

# MONITOR

2  
14

## The last word in safety

Proven technology  
for electrical safety in  
Russia's hospitals

## The new PEM735:

**A measuring device with class ... specifically class A.**

The PEM735 meets the high requirements of  
DIN EN 61000-4-30 (VDE 0847-4-30)



## The upswing in DC

About the appropriateness of the usage of DC



### Operating photovoltaic installations safely and efficiently

Electrical safety and safety standards for PV installations represent a particular challenge for the operator

**BENDER Group**

# editorial



Dear Readers,

Both the economy and the weather have taken a turn for the worse. We cannot do anything about the weather or stop winter in its tracks. But we can help stem economic developments. As a company based in Hesse, we are faced with three major challenges: firstly, improving teaching in mathematical, engineering and technical (MINT) subject areas and secondly, further developing the infrastructure. This involves, in particular, extending the road network, expanding Frankfurt Airport and digital networking. The final challenge lies in overcoming the still ever-present euro crisis, which is combated by ultra-low interest rates and other political measures.

The Transatlantic Trade and Investment Partnership (TTIP) could make a positive contribution to livening up the European economy if it could be signed in a form acceptable to all parties. This is what we want the politicians to do for us.

As a company, we are fighting the tide of economic downturn with lots of new products and innovations; some of which are presented in this brochure. For example, our high-end ISOMETER® iso685, our PEM735 Power Quality Analyzer, our new RCMB42...EC for charging stations for electric vehicles or our fully analogue VMD258 voltage relay.

We hope you enjoy reading the latest issue of Monitor!

Yours

Dirk Pieler  
CEO

## IMPRINT

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## The upswing in DC

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How long will it be until DC sockets are a matter of course in our houses? Will they come at all? This is a subject that is currently under discussion among experts in the standardisation world, triggered by questions about DC that have arisen in photovoltaic, electric mobility and server applications ...

## Operating photovoltaic installations safely and efficiently

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Like every complex technical installation, a PV installation can also produce hazards. In addition, due to its nature a PV installation places high requirements on the system safety technology with its large voltage fluctuations ...

GEISE Elektrotechnik GmbH:

## Your partner for energy transmission & distribution

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Since 1957 our family-run business has continuously impressed with its competence, quality and service: From the transformer station, through the switchgear, to the distribution board, our customers find both in-house developed products and also products manufactured under licence. Due to the broad product range, with us as a partner they can realise complete projects from the medium-voltage feed to the low-voltage outlet from a sub-distribution system ...



**How long will it be until DC sockets are a matter of course in our houses?** Will they come at all? This is a subject that is currently under discussion among experts in the standardisation world, triggered by questions about DC that have arisen in photovoltaic, electric mobility and server applications.



## The upswing in DC

**The appropriateness of the usage of DC quickly becomes clear** if you consider the millions of times AC is converted to DC for the supply of power in countless millions of appliances. A primary example for the user is the 'smart phone'. The voltage of AC 230 V with a frequency of 50 Hz normal for us in Germany must always be converted to the usual DC 5 V to supply the electronics. The resulting power loss is apparent in the increase in the temperature of the charger during the charging process. Applications involving the supply of PCs, radios etc. with DC are similar. Electric mobility and its DC application will also play a significant role in future.

But first a look at the history of the supply of power in electrical engineering. Why did AC win out over DC more than 100 years ago? Ten years earlier this situation had been preceded by the well-known "electricity dispute" between Westinghouse and Edison in the United States. While at the start of electrical engineering the supply of power to cities and villages was often installed as a DC supply, the demonstration

At this point a historical note about the first electrical accident, which was recorded in an article in 1879:

## The first electrical accident

A story from the good old days ...

In 1879 the German journal on applied electricity reported:

"On the evening of 4 November the newly installed electric lighting was tested in the Reichstag building in Berlin. In total eight lamps were shown in operation." The following story was chronicled in relation to this event:

"A remarkable occurrence took place in the Reichstag building shortly after the installation was placed in operation. A member of staff wanted to explain to some gentlemen how the lamps work. For this purpose he had lowered one of the lamps, which were mounted on adjustable height mechanisms. During this process he was careless, touched both terminals of the live electrical circuit and fell to the floor as a result of the electric shock. One of the men who witnessed the event suggested rendering harmless the electrical energy that had flowed into the body by dissipating it to earth. The victim was immediately taken out into the garden where both his hands were placed in the soil. The electrocuted individual remained there until he had recovered."

This was then the first accident due to electricity and its wondrous healing.

of the practical feasibility of the transport of electrical energy over large distances produced the breakthrough for AC in Germany. This demonstration of the high-power long-distance transmission of electrical energy took place on 25 August 1891 at 12 o'clock noon at the International Electrotechnical Exhibition (Internationale Elektrotechnische Ausstellung) in Frankfurt am Main and was presented there as "Power transmission Lauffen-Frankfurt".

An important innovation of the transmission path was that the three-phase AC power with a low star voltage of 55 V generated using the generator was transformed up to 15 kV using a three-phase AC transformer and transmitted along a 176 km-long overhead cable to Frankfurt am Main. At the International Electrotechnical Exhibition in Frankfurt the voltage was converted to 100 V using a further three-phase transformer and used to supply more than 1000 light bulbs.

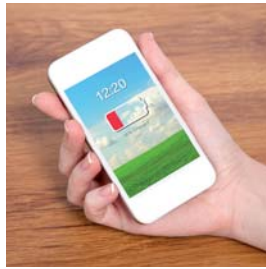
The historic significance of this demonstration: the long and passionate debate among the world's "electricity pioneers" about which technology – DC or AC – should be used for future energy transmission was brought to a close with this event.

At the same time reference is also made to the ever present hazard due to electrical power, even if the number of fatal electrical accidents has reduced significantly in recent years, not least thanks to the normative protective measures against electric shock.

"The "change in energy policy" in Germany is prompting a new discussion about **"AC or DC"**."

The values for the continuous permissible touch voltage for AC and DC vary significantly. In accordance with IEC 60364-4-41:2005, 411.3.2.5, 50 V are defined for AC and 120 V for DC. This situation could lead to the assumption that DC is significantly less hazardous than AC. Practical experiments with a touch voltage of AC 12 V also reveal a noticeable "tingling";





conversely the comparable DC voltage is not noticeable. As the scientific work on the effects of DC flowing through the body is a long way from complete, one should not jump to over-hasty conclusions based on these findings.



The "change in energy policy" in Germany is prompting a new discussion about "AC or DC". The portion of electrical power generated in Germany by photovoltaic installations is continuously increasing despite falling subsidies. As DC is generated with the aid of sunlight by the panels in the photovoltaic installation, currently it is necessary to use inverters to convert from DC to AC. However, the transmission of energy produced by wind turbines from the large wind farms in the North Sea and the Baltic to the users in the south also requires significant political discussion.

The change in energy policy in general and the particular importance of the most efficient usage of the energy sources available to us are a legitimate reason to revisit the specialist discussion from the end of the 19th century on the contentious issue of – AC or DC. Despite the lack of knowledge about the effects of DC flowing through the body, the protective measures against electric shock definitely need to be adapted to DC applications. ■

*Dipl.-Ing. Wolfgang Hofheinz  
Chairman of DKE*

*(Deutsche Kommission Elektrotechnik  
Elektronik Informationstechnik im DIN und VDE)*

"The portion of electrical power generated in Germany by photovoltaic installations **is continuously increasing despite falling subsidies.**"

The subject is also hotly debated in the European Union. For example, in the "European Partners ENIAC JU Project: Direct Current Components + Grid" work is in progress on the topic of energy efficiency, integrated DC power distribution based on advanced semiconductor power technology ([www.dcc-g.eu](http://www.dcc-g.eu)). In this project fourteen partners are studying the possible advantages of a DC 380 V installation compared to a 400 V three-phase system.

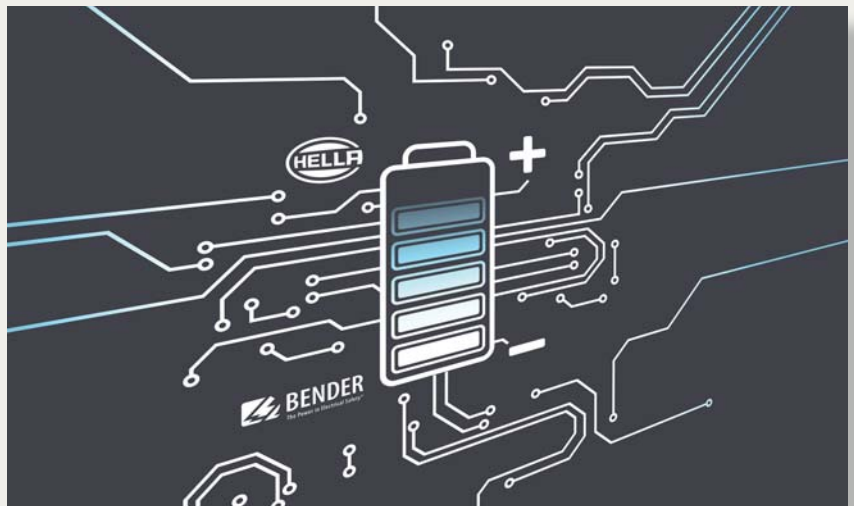


## HELLA and Bender cooperation – stands for electrical safety in emobility

The growing demand for electric and hybrid drives is creating new challenges for automotive part suppliers of electronic high-voltage components.

As a supplier, the cooperation between Bender and HELLA, whose development projects ensure safety in electromobility, is also facing these challenges. But with Bender's technological expertise combined with HELLA's years of experience in the automotive industry, these challenges are being met with high innovation competence.

One such innovation is the insulation monitoring device, the iso165C, which was developed for hybrid and electric vehicles. Designed with regard to the mobility of tomorrow, this device monitors the insulation resistance of the high-voltage on-board electrical system and protects the user against the risk of



electric shock, thereby guaranteeing safe driving operation. This device went into production in 2014 and is available both as an integrated version in a lithium-ion battery management system as well as a stand-alone device with CAN interface.

HELLA and Bender are currently working on the development of an onboard Residual Current Monitor (RCM) for residual current monitoring during the charging process. The RCM detects DC fault currents and can stop the charging process of the vehicle.

Together with HELLA we presented our technology at the eCarTec 2014 in Munich. ■

Marita Schwarz-Bierbach  
S-COM



Insulation monitoring device iso165C



Electrical safety and safety standards for PV installations represent a particular challenge for the operator

## Operating photovoltaic installations safely and efficiently

Like every complex technical installation, a PV installation can also produce hazards. In addition, due to its nature a PV installation places high requirements on the system safety technology with its large voltage fluctuations. The often physically extensive PV installations are also subject to a heterogeneous range of climatic conditions such as UV radiation, heat, frost, moisture, salt and other environmental effects, e.g. rodent damage. As a consequence far-reaching safety standards apply to PV installations. This article addresses the requirements from the standards and how they can be implemented.





In relation to "Protection against electric shock" the basic national safety standard DIN EN 61140 (VDE 0140-1):2007-03 or the international IEC 61140:2009 describes essential "Common aspects for installation and equipment [...] without limitation of the voltage" for these installations and equipment. A crucially important requirement for all electrical installations and equipment is:

*"Hazardous-live-parts shall not be accessible and accessible conductive parts shall not be hazardous live either under normal conditions (operation in intended use and absence of a fault), or under single-fault conditions".*

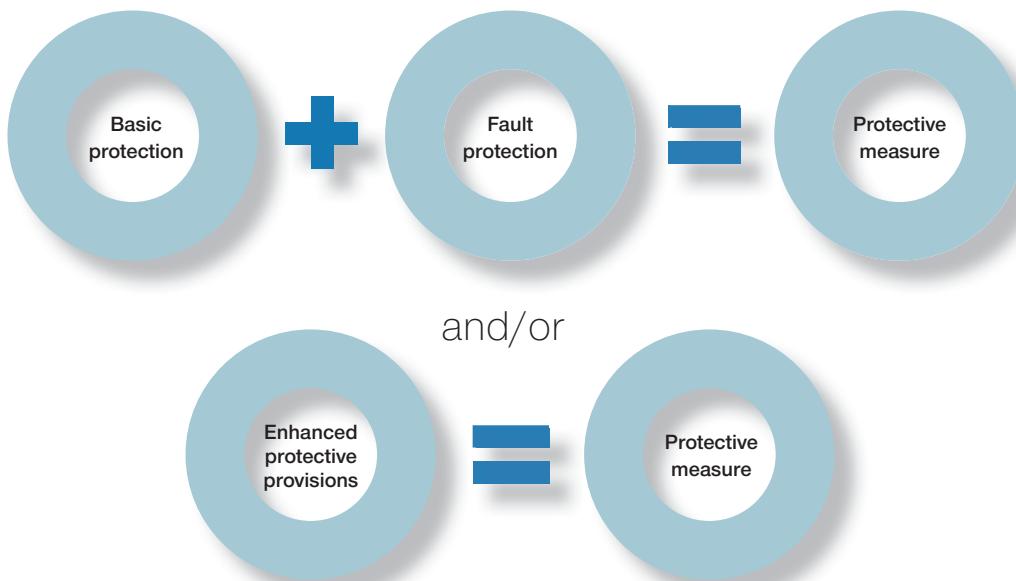
Here there is no differentiation between PV installations and other electrical installations.

An equivalent permissible implementation of a protective measure against electric shock in accordance with IEC 61140 comprises:

Detailed requirements in relation to the protective measures on erecting low-voltage electrical installations are described in the basic national safety standard DIN VDE 0100-410 (VDE 0100-410):2007-06 and the international IEC 60364-4-41:2005.

A harmonised European standard is also available, HD 60364-4-41:2007.

In section 411 of IEC 60364-4-41:2005 the "protective measure: automatic disconnection of supply" is described. This protective measure is widely used in most electrical installations and can be used for earthed systems and for unearthed systems (IT systems).



## ►►► Comprehensive protective measures are necessary



With the current state-of-the-art it is not possible to apply the protective measure "automatic disconnection of the supply" to the photovoltaic generators in PV installations, as an unpowered state in the normally physically extensive photovoltaic generator can only be achieved by covering the solar modules or in the dark at night. For this reason, in PV installations the "protective measure: double or reinforced insulation" is used as a minimum for the photovoltaic generator section. The requirements on the "protective measure: double or reinforced insulation" are described in part 412 of IEC 60364-4-41:2005. Particular attention is to be paid to section 412.1.3:

*"Where this protective measure is to be used as the sole protective measure (e. g. where a whole installation or circuit intended to consist entirely of equipment with double insulation or reinforced installation), it shall be verified that the installation or circuit concerned will be under effective supervision in normal use so that no change is made that would impair the effectiveness of the protective measure. This protective measure shall not therefore be applied to any circuit that includes a socket-outlet or where a user may change items of equipment without authorisation."*



## Negligence can cost lives

This part currently applies to most photovoltaic generators in PV installations and means that the quality of the insulation, both during commissioning and during operation over decades, defines whether the "protective measure: double or reinforced insulation" is met. If there is a fault, compliance of the installation with the required insulation properties will decide on life or death, as negligence can cost lives.



The term insulation in PV installations refers, along with the insulation of cables and wires, air and creepage paths (e. g. in connectors and on terminals), also to the insulating films and insulating glass in the PV modules.

## Standards for the prevention of electric shock and a fire risk

As these properties were already recognised as important long before the change in energy policy, as early as the start of the 90s there were extensive studies and assessments during which it was attempted to estimate which design measures in PV modules would result in safe behaviour over the long-term, both during fault-free operation and also after the first fault. Along with protection against electric shock, the fire risk was also considered.

The results of these studies and assessments were taken into account by the experts in the standards committees during the preparation of the standards on the design qualification and type approval of PV modules.

Currently these are for

- Terrestrial crystal silicon photovoltaic (PV) modules DIN EN 61215 (VDE 0126-31):2006-02 (intended replacement is E DIN EN 61215 (VDE 0126-31):2012-07)
- Terrestrial thin-film photovoltaic (PV) modules DIN EN 61646 (VDE 0126-32):2009-03.

Despite the numerous comprehensive tests during the type approval of PV modules and consideration of the requirements from the basic safety standards in the standard on erection DIN VDE 0100-712 (VDE 0100-712):2006-06 "Errichten

von Niederspannungsanlagen –Teil 7-712: Anforderungen für Betriebsstätten, Räume und Anlagen besonderer Art – Solar-Photovoltaik-(PV)-Stromversorgungssysteme”(Low-voltage installations – Part 7-712: Requirements for special installations or locations – Solar photovoltaic (PV) power supply systems” IEC 60364-7-712:2002, modified) time and again during the erection and the continuous operation of PV installations dangerous weak spots become apparent that have not been taken into account in the standards.

### Example weak spots in PV installations:

- Studies by the Fraunhofer Institute for Mechanics of Materials IWM on the "life expectancy of solar modules" [www.fraunhofer.de/de/presse/presseinformationen/2013/Oktober/lebenserwartung-von-solarmodulen-vorhersagen-7.html](http://www.fraunhofer.de/de/presse/presseinformationen/2013/Okttober/lebenserwartung-von-solarmodulen-vorhersagen-7.html) "Using the simulation, we have learned for example that the brittleness caused by UV radiation plays a much greater role in material fatigue than has been assumed thus far."
- The results of the "Statistischen Schadensanalyse an deutschen PV Anlagen" (Statistical damage analysis on PV installations) from the Fraunhofer Institute for Solar Energy Systems ISE. [www.pv-brandsicherheit.de/fileadmin/WS\\_26-01-12/Stat.Schadensanalyse\\_an\\_dt.\\_PV-Anlagen.pdf](http://www.pv-brandsicherheit.de/fileadmin/WS_26-01-12/Stat.Schadensanalyse_an_dt._PV-Anlagen.pdf) On slide 6 of the presentation => out of 107 responses 3 cases with the classification "electric shock".
- During the 3 1/2-year research project on "Brandschutz und Lichtbogenrisiko von PV-Anlagen" (Fire protection and arcing risk in PV installations), among other events, three workshops were held. From the third workshop on



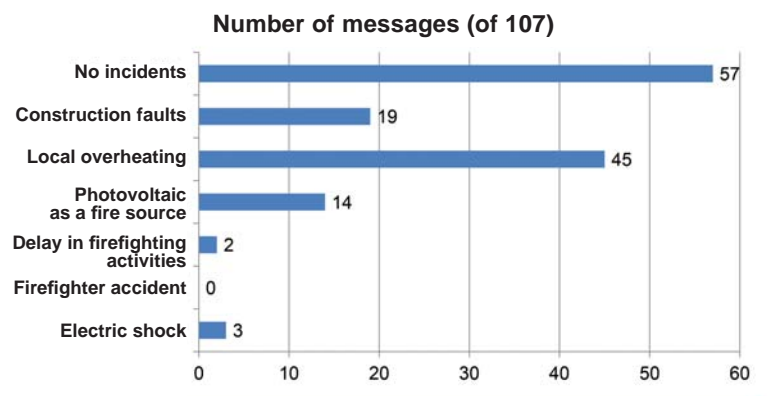
03 April 2014 in Cologne ([www.pv-brandsicherheit.de/koeln2014/](http://www.pv-brandsicherheit.de/koeln2014/)) interesting information can be drawn from the papers presented by the participants.

- During a presentation by the GDV (Gesamtverband der Deutschen Versicherungswirtschaft e.V. Berlin - German Insurance Association) e.g., the following defects were highlighted (extract):
  - Resistance to ammonia not taken into account. Comment: This means, e.g., the lasting chemical resistance of the insulating materials used in relation to liquid manure.
  - Ambient conditions not taken into account (frost, atmospheric humidity, temperature drops, direct solar irradiation). Comment: *Condensation changes the creepage current behaviour in the extreme, this issue must be taken into account during the design of creepage paths.*
  - Cable laying. Comment: A photograph was shown in which the insulation on a cable had been damaged by a sharp metal edge.



Fig. 1:

Overview of the evaluation



© Fraunhofer ISE



- – In numerous impressive photographs a large number of installation defects in PV installations were shown by the various participants to the workshop in the 15 presentations; these photographs demonstrate that the requirements and standards on the achievement of the protection objectives
- Protection against electric shock
  - Fire protection
- are obviously often not met.
- TÜV Rheinland, e.g., stated: "At least 50 % of the defects are installation related"
- The quality of the maintenance of PV installations and the maintenance cycle were also the subject of numerous complaints.
- There is a relationship between the frequency of damage and the time of year. There is more damage in the summer.
  - The significance of regular inspection is highlighted.



The door is open to the solar field, anybody can walk in.



Unauthorised people (family with children) are walking around in the solar field without knowing the dangers lurking around.



- In relation to "rodent damage" the following is stated in the book "Brandschutz in elektrischen Anlagen" by Herbert Schmolke: Such insulation damage is often not even detected by an insulation resistance measurement, as the remaining air gap between the bare conductors is very high impedance. As such the instrument sees intact insulation. Only on the addition of atmospheric humidity, soiling or the like do hazardous creepage currents occur.

### Periodic testing not practical

The requirements on devices for insulation resistance measurement are described in the standard IEC 61557-2:2007. These devices normally operate at a measuring voltage of 500 V or even 1000 V, such that mostly the complete low voltage system with all its equipment and the protective and monitoring devices is not measured or tested, often only a cable. To undertake an insulation resistance measurement as a periodic test in a photovoltaic system a level of effort that should not be underestimated is required to configure the system for the measurement. As based on the current state-of-the-art the part of the installation related to the photovoltaic generators cannot be powered down, an insulation resistance measurement as periodic test in photovoltaic installations is not really practical.

## Measuring without disconnecting

Conversely, insulation monitoring devices in accordance with IEC 61557-8:2007 are able to determine the total insulation resistance of an unearthed system (IT system) in operation without the need to disconnect equipment for this purpose. Measurement is made using low voltages such that no damage to equipment or protective and monitoring devices is to be expected. The determination of the total insulation resistance value by insulation monitoring devices functions correctly also on photovoltaic generators in the normal operating state without the need to specifically configure the system for the measurement and with the PV voltage present!

If the solar inverter is not operated as an IT system but has an earthed system, it is not possible to continuously monitor the photovoltaic generators in the operating state, as due to the electrical connection to the solar inverter necessary for normal operation there is already a low impedance path to earth. It is not possible to differentiate between the mostly higher parallel impedance insulation resistance values and this path.

Even though in the case of an earthed solar inverter complete continuous monitoring during 24-hour operation is not possible, the installation of an insulation monitoring device is definitely advantageous, as e.g. overnight the earthed solar inverter can be disconnected from the unearthed photovoltaic generator and at least the insulation resistance value for this part of the PV installation monitored by an insulation monitoring device for a few hours.

## Continuous logging is prevention

In modern insulation monitoring devices the change in the level of insulation resistance over time can be recorded and displayed. If in this change over time, e.g., correlations are found between the level of insulation resistance and condensation overnight, and as a consequence fault location is started, the probability that rodent damage is found is much higher than during the mostly infrequently occurring periodic tests.

For other currently known defects in PV installations the continuous monitoring of the photovoltaic generator overnight also provides good chances of detecting states where there is a risk of fire in good time before damage occurs.

As an example of this issue reference is made to the article: "Warum kompatible PV-Steckverbinder gefährlich sind" (Why compatible PV connectors are dangerous) in ELEKTRONIKPRAXIS No.16 dated 26.8.2013. Here it is described that the necessary sealing of PV connectors had not been achieved due to installation errors during the erection of PV installations. Due to the ingress of dirt and moisture, the contact resistance in the related PV connector increases over time. In installation situations involving high currents there is a high probability of a fire due to the heating at the contact resistance.

At the same time there is a similar probability that the humidity and soiling in such an incorrectly installed PV connector will also cause a reduction in the level of insulation.

On the usage of an insulation monitoring device over a period as long as possible and on the display of a graphic curve of the level of insulation resistance as far as possible starting with the initial commissioning of the PV installation the detection of such critical defects also becomes more likely than via the infrequently undertaken periodic tests.



▶▶▶ Also the increasingly frequent requirement for the usage of arcing detectors does not always signal arcs with the expected reliability, as can be seen in the presentation by the Fraunhofer ISE on the following link

@ [http://www.pv-brandsicherheit.de/fileadmin/WS\\_03-04-14/GRAB\\_Lichtbogendetektion\\_in\\_PV-Anlagen\\_K%C3%B6ln\\_2014-04-03.pdf](http://www.pv-brandsicherheit.de/fileadmin/WS_03-04-14/GRAB_Lichtbogendetektion_in_PV-Anlagen_K%C3%B6ln_2014-04-03.pdf)

On the usage of an insulation monitoring device, the insulation resistance value is only an early indicator in this case. In conjunction with timely fault location to identify the cause of the reducing level of insulation resistance, this indication can lead to the actual problem of increased contact resistance. The higher impedance an insulation monitoring device can measure with system leakage capacitances present, the more likely such states will also be detected.

### Advantage of unearthed IT system

In PV installations entirely designed as IT systems, the insulation resistance value can be monitored by an insulation monitoring device continuously and completely over all operating states. Insulation resistance values and even other system parameters are recorded with the assignment of the date and time in the insulation monitoring devices such that the specialist can correlate operating parameters and environmental parameters to critical states and initiate timely fault location.

For locating faults in PV installations there exist very varied methods, which in practice are more or less efficient. Very often the costs for a fully integrated fault location system are saved during the design of PV installations. Also the capabilities of a modern fault location system are unknown to the user or to the maintenance provider.

**Arcing detectors tests according to UL 1699B at the Berner Fachhochschule**  
**Measuring results: DUT (Device Under Test) 1**

Short cable without resistance

| Imp (A) | Electrode gap (mm) | Maximum response time permitted (s) | Tripping time 1 (s) | Tripping time 2 (s) | Tripping time 3 (s) | Passed yes - no |
|---------|--------------------|-------------------------------------|---------------------|---------------------|---------------------|-----------------|
| 7       | 1,6                | 2                                   | 0.00                | 0.00                | 0.00                | no              |
| 7       | 4,8                | 1,5                                 | 0.00                | 0.00                | 0.00                | no              |
| 14      | 3,2                |                                     | 0.00                | 0.00                | 0.00                | no              |
| 14      | 6,4                | 0,8                                 | 0.00                | 0.00                | 0.00                | no              |

Long cable without resistance

| Imp (A) | Electrode gap (mm) | Maximum response time permitted (s) | Tripping time 1 (s) | Tripping time 2 (s) | Tripping time 3 (s) | Passed yes - no |
|---------|--------------------|-------------------------------------|---------------------|---------------------|---------------------|-----------------|
| 7       | 1,6                | 2                                   | 0.1                 | 0.08                |                     | yes             |
| 7       | 4,8                | 1,5                                 | no                  | 0.06                |                     | no              |
| 14      | 3,2                | 1,2                                 | 0.07                | 0.08                |                     | yes             |
| 14      | 6,4                | 0,8                                 | 0.08                | 0.085               |                     | yes             |

12 © Fraunhofer ISE Basics UL measurements New test methods Fraunhofer ISE

**Arcing detectors tests according to UL 1699B at the Berner Fachhochschule**  
**Measuring results: summary**

Measurements with series resistance

|       |             |
|-------|-------------|
| DUT   | no          |
| DUT 1 | yes (17/17) |
| DUT 2 | no (16/23)  |
| DUT 3 | yes (17/17) |
| DUT 4 | no (7/16)   |

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## Variety of methods for locating faults

Often simple methods are used, e.g. displacement voltage measurement, which has been used for over 70 years for locating earth faults in power systems. Here it is to be noted that symmetrical faults, which can cause fires, are not found.

For another method often used, parts of the PV installation, the strings, are very time consumingly taken out of operation to estimate, based on the changing the insulation resistance value, whether the string shut down is faulty. Here at least symmetrical faults are detected on the usage of an insulation monitoring device in accordance with IEC 61557-8 :2007.

The disadvantage of this method is in the very coarse identification of the faulty string, as it is not possible to detect the fault down to the module level. Locating faults based on this method is particularly disadvantageous if the insulation monitoring device used requires measuring times from 30 minutes to even hours due to large system leakage capacitances! As a consequence there are correspondingly high feed losses that reduce the efficiency of the PV installation to a significantly greater extent over the service life than any saving at the start due to the selection of a cheap, but ineffective insulation monitoring device.

Therefore, instead of locating faulty strings by means of expensive selective shut down, which itself involves hazards as it is necessary to switch manually, modern insulation fault location systems in accordance with IEC 61557-9:2009 are the instrument of choice. In special versions for PV installations, they offer the quick, reliable location of faults down to the PV module level, even in extremely large and physically extensive PV installations.



## Increase in safety for man and machine

The insulation fault location systems are also available as portable systems. However, it is recommended to take into account fault location during the design of PV installations and preferably to select insulation monitoring devices that are already prepared for insulation fault location. In a system configured in this manner the electrician does not need to connect a portable measuring code generator in the field to locate the fault. The electrician is therefore no longer subjected to a hazard due to handling live parts of the photovoltaic generator.

Insulation fault location in the PV installation designed in this manner is straightforward and also possible at short maintenance intervals. Failures and downtimes are minimised. This situation benefits the safety and efficiency of the PV installation. ■

*Dipl.-Ing. Dieter Hackl  
T-MIS*

## INNOVATIVE PRODUCTS



The new insulation monitoring device iso685:

## Field test at Swiss Federal Railways

The unique constellation: SBB (Swiss Federal Railways) is testing the new ISOMETER® iso685 in the relay signal box installation for the Wetzikon and Aathal region, which is housed in a former SBB office building at Wetzikon railway station. Optec AG, the Swiss representative of Bender GmbH & Co. KG, has also had its headquarters there has since 2010.



ISOMETER® iso 685



ISOMETER® IRDH275

The new ISOMETER® iso685-D is intended to replace the old method of measuring the signal supply lines. David Benz, project manager in the "Safety Tests Safety Systems" department at SBB initiated the project. Up to this point modern measuring instruments had not been used and the measurements were undertaken using an ammeter and a light bulb – in the same way as at one time Walther Bender developed the first ISOMETER®. "The measurement results were always satisfactory up to now, but will need of improvement for modern conditions", was the opinion of David Benz who installed the IRDH275 from Bender in a test rig he developed himself. This rig significantly simplifies the testing of the signal lamp circuits, as it is possible to measure independent of the switching state

and as a result it is not necessary to restrict railway operations. The measurement results can also be read in detail on a LC display.

At the same time he contacted Bender in Gruenberg and heard about a new ISOMETER® development. "The new series iso685 meets the requirements placed by David Benz 100 % and will go into series production in June", explained Jörg Irzinger, the responsible product manager at Bender. "Tests on a real installation are necessary for quality assurance."

As a consequence a date for a field test in Wetzikon was agreed together with Optec and the staff at SBB. "The test was very successful, we are still collecting the long-term data", states Peter Neumann,



"Tests on a real installation are necessary **for quality assurance.**"



responsible for Bender at Optec. The new series iso685 impressed due to its straightforward intuitive operation, the commissioning wizard and the numerous options for the digital inputs and outputs. From now on it will be used at SBB as a new insulation monitoring device.

In addition customers can display the insulation value graphically using the isoGraph and can utilise continuous device and coupling monitoring. In this way continuous monitoring of the connection cable to the system to be monitored is ensured. If the long-term field test is completed successfully, the customer will soon have a powerful, intelligent ISOMETER®. ■

*Peter Neumann  
Optec AG, Switzerland*

|                         |  |
|-------------------------|--|
| <b>Project:</b>         | SBB signal box control system Wetzikon<br>– type Integra Domino 67, relay signal box     |
| <b>Scope:</b>           | Usage for all SBB relay signal boxes and their signals                                   |
| <b>Characteristics:</b> | Field test (currently one ISOMETER® iso685-D)  |
| <b>Requirements:</b>    | Measurement of the signal lamp circuits without illuminating the lamps (current < 80 mA) |
| <b>Solution:</b>        | ISOMETER® IRDH 275 + ISOMETER® iso 685-D   |

## INNOVATIVE PRODUCTS

**Crucial advantages** due to the latest generation of insulation monitoring devices

**The new iso685:**  
**More than just insulation monitoring**



## THE POWER IN ELECTRICAL SAFETY®



**Bender-ISOMETERS®** offer installation operators reliable safety technology that also significantly reduces the maintenance effort for the installation. The worldwide proven ISOMETER® series now has a powerful new addition in the form of the new iso685. Along with its core function of monitoring continuously the insulation of a system in relation to earth, the new insulation monitoring device iso685 provides numerous new additional features that can help to further raise the level of safety and to save costs.

### Fault analysis with history memory

Often customers have the problem of sudden, transient insulation faults that are signalled via a relay contact. With only the information from this contact it is difficult to make a decision on the urgency of the need for maintenance. Without additional measures, fault location is difficult and time-consuming. On the other hand, targeted fault location and installation analysis can be realised using the iso685 with its integrated history memory with real-time clock. As such each insulation fault signal is saved in the history memory with time stamps for the occurrence and disappearance of the fault. In this way it can be determined which loads or sections of the installation were switched on, switched off or switched over at this time. Faulty or erroneous loads and sections of the installation can be identified without shutting down sections of the installation (failure prevention).

### Early detection and quality assurance

The sudden occurrence of an insulation fault can be countered at a very early stage. By means of the integrated "isoGraph", a graphic indication of the insulation resistance over time, a trend in the level of insulation can be detected at an early stage. Different time scales are available that can be switched between very easily. As a consequence it is possible to initiate installation maintenance long before an insulation fault occurs. In addition isoGraph makes it possible to assess the quality of the electrical sections of the installation. As such, for instance, it can be checked whether the insulation level has changed on the replacement of devices.



## INNOVATIVE PRODUCTS

### ▶▶▶ Shorter measuring times

On the acceptance or checking of the installation by an expert assessor or the installer, insulation faults with appropriate resistances must be incorporated in the system to check the function of the insulation monitoring device. In large systems there are often large system leakage capacitances, which significantly increase the measuring time of the insulation monitoring device. By means of special measuring profiles in the iso685 the device can be optimally adjusted to the installation and the system and in this way the measuring time significantly optimised. Unnecessary delays during the acceptance of the installation are therefore a thing of the past.

### Full flexibility with only one device

Modern production lines are operated efficiently and economically using frequency converters and variable-speed drives. As a consequence, the DC components and interference in a system also increase. Due to integrated measuring profiles with different filter settings and interference suppression, even systems with high levels of interference can be monitored using an iso685 - for instance by selecting the profile for converters. By selecting a different profile adapted to the application, the measuring voltage can be reduced such that even sensitive control circuits, as are to be found in every production line, can be measured using the same iso685. At the same time the device indicates how good or bad the instantaneous measuring situation is in the system, such that the user has information on whether the measuring situation is straightforward or the iso685 must suppress a large amount of interference to be able to measure correctly.

### Monitoring complex systems

The increasing complexity of systems makes fault location more difficult, in particular the connection to the system to be monitored may be lost. The integrated voltage and frequency measurement between the three phases and from the three phases to earth makes it possible to trace a possible asymmetrical earth fault on the faulty phase. The indication of an existing DC offset is indicative of a faulty DC link circuit even though the iso685 is coupled to the AC system. In this way continuous coupling monitoring is also possible.

### Straightforward communication

The control and monitoring of modern installations by programmable logic controllers (PLC) is state-of-the-art. The iso685 can be connected directly to an existing PLC using the IO (digital inputs and outputs) integrated into the device. In this way the states of the monitored system can be transferred directly to a higher level control system and the iso685-D can be controlled directly from the control system. Functions such as resetting faults, manual testing or the deactivation of the insulation monitoring device are possible via the digital inputs. Detailed fault information is available via the digital outputs. This data includes, for example, information on whether the fault occurs in the link circuit, whether it is a symmetrical fault or an asymmetrical fault. The feedback on the digital inputs can also be checked.

## User-friendly operation

Installations often comprise a heterogeneous range of devices from different manufacturers. All devices must be placed in operation and correctly adjusted. A commissioning wizard integrated into the iso685 guides the user or the installer through commissioning, similar to the method that is familiar for consumer appliances. During this process the most important installation parameters are requested and set. Commissioning is intuitive, it is not necessary to consult the manual. After successful commissioning, the device is optimally adjusted to the measuring task to the monitored, undertakes a self-test and starts the continuous measurement of the insulation resistance.

## International service

A good three quarters of German machine production is exported abroad. As such it is very important that devices can also be used internationally. 12 languages are integrated into the iso685 and it is therefore equipped for international requirements. In addition Bender service can access the device worldwide via an integrated Ethernet service interface and provide assistance during fault diagnostics. For this purpose it is only necessary for the customer or installation operator to provide a VPN connection for the service work. The new iso685 of course has UL approval. ■

*Dipl.-Ing. Jörg Irzinger  
T-MIS*



ISOMETER® iso685

## THE ADVANTAGES OF THE NEW ISO685 AT A GLANCE:

- Fault analysis with scalable history memory
- Fault finding without shutting down
- Early detection increases reliability and the ability to plan maintenance
- Assessment of the quality of components used
- Shorter measuring times
- High level of adaptability to systems with different characteristics
- Additional devices no longer required
- Straightforward, powerful communication interface
- Self-explanatory commissioning of the installation
- Comprehensive configuration features
- Very easy to use
- Due to numerous languages can be used worldwide
- Quick and competent help in the event of the need for service.

INNOVATIVE PRODUCTS



**PEM735**

## A measuring device with class ...

### ... specifically class A.



The PEM735 meets the high requirements of DIN EN 61000-4-30 (VDE 0847-4-30) <sup>1)</sup>: "This class of performance is used where precise measurements are necessary, for example, for contractual applications, verifying compliance with standards, resolving disputes, etc." (DIN EN 61000-4-30 §4.1).

The power quality at the supply point plays a crucial role in relation to system failures and premature material fatigue. All electrical devices emit interference into the electricity network (interference emissions) and at the same time are designed such that with a defined, existing level of interference in the electricity network (interference immunity) they operate satisfactorily.

The measurement of the power quality at the supply point is of central significance in this delicate equilibrium: compliance with the limits for the electrical "ambient conditions" is checked. The ambient conditions are defined, e.g., in DIN EN 50160<sup>2)</sup>.

The majority of modern devices require a DC power supply. Even if the supply is provided from the AC distribution network, the AC voltage is converted internally (rectified). The rectification of the AC voltage, however, always causes interactions on the AC side. These interactions are superimposed at the point of common coupling and affect all equipment. Only by measuring the power quality can it be ensured that the permissible limits are not exceeded and equipment is not affected. ■

*Dipl.-Wirt.-Ing. Michael Faust  
T-MTS*

1) DIN EN 61000-4-30 (VDE0847-4-30) Electromagnetic compatibility – Part 4-30: Testing and measurement techniques – Power quality measurement methods  
2) DIN EN 50160 Voltage characteristics of electricity supplied by public electricity networks

## Electrical safety starts in the electrical installation

with the AC/DC sensitive residual current monitoring device in the **RCMB42xEC series**



The safe and reliable charging of electric vehicles is also directly related to electrical safety in the building installation and the charging stations.

The new RCMB42...EC series AC/DC residual current monitor is used for residual current monitoring on AC charging stations for electric and plug-in hybrid vehicles in which DC or AC fault currents are likely to occur the value of which is constantly greater than zero.

The residual current monitoring is undertaken using measuring current transformers connected externally. During this process the effective value of the DC components in the residual current and the AC components below the cut-off frequency is formed.

Alarm relays indicate if the limits of  $I_{\Delta n} = DC \geq 6 \text{ mA}$  and/or  $I_{\Delta n} = RMS \geq 30 \text{ mA}$  exceeded. Both items of information are signalled by the same relay. After actuation of the test button on the front panel, the integrated microcontroller generates a test signal that comprises an AC signal with superimposed DC component. The magnitude of the test current is designed such that the response value is exceeded and therefore both alarm relays are triggered if the device is functioning correctly.

Prior to each charging process, it is necessary for the monitoring device to carry out a self-test and offset measurement. During this process the safety-related residual current monitoring is tested. It is necessary that the charging process is deactivated for this purpose. This function increases safety and prevents long-term drift on the residual current measurement.

The fault memory can be selected using the integrated sliding switch S0. If the fault memory is **enabled**, a fault that occurs must be reset manually via the device test button, or an external test button, or via a digital input (> 3 s). If the fault memory is **disabled**, the reset occurs automatically as soon as the residual current drops below the response value of DC 6 mA/RMS 30 mA less the hysteresis of 20%.

The RCMB42xEC is available in three variants matched to the related application. The two-channel device RCMB420EC is intended for usage in charging stations with several charging points, while the single-channel RCMB422EC is essentially intended for usage in a wall box. A third variant, the RCMB421EC, is also in planning, this device measures the residual current using a single-channel process, however it also signals if the charging current exceeds 32 A. ■

*Dipl.-Ing. Frank Mehling  
T-MIS*

INNOVATIVE PRODUCTS

THE POWER IN ELECTRICAL SAFETY®

Condition Monitor CP700



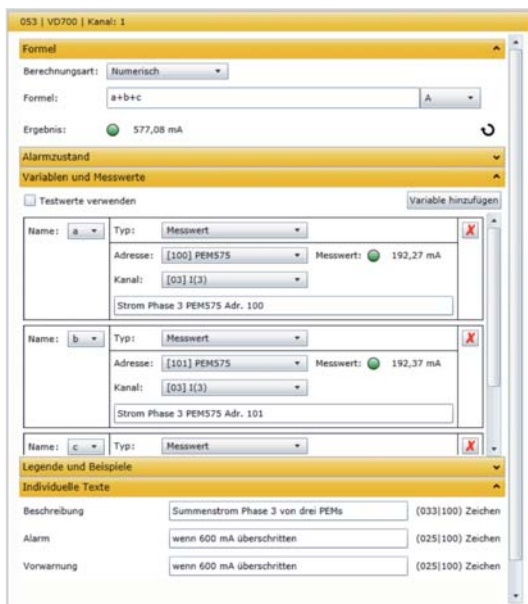
## Virtual measuring points in the condition monitor CP700

### What are virtual measuring points?

"A virtual measuring point is produced by the addition, subtraction or factoring of real measuring points. They are required to calculate partial or total powers".

Quote: RSW-Technik GmbH: <http://rsw-technik.de/?s=Virtuelle+Messstellen&x=11&y=8>, retrieved on 18.09.2014

Fig. 1: Configuration example for a virtual measuring point in the CP700



The usage of virtual measuring points is based on the possibility of combining, as well as linking mathematically and/or logically, data from real devices. In this straightforward manner, virtual measuring points generate the solution to system-specific problems that in the past could only be achieved with significant effort. The possible uses for virtual measuring points in practice are virtually unlimited.

### Formation of a sum

A simple example of a virtual measuring point is, e.g., the formation of the sum (Fig. 1) of individual load currents  $I_{1...n}$  to form a total current  $I_{ges}$  or the combination of the consumption figures for all the loads that belong to a cost centre.

### Formation of common messages

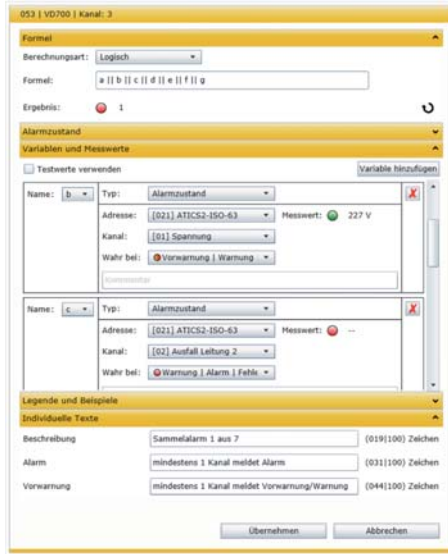
Individual messages from Bender devices that support communication can be linked together and with external information to form common messages, the virtual measuring points.

An example of this issue is the formation of common alarms. Here all relevant information can be combined into one logical common alarm with which the flood of information is reduced to the essential.



Fig. 2:

Usage of common alarms in an overview screen



### From the virtual measuring point to the virtual device

For ease of use, virtual measuring points are combined into virtual devices. Like real devices they can be configured with meaningful, specific texts so that every user can use the system without problems. In the integrated data display the texts are available as input values, which is of significant advantage particularly for displaying overviews. (Fig. 3)

Fig. 3:

Overview of the three virtual measuring points presented combined into one virtual device

| Nr. | Alarm                                   | Test   | Beschreibung | Messwert  |
|-----|---|--|--------------|-----------|
| 1   | Warnung wenn 600 mA überschritten       | Virtuelle Messstelle Summenstrom Phase 3 von drei PEMS |              | 784,87 mA |
| 2   | Warnung mindestens 1 Kanal meldet Alarm | Virtuelle Messstelle Ratio Last-Differenzstrom         |              | 0,38 %    |
| 3   | Warnung mindestens 1 Kanal meldet Alarm | Virtuelle Messstelle Sammelalarm 1 aus 7               |              | 1         |

In a medical area this could be:

- Failure of a supply cable
- Failure of oxygen
- Failure of compressed air
- Failure of the UPS system
- An insulation fault
- Transformer overload
- Transformer overtemperature
- Interruption in communication
- An internal device fault.

### Virtual measuring points during residual current measurement

RCMS systems provide proven methods for the detailed analysis of overcurrents, undercurrents and residual currents. In installations with complex loads the assessment of the state of the loads is nevertheless difficult, as the permissible residual currents are also dependent on related operating state of the loads. Static limits defined for the individual residual currents are inadequate for alarms. Here virtual measuring points are used in which the residual current is placed in relation to the total current drawn by the load. Straightforward and reliable installation monitoring can be implemented by using limits defined for the virtual measuring point.

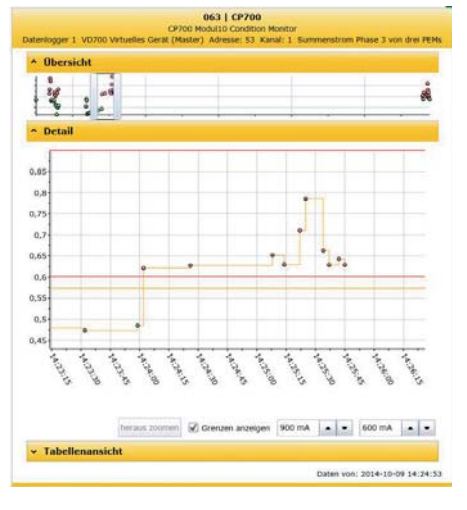
### Display of the virtual devices in the condition monitor CP700

Along with a display of the real devices in the device overview, in the alarm list, in the history memory, in the data logger and in the data display, the CP700 can also display the virtual devices. Due to the complete recording of alarms in the history memory and the graphic analysis features of the data logger, the CP700 is an excellent instrument for assessing installation behaviour. Virtual measuring points have been supported in the CP700 since version 1.80. ■

Dipl.-Ing. Friedhelm Dalitz  
T-SCT

Fig. 4:

Graphical representation of the virtual devices in the CP700 data logger



## INNOVATIVE PRODUCTS



### Why analogue technology in 2014?

The answer to this question comes from power station operators who continue to want to avoid software-controlled equipment functionality. The reason for this attitude is in the difference between a permanent random fault and a dynamic random fault.

## LINETRAXX® VMD258 – New undervoltage/overtoltage relay

for monitoring three-phase AC systems up to 690 V in pure analogue technology

**Permanent random faults occur predominantly in analogue technology** and remain present until they are rectified, e.g. a faulty component. Dynamic faults on the other hand, occur only under certain conditions and are difficult to find, e.g. a software bug or a faulty memory cell. Despite comprehensive tests, possible malfunctions and faults due to software cannot be excluded.

As a consequence, at the request of the power station operators, the vital, important monitoring functions for undervoltage and overvoltage monitoring continue to be designed using pure analogue technology. The design of a series of devices from monitoring three-phase AC systems in pure analogue technology (without microcontroller) is also a requirement that results from the risk analysis for safety-critical areas.

The new voltage relays LINETRAXX® VMD258 from Bender, which are replacing the SUR35x series devices, monitor these AC systems for undervoltage and overvoltage (window function). They do not need a star point connection for this purpose and are therefore universally suitable for 3 AC systems up to 690 V.

The voltage to supply the electronics is taken from the system to be monitored. The supply to the electronics, the relays and the connection for the external energy

storage device are isolated from the system by means of double isolation. An additional energy storage device ES258 provides a bridging time of at least 5 s in the event of a power failure. Special input transformers attenuate interference from the system. The response values for undervoltage and overvoltage as well as the response delays are continuously adjustable.

The analogue technology in the VMD258, which is compliant with the device standards: DIN EN 60255-1 VDE 0435-300 and DIN EN 60255-127 VDE 0435-3127, is primarily intended for use at utilities in power stations or in substations. The VMD258 is also suitable for standard applications in industry at system voltages from 100 to 690 V. ■

*Dipl.-Ing. Marc Euker, T-MTS*

### DEVICE FEATURES

- Undervoltage and overvoltage monitoring for 3 AC systems
- No separate supply voltage required
- Separate alarm relays for undervoltage and overvoltage with 2 potential-free changeover contacts
- Adjustable response value:  $0,7 \dots 0,95 \times U_N / 1,05 \dots 1,3 \times U_N$
- Nominal system voltages:  
3 AC 690/500/480/440/400/230/110/100 V
- Adjustable response delay: 0...5 s
- LEDs for operation, overvoltage, undervoltage.



## Construction of a new computer centre with redundant power feed

**For more than 30 years KSV Koblenzer Steuerungs- und Verteilungsbau GmbH** has planned, designed and realised power distribution systems, medium voltage installations, industrial automation applications, building services management systems, as well as control systems and process data display systems.

For the construction of a new computer centre, KSV is planning and designing the building automation; during this process, KSV is integrating all the power, heating, ventilation, air conditioning and cooling systems. The organisation is also implementing the data display system for the building automation.

The computer centre, designed for expansion, has a total floor area of 1,500 m<sup>2</sup> on two floors with space for approx. 145 racks in the maximum configuration. Currently there are only racks on the first floor; the second floor is intended as a reserve. The real heart of the computer centre, that is the building services, is on the ground floor.



### ▶▶▶ Power system

The power consumption of the computer centre is defined as 600 kW in the maximum configuration. For this purpose the power supply in the building comprises a fully redundant layout up to the load and therefore offers a high degree of availability and reliability in accordance with the current state-of-the-art. Each zone of the power supply can be electrically isolated to undertake work. These days modern IT (Information Technology) equipment generally has a redundant power feed such that continued supply is ensured on the electrical isolation of one path.

On the failure of the general power supply to the IT distribution area in the computer room, the battery-backed UPS system can continue to provide power for 15 minutes. To bridge longer-term failures in the general power supply, a diesel backup generator will take over the supply of the IT area. This emergency power system provides 1.500 kVA and has enough fuel in three underground tanks for 72 hours. If necessary these three fuel tanks can be re-fuelled during operation.

### Heating and air conditioning system

The waste heat produced by the servers is utilised by a modern heat pump to heat the WC, the workshop or the utilities room. Due to this heating concept the heat pump operates highly efficiently and therefore saves energy.

### Cooling system

Like the power system, the cooling system also has a fully redundant layout. The cooling is distributed via two separate distribution systems and each system is configured for only 70 % of the maximum rating, such that there are adequate reserves.

Two compact chillers in the central building services area provide the cooling. Each of the chillers has a cooling capacity of 350 kW. Cold water pumps feed the glycol-water mixture to the recirculating air cooling equipment that cools the server rooms. Again all pumps here are duplicated and can also be adapted to the cooling demand. Should, nevertheless, the cooling capacity be inadequate, an additional third chiller can be installed.

### Electrical safety thanks to ATICS®

All of the cooling system, which is vitally important for the computer centre, is controlled via a switch cabinet with redundant power feed. To achieve the required high availability, the power supplies to the controller must be equipped with automatic change-over to ensure continuous function. For this purpose KSV uses proven technology from Bender in the form of the switching device „ATICS®-4-80A-DIO“.

The switching devices in the ATICS® series contain all the necessary functions to change-over between two independent supply lines. They were designed





Transfer switching device of the ATICS® series in use

in strict accordance with the guidelines for functional safety as per IEC 61508. This aspect ensures safety in relation to hazards due to malfunctions as per the requirements in accordance with "Safety Integrity Level" SIL2. As such ATICS® switching devices are predestined for usage in safety-related installations and meet all the requirements for configuring a safety power supply in accordance with DIN EN 61508 in computer centres.

The integration of the power section and electronics in one flat, compact device significantly reduces the amount of space required in the switch cabinet and minimises the wiring effort. Switching devices in the ATICS® series communicate with alarm devices via the BMS bus interface and in this way can easily be integrated into the building services management system and data display system.

KSV selected the ATICS® switching device not least due to its small dimensions and its excellent communication features.



Transfer switching device ATICS®

## Building services management system

All operating signals and error signals from all the systems installed are integrated into the building automation. At the same time, in this way the installation can be better monitored and optimised in relation to energy efficiency. During this process the building automation acquires data from the power, heating, ventilation, air conditioning, and cooling systems in the form of all their signals and measured values. For this purpose controllers are used in the related switch cabinets; these controllers acquire and process the relevant data.

With the aid of the building automation and data display system, the sections of the installation can be displayed in a simplified and clear manner for the customer. Finally, after more than three months of commissioning, KSV has provided its customer with a computer centre with a total of 1,100 data points and 50 screens in the data display system. ■

*P. Demand, KSV Koblenzer Steuerungs- und Verteilungsbau GmbH  
Ralf Gudelius, Techn. Büro NRW*



## The Schluchseewerk AG: Hydropowered

Residual current monitoring to ensure the operational reliability of Schluchseewerk machines at Waldshut Power Station

**Laufenburg-based Schluchseewerk AG** has been using the hydropower potential available in the southern Black Forest as a power source for generating electricity since 1928. It has met the growing demand for electrical energy by building and operating pumped-storage power plants since the 1920s.

The unbeatable benefits of pumped-storage power plants become clear precisely at times when unpredictable peak loads have to be met and additional energy sources are required at short notice. These plants can go from shutdown to full power within 90 seconds – by contrast, a lignite-fired power station requires around three and a half hours to do the same. And right now – with renewable energies on the advance – pumped-storage power plants are becoming increasingly important.

Schluchseewerk AG has 5 power stations with a total of 20 generating sets delivering a maximum output of 1,836 MW in turbine mode and 1,604 MW in pump mode.

The company also manages 14 storage reservoirs. The contents of these reservoirs are centrally monitored, just as the generating sets are controlled centrally from the load management centre in Kühmoos. Permanent operational readiness is one of the main goals.

## WALDSHUT PUMPED-STORAGE POWER STATION

With its machinery hall directly on the banks of the Rhine, the power station forms the bottom level of a three-stage chain.

### TECHNICAL SPECIFICATIONS:

Average generator output: 150 MW

Average pump output: 80 MW

Maximum water throughflow:

- in generator mode 140 m<sup>3</sup>/sec
- in pump mode 40 m<sup>3</sup>/sec

Electrical generating output:

approx. 170 million kilowatt-hours/year

## Continuous monitoring

As part of a preventive maintenance strategy it is important to monitor power supplies permanently. In line with the motto of "It's better to alert than switch", modern residual current technology detects looming insulation faults at an early stage and enables the operator of a technical system to locate and remedy the fault quickly before a shutdown is initiated.

## Enhanced operational reliability and cost reduction

After completing a survey of the market, Schluchseewerk AG's Electrical Engineering Maintenance department at Waldshut Power Station decided to install residual current monitoring systems (RCMS) from Bender.

Operationally relevant plant in the power station was equipped with these systems over a period of two years. The RCMS devices of the individual machine sets are linked via a COM460IP gateway and are visualised via the Schluchseewerk AG intranet. Data can be accessed from any of the company's computers with the appropriate authorisation. Consequently, the available information on the status of the power supply systems can be called up at any time.



## Detecting looming insulation faults

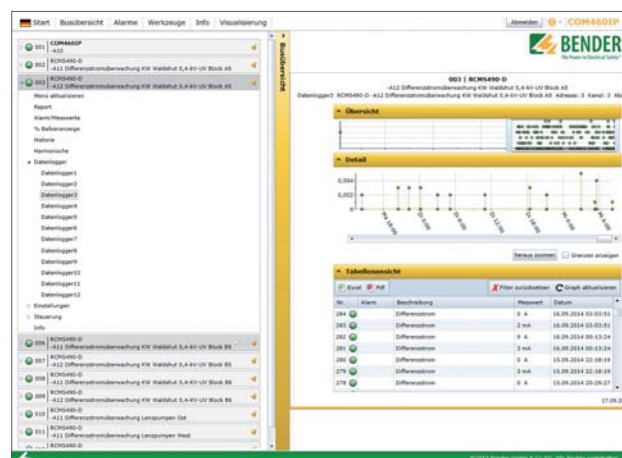
Insulation faults usually occur at a time when the machines are urgently needed. A protective system is triggered without advance notice! Rapid action is then needed. Locating the fault can result in the plant being out of action for several days, weeks or even months. In most cases an insulation fault "grows", i.e. the condition of the installation and the machine deteriorates. The longer it is there, the faster its extent and impact grow.

The cause of the faults in an electrical machine is usually mechanical or electrical, e.g. as a result of wear, an interturn fault, earth fault etc., and in most cases can be recognised by a rise in temperature.

A shutdown in the event of a fault serves to protect people and systems in general. However, it can also result in continued operation no longer being possible or the threat of a total failure as a result of irreparable damage. After every incident the question arises of a warning in good time before a system fails.

Fig. 1:

Overview image of monitoring system of the power plant Waldshut with details of monitored operating material



## TECHNICAL APPLICATION



At the same time, the technical staff are able to set separate limit values for warning and malfunction alarms for every equipment item connected. Once the residual current monitoring systems are in operation, the power station is promptly notified when an electrical system moves outside the approved range.

The electrically skilled persons at Schluchseewerk AG are therefore able to monitor the machines' electrical power supply continuously, visualise the system statuses, significantly increase availability and optimise staff costs. In concrete terms, this results in cost savings of approx. three person-weeks per power station per year.

### Savings potentials during periodic inspections too

DIN VDE 0105 specifies the periodic inspection of electrical equipment. The most costly part, which involves isolating the equipment and shutting it down, is the insulation measurement. This test must be carried out regularly after a risk assessment. With the operating conditions in the power station, these tests are carried out every four years. Too long a time.

Furthermore, the test represents a snapshot outside the normal operating situation; as a result, it has only limited meaning and is also very time-consuming.

The permanent residual current monitoring of electrical equipment during the periodic inspections in accordance with accident prevention regulation DGUV 3 (formerly BGV A3) and the Betriebs-sicherheitsverordnung (German ordinance on industrial health and safety) is an integral element of preventive maintenance. Additional savings potentials can be achieved.

At Schluchseewerk AG, for example, in addition to increasing the operational reliability of the electrical system, it was possible to significantly reduce costs as a result of the time saved on the prescribed testing to DGUV 3.

I am particularly indebted to Mr. Wolfgang Kiefer, Head of Electrical Engineering Maintenance, for accompanying me while I was at Waldshut Power Station and for the detailed information and explanations he provided for this article. ■

*Dipl.-Ing. Thomas Frößinger  
Ing.-Büro Frößinger*



**Fig. 2:**  
Cable terminal compartment of a block distribution board with residual current transformers



**Fig. 3:**  
Overview image of monitoring system of the power plant Waldshut with details of monitored operating material



**Proven technology for electrical safety**  
in Russia's hospitals

# The last word in safety



**Russia is continuing to modernise its healthcare system** and is thus also raising the level of its building services management technology. The ongoing standardisation of safety requirements, at an international level too, calls for reliable and standardised safety solutions for plant engineering and building services management systems. As part of a complex reconstruction and modernisation process of an operating suite in Municipal Hospital N12 (known as GKB N12 for short) in Moscow, the latest power supply and system protection technology from Bender is being used which reliably guarantees the safety of people and machines, even in a highly complex electronic environment. >>>

▶▶▶ The Russian healthcare system has been undergoing great change for over two decades now and can boast huge modernisation projects which are probably unparalleled on this scale anywhere in the world. The Russian government's "Health" major structural project is raising the level of medical technology in Russia's hospitals and other medical establishments across the board to international standards. The associated safety standards for power supplies must also be satisfied, as must the requirements relating to highly complex medical electrical equipment and systems.

### Tradition of strong partnerships

German companies now have a long tradition of involvement in upgrading medical facilities in Russia. Again and again the excellent experience with German engineering, German planning quality and German know-how is a key criterion in the participation of German companies or German technology in healthcare modernisation projects in the Russian Federation. At the beginning of 2014 a further, state-of-the-art operating suite with a total of 14 operating theatres was commissioned in Moscow. The new operating suite, which was built in just 16 months, provides Municipal Hospital N12 with new options in the form of the latest in diagnostic and treatment facilities for almost all relevant medical disciplines.

With a total of 1,250 in-patient beds, GKB N12 can look back on more than 40 years of history and is now the largest primary healthcare provider in Moscow with more than 55,000 patients annually. It has earned a good reputation thanks especially to the implementation of the latest scientific research results in clinical practice, and in 2013 it won the Department of Healthcare's award for "Best Medical Institution in the City of Moscow". Since its foundation the hospital has also operated as a university medical centre and cooperates with the best medical teaching institutions in Russia.



The hospital's medical building complex includes the following facilities:

- A multiple-bed unit with more than 1,000 beds for in-patient treatment
- 60 resuscitation beds
- a department for consultation and diagnostics and
- a transregional department for paroxysmal disorders.

### Investment in the future

Since 2007 the modernisation programme has also seen the operating theatres, intensive therapy units and resuscitation departments being upgraded with the latest equipment. In 2011 the decision was taken to set up a regional centre for cardiovascular diseases within GKB N12, and this has now been in operation since January 2013.

The next stage, completed in 2014 after only 16 months of construction, was to build another new operating suite. In addition to general function rooms, the new operating suite comprises a total of 14 operating theatres for a very wide range of medical disciplines, including an angiography theatre.

### Strong together

In addition to the use of leading-edge medical technology supplied by renowned German companies such as Maquet Deutschland GmbH, Dräger AG & Co. KGaA, Siemens AG, Karl Storz Endoskope GmbH & Co. KG among many others, Bender provides the following protection and monitoring solutions for the building services management system:

- Power supply to all rooms of groups 2, 1 and 0, i.e. the complete power supply system for a total of 14 operating theatres

- 14 combined TN-S/IT system distribution boards, equipped among other things with a total of 14 IT systems, with fully automatic UMC710D4-160 series changeover devices, integrated insulation monitoring devices and the latest generation of EDS systems
- 26 TM series panels plus display in a hygiene-compliant finish, with all the operating and control elements now standard for operating theatres, anaesthetic rooms and pre-operative rooms
- 175 "AT" series display panels (version with glass cover)
- 3 BSV systems equipped with NiCad batteries for uninterruptible power supply for operating lighting systems
- Installation of the proven BMS bus to provide all information needed by medical and technical personnel at two central nurses' stations
- 16 main electrical distribution boards
- 10 air-conditioning switchgear cabinets, equipped with 10" HMI touchscreen and VPN access, for complex control of the ventilation system in association with the TM series panels installed in the operating theatres, including a remote control facility.

## Simple and safe

The use of EDS systems ( insulation fault location systems in unearthed power supplies) is still a pioneering step for Russia, especially in medical locations. These systems enable users to quickly and safely locate faulty power circuits caused by insulation faults in medical electrical equipment or system components within the installation. TM series operating theatre panels are now part of the basic equipment in Russia too since



their alphanumeric displays have been completely converted to the Cyrillic alphabet. As a result, the hospital personnel can focus on the essentials rather than being diverted by operating the building services technology.

The example of Moscow's Municipal Hospital N12 is a further demonstration of the complex electrical engineering requirements relating to building services management that have to be met using the latest technology for electrical safety. At the same time, however, a demonstration of how simple the operation and monitoring of this highly complex technology can be for personnel when Bender systems are used. In collaboration with its customers, in this case Moscow's GKB N12 hospital, Bender develops needs-driven solutions and finds an answer to every challenge – and not just in the healthcare sector. ■

*Dipl.-Ing. Thomas Gans  
Moscow Technical Office*

TECHNICAL APPLICATION

Complete, high-tech new hospital building erected using modular design and secured **with Bender technology**

## Starting small and getting big: New methods in construction

The new clinic for children and young people at the Diakonie-Klinikum in Schwäbisch Hall is a milestone in construction technology. It was not produced on the actual site, instead it was pre-installed in Neresheim and largely delivered complete with furniture, air-conditioning and heating and water and electricity connections. This also applies to the Bender technology installed.

Every floor of the new building is made up of fitted modules which were put together using a system of building blocks. A total of 60 of these room modules were required to form the entire building unit, including stairwells, treatment rooms, patient rooms and corridors. Putting them all together took just six days. The 61st module - the second floor bridge - forms the connection between the children's hospital and the main hospital building.

### Time saving and synergies

Each of the modules is up to 20 m long and 4.50 m wide and weighs 35 tons - about the same as four double garages. It required a complicated system of logistics to transport, a task entrusted to specialists Felbermayr from Nuremberg and Kübler from Michelfeld. According to project coordinator Thorge Clever from Speditions Kübler, all the obstacles on the stretch between Neresheim and Schwäbisch Hall were recorded and incorporated into a special workflow plan.





## Logistical masterpiece

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The heavy-load transporters drove to the grounds of Spedition Schwäbisch in Michelfeld-Erlin overnight. During the day, when new room cells were required at the 'Diak', a small convoy headed off towards Schwäbisch Hall with a police escort.

## Special machinery for a special project

Assembly involved a mobile crane, of which only a few exist in Germany. The giant, which can lift up to 750 t, arrived on another 16 heavy transporters. It took two days to assemble the crane and just as long to dismantle it. It was posted in front of the main building so it could lift the individual buildings straight from the low-loaders in Diakoniestraße.

One indicator of just how precisely the individual modules are produced becomes clear as you walk through the finished building: there is no evidence of impacts or joins either inside or outside the building.

## Starting small and getting big

The new building covers 3200 m<sup>2</sup> and fits 58 beds across five floors. The total of 230 rooms include intensive care units for newborns and children, an infant and infection ward, a special paediatric surgery clinic and a neuro and social paediatrics unit. The ground floor incorporates a treatment centre, with physiotherapy, speech therapy and occupational therapy.

In future, modular construction will take on more importance, not only as an interim solution but also for extensions to existing buildings. Only very little time is required at the building site itself, which minimises building site issues such as noise, dust, exhaust gases and vibrations.

We would like to thank Ms Giesel from the Diak and Mr Langenbach from ADK for their help and support in producing this report. ■

*Jürgen Eisfeld, Technical Office Stuttgart*



**ABOUT EPLAN:**

EPLAN is a software platform from EPLAN Software & Service GmbH & Co. KG, a company in the Friedhelm Loh Group. The platform contains engineering tools for various disciplines. EPLAN "Electric P8" is an engineering software application for the electrical technology sector, in particular for planning switch cabinets and switchgear. The EPLAN Data Portal is a web-based data platform for the provision of the latest device data from market-leading component manufacturers. Information from the data portal for engineering is available directly in "EPLAN Electric P8".

@ [www.eplan.de](http://www.eplan.de)

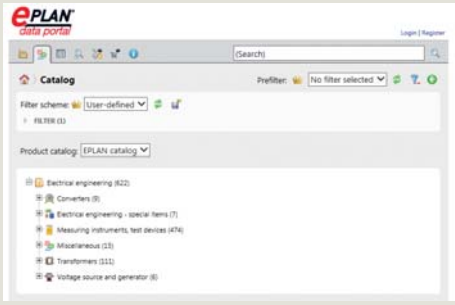
## From the catalogue to the circuit diagram using drag & drop Bender in the EPLAN Data Portal

**Since July of this year** Bender has provided device data on over 600 articles in the EPLAN Data Portal. These data ensure straightforward usage of the Bender product portfolio in the planning software "EPLAN Electric P8". The data portal uses standardised article data sets that provide, along with technical details and ordering information, also all the graphic and logic aspects for planning with EPLAN. The EPLAN user refers to article data (including the order number, the dimensions as well as a selection of technical data) and macros (graphic implementation in the circuit diagram) that together represent the device data.

The EPLAN Data Portal makes it possible to select Bender products from an online catalogue and then to drag them to the circuit diagram as well as the switch cabinet layout diagram using drag & drop. Working with device data provided by Bender accelerates planning, increases quality and eases the organisation of master data.

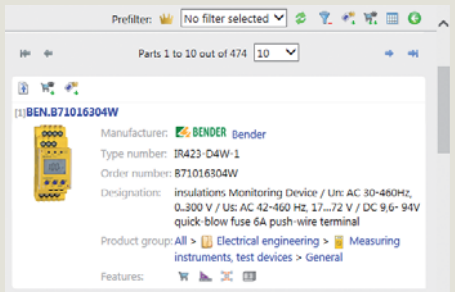
It is possible to search the EPLAN Data Portal based on various criteria. Figure 1 shows all device data available in the tree view as a result of a search for the "Manufacturer Bender". The tree structure is consistent across all manufacturers and therefore within the Bender portfolio it is not broken down as finely as is normally the case, for instance, on the Bender homepage.

FIGURE 1



Product categories are selected via the tree structure to produce an article list. The most important information on each article is displayed clearly (Figure 2).

FIGURE 2



The device data identifier is based on the Bender order number, i.e. "BEN.B71016304W" stands for order number "B71016304W". The symbols in the "Merkmale" (Features) row indicate which EPLAN features the article supports.

In the specific example Order Data, Function Template, Logic Macro and 3D Graphic Data are supported.

The detailed view of the article shows all available information at a glance (Figure 3):

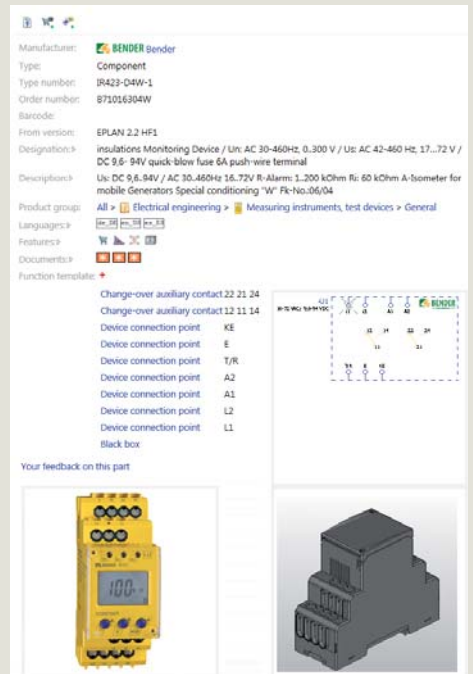
Even in this view (device is shown inside the dotted blue rectangle) it can be seen that functions are saved for the connections. For instance terminals 21, 22, 24 are for a change-over contact.

Depending on the device type, the functions saved in the device data are significantly more comprehensive than the examples shown here. As such control and power sections for change-over devices are shown in the macro. The 3D view is also of advantage for these complex devices.

Further plus points of pre-defined device data are clear: on the selection of the devices from the EPLAN Data Portal all basic information such as dimensions, electrical characteristics, order numbers, etc. are available immediately. These data flow into a wide range of engineering steps, such as the electrical wiring, positioning on the mounting panel, the parts list or the documentation. ■

*Dipl.-Ing. Frank Baier, S-MAR*

FIGURE 3



**CONCLUSION:**

By using EPLAN device data it is no longer necessary to enter data manually with the related possibility of mistakes. This situation makes possible a significant increase in efficiency during engineering. Bender is supporting this straightforward engineering approach by providing device data for many products.



## BENDER INHOUSE

Bender ensures electrical safety at the **Formula Student Electric competition**

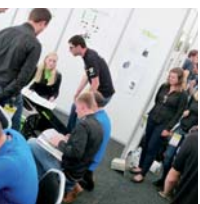
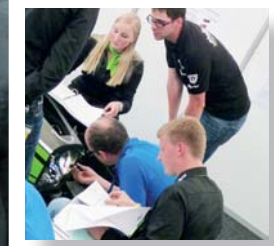


## Electrical safety in electric vehicles by Bender

**At the beginning of August,** 115 teams from 32 countries with a total of 3,600 participants attracted 10,000 visitors to the Hockenheimring for the annual Formula Student Germany (FSG) 2014 competition. The competition, which tasks student engineers from around the globe to design and build a prototype of a single-seat racing car within one year, is now in its ninth year. Complementing the FSG is the Formula Student Electric (FSE) competition where participating teams are required to design a vehicle powered solely by electricity.







Since 2010 (the year the FSE competition was introduced) Bender GmbH & Co. KG has been providing the teams involved with leading technological solutions that monitor electrical safety in electric vehicles, as well as their technical know-how. In the 2014 season, Bender supported 40 FSE teams, 32 of which came from Germany, and almost all of them were equipped with Bender's IR155-3204 insulation monitor, a device designed for unearthed DC drive systems (IT systems) in electric and hybrid vehicles. With its patented measurement technique, speed and reliability especially when high levels of interference are present, the IR155-3204 is increasingly recognised and appreciated by the FSE teams.

According to Winfried Möll, CTO of the Bender Group, the industrial development of electric vehicles is in full swing and the FSE has challenged university teams to develop innovative solutions in this growing sector. We want to be part of this." He said. "We are not only present at the Hockenheimring but we also support teams with technical advice and assistance throughout the year". To be more precise, the Bender Group supports 100 FSE and Formula Hybrid teams worldwide.

As well as supporting teams, Bender had two representatives on the judging panel that also consisted of experts from the automotive industry and whose job was to assess the race cars in terms of their business plan and cost analysis.

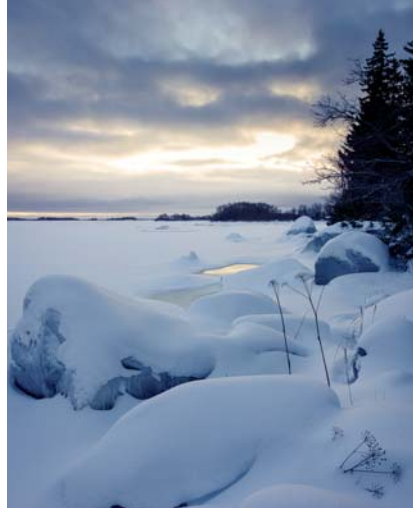
In addition to insulation monitoring, Bender also develops solutions for charging electric vehicles that meet the requirements of the latest IEC and UL standards and regulations. ■

*Andrea Gossel, S-COM*

**MORE INFORMATION:**

<http://www.formulastudent.de/fse/>

<http://www.bender-emobility.com/>



## Agentuuri Neumann

is the Bender representative for the Finnish market.

The company, which has cooperated with Bender since the 80s, is based 300 km north-west of Helsinki in Oy Pori. The family-run business was founded in 1955 and is currently run by the second generation. Like Bender, the owner Heikki Neumann places importance on quality and tradition, an aspect that almost predestined a partnership. In the meantime the company has acted as a successful multiplier for Bender and has been able to convince a number of Finnish businesses and projects to adopt safety technology from Gruenberg.

AGENTUURI NEUMANN



Caption: f.l.t.r. Juha Pelto-Piri, Heikki Neumann, Petri Hietasalo

"The company places particular importance on the **quality of the products and service** provided by its sales partners. As such only companies with above **average quality** are taken on."



At the time of its founding a real "provider of anything", the company traded in everything imaginable that was required in post-war Finland: From ballpoint pens, glass eyes for stuffed animals, candy floss machines for fairs, to harbour cranes, there was no limit to the range of products. However at the start of the 60s a large portion of the turnover was obtained with electrical components for the switch panel industry and the wholesale trade.

Currently the company employs, along with Heikki Neumann, two further staff, the marketing manager Petri Hietasalo and a product manager Juha Pelto-Piri.



The main area of business is representing various device manufacturers and wholesalers based in the EU along with the related import and distribution services. As Heikki Neumann, an electrical engineer, is very familiar with electrical safety technology, he has concentrated on representing companies that offer compact and highly specialised product ranges in the area of electrical engineering.

The company places particular importance on the quality of the products and service provided by its sales partners. As such only companies with above average quality are taken on – at the end of the day Heikki Neumann is answerable with the name of his traditional, family-run business and only acts as a representative for products behind which he can also stand. The choice for Bender was therefore easy, after all the high requirements on quality and customer satisfaction are shared.

Neumann primarily markets Bender technology at relevant trade fairs, by means of public relations work particularly on the company's homepage, and by means of various training courses at companies and planning offices.



OY



▶▶▶ Since 1980 a large number of outstanding projects have been completed using Bender components:

- The first projects involved insulation monitoring devices (ISOMETER®) sold to Scotland that were installed on oil platforms for monitoring IT systems in switch panels.
- In the 80s and 90s there was significant investment in the paper and wood industry in Finland. During this process the advantages of unearthed power supplies (IT systems) were quickly recognised. Since then practically all paper factories in Finland have been equipped with IT systems that are monitored using insulation monitoring devices from Bender.
- Since the 90s frequency converters have been used almost exclusively for speed regulation worldwide, even of the largest drives. ISOMETERS® in the IRDH series proved themselves excellently for this task right from the start, such that in this sector in Finland there has been very good collaboration with a number of well-known manufacturers such as ABB, collaboration that continues today.
- During the same period a building boom for large luxury cruise ships started in Finnish dockyards. Practically all ships have been equipped with sophisticated residual current monitoring systems

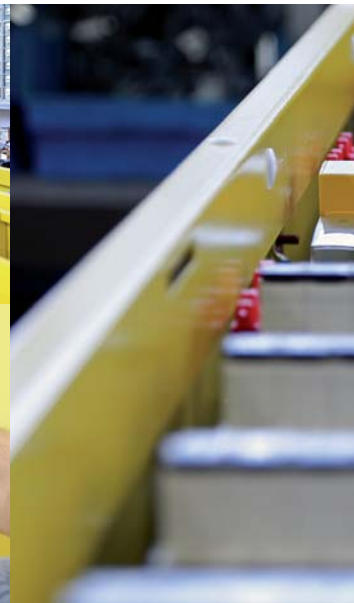


(RCMS) and devices for insulation fault location (EDS). The most impressive projects were those for the shipping line RCC: from 2010 to 2012 this line built the largest cruise ships in the world with the Oasis of the Seas and the Allure of the Seas. The EDS and RCMS systems installed in these ships have a total of one more than 1,000 measuring points.

- In the photovoltaic sector, special inverters are developed and manufactured in Finland for the world market; Bender devices from the isoPV series were considered the best technical solution for these inverters from the start and have been used to a corresponding extent.

"The success of our long-term business relationship is based on the technical know-how and the high-quality products from Bender" says Heikki Neumann. "We are very optimistic that we can further expand our successful collaboration. However, above all we owe our thanks to all the staff at Bender who have supported us over the years with their friendly manner and their extensive technical expertise." ■

Dipl.-Ing. Heikki Neumann  
Agentuuri Neumann



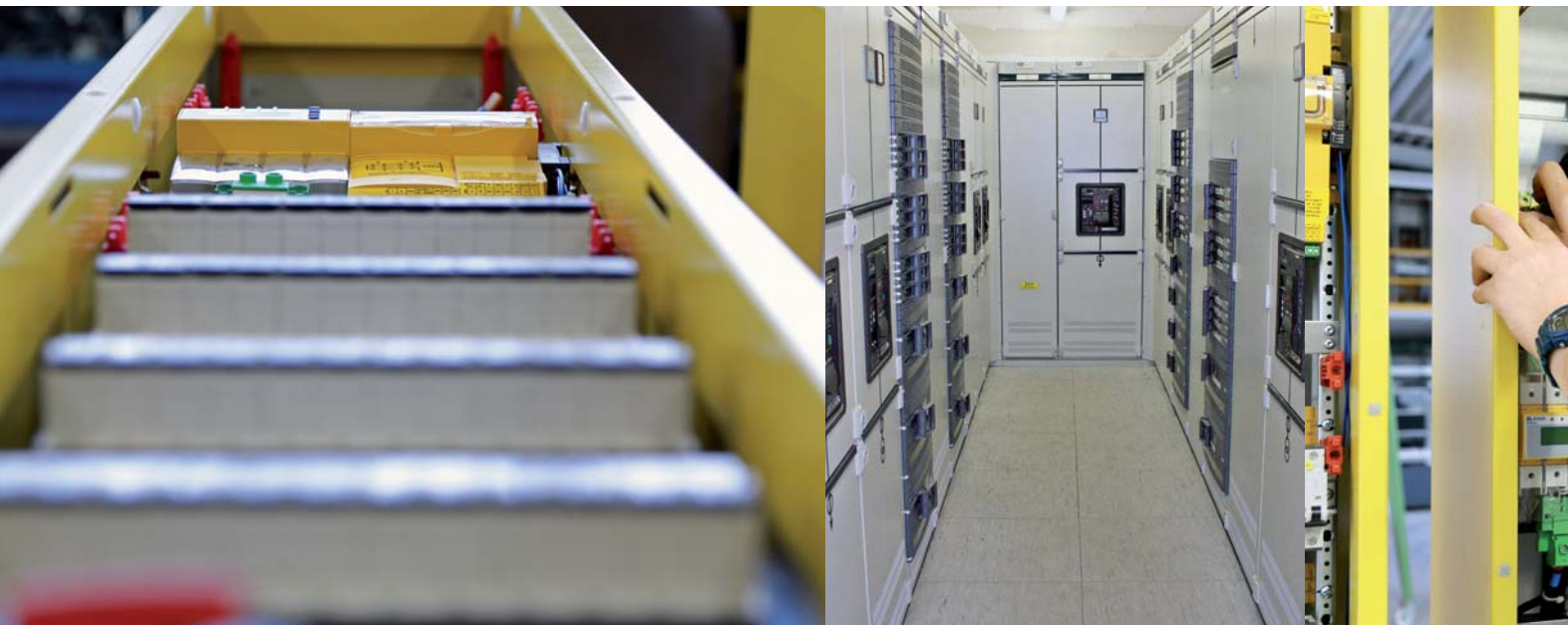
**GEISE Elektrotechnik GmbH:**

User-oriented solutions - safe, flexible & economical

## Your partner for energy transmission & distribution

**Since 1957** our family-run business has continuously impressed with its competence, quality and service: From the transformer station, through the switchgear, to the distribution board, our customers find both in-house developed products and also products manufactured under licence. Due to the broad product range, with us as a partner they can realise complete projects from the medium-voltage feed to the low-voltage outlet from a sub-distribution system.





— User-oriented solutions - safe, flexible & economical —

### ▶▶▶ History

The demands we place on ourselves can never be high enough. As a consequence since its founding GEISE Elektrotechnik has developed from a small local business in Sauerland to today's medium-sized nationwide and to some extent international business with 40 staff.

#### **Our customers**

Customers include, on the one hand, distribution network operators, industry, installation operators in accordance with the Erneuerbare-Energien-Gesetz (EEG) (Renewable Energies Act), department stores and hospitals, as well as related buildings and, on the other hand, electrical installers and planners. For these organisations we, as an experienced partner, provide modern,

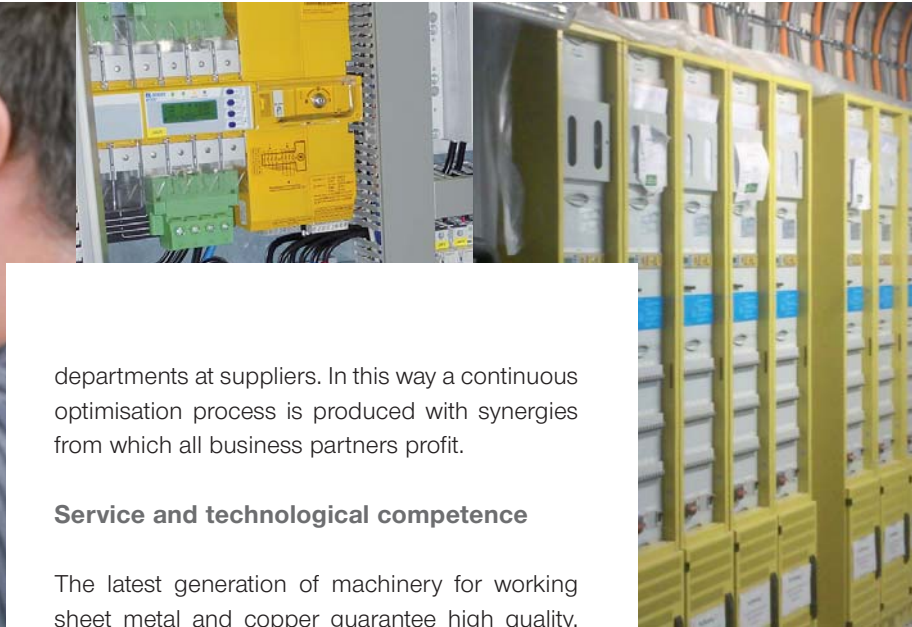
efficient solutions for electrical engineering always in accordance with customer-specific requirements and needs. In this way our customers receive expert advice during planning.

#### **Our staff**

Our highly qualified and committed staff are our most valuable asset. Their skills, their expertise and their experience are an important element in our success. So that we can also in the future impress with technical know-how, we place particularly high value on training young people.

## "We obtain new findings for product development

from the continuous exchange of information with the users of our products."



departments at suppliers. In this way a continuous optimisation process is produced with synergies from which all business partners profit.

### **Service and technological competence**

The latest generation of machinery for working sheet metal and copper guarantee high quality. It also provides greater vertical integration and, in combination with a comprehensive warehouse, makes us less dependent on suppliers such that we can address our customers needs immediately with a high level of flexibility and adherence to schedule.

## Principles

### **Quality**

So that our customers always receive high-quality products from us, we have based our business on the process-orientated quality management system DIN EN ISO 9001. Safeguarding and continuously improving this system have the highest priority.

### **Innovation**

To satisfy our demands and as a consequence the demands of our customers, we continuously exchange information about our products with the users. From this dialogue we obtain information that we can both utilise during our product development and also pass on to the development

## Our products

### **Transformer stations**

By combining aluminium and concrete GEISE Elektrotechnik has adopted a special position in the compact transformer station sector with in-house developed station buildings. By using different materials there are advantages in relation to resistance to corrosion and the weather, as well as durability. These features are achieved by a resilient anti-graffiti powder coating, smooth surfaces and the ability to replace facade elements if there is external damage, as well as a weight saving of four to five metric tonnes.





"IT system distribution boards from GEISE  
– a safe bet."



### Switchgear

As a switchgear manufacturer with decades of experience and a certified SIVACON technology partner for low-voltage switchgear up to 7,000 A, GEISE can offer its customers the bundled know-how of Siemens. We can also offer our low-voltage distribution framework, which is mostly used in transformer stations, as well as the SF6 medium-voltage switchgear 8DJH up to 24 kV as a strong Siemens partner.

### Distribution boards

Free-standing, wall-mounted and small distribution boards as well as bayed cabinets and meter cabinets complete the product range. Particularly worthy of mention are the in-house developed free-standing distribution enclosures equipped with Siemens (ALPHA) or Striebel & John fittings with their extraordinary variety of sizes, almost every RAL colour, and a generously dimensioned compartment that permits clearly laid out connection. These enclosures are used both in industry and in office buildings, department stores and hospitals or related buildings. Approx. 80 clinics place their trust in our competence in North Rhine-Westphalia alone.

By means of co-operation with Bender we were able, as one of the first ATICS® system partners, to develop new group 2 distribution boards for medical locations in hospitals and doctors' practices on the market launch of the automatic transfer switching and monitoring device in 2012. These distribution boards meet the standard IEC 60364-7-710, which came into force in 2013.



GE MV-IT: IT mobile distribution board

### Wherever needed

Along with the IT system distribution board we also offer a mobile variant to maintain a reliable supply of power during renovation work or in the event of failures. In this way all the prerequisites are provided to ensure a stable supply system for sensitive installations, e.g. in group 2 medical locations during the renovation of old existing distribution boards. Also on the failure of a distribution system in intensive care units or in operating theatres, the IT mobile distribution board provides a quick, reliable solution. Narrow doorways or small lifts do not represent an obstacle due to the small housing dimensions. Long distances are not a problem even if the floor is uneven thanks to the rubber wheels. The standardised connections permit quick commissioning. ■

Andreas Geise  
GEISE Elektrotechnik GmbH



# EXHIBITIONS 2014/15



## EXHIBITIONS INTERNATIONAL

### Annual National Convention



Event dates: 26.11. - 29.11.2014

Location: SMX Convention Center, Manila, Philippinen  
<http://iiee.org.ph>

### Data Center World



Event dates: 11. - 12.03.2015

Location: London – United Kingdom  
[www.datacentreworld.com](http://www.datacentreworld.com)

### Electric Networks



Event dates: 02.12. – 05.12.2014

Location: Moscow – Russia  
[www.expoelectroseti.ru](http://www.expoelectroseti.ru)

### International Summit & Exhibition on Health Facility Planning, Design & Construction

Event dates: 15.03. – 18.03.2015

Location: San Antonio, Texas – USA  
[www.ashe.org/PDC](http://www.ashe.org/PDC)



### NVTG Congress – Care Property & Housing Congress

Event dates: 09.04. – 10.04.2015

Location: Eindhoven, Netherlands  
[www.nvtg.nl/agenda/nvtg-congres](http://www.nvtg.nl/agenda/nvtg-congres)



### ASHE – Region 6 Conference

Event dates: 15.04. – 17.04.2015

Location: Rochester, Minnesota – USA

[www.ashe.org/learn/regional\\_conferences/region\\_6\\_educational\\_conference](http://www.ashe.org/learn/regional_conferences/region_6_educational_conference)



### SALUD PARA TODOS 2015 – Hospital exhibition

Event dates: 20.04. – 24.04.2015

Location: Havana, Cuba  
[www.convencionsaludcuba.com](http://www.convencionsaludcuba.com)



### EXPONOR Chile 2015 – Mining exhibition

Event dates: 11.05. – 15.05.2015

Location: Antofagasta, Chile  
[www.exponor.cl](http://www.exponor.cl)



### Railtex- NEC 2015

Event dates: 12.05. – 14.05.2015

Location: Birmingham – United Kingdom  
[www.railtex.co.uk](http://www.railtex.co.uk)



### CHES – Ontario Chapter 2015

Event dates: 24.05.2015

Location: Ottawa, AB – Canada  
[www.ches.org](http://www.ches.org)



## EXHIBITIONS NATIONAL

### SPS/IPC/DRIVES 2015

#### Electrical Automation – Systems & Components

Event dates: 18.02. - 20.02.2015

Location: Nuremberg, Germany

Hall 4 / Booth 265

[www.mesago.de/en/SPS/](http://www.mesago.de/en/SPS/)



### Elektrotechnik 2015

#### Trade Fair for Building and Industrial Applications

Event dates: 18.02. - 20.02.2015

Location: Dortmund, Germany

[www.messe-elektrotechnik.de](http://www.messe-elektrotechnik.de)



### eltefa 2015

#### Biggest regional trade fair for the electrical sector

Event dates: 18.03. - 20.03.2015

Location: Stuttgart, Germany

[www.messe-stuttgart.de](http://www.messe-stuttgart.de)



### Hannover Messe 2015

Event dates: 13.04. - 17.04.2015

Location: Hanover, Germany

[www.hannovermesse.de](http://www.hannovermesse.de)



### Intersolar München

#### The world's largest Exhibition for Solar industry

Event dates: 10.06. - 12.06.2015

Location: Munich, Germany

[www.intersolar.de](http://www.intersolar.de)





## Dipl.-Ing. Ralf Wanser

### Sales Management Europe & MEA Bender Group

#### PROFESSIONAL CAREER

|                  |   |
|------------------|---|
| 1987             | Karlsruhe Institute of Technology, degree in electrical engineering   |
| Until 1992       | Messerschmidt Bölkow Blohm, Munich, development of actuator systems for aircraft  |
| Until 2006       | Family-run businesses (e. g. Tornado in Berlin, Baumüller in Nuremberg), sales management in the area of electrical and electronic components and systems, national and international |
| Until April 2014 | ABB Ratingen and Mannheim: sales management DE and sector management  |
| Since Mai 2014   | Bender Group, Gruenberg: sales management Europe & MEA  |

**Herr Wanser, since 1 May this year you have worked at Bender. What was your motivation to join Bender?**

Bender has created an excellent reputation for itself on the market; it has expanded and is successful internationally. Also, it is a family-run business that has adopted sustainable economic goals, which I find very positive. Sustainability, international orientation and the power to innovate – these aspects all lead to a very appealing professional environment. My positive impression was rounded off by some very interesting conversations with the senior management. And last but not least, Bender is not far from my home town. A perfect package!

**The sales structure at Bender was recently completely reorganised. You are now in charge of the Europe, Middle East and Africa (EMEA) region. How would you summarise your tasks as regional sales manager?**

The structure was introduced to focus more on the individual regions, independent of the sales channels (distributor or Bender subsidiary). In this way we achieve greater proximity to the customer. My tasks include developing strategies together with the organisations at home and abroad, agreeing goals and, of course, providing support during their implementation.

Other tasks are the development and organisation of market segment management to exploit markets with great potential. Currently we are concentrating on eight focus markets with, in future, one member of staff each with corresponding

expert knowledge to support the sales units, for example whether it be the oil and gas, ship and harbour markets. Along with these topics I am currently involved in the sales-related integration of the sales areas in two Bender companies. The acquisition of new distributors and winning OEM customers are further focal points.

**Unlike the Latin American and Asian markets, there is relatively high penetration in the European markets. Why do you see potential for increased sales here?**

Despite the very high market penetration, there are prospects for further development! In the hospital sector we expect considerable growth even in the short term. We see major potential and sustained growth in the computer centre application area; a sector that is becoming increasingly sensitised to the topic of power quality. A further exciting sector is the areas of oil, gas and offshore, particularly in England and the Netherlands. In general we see potential at all utilities.

Also at machine tool manufacturers and in manufacturing industry there is a sustained and growing demand for safety technology for electrical systems, among others in Germany. Installations on which the operating organisations want to detect faults before a malfunction occurs also represent interesting niches.

Along with our established products, with the new "PEM" (Power Quality) product series our portfolio will have very interesting new solutions for computer centres and utilities.

**"Knowledge is the key.** We want to want to improve the qualifications of both our customers and our staff."

**The economic growth data for Africa and the Middle East have been stagnant for some time. Nevertheless, there is talk of ambitious growth goals. What is the possible growth scenario in these markets?**

The term stagnation can only be applied to a limited extent, the (gross domestic product) GDP growth in the Middle East / Africa region is still 3 - 6 %. And to profit from this growth we have significantly expanded our presence in the region with new distributors. In addition our region manager Amin Shabou receives intensive support – from next year he will manage the region on the ground from Tunisia.

**You share worldwide sales with your colleagues Mo Masghati (Americas) and Ulrich Lampe (Asia-Pacific, APAC). As is well known every market has its regional differences, whether these are of a legal, economic, technical or also cultural nature. What are the greatest differences between the three large regions APAC, Americas and EMEA?**

The greatest difference is obviously the different standardisation world to which our products and services must be adapted. Large structural differences exist in the general economic boundary conditions, which in Asia with GDP growth of 4 - 8 % are significantly stronger than in the Americas region with 2 - 3 % or Europe with 0 - 2 %, where our market shares are the highest. Even though the general outlook in Europe appears at first glance to be the least optimistic, it is easier to tap new potential, as widely branched structures provide easier access, particularly to large OEM customers, than in the other regions.

**During the phase of rapid globalisation there are – despite all the differences – definitely also some similarities?**

In principle there are major similarities between the individual regions. It is irrelevant whether a market is already highly industrialised or is still in a stage of industrial development, the needs for safety, availability, protection and to meet safety standards exist everywhere and will also become increasingly complex with increasing technological development. Know-how will always remain a product in demand!

In particular large projects will be tendered internationally and the new challenges such as offshore technology, integration with deep

sea cables and the growing density of computer centres (to integrate smart phones) are of a global nature. Intensive, cross-border harmonisation and the networking of expert knowledge are key aspects in all markets.

**Bender staff occupy positions in national and international forums. Knowledge about technical requirements and future developments is therefore also available to the local market quasi in real-time. How will this knowledge be obtained for markets abroad with their numerous, often significantly different standards?**

An important question! To be able to address this challenge, we have significantly reinforced our personnel in the standards area. Our staff are increasingly also involved in international standardisation forums where they are warmly welcomed due to their know-how.

**Knowledge is definitely a supporting pillar for sustainable market penetration. However, in the end every product, whether it is a service or a physical item, must reach the customer. Which sales-related optimisation ideas do you have for the future?**

I think knowledge is the key. We want to want to improve the qualifications of both our customers and our staff – in this way we will be able to better address the needs of the individual market segments.

And to be able to better prepare ourselves for surprises of any nature, we have improved our early warning systems and forecasts: by means of a continuously optimised system for measuring the key performance indicators we will be able to evaluate increasingly detailed feedback.

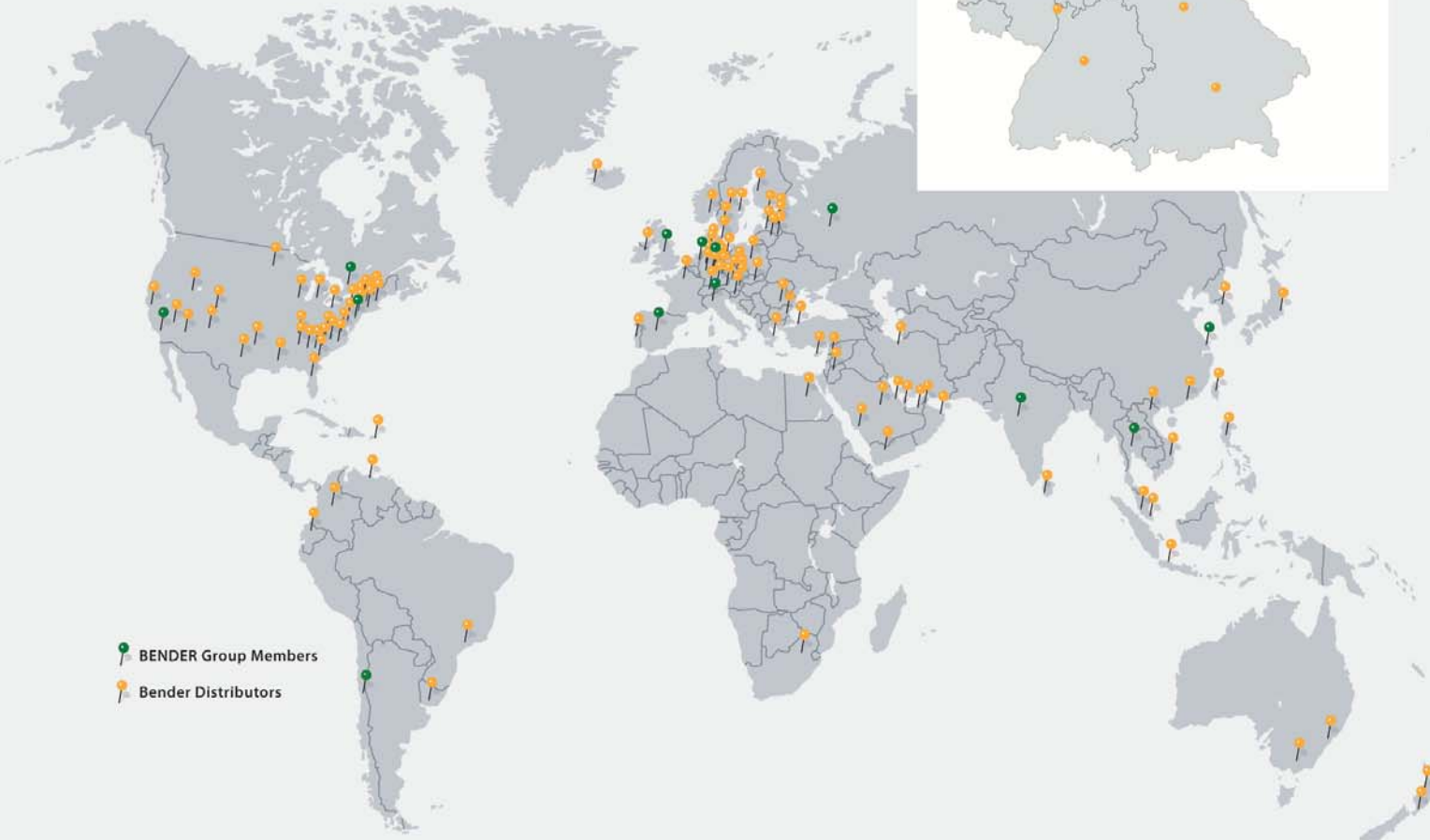
Where necessary we will drive forward the standardisation of procedures and processes, for example as is currently the case in the hospital technology sector.

Traditionally, customer satisfaction is a key element of our work. Well-organised customer relationship management creates transparency and trust on both sides. Satisfied customers are after all one of the most effective multipliers...

Herr Wanser, we thank you for the interview. ■

# BENDER Group

The Bender Group with its main office in Gruenberg/Hesse has 70 agencies with more than 650 employees worldwide.



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