technology can become an oasis for bugs

However, despite these strict measures, from a statistical point of view every MRSA patient transmits his/her MRSA to 1.5 other people per hospital stay. The most frequent transmission path is direct contact, like many other bugs involved in nosocomial infections. In a normal hospital ward medical personnel have around 40 contacts with different patients per shift, in the intensive care ward as many as 100 contacts. The need for the disinfection of the hands already mentioned is therefore self-evident. However this is not enough by a long way. The medical equipment, information technology systems and medical PCs must be regularly disinfected to prevent propagation. Certain bugs, like MRSA, can survive for months on what are actually inhospitable surfaces, such as fabrics, plastic or metal. This situation has also resulted in the invention of the term "plastic infection". Computers and keyboards used jointly by a number of people or used in the immediate vicinity of patients can therefore become real "oases for bugs". (see figure 2)

Particularly keyboards have as a rule spaces that cannot be wet cleaned and can definitely not be disinfected, the mouse also has gaps into which dirt, cleaning and disinfection liquids can enter and may even degrade the function of the device.



Figure 2: Keyboards can become real oases for bugs and often form the starting point for plastic infections.



Figure 3: Dust and particles from the ambient air often collect on ventilation slots.

The fact that such data entry devices are heavily colonised by bugs was confirmed by a scientific study in 2003. During the study 100 PC keyboards from the outpatient, emergency surgery and long-term treatment areas were checked for contamination by micro-organisms. The result was worrying: 95 % were infected with bugs. Although the majority belonged to the traditional skin flora, 5 keyboards were infected with pathogenic bugs (*Staphylococcus aureus* and enterococci).

PC hygiene is essential

The usage of medical equipment, IT systems and medical PCs that can be easily cleaned and disinfected is therefore elementary to prevent the colonisation and transmission of pathogens. According to an assessment by Prof. Dr. Rotter, head of the Clinical Institute for Hygiene and Medical Microbiology at the Medical University of Vienna, ideal here are medical PCs that have a passive, fan-less cooling concept and therefore have a fully

enclosed housing without joints. The medical PC should also be specified with ingress protection IP65 to prevent the entry of cleaning liquids into the interior of the device. Last but not least, the housing must of course be manufactured from resilient materials so that it is not damaged over the long term by the aggressive disinfectants.

In the case of conventional computer technology, as is also found in medical PCs, an often unsuitable surface design and a cooling system with fans and ventilation slots prevents thorough cleaning and disinfection of the systems. Another problem with active fans: dust collects on the ventilation slots on PCs – a good breeding ground for pathogens. (see figure 3) In turn the active ventilation then distributes the dust across wide areas of the room, for instance on booting the PC. Furthermore, fan-less medical PCs are silent in operation and are particularly suitable for usage in the immediate vicinity of the patient, e.g. at the patient's bed.

Touchscreens are ideal for hygiene-sensitive areas

However, it is not just the housing that is important for the prevention of infection, but also the operating concept for medical PCs. Conventional keyboards as data entry devices



Figure 4: Touchscreens are particularly easy to clean and, thanks to multitouch functionality, create completely new possibilities for medical applications.

are clearly unsuitable in hygiene-sensitive areas. As they are used by many persons, but can only be cleaned with difficulty due to the fissured surface structure, there are often large numbers of bugs on them. Operation via touchscreen is significantly more suitable here. The intuitive and easy operation via a touchscreen not only increases the likelihood of correct operation, thanks to multitouch functionality, as is familiar from modern smartphones and tablet PCs, completely new possibilities for medical applications are created. (see figure 4) The usage of the touchscreen is certainly more suitable from the hygiene point of view. As the smooth display surfaces are made of glass in some cases, they can be cleaned without problems. ■

*Helmut Müller,
General Manager Penta GmbH*

REASONABLE INVESTMENT

It is clear: hygienic medical PCs can contribute significantly to a comprehensive and successful hygiene concept and help to prevent many infections. However, it is important to pay attention to the suitability of the systems for hygiene. And the procurement of such systems is a reasonable investment in many ways. As apart from the suffering that patients could be saved by stemming nosocomial infections, significant additional costs for the health system in the region of billions could be reduced. And a high hygiene standard will also become increasingly economically important for every hospital: an excellent hygiene concept is an important differentiating feature in the competition for patients. Otherwise the image could be damaged by hygiene scandals, bed occupation could drop as a result and therefore also earnings. And lost trust is very difficult to regain.



Bender is the award winner of Hessen Champion 2011 in the category of World Market Leader

Won!



On the 25th of October 2011, for the eleventh time the Hessen Champions in the categories World Market Leader, Job Motor and Innovator were chosen during the Entrepreneur Day of Hesse at Wiesbaden Kurhaus. The object of this competition is to award companies who distinguish themselves through especially outstanding achievements.

Dr. Dirk Pieler, D. Christian Bender and Christian Bender were pleased to receive the Hessen Champion Award in the category World Market Leader from Volker Bouffier, the Hessian Prime Minister. Our company stood out against strong Hessian competitors like Sanofi-Aventis Deutschland GmbH from Frankfurt am Main, Pfeiffer Vacuum Technology AG from Aßlar and VITRONIC Dr.-Ing. Stein Bildverarbeitungssysteme GmbH from Wiesbaden. A jury made up of high-qualified representatives from the media, business and political world praised us for making the world a more secure place.

Already in 2004, Bender was delighted to receive the special Job Motor Award.

This year, the Online agency EOL Group from Fernwald-Annerod near Gießen received the award in the Job Motor category. The Innovation Award was handed out to Bode from Kassel.

The Hessen Champion Award once again conveyed to us, again is a proof and appreciation of the excellent work carried out by all of you around the globe. ■

Anne Katrin Römer, S-COM



Electrical safety on charging electric vehicles

The monitoring of the insulation resistance is particularly important for the prevention of damage and injury, and for the reliability of electrical systems. The insulation resistance also serves as an important indicator for the condition of an electrical installation. This statement also applies to the area of e-mobility. By means of the correct selection of the type of system, combined with protective and monitoring devices compliant with the standards, a high degree of safety and reliability is achieved.

Type of system and protective measures

In the e-mobility area there are essentially three types of system to be taken into account. In the case of AC charging these are primarily earthed systems (TN-S systems) while in the case of the DC charging station unearthed power supplies (IT systems) are used. The electric vehicle itself has an insulated high voltage system that is comparable with an IT system in accordance with DIN VDE 0100-100:2009 [1]. A key issue for the electrical safety is the charging process in particular, as here different types of system are connected together to form an overall system. During vehicle operation the vehicle's high



voltage system can be considered a “mobile” IT system, during charging this changes to either an earthed (TN system) or an unearthed (IT system) overall system with the important challenge of reconciling the supplying system’s and the HV system’s protective measures.

HV system

The HV system in the vehicle is monitored by an on-board insulation monitoring device and the occurrence of an insulation fault signalled, as shutdown while driving would be fatal. The message is displayed to the driver, e.g., on a display such that the insulation fault can be rectified by a specialist garage. There is no immediate hazard for the driver, however the insulation fault must be rectified as soon as possible to prevent a second fault on another cable affecting the operation of the vehicle.

Charging process

The protective measures for the electrical installation are described in detail in the standard DIN VDE 0100-410 (VDE 0100-410): 2007-06 [2], while the measures for the electric vehicle are defined in the standard ISO/FDIS 6469-3:2011-05 [5]. Before an electric vehicle can be charged, it should first be ensured that the HV system in the vehicle is free of insulation faults. In this way it is ensured that an insulation fault in the vehicle does not cause the protective and monitoring device in the charging station to trigger and therefore prevent charging. As a rule the vehicle’s own insulation monitoring system checks the insulation resistance and only enables the charging contact in the vehicle if there is adequate insulation resistance. Limits are defined, e.g., in ISO/FDIS 6469-3:2011-05 [5] as 500 V/ Ω for AC systems and as 100 Ω /V for DC systems. At the start of the charging process, the

vehicle’s insulation monitoring is mostly switched to passive to prevent interaction with the protective and monitoring devices in the charging station. As a result the protective device in the charging station then has the task during the charging to monitor the complete circuit including the charging electronics in the vehicle.

An important prerequisite for a safe charging process is the continuity of the protective conductor. This continuity is checked by the ControlPilot and monitored during the charging process. If there are no problems with the protective conductor the charging process is enabled. From the point of view of the charging station it is also possible to measure the insulation resistance prior to the

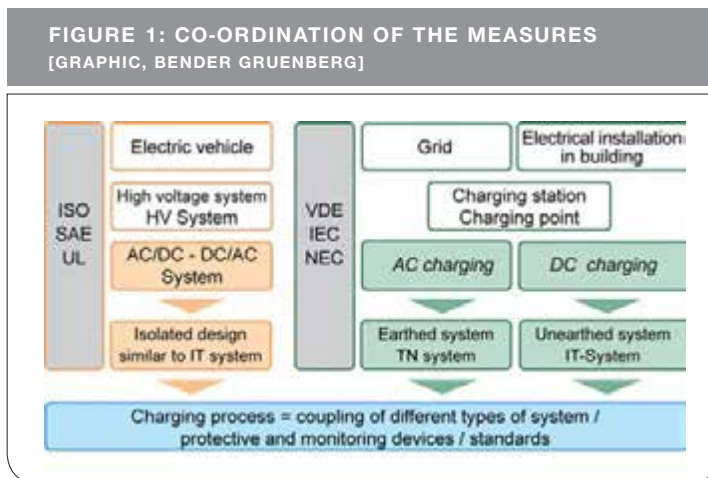
start; this measurement will then mostly include the charging cable to the vehicle input. This, however, makes it possible to detect, e.g. damage to the charging cable caused by mechanical effects.

There are various options in the standards for charging an electric vehicle; these

options are defined in the DIN IEC 61851-... series of standards [3] as mode 1...4.

AC charging (mode 2 and 3)

For AC charging a residual current device of type A is required per charging socket in accordance with IEC 61581-...[3] mode 3. It is also necessary to take into account the requirements from DIN EN 61140 (VDE 0140-1):2007-3 [7] that the measures taken against protective conductor currents must be compatible with all the frequencies transmitted to and from the equipment. This means that if DC fault currents ≤ 6 mA or fault currents with higher frequencies (e.g. 20 kHz) can occur, protection against electric shock is to be provided using



DC charging (mode 4)

DC charging stations are designed as unearthed systems (IT systems), i.e. an active conductor is not allowed to be connected to earth. This situation is achieved in the DC charging station by the isolated design of the charging electronics or an isolating transformer. In accordance with DIN VDE 0100-410:2007-06 [2] an IT system must be permanently monitored using an insulation monitoring device and a signal output if a specified value is exceeded. Such an IT system has two important advantages: a first insulation fault will not result in shut-down but only signalling. This means that the charging process can be continued until it is complete without problems. The second important advantage: the touch voltage in the case of the first fault is approximately 0 V. As a result a potential hazard due to current flowing through the body can be almost excluded. An important aspect, particularly in relation to the usage of charging stations by individuals with no electrical knowledge.

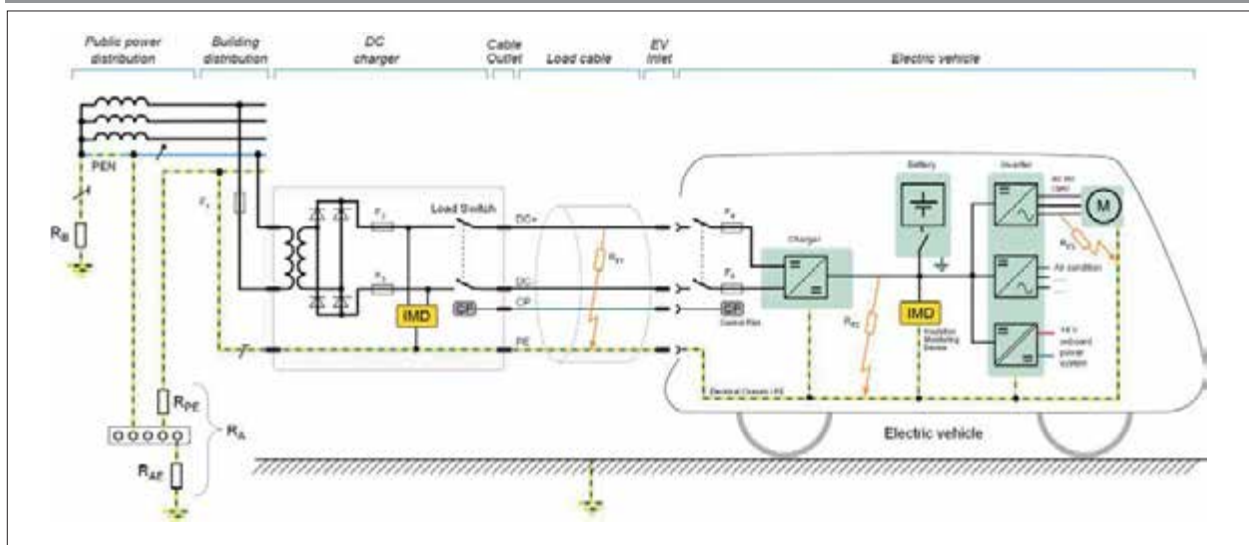
In accordance with DIN VDE 0100-410:2007-06 [2] the insulation monitoring device itself must satisfy the requirements of DIN EN 61557-8:2007-12 [6], i.e. it must detect both symmetrical and unsymmetrical insulation faults. A symmetrical insulation fault can occur when the insulation resistance of all conductors in a system to be monitored decreases to approximately the same extent. If this fault condition is not detected, there is, e.g., a risk of fire, as a higher current flows due to the two insulation faults on different active conductors; this current can cause increased heating at the faults.

Touch voltages on a 1st fault in a DC IT system

In accordance with DIN VDE 0100-410 (VDE 0100-410):2007-06 [2] exposed-conductive-parts of electrical equipment in IT systems must be earthed individually, in groups, or collectively, using a protective conductor. The condition $R_A \times I_d \leq 50 \text{ V (AC) or } 120 \text{ V (DC)}$ must be met. Here R_A is the sum of the resistances of the earth electrode

FIGURE 4: DC CHARGING IN MODE 4

[GRAPHIC, BENDER GRUENBERG]



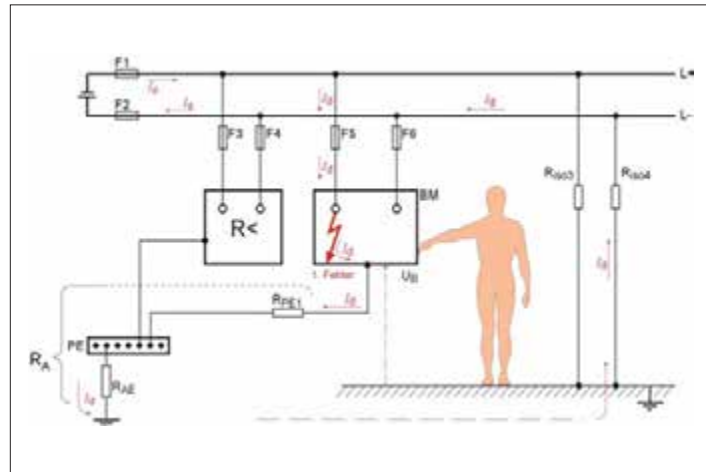
and the protective conductor for the exposed-conductive parts, I_d is the fault current of the first fault of negligible impedance between a line conductor and an exposed-conductive-part. The value I_d takes into account the total insulation resistance of the electrical system in relation to earth.

Figure 5 shows the current path on the occurrence of a first fault (insulation fault) in an IT system. R_{iso3} and R_{iso4} represent the total insulation resistance to earth that form part of the fault current circuit in the event of a fault. The insulation resistances shown in the figure are mostly very high in practice and only have a minimal effect on the touch voltage in the fault situation shown.

Figure 5 makes it clear that the touch voltage depends on the natural insulation resistances R_{iso3} , R_{iso4} , the resistance of the protective conductor R_{PE1} for the equipment touched and the earth resistance. Given the assumption that the protective conductor resistance and the earth resistance R_{AE} are small, the touch voltage is only slightly affected by the connection in parallel of the resistance of the human body (approx. $1\text{ k}\Omega$). In Figure 6 the magnitudes of the possible touch voltages in a DC 400 V IT system on a first fault are shown as curves. Variables plotted here are the natural insulation resistance R_{iso3} , R_{iso4} and the earthing resistance R_A . The equipment's protective conductor resistance is taken into account as $0.2\ \Omega$. During the evaluation of the touch voltage, it has to be considered that the charging station and the electric vehicle have a common earth.



FIGURE 5: TOUCH VOLTAGE IN A DC IT-SYSTEM
[GRAPHIC, BENDER GRUENBERG]



CALCULATED TOUCH VOLTAGES IN A DC IT SYSTEM ON THE OCCURRENCE OF A FIRST FAULT
[GRAPHIC, BENDER GRUENBERG]

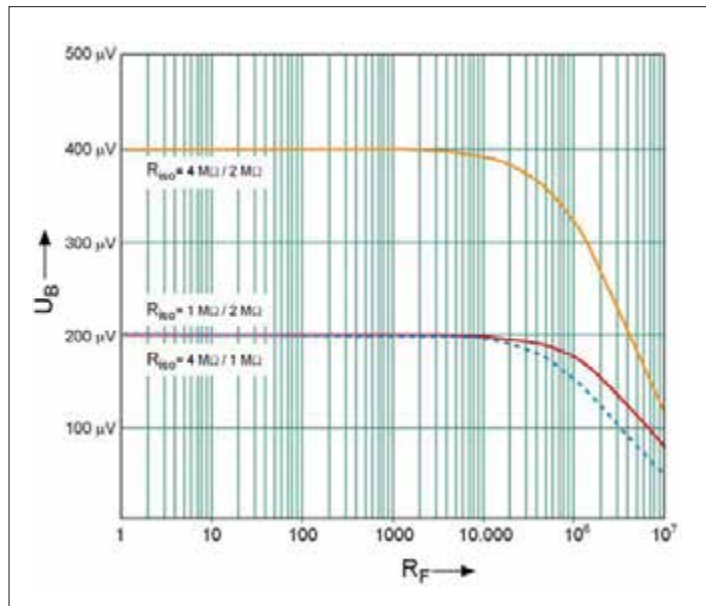


FIGURE 7: EXAMPLE INSULATION MONITORING DEVICE (A-ISOMETER®) FROM THE E-MOBILITY AREA

[FACTORY PHOTO, BENDER GRUENBERG]



Even though on a first fault in IT systems only relatively low touch voltages are to be expected, the mandatory requirement in point 413.1.5.4 of DIN VDE 0100-410:2007-06 [2] on the need for an insulation monitoring device is of elementary importance. With the requirement in note 1 point 413.1.5.4 recommending that "a first fault be eliminated with the shortest practicable delay", it is clear that in the case of a first fault that has not been eliminated, an additional second fault may cause higher touch voltages. If in such a case both faults are relatively low, impedance and on different active conductors (L+, L-), power may be lost due to the triggering of the upstream protective device. An important reason for the need for insulation monitoring devices is to be able to also detect symmetrical insulation faults. ■

*Dipl.-Ing. Wolfgang Hofheinz, CTO
Dipl.-Ing. Harald Sellner, S-MAR*

SUMMARY

In e-mobility attention has to be paid when AC systems and DC systems meet the high voltage system in the vehicle, particularly during the analysis of protective measures. With the correct selection of the protective and monitoring devices in relation to the related type of system, a high degree of electrical safety and reliability is, however, achieved for the users and operators of electric vehicles.

The IT system has clear advantages particularly with respect to a high degree of safety and high reliability.

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- [4] DIN VDE 0100-100 (VDE 0100-100):2009-06 Low-voltage electrical installations -Part 1: Fundamental principles, assessment of general characteristics, definitions (IEC 60364-1:2005, modified);
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[Standards can be procured from: www.vde-verlag.de, www.beuth.de]



The importance of e-mobility is increasing in the age of climate change and the scarcity of crude oil reserves.

UNIVERSAL AC/DC SENSITIVE RESIDUAL CURRENT MONITORING MODULE RCMB101

for integration in charging stations as per requirements in accordance with UL 2231-2*

As a consequence, the topic of e-mobility is currently experiencing a renaissance at all levels. Industry, politicians and consumers see this technology as a solution to soften the effect of individual mobility on the climate and resources.

In electric vehicles and charging stations it is necessary to place particularly high attention on the electrical safety. The monitoring of fault currents in the vehicle and the necessary charging station is a significant step towards electrical safety. With the newly developed universal AC/DC sensitive residual current monitoring module RCMB101 Bender is making an important contribution.

The RCMB101 module is used for monitoring residual currents in charging stations for electric vehicles. Residual currents can be caused in practice by insulation faults that occur, e.g. due to defective cable insulation. In the worst case, a dangerous electric shock could be suffered.

In combination with a power contactor, the RCMB101 satisfies the requirements in accordance with UL 2231-2 for CCID20 protective devices (CCID = **C**harging **C**ircuit **I**nterrupting **D**evice).

The RCMB101 is insensitive to external interferences and satisfies the highest requirements in relation to temperature stability.

The technology:

The residual current monitoring module RCMB101 measures AC and DC fault currents in the range 0...100 mA (0...500 Hz). The measurement is made via the internal measuring current transformer. The r.m.s. value is determined electronically. A DC voltage proportional to the residual current is available on the analogue module output (X1). If the measuring range of 100 mA is exceeded, a further signal is provided on a switched output (X12). In addition, the control input (X10) is polled. Depending on the sequence of levels applied, the RCMB101 can be reset with or without a self-test, calibration and activation of the test winding. ■

*Dipl.-Ing. Marc Euker, T-MTS
Dipl.-Ing. Wolfgang Hofheinz, CTO*

SUMMARY

With the new Bender residual current monitoring module RCMB101 as per the requirements in accordance with UL 2231-2, fault currents in the charging station or defects in charging cables are detected and accidents due to electrical power prevented by powering down.

*Personnel Protection systems for Electric Vehicles (EV)
Supply Circuits: Particular Requirements for Protection Devices
for Use in Charging Systems

Insulation fault location system EDS151

Electrical safety for medical locations

Particularly in intensive care units or premature baby stations, the number of circuits and sockets required is increasing with the rising amount of medical electrical equipment. If an insulation fault occurs, the service engineer is faced with the challenge of finding the circuit/socket or device with the fault. In the worst case this means parts of the installation must be shut down for insulation fault location and the related area can only be used to a limited extent, or even not at all.



ATICS with EDS151

To avoid this situation, automatic insulation fault location systems that meet the requirements of DIN EN 61557-9: are used. These systems locate the insulation fault automatically during operation and very quickly indicate the faulty circuit, e.g. via alarm indicator and operator panels.

Compact insulation fault locator EDS151

The insulation fault locator EDS151 is used to locate insulation faults in unearthed power supplies (IT systems) in conjunction with the automatic transfer switching and monitoring device ATICS® or the insulation monitoring device isoMED427P. For this purpose they use integrated measuring current transformers to measure the locating current pulses generated by the ATICS® or by the isoMED427P and evaluate these signals correspondingly. There are six measuring current transformers integrated into an EDS151 through which all live conductors in an outgoing circuit can be laid. The response time for an alarm message including indication on a corresponding display unit is max. 8s. A total of up to 88 EDS151 devices can be connected via an RS485 interface (BMS protocol) and in this way up to 528 circuits monitored. Activity on the BMS bus is indicated by an alarm LED

Space-saving compact solution

The automatic transfer switching and monitoring devices in the ATICS® series in particular feature a compact, shallow design. This was also the requirement for the insulation fault locator EDS151. The device is designed such that it can be placed between the rails in the equipment rack without any problem and, therefore, also built into wall-mounted distribution cabinets; it is used immediately ahead of the miniature circuit breakers. ■

*Helmut Becker T-MIS
Dipl.-Ing. Winfried Möll*



BENEFITS FOR THE USER

Space-saving:

- Installation possible between two DIN rails in a 120 mm wall-mounted distribution cabinet
- Possible to install two EDS systems immediately ahead of the new double miniature circuit breaker

Compact:

- Can be installed together with ATICS® in a shallow wall-mounted distribution cabinet

Straightforward mounting:

- Quick connection is possible due to few connections
- No additional installation effort (mounting bar, bracket or the like) required

Efficient troubleshooting:

- Possible to detect not just one fault, but several faults on all channels
- Optical channel indication on the cable feedthrough as well as on the control unit
- Insulation fault location during operation without shutting down equipment
- Alarm message via interface to central point
- Cost reduction due to rapid diagnostics and analysis
- Future-proof investment

Cascadable:

- Monitoring of up to 528 channels possible

Legally protected registered design.



FOR THE MEDICAL SECTOR:

A-ISOMETER® isoMED427P

The A-ISOMETER® isoMED427P monitors the insulation resistance in medical IT systems (unearthed AC circuits) in accordance with IEC 60364-7-710, DIN VDE 0100-710 (VDE 0100-710) and insulation monitoring devices (IMD) according to IEC 61557-8 and IEC 61557-9. At the same time, the load current and temperature of the IT system transformer as well as the connections to PE, to the measuring current transformer and to the temperature sensor are monitored. The currently measured value is indicated on the LCD. Alarms are indicated via LEDs and an additional identification is shown on the LCD. Parameters are assigned to the device via LCD or the function keys on the front of the device.



The isoMED427P can be combined with EDS insulation fault locators and the associated measuring current transformers to set up a corresponding insulation fault location system.

Insulation monitoring and fault location

The isoMED427P uses the AMP measurement method, which is also able to detect DC faults. When the value of the insulation resistance falls below the set response value, the alarm relay switches and the alarm LED lights up. When the insulation resistance exceeds the release value (response value plus hysteresis), the alarm relay returns to its initial position and the alarm LED goes out.

Insulation fault location is carried out with EDS insulation fault locators and the respective measuring current transformers. Once an insulation fault is detected by the isoMED427P, the insulation fault location process is started automatically or manually. The isoMED427P generates a locating current the amplitude of which is dependent on the existing system voltage and the insulation fault. In the case of low-resistance insulation faults, the locating current is limited by the isoMED427P to a maximum value of 1 mA. The locating current pulse flows from the isoMED427P via the live parts to the point of fault. From there, the locating current flows back via the insulation fault and the earth conductor (PE) to the isoMED427P. This locating current pulse is detected by the measuring current transformers located in the insulation fault path, and is evaluated by EDS insulation fault locators. When the locating current in the measuring current transformer exceeds the response value, the associated alarm LED at the EDS lights up indicating the faulty sub-circuit. This information is also indicated at the respective MK alarm indicator and test combination. By assigning the measuring current transformers to the respective circuit, the point of fault can easily be detected from a central position.

Load current and temperature monitoring

The load current is monitored by an STW2 measuring current transformer, the temperature is monitored by a temperature switch or a PTC thermistor in accordance with DIN 44081.

Alarm relays

The alarm relay switches on the occurrence of an alarm or a device error, or in the case of voltage failure (N/C operation). The factory-programmed operating principle can be re-programmed. ■

Helmut Becker, T-MIS

USER BENEFITS:

A device of extremely compact design and an integrated locating current injector for the functioning of insulation fault location, used in combination with insulation fault location system EDS151, makes it possible to realise a very compact and cost-effective equipment for insulation fault location. In practice this means:

- Occurring insulation faults are indicated reliably in compliance with the standards.
- The faulty circuit of the distribution board resp. of the defective load is detected automatically, no personnel required.
- Localisation is carried out during operation without operational interruptions.
- The localisation process takes a few seconds only.
- Insulation faults occurring for a short period can also be localised reliably.
- Knowing the point of fault allows the insulation fault to be eliminated easily.



Retrofitting based on the example of the Theresienklinik Wuerzburg

Small components with big effect

In medical areas the highest requirements are placed on the reliability of the power supply to safeguard the safety of individuals and machinery. To be able to keep up with the technical progress in the medical and also building services area, an increasing number of clinics are undertaking retrofits. It is not unusual for the consequences to be extensive alterations and changes to existing installations, without seriously restricting the ongoing operation of the clinic. Incorporating new systems and installation solutions in existing structures is a technical and logistical challenge. This challenge was successfully tackled in an exemplary manner at the Theresienklinik in Wuerzburg.

The Theresienklinik in Wuerzburg can look back on 103 years of history and is a dependable linchpin of the city's and region's health system. It has 50 beds distributed over the specialist areas of gynaecology, surgery, ear nose and throat, as well as internal medicine. There are also three operating theatres with the related recovery area. The medical service is provided by 29 medical practitioners from the various fields, 13 anaesthetists and several external doctors. Around further 75 employees care for the patients.

The premises of the Theresienklinik are characterised by bright corridors flooded with light; the building's atmosphere is like that of a spa due to the well maintained, green grounds. Behind the facade of the attractive tranquil site, however, the latest medical and system protection technology is used, as most recently during the expansion of the operating theatre recovery room from three to six beds.

Less space ...

The alteration of buildings while they are in use always places the highest requirements on planners and the organisations undertaking the work. With the increasing density of patient beds and also electrical loads, the requirement to incorporate more technology in the same space also increases. Of course, the latest standards must be met in the process, an aspect that often proves to be difficult in the tight space available and that requires extensive know-how.

... for more safety

In medical areas high requirements are placed on the reliability of the power supply. The basis is defined by DIN VDE 0100-710 (VDE 0100-710) and IEC 60364-7-710. For areas in group 2 these standards require the supply of power via two independent feed points and the usage of an unearthed power supply (IT system) with insulation monitoring. During so-called retrofits, that is modernisation aimed at sustainability, planners and organisations undertaking the work come up against complex challenges that can range from the restricted space available, poor cable ducts, to out-of-date supply systems, or loads that are not compliant with the standards.

The recovery area in the operating theatre area at the Theresienklinik was a good example of such a complex task on the change from three to six beds. To supply the three additional beds with mains power it was necessary to install a second IT system alongside the existing system with the same amount of space in the distribution cabinet.

Herr Metzger from the planning office REA turned to the technical office in Nuremberg to find a solution. The challenge was to house a second IT system in an existing distribution cabinet beside the system



INITIAL SITUATION



RESULT

already installed. With a maximum installation width of 13 modules and a height of two metres, this task would not have been possible with UMC modules, the classic Bender technology. The very small installation depth also excluded switching using contactors.

Space saved ...

Taking into account the extremely tight space, the requirement was implemented using a Bender transfer switching device of type ATICS®. Due to the low depth required for installation (that is the same as that of a miniature circuit breaker) and due to the design, which to a certain extent is ready to use, ATICS® provides the perfect solution to this problem. As a result of the small installation dimensions, there was also space for the output protection in the distribution cabinet without problems. The transformers are mounted externally.

Automatic transfer switching devices in the ATICS® series are characterised in particular by extremely compact external dimensions and minimised wiring effort, thus reducing the risk of mistakes. For maximum reliability ATICS® was designed in strict accordance with the guidelines for functional safety. Connectors on all connection cables in conjunction with the optional bypass switch make it possible to test the ATICS® without interruption. In case of need for service, it is possible to replace the device without interrupting the supply of power.

... Interruption minimised

Together with the electrical business undertaking the work, RGT Rhönland Gesundheitstechnik GmbH & Co. KG from Bad Neustadt a. d. Saale, and ESAL GmbH, its partner for switchgear, it was possible to develop an implementation strategy that made it possible to strip out the entire existing distribution cabinet and install the new equipment in only one week. Due to the detailed planning by the technical office in Nuremberg the modification was completed on schedule with the teamwork of the staff from ESAL and Bender Service. With its official test certificate TÜV Süd has certified that ATICS® is compliant with the hospital standard, and has also certified its functional safety in accordance with IEC 61508 (SIL 2); as a consequence safe and reliable function over the years is ensured.

Strong together

The compact design of the ATICS®, as well as the co-ordinated teamwork between the hospital, planners, organisation undertaking the work, and Bender will in future give operating organisations completely new, particularly flexible options compliant with the standards during retrofits. Along with the numerous technical advances in ATICS®, the small size of ATICS® certainly also makes it recommendable in applications where space is at a premium. ■

TECHNICAL APPLICATION

THERESIENKLINIK



Bernd Häuslein, Tech. Office Nuremberg

TECHNICAL APPLICATION



Residual current monitoring
in one of the largest industrial power grids in Germany

Logistics you can rely on



Frankfurt airport is the largest air traffic hub in Germany. Along with the baggage handling system operated by Fraport AG it houses one of the largest ever industrial power grids. The highly sophisticated logistics system is 73 km long in total and features thousands of electrical devices. To ensure a high level of availability and minimise costs, the operator opted for Bender power system protection technology.





TECHNICAL APPLICATION

Frankfurt Airport (FRA) is the largest airport in Germany. Servicing around 55 million passengers, it ranks third largest in Europe after London and Paris. Frankfurt is what is known as a hub airport, acting as a pivot for connecting traffic to other airports. As baggage handling can be a bottleneck in the chronological sequence of flight handling activities it is one of the most important services provided by every airport.

Highly sophisticated

The two terminals, with their approximately 400 check-in desks, necessitate around 73 km of baggage conveyor belt. Another 8 km will be needed for the new Gate A. There are currently around 300 personnel working to ensure the smooth running of the baggage handling system (BHS), making it one of the most extensive industrial power grids ever. Every year it processes more than 40 million items of luggage, 60% of which belong to passengers in transit. On peak days, the BHS has to process up to 110,000 inbound and more than 110,000 outbound baggage items, at a guaranteed transit time of maximum 45 minutes.

... and it does so fully automatically

These impressive figures for the BHS are underpinned by highly sophisticated logistical and technical concepts. The system is completely automated, apart from the weighing

process at the check-in desks and the handling of last-minute baggage. To this end, every item of luggage is given a bag tag. Fully automatic scanners identify the barcodes on the tags. Baggage is transported in containers bearing optocoded numbers that are linked to the data on the bag tag during loading. The technical output of an automatic coding station is up to 1,380 items of baggage per hour, three times more than a manual system.

High potential for error calls for safety

A large-scale conveying system of this kind, with its fully automated control logic, is operated by drive motors, counters and actuators as well as control PCs. These devices communicate with one another using active network elements such as routers, switches and star couplers. The sensor technology for system control requires extensive control voltage supply networks. Wherever a high-voltage current controller (WETEC) is still in use, these voltage supplies are designed as unearthed systems (IT systems) with 230 V control voltage. It is obvious that electrical faults at one location can trigger a whole chain of faults in the entire system. This is why high-performance power system protection technology is absolutely essential for smooth operation in control-circuit voltage supply systems. To identify insulation faults in good time, IR420 / IR425 insulation monitoring devices are installed in the IT systems.



Central monitoring and transparency

Fault currents in the BHS are monitored via a residual current monitoring system (RCMS460). The 12-channel residual current evaluating unit continuously logs fault currents in the system. The individual system controllers pass on collective fault messages received from the RCMS via process variables to the control system of the BCC Baggage Control Centre. Connection via gateways (FTC470XET) is also available as an option. The baggage control centre (BCC) is the nerve centre of the entire baggage handling system. This is where all information about operating conditions converges and is visually represented on screens.

Minimum fault rectification time

The RCMS measures the fault current in the distribution systems. The PE is monitored separately, so that any overload can be identified at an early stage. As soon as the insulation resistance in the monitored system drops – due, for example, to electrical, mechanical or other environmental influences – resulting in the measured residual current exceeding the defined value, the RCMS460 sends an alarm message to the system controller (PLC). This passes on the fault to the control system in the BCC, where it is visualised on the relevant screens. The BCC then informs the responsible maintenance technician, who can then rectify the named fault source. Currently, technicians need on average just 5 – 10 minutes to eliminate faults occurring - a fantastic time in view of the vastness and complexity of the baggage handling system.

Reliable checkback signalling

There are two stages to the reporting of residual currents as they occur: when the selected rated fault current is reached, both the user-definable pre-alarm and the main alarm are output via separate relays, whose signals can be further processed. At the same time, the evaluation unit displays the existing residual currents via an LCD and alarm LEDs. The settings can be executed on the equipment itself. The RCMS permanently monitors the connection to the transformer, and faults in the connection are displayed immediately. Any residual currents that occur are recorded in the control system and are available for evaluation and fault analysis.

Overall, the benefits of the Bender residual current monitoring system (RCMS) are reduced maintenance costs, faster fault location and more reliable operation, even where highly sensitive technology is used. The bottom line, therefore, is that it is possible to cut costs while at the same time enhancing quality. Due to Fraport AG's positive experience with the RCMS, the device will also be installed in other areas of the airport. ■

*Heiner Carnein
Hesse Engineering Office*

ADVANTAGES

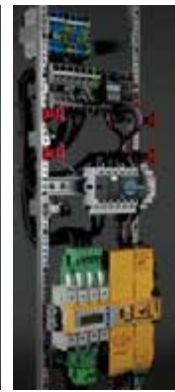
of preventive maintenance using residual current monitoring

- > High operational and system uptime
- > Permanent monitoring instead of regular inspections
- > Fault currents are identified and reported as they occur
- > Rapid location of the faulty system section
- > Lower consequential costs resulting from faults and downtime
- > Reduced requirement for servicing by technicians
- > Reduced maintenance costs
- > Remote diagnosis via internet
- > Ongoing monitoring of the insulation resistance to safety regulation BGV A3.





TECHNICAL APPLICATION



One of the most modern hospital buildings in Europe is taking shape in Munich

New building benefits from new technology

The construction of the new surgical facility at Munich University Clinic's Großhadern campus is a shining example of state-of-the-art medicine and the latest technical developments. As early as the planning stage, the focus was on achieving the highest standards of patient care. This is why experienced, highly qualified doctors and nursing staff were also involved in the planning process, to ensure that the new building would meet the sophisticated requirements necessary for optimum patient care. Bender's contribution to the facility's impressive and sophisticated technical infrastructure is its new automatic transfer switching device with monitoring function for secure power supply.

Since 2008, the Bavarian State Ministry for Science, Research and the Arts has been building one of the most up-to-date hospital buildings in Europe: the new surgical wing at the Großhadern Hospital. The Munich 2 State Building Authority is responsible for both project management and architectural planning. Total construction costs are likely to be in the region of 135 million euros, a sum that will enable approximately 14,600 m² of floor space, incorporating the most up-to-date medical equipment and building technology, to be completed by around 2013. The building will house 32 operating theatres, five ICUs with 70 beds, a main accident and emergency department, a central sterilisation facility and an outpatient operating centre with another four operating theatres. This launches the first phase of the amalgamation of inner city hospitals and the Großhadern campus. This is a project that will bring great improvements for patients in particular, as it brings various medical disciplines into even

closer proximity, while the sharing of experiences and ideas will allow better services and processes to be developed.

In 2010, the University of Munich Hospital (LMU) treated 465,000 outpatients, inpatients and day patients at its Großhadern and inner city facilities. More than 2,200 beds are available in the 45 specialist clinics, institutes and departments, as well as 35 multi-disciplinary centres. The hospital employs more than 10,000 people, 1,800 of whom are health professionals.

Planning is about teamwork

The electrical facilities for the operating theatres and ICUs were designed by the Würzburg-based engineering firm abi Betz-Flöhl-Wolfstädter. Electrical installation, including secure power supplies for operating theatres and the intensive care areas, was assigned to Bachner Elektro GmbH & Co. KG from Mainburg. In conjunction with Bachner, esb elektro systembau bender will equip the medical areas with secure IT systems and standard-compliant display devices during the period October 2011 to November 2012.

Standard IT system

On two dedicated floors, 32 state-of-the-art operating theatres will be equipped with various IT systems, for use in keyhole surgery, CT-based navigation and in operating theatres using lasers and high-performance microscopes. In these highly critical



areas, where an uninterruptible power supply is absolutely crucial, power will be supplied via two separate IT power supplies fed from the grid or, in the event of failure of the standby electric supply system, by the emergency generator. In addition to the normal power supply and the distributed backup battery-supported power supply, there is an additional backup power supply in each operating theatre, which is independent of the aforementioned options.

Simply reliable

For this area, *esb* will supply 106 IT system distributors with the new ATICS®-2-63-ISO automatic transfer switching device, a 6.3 kVA transformer and miniature circuit breakers. 49 type TM800 alarm indicator and operator panels will be used for display and control functions in the operating theatres. The company's decades-long experience in panel design ensures effective and functional operation along with an informative and practical display. Extensive integration of external technical equipment such as operating table controls, gas monitors and intercoms, and of course compliance with stringent hygiene standards, are obviously included in the scope of supply.

The surgical ICUs and an interdisciplinary emergency ICU with 70 beds will be housed on one level close to these operating theatres. In this area, a continuous, failsafe power supply for life-sustaining measures such as artificial respiration, treatment or monitoring is of the highest priority.

Incorrect operation precluded

For the intensive care units, *esb* will supply 52 IT distributors with ATICS®-2-63-ISO modules and integrated insulation fault locators, a 6.3 kVA transformer and miniature circuit breakers. In intensive care areas in particular, fast insulation fault localisation is of key significance for reliable voltage supply. This allows personnel working in this area to locate faulty medical equipment in the fastest possible time and take appropriate measures. In addition, the new ATICS® modules offer the option of non-interruptible testing and/or servicing of the transfer

switching devices by means of a bypass switch. This is a crucial factor especially in intensive care scenarios, as it rules out improper operation by means of a corresponding mechanical interlock and signalisation of the bypass settings. For display and operation in ICUs, five TM800 alarm indicator and operator panels are also installed in the intensive care area. These foil-laminated panels meet hygiene regulations and exhibit antibacterial properties.

Unbeatably compact and reliable

Designers and operators of the surgical centre have opted for the best possible protection against voltage interruption. Bender's new, groundbreaking ATICS® automatic transfer switching device offers the following:

- Enhanced safety and availability by integrating switching and IT system in one compact device
- Non-interruptible testing or replacement thanks to plug-and-socket connectors and optional bypass switch
- Simple manual control with optional locking

Monitoring and transparency

The IT systems are constantly monitored, using the TÜV Süd-certified ATICS® including associated panels, via a high-availability bus system. If faults and associated compliance violations are identified they are notified to the technical areas and displayed on the system overview monitors. In addition, the operator can also request support via secure data links (VPN tunnels) in the event of a fault.

The *esb* and Bender Sales project team is delighted to have been involved in the construction of this new, groundbreaking surgical centre for Munich University Hospital's Großhadern facility. ■

Reinhard Piehl,
Munich Engineering Office

Automatic Test System (ATS) improves Bender quality for customers

Product quality from the start

ATS is an automatic test system that is used both during product development and also during type approval. It was introduced in August 2009 and has in the meantime been proven in a large number of projects. It allows comprehensive checks and tests to be made reliably and above all automatically. In the past these very monotonous but vital for quality assurance tasks had to be undertaken manually requiring great concentration and a large amount of time. At the bottom line ATS signifies an increase in product quality.

Manual tests were an unpopular time consuming task during development projects. Along with speed, the reproducibility of the measurements has increased significantly. Due to the automation, quality has increased, as possible human measurement or interpretation errors are excluded. With ATS it was possible to significantly increase the quality of the testing because the test depth and test reliability are significantly improved even at an early phase of equipment development, while at the same time requiring less time. Comparative repetitive tests after equipment modifications are also more dependable due to the better reproducibility of the measurements. As a result development work is significantly more efficient.

Simulation and measurement of all possible parameters

Bender ATS was developed and built in collaboration with Schneider & Koch from Bremen in accordance with Bender requirements. Along with off-the-shelf

ATS SYSTEM

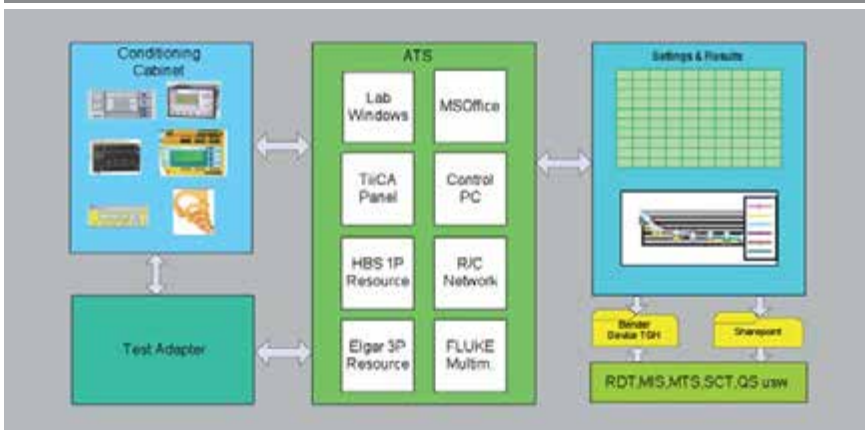
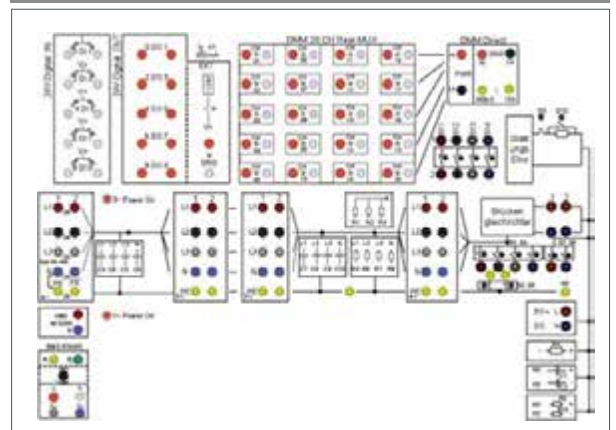


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components such as power sources, control PC and instruments, the system comprises custom load resistance decades, fault resistance decades, load capacitance decades and system leakage capacitance decades developed and built by the development department T-RDT.

The special function of ATS is the simulation of supply and control networks in defined operating states, as well as the measurement of all the necessary parameters in the network and on Bender devices. All ATS components and Bender devices with bus support can be operated via the control PC.

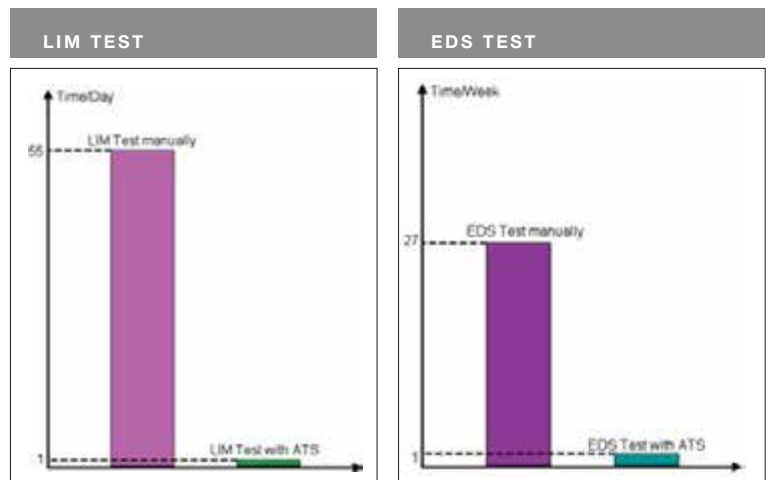
The ATS can simulate types of system such as IT, TN or TT systems. Particularly advantageous is the usage of ATS for the simulation of complex system states in an IT system so that all system-relevant states with upstream and downstream capacitances can be tested on checking EDS systems.

Flexible test scenarios, quickly configured

To design the system so it is as easy to use as possible for development and QA, the Testing department developed a special test software package that makes it possible to straightforwardly prepare ATS test plans using Excel tables. The necessary test steps are entered in the Excel table by the developer and/or the member of staff in QA. These test steps are interpreted by the ATS and run automatically. Even while the test is running all measurement results are automatically saved by the ATS in the related areas of the Excel test plans and displayed graphically. The experienced tester can see at a glance from the graphic how the test is running and can react to any problems at an early stage.

Reduced development time...

Two projects are mentioned here as examples of the test effort achieved by the ATS and the time saved. During the test on an LIM2010 prototype all combinations of fault resistances and system leakage capacitances must be tested with all mains voltages and mains frequencies as described in the standard UL1022. This corresponds



to approx. 1,650 test cases. Manually one would need almost 2 man-months for this work! With the ATS system the testing only takes approx. 20 hours, i.e. the Automatic Test System has reduced the time by a factor of approx. 40. For the EDS460 type test as many as 6 man-months would be required to undertake the test manually. With the ATS the test time reduces to approx. 1 week.

... with a further improvement in quality

The time saving due to the ATS is also used to increase the test depth. As a result Bender equipment can be even more comprehensively and systematically tested for reliability and function. An expansion of the ATS originally developed allows, for instance, the integration of a climatic conditioning cabinet. As a result automated tests can be undertaken taking into account the test temperature and humidity. The measurement of environmental relationships in particular can be very time consuming due to the settling time of climatic conditioning cabinets.

For our customers this means: all Bender equipment has been tested for all conceivable usage scenarios on-site at the customer. Independent of how demanding the environmental relationships are or how complex the corresponding supply systems are configured in which the equipment is used: our customers can be sure the equipment has already been proven in the specific situation. So ATS also signifies an improvement in quality for our customers. ■

Zhonghui Huang, T-RDT
Dieter Hackl, T-RDT



It is of central importance for the success of every business to have the right product at the right

GPM working group meets at Bender

Working logically in project structures, the usage of methods and as a consequence the usage of PM as a management instrument has been indisputable for many years in large businesses. Conversely, many medium-sized businesses seem to find it difficult to apply PM as an instrument and to adapt their organisational structures to it.

What actually differentiates a medium-sized business from a large business? Why is it so difficult to successfully introduce PM in typical medium-sized business structures. How can the tool box of PM methods be adapted to a medium-sized business? There are many questions related to this issue but few scientific findings.

The clarification of these and other questions has now been taken up by a GPM working group (Deutsche Gesellschaft für Projektmanagement – German association for project management). As such

questions are also of interest for Bender, Claudia Rumpf and Joachim Wagner – are involved in this working group as personal members of the GPM.

What is the GPM?

The GPM, a non-profit association, is the leading professional association for project management in Germany. With currently more than 5,700 members and 280 member companies from all sectors of commerce, universities and public institutions, the GPM forms the largest network of project management experts in Europe. The GPM has worldwide links via the umbrella organisation IPMA (International Project Management Association).

The primary objective of the GPM, founded in 1979, is to promote, further develop,

systematise, standardise and further spread the usage of project management in Germany. GPM working groups address specific aspects of project management. They take up the latest developments in project management, systematise them and further develop them.

The new "Projektmanagement im Mittelstand" (Project management in medium-sized businesses) working group was founded on 13 April 2011. The central task of the working group is to address why that which functions well in large concerns, that is proven and that has recognised positive effects is not implemented and used in many small and medium-sized businesses?

Bender has been involved since the working group was founded. The sectors represented up to now come from the areas of mechanical engineering, transport, control systems, foodstuffs, IT, electrical engineering and laboratory furniture.

The new working group wants to produce aids so that projects in small and medium-sized organisations can be completely successfully with considerably more success. Especially in businesses of this size it is unlikely for difficult projects to be run outside the operative business, as large areas of classic "project management" have not yet been adopted or can simply not be implemented. Practical application is a key point for the working group, that is combining and conveying experience from practice for practice and with it strengthening the project competence in the business. It is intended to create a workable and comprehensible aid.

The "Projektmanagement im Mittelstand" (Project management in medium-sized businesses) working group will meet next on 22.11.2011 in Gruenberg at Bender.



Why PM at Bender?

Customer proximity and speed have long been strengths of Bender. Products are becoming more complex and at the same time the growing number of staff require an increasingly layered organisational structure. Bender is therefore facing the task of maintaining its strengths despite increasing complexity. Project management is without doubt a suitable instrument to master this challenge, so as a medium-sized business Bender can profit from the results of the working group at the same time. These include:

- > Suitable organisational changes
- > The selection of the right PM methods
- > The tailoring of the methods specifically to the business
- > And the necessary training measures.

Also project management helps with finding the right balance between necessary process change and preserving existing strengths. ■

*Claudia Rumpf, T-RDT
Dipl.-Ing. Joachim Wagner, T-SCT*

FOR MORE INFORMATION:

PM specialist

GPM: www.gpm-ipma.de

Working group: www.gpm-ipma.de/know_how/fach_und_projektgruppen/projektmanagement_im_mittelstand.html

3rd edition of volume 114 of the VDE series



“Schutztechnik mit Isolationsüberwachung”



BOOK LAUNCH

Due to the increasing usage of unearthed power supply systems the correct choice of appropriate monitoring devices is very important. The combination of unearthed systems with insulation monitoring makes possible a special protection system. The advantages of this system are the increased reliability and protection against fire and accidents.

On 19 July 2011 the third revised edition of volume 114 of the VDE series with the title “Schutztechnik mit Isolationsüberwachung” appeared. A central topic in this book is the unearthed power supply system, referred to simply as the “IT system”, and insulation monitoring. The volume contains suggestions for protection against electric shock with various protective measures for electrical equipment and systems.

ABOUT THE 3RD EDITION

The rapid pace of development and changes in standards make it almost impossible to publish a specialist book that includes the latest updates to the standards. The standards referenced represent as far as possible the latest issues. Quotations have been taken from the drafts of only a few standards that will be available as full standards in the foreseeable future.

The book describes the IT system and its applications in industry, on ships, in electric vehicles and railway rolling stock, and in mining. Along with the historical development of the unearthed power supply system, insulation monitoring in Germany is also addressed. The individual measurement procedures are also presented and the VDE stipulations to be applied are explained in detail.

Due to the topicality of electric mobility, the chapter on electric vehicles has also been revised and expanded

in relation to the standards situation. Other example applications, e.g. related to the topic of “photovoltaics” have been expanded.

The comprehensive topic of electrical safety in medical locations is only addressed in chapter 16 of this book. There is more comprehensive information on this interesting application of the IT system in the specialist book “Elektrische Sicherheit in medizinisch genutzten Bereichen”, VDE series 117, 2nd edition 2009.

In Annex D the reader will find a small excursion into the field of standardisation work and the topic of standards and the law; it also contains answers to your questions, e.g.: what do the letters in front of the standard numbers mean, how does a standardisation organisation work and what is the legal relevance of standards etc. This basic information gives the user an insight into the topic particularly as the electrical engineer must increasingly address legal aspects in his/her field of work.

INTENDED AUDIENCE

This book is a proven tool for electrical system planners and project engineers; at the same time the book can be utilised as a reference work on the topic of the “IT system”.

Installers and operators of electrical power supply systems will find useful information on day-to-day operation in the description of applications, measuring systems, regulations and standards. ■

Dipl.-Ing. Wolfgang Hofheinz, CTO



St. Vincenz-Hospital Limburg was a trailblazer:

holistic therapy concept in orthopaedics

**Pioneer project for hips and knees:
patients become mobile again faster with Joint Care®**

As a general, non-profit private hospital the St. Vincenz-Hospital Limburg has a total of 15 specialist departments with 477 beds. The hospital is also an academic teaching hospital for the Justus Liebig University Giessen, a major regional hospital and at the same time the oncological centre in the region. With around 1000 employees, 80 training places and around 68 highly specialised professions, the clinic is an important commercial factor in the region.



In recent years the way forward to the future has been carefully defined at St. Vincenz: modern medical technology supports the doctors during diagnosis and therapy, new less aggressive treatment methods make it possible for many operations to be performed as outpatient treatments, in short: by developing and specialising in all medical areas the standards at St. Vincenz are cutting edge.

The prospects for medical innovations are clear. However in an establishment like the St. Vincenz, the existence of which is based on Christian concepts, an eye is also kept on ethical questions. Knowledge related to other needs is treated in the same way as all the medical endeavours: progress requires appropriate accompanying measures in the human area, in short: orientation on that which is really important: comprehensive assistance for people using both the heart and technology. The best possible specialist medicine is to be provided, but with a humane element. As an example of this balancing act we report on a holistic project in orthopaedics at the St. Vincenz-Hospital, the so-called Joint Care® programme.

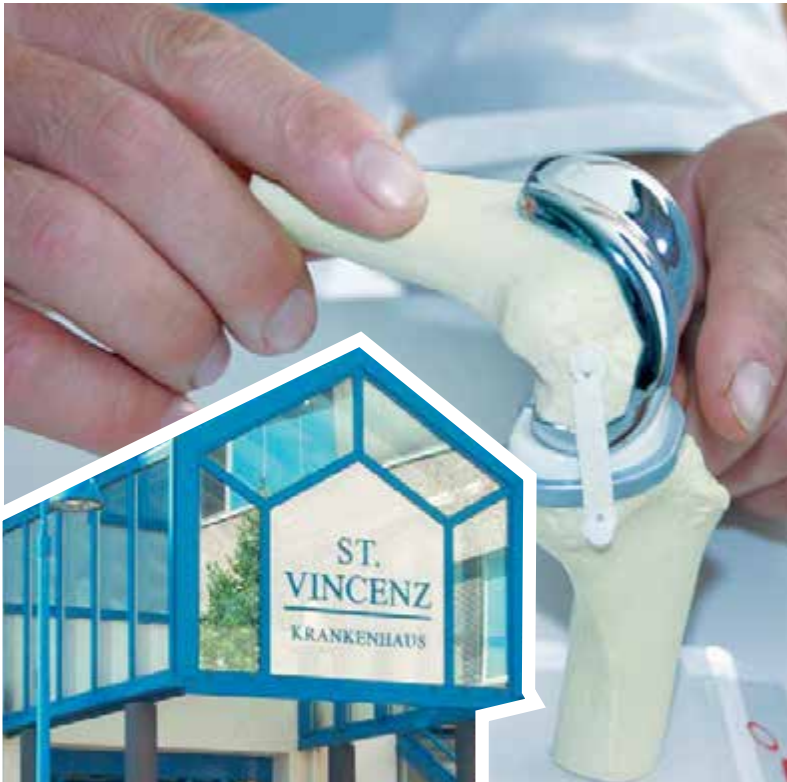
It was a pioneering project – both in the St. Vincenz-Hospital and in Germany as a whole. In the mean time Joint Care® has progressed to become the keyword for the medical care of patients with hip and knee problems. It is for good reason that this holistic treatment concept, which allows patients to get back on their feet significantly faster after joint replacements, has been chosen by the Financial Times Deutschland as one of the most successful innovations in health care. The programme was acknowledged as being innovative and a significant improvement in patient care.

Three years ago the department for trauma surgery and orthopaedics at the St. Vincenz-Hospital was the second clinic in Germany to adopt Joint Care® and the first in the German state of Hessen. There are still



only a few clinics across Germany that use this innovative treatment concept. “The conditions in Limburg are almost ideal due to the combination of certification as a pain-free hospital and the facilities for outpatient rehabilitation”, states Dr. Joachim Hillmeier, head physician in the department. Thanks to Joint Care® his patients now consistently leave the clinic seven days earlier, a significant improvement compared to the 14 days patients normally have to stay in hospital for hip and knee operations. The majority are back on their feet on the first day after the operation, and that even free of pain thanks to the concepts for pain treatment. Due to the combination of the usage of ingenious artificial joints and the latest anaesthesiology expertise, the majority of patients are able to overcome their severe pain and to significantly improve their mobility.

The similarity of the term used for this treatment and the term joint venture is no accident: with Joint



COSTUMER PORTRAIT

Care® the patients receive their therapy in a group. Getting better together is an important facet here. The processes of group dynamics are a key element of the treatment philosophy. All operations take place on one day, every patient can bring a companion with him/her; this companion receives the same training and is intended to support the patient during the entire period of convalescence. The optimal provision of information even before the actual hospital stay is intended to reduce fear during Joint Care® and contribute to obtaining the best possible treatment results. From the start the intention is that the patients learn how they can take over the responsibility for their convalescence.

All therapy steps during Joint Care® are planned in detail in advance and co-ordinated. The perfect interaction of the departments involved is a prerequisite: trauma surgeons and anaesthetists, nursing staff, physiotherapists and social

workers work hand in hand. The careful planning from admission to discharge, including rehabilitation aftercare, is intended to help patients receive even better quality during treatment, despite reducing financial resources in health care. ■

*Nicola von Spee,
Krankenhausgesellschaft St. Vincenz*

ORTHOPAEDIC BACKGROUND

In Germany around 100,000 artificial hip joints and 80,000 artificial knee joints are implanted per year at the moment. Endoprosthesis care for all major joints is also an important element in orthopaedics at the Limburger St. Vincenz-Hospital with around 400 replacements per year. In general head physician Dr. Hillmeier relies on trend-setting standards in the clinical routine: if possible operations are carried out using the latest minimally invasive methods developed in the USA; these methods are considerably easier on patients than conventional operations. Joint Care® is in this respect the icing on the cake ...

Dipl.-Ing. Joachim Wagner

Head of System and Communication Technology Division



PROFESSIONAL CAREER:

- | | |
|-------------------|--|
| Since 10.2009 | Head of System and Communication Technology Division for Dipl.-Ing. W. Bender GmbH & Co.KG |
| 01.2001 – 09.2009 | Various management roles at Avaya: Team Coach in Development Department, Project Manager, Program Manager für Avaya Mid-Market Portfolio, Head of Project Office |
| 06.1987 – 12.2000 | Developer/specialist in pre-development and product development at Telefonbau & Normalzeit GmbH and Avaya |

TRAINING AND QUALIFICATIONS

- | | |
|-------------|---|
| 2007 | Project Management Professional, PMI certified |
| 2002 – 2004 | Part-time post-graduate project management course at Gießen/Friedberg University of Applied Sciences, graduated with degree in project management |
| 1980 – 1987 | Studied electrical engineering, specialising in telecommunications, at RWTH Aachen, graduating with degree in engineering (Dipl.-Ing) |

Mr. Wagner, this issue of the MONITOR is focusing on electrical safety technology in hospitals. It is clear that in a medical environment a reliable power supply is especially important. The term “functional safety” is often mentioned in conjunction with power supply. What exactly does this mean? Mr. Wagner, this issue of the MONITOR is focusing on electrical safety technology in hospitals. It is clear that in a medical environment a reliable power supply is especially important. The term “functional safety” is often mentioned in conjunction with power supply. What exactly does this mean?

Quite simply: The system remains in a safe condition under all circumstances. A key element of power supply in hospitals is the ATICS® automatic transfer switching and monitoring device. To provide the greatest level of safety in hospital applications it was developed to meet requirements for functional safety. The corresponding regulation DIN EN 61508 specifies that safety-related functions must always work as intended. In the case of ATICS®, this means the safe, automatic switchover of power supply. Naturally, a technical system can be faulty. However, in the event of a fault, the user is alerted and the system remains in a safe condition. To make sure of this, we worked with the TÜV Süd technical inspectorate from the very outset.

The entire process, from planning through development to operating concept, was coordinated with TÜV Süd and designed to meet the requirements for functional safety. Today, we offer the only automatic transfer switching and monitoring device on the market certified to safety integrity level SIL2.

Many hospitals are set to undergo refurbishment or retrofits. Unlike new construction projects, the space available for technical equipment is predetermined and aligned to older technology. However, the demands of modern building technology and its functionality are steadily increasing. How can these aspects be reconciled?

As well as the upgrading as such, there is generally also a requirement for additional functions that exceed the capability of the previous installations. However, structural factors and the existing switch cabinets determine what space is available. This is where ATICS® is an ideal solution. The A-ISOMETER®, locating current injector for insulation fault location and the switching logic are integrated into one compact circuit breaker. The entire device is only 74 mm deep. This means it takes up less space than any other switchover device made up of separate units. There is also a reduction in the cabling requirement. The space gained by installing ATICS® is frequently used to provide new functions.

A recent addition to Bender's product range has been the new Gateway COM460IP. How did its development process differ from that of older models?

Put simply, there are several phases in a conventional product development process. The first step is to define the requirements from which to derive a specification that will form the basis for the development as such. Then, the resulting product has to undergo various tests before being approved for volume production. Depending on product and complexity of the project, this process can take years.

Unfortunately, it is often only after the project is completed that it is determined that the customer's requirements have not been accurately reflected. There are two main reasons for this: Firstly, it may be that the customer's requirements have changed in the course of the project, and secondly, it is very difficult to transpose customer wishes into a specification. Misunderstandings are inevitable. In the software industry, these experiences have led to new approaches in development methodology. Basically, these new approaches provide for the customer to be constantly involved in the development process. This means that changes in an ongoing project are no longer a necessary evil, but are in fact desirable and welcome. This kind of approach has become known as "agile software development". The Scrum framework is the most widespread method used today.

The COM460IP was ideal for testing out this method. It is a software-only project, highly complex and characterised by a variety of customer requirements. Our initial experience has been very positive. At regular intervals of around three weeks, we have software that is executable, stable and robust and that we can verify against customer requirements. The functions implemented in each case therefore very closely approximate the customer's requirements, resulting in great satisfaction for all those involved as well as good deliverables.

Yes, but not just in theory. The customer's input into product development is the whole point of switching to agile development methods. We always provide the customer with a functioning sub-product that can already be utilised.

Of course, it is not always easy to find a real customer willing to become involved in this process. Often, staff members with extensive contacts to customers take on this role themselves. However, this has been working out very well so far.

In many sectors, there is currently a trend towards the visualisation of process sequences. For example, a logistics

company dispatcher can see at a glance exactly where an item is in the logistics chain. What is happening at Bender in this regard?

We have various options and are able to adapt accordingly to customer circumstances. Our communication-capable devices can be networked with one another via a Bender two-wire bus. Our gateways provide access to other fieldbus systems or to the customer's LAN, and consequently to the building services technology.

In addition, the new COM460IP gateway offers an integrated web server with a wide range of options. The overall status of the system, with all alarms and operational status messages, can be displayed in any browser. A specially adapted version also enables this to work with your Smartphone.

From December this year, an additional software option will be available for the COM460IP, allowing all settings for our devices to also be done directly via the browser. This is not only convenient, but also allows the system to be documented automatically.

A configurable visualisation is also scheduled for April 2012. The customer will be able to upload a building layout plan, system image or similar and then position his system devices on it as desired. As stated previously, there is no need to install a programme to do this. It all runs via your computer's browser.

Does this mean that increasingly, individual technical devices are being combined into a single system where information about status, monitoring conditions and error messages is displayed in visualised form in a central building control room via PC software?

Yes, this is certainly the trend for large systems. New technical developments will render this even more widespread. IP-based protocols will also become established. Provided the information is available in the IP-network, all options are open. This will be of particular interest for service provision. Web-based platforms will allow a great deal of commissioning and maintenance work to be offered as a remote service. This drastically cuts processing time for solving problems and reduces travel time and expenses. Even proactive advice and alerts to customer can be provided using this model. The visualisation platform ensures that both customer and service provider are always aware of the status of the entire system. The device used to access that information is of minor importance. Smartphone, tablet, notebook or special console are all options.

Mr. Wagner, thank you for talking to us. ■

BENDER Group

The Bender Group with its main office in Gruenberg/Hesse has 56 agencies with over 500 employees worldwide.



Worldwide for Electrical Safety

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Power in Electrical Safety