

Day ^{by} DIN



News and know-how for informed professionals

Data Center Zürich-West, Lupfig

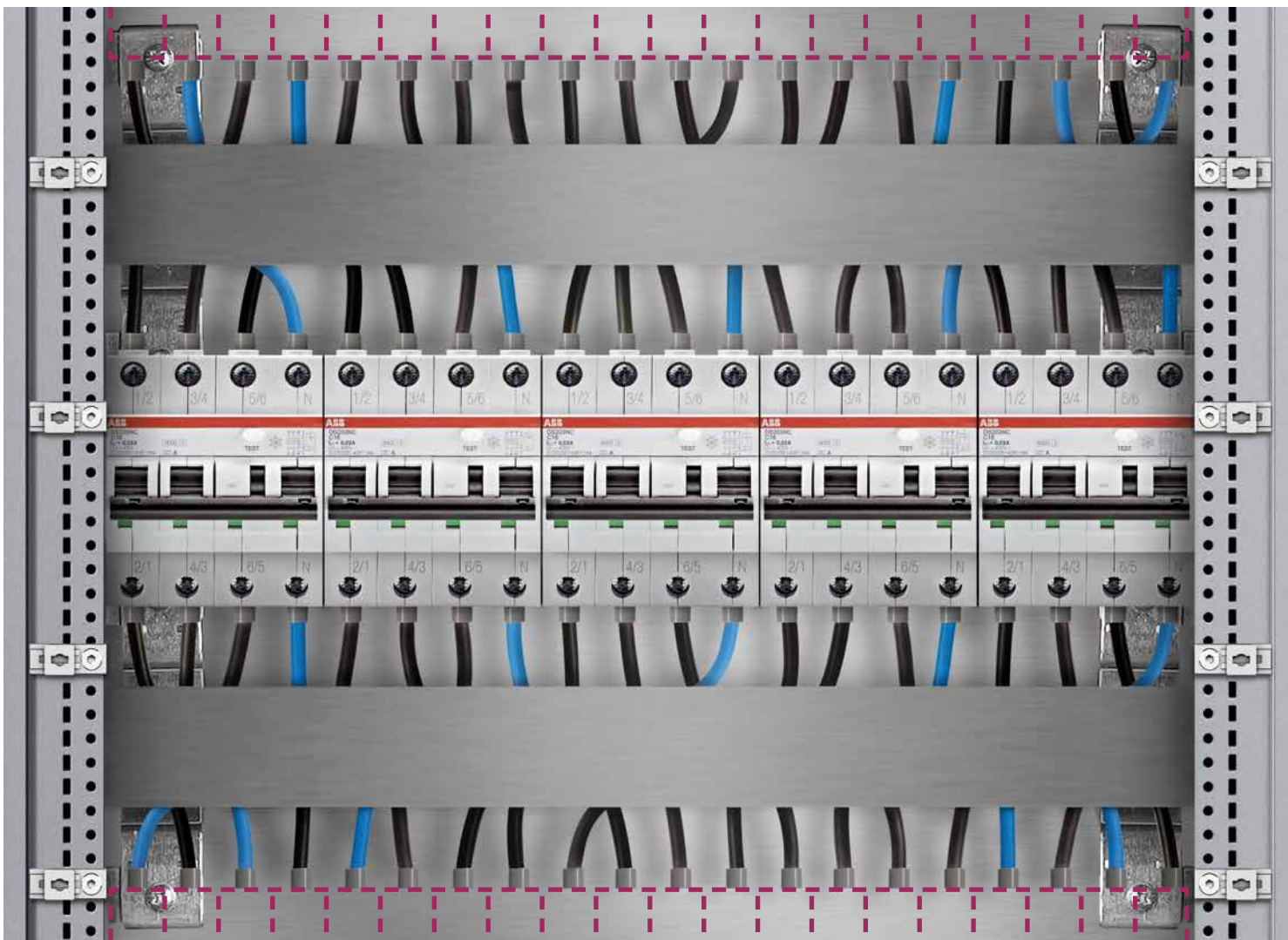
ABB and Green.ch launch state-of-the-art data center

No job too dirty for ABB products

What are some of the dirtiest places to work at?

ABB Santa Palomba plant. Production efficiency combined with energy savings

How to reduce energy consumption with an immediate return on investment



Minimum space, maximum protection DS203NC: 3P+N RCBOs in 4 modules



Designed to be compact, DS203NC 3P+N RCBOs are suitable in all those applications where size can be an obstacle. They provide reliable and complete protection from overcurrent and earth fault currents. DS203NC RCBOs are available in two ranges with different breaking capacities to cover all the applications in commercial and industrial installations; DS203NC L with 4.5kA and DS203NC with 6kA breaking capacity according to IEC/EN 61009. The range includes types AC, A, APR and S and tripping curves B, C or K. www.abb.com/lowvoltage

Power and productivity
for a better world™





GFDI - Ground Fault Detection Interruption (48)

Day by DIN 1|15



Valentina Surini
Product Marketing Manager
DIN-Rail Products

Dear readers,
welcome to the first edition of Day by DIN 2015! We had a great response for any of the three editions of 2014 and therefore we will continue on this path in 2015 with plenty of interesting and curious topics. One of the main event of this season is Hannover Messe: it started in 1947 in an undamaged factory building in Laatzen, in order to boost the economic advancement of post-war Germany. Since then, it has emerged as the world's biggest industrial fair: every year around 6.500 exhibitors and 250.000 visitors meet to share latest news. For us it is a great chance to meet you and, in order to celebrate this opportunity, in this edition we speak about topics related with industrial world. One of the most important issues we all have to deal with is to guarantee

energy continuity: an example is the case of Green.ch center in Lupfig (CH), where the firm was able to reach new levels of reliability, safety and efficiency in ICT services.

Another topic which is always under the magnifying glass is energy saving: for this reason we would like to share our experience at our production site in Santa Palomba (IT), where we managed to reduce annual electricity consumption and CO₂ emissions, with immediate return on investment.

I invite you to send me your suggestions, inputs and questions for the next issues of Day by DIN.

Looking forward to read your emails at mail.daybydin@abb.com.

Enjoy the reading!

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No job too dirty for ABB products

Companies like the Swedish Duztech AB with the help of ABB's low voltage components, offer customers reliable operation in extreme environments.



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Hermes Systeme GmbH

Keeping a close eye on power consumption: cost savings with ABB electricity meters

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The introduction of tablets in the production of switchboards customized to the customer's specifications

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Thanks to Ekip Power Controller up to 400 kW of HVAC loads can be controlled with about 11,000 € saving per year!

Time to relax

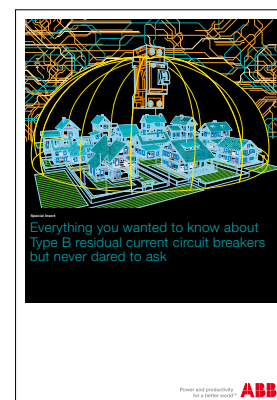
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Train your brain

Technical

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ABB and Green.ch launch state-of-the-art data center employing HP servers for new levels of efficiency and reliability



Special Insert

Everything you wanted to know about Type B residual current circuit breakers but never dared to ask

Jump in the box

Find in this section new products and systems for industrial, photovoltaic and residential applications: electricity meters, floor standing cabinets and softstarters are just some of the new solutions you will find for your business.

Protection

S 200 MT UC

Miniature Circuit Breaker S 200 MT UC

The miniature circuit breaker S 200 MT UC extends the established ABB System pro *M* compact® product range with an MCB for DC and AC applications for the traction industry.

The S 200 MT UC impresses with its performance range and the accordingly large amount of approvals. Its high inbuilt short circuit breaking capacity across the entire model line, its flexible AC and DC application and its approval and compliance in accordance with all major international and local standards make it truly unique.

The new S 200 MT UC is designed for special traction applications according to the French standard NFF16-101/102 (I2-F3) and to the European standard EN45545-2.

All current System pro *M* compact® accessories can be combined easily with the new model line. Whether warehousing or project engineering, planning, installing or maintaining your equipment, the S 200 MT UC is a simple and flexible solution.

Catalogue: 2CDC002053D0204



+ Benefits

- Superior technical features, e.g. high short breaking capacity in AC and DC applications
- Exigence 3: Designed to meet NFF 16-101/102 (I2 / F3) and EN45545-2 applications in the traction industry
- Wide range of approvals
- Fully compatible with System pro *M* compact® accessories
- 1 module width even with integrated auxiliary contact
- Improved terminal technology
- State-of-the-art product marking

Protection

F200 Type B

RCCB F200 Type B



Benefits

- 2 Pole devices in 2 DIN Module, unique in the market
- High reliability against unwanted tripping
- A wide range of accessories available: Common accessories similar to F200 devices
- Total coordination and selectivity with all ABB devices
- Improved operational continuity with the fitting with auto-reclosing units and motor operating devices
- Range tested and approved by IMQ (Italy) and VDE (Germany)
- F200 type B operates in heavy duty climatic conditions, from -25 up to +60° C

The F200 Type B are universal current sensitive residual current circuit breakers (RCCBs) designed for industrial applications where there is an increasing use of devices like frequency converters, medical equipment and UPS systems. The RCCB Type B protect from faults due to smooth DC residual currents or currents with low residual ripple which are common in the above applications.

Regular Type A/AC RCCBs are unable to detect these smooth DC residual currents. In addition these smooth DC residual currents make the Type A devices insensitive to AC residual currents and pulsating DC residual currents creating a higher risk for safety in such installations. With the use of Type B RCCBs in such application we can guarantee complete protection to the entire installation. For this reason, they are considered universal current devices as they provide protection against all the possible tripping waveforms listed in the standard EN 62423. Type B RCCBs are suitable for non-linear circuits that are able to generate leakages with high direct current (higher than 6 mA) and/or high frequency components, for example single-phase or poly-phase rectifiers, rectifiers with active correction of the power factor, continuous voltage generator with no separation from AC networks and inverters at variable frequency.

Brochure: 2CSC423015B0201

Protection

DS203NC: RCBO 3P+N in 4 Module

Minimum Space Maximum Protection

DS203NC 3P+N RCBOs in 4 module are designed to suit for applications in switchboards, sub-distribution boards and the switched socket outlets. With its compact size of 4 module it gives maximum protection against over currents and earth fault currents.

Brochure: 2CSC423030B0201



Benefits

- CPI (contact position indicator) for each single pole to exactly know the status of the device contacts
- Differential Trip indicator: helps in troubleshooting in case of earth fault currents

Protection

E 90 class J 30A/60A Fuseholders

The UL range of fuseholders continues to grow!



E 90 J range has been designed to comply with North American market regulations.

The E 90 J fuseholders are the ideal solution for industrial installation, motors and transformers protection, heating systems and control circuits. In accordance with the reference standard UL 4248-8, they come in voltage and current ratings up to 600V and 30/60A. The breaking capacity reaches 200 kA.

They are available in 1P, 2P and 3P versions. The versions with blown fuse indicator light provide a visual signal of the fuse break condition. They can be padlocked open and sealed closed to ensure operator safety during maintenance operations.

Brochure: 2CSC444003B0203



Benefits

- A complete range: more than branch circuit protection for residential. Now also industrial protection
- "Touch safe" technology thanks to the 90° flip hinge with ergonomic knob
- Fast maintenance thanks to the availability of optical blown fuse indicator light in each pole
- During maintenance, small size and lockability makes operation safer and more flexible
- As for the whole E 90 range, when required to be installed in batteries, thermal features enhanced by venting grooves and cooling chambers ensure a minimum level derating and help save space
- All kind of industrial applications covered thanks to the availability in multiple poles version from 1P to 3P

Protection

OVR PV 1500

A unique product on the market

ABB introduces a new rating of 1500VDC in our photovoltaic SPD offering which enables us to provide the most complete offering in the market. In addition to the OVR PV 600 and 1,000 V, this one has been especially designed to meet the trend in development of large scale 1500VDC utility power plants. With this new range of OVR, ABB doesn't want to only follow the photovoltaic trend for high voltages, but also wanted to launch a new benchmark in surge protection devices. On top of that further improvements have been introduced to achieve amazing performances such as a prospective short circuit current up to 10kA, which is unique in the market.

Application note: 1TXH000313L0202



Benefits

- Better return on investment for the end user! The only one that allows the use of PV SPDs in 1500VDC installation, thanks to higher voltage the solar panels can produce more energy even in cloudy conditions
- Cost saving! No need for additional protection as our OVR PV 1500VDC is self-protected up to 10kA! At the same time we ensure a safer installation by reducing the risk of fire in the installation
- Prevent extra cost with a design of the future! When incorporating the OVR PV 1500 in today's design, you already comply with future standards. No need to reshape existing designs.
- Last but not least: Safety without compromise! Our PV range is fitted with a patented thermal disconnection for small DC currents present in PV installation

Smart Home and Intelligent Building Control

ABB i-bus KNX Weather Station and Weather Unit

Detection and processing of weather data



The new KNX Weather Station and Weather Unit, detects and processes weather data. One of the typical applications is the measurement of wind speed and outside brightness values for operation e.g. automatic sun positioning to ensure appropriate shading which is a key measure to improve the energy efficiency of the heating and lighting system in commercial buildings. The Weather Unit can be operated with a specially designed weather sensor, which is especially suitable for small to medium sized buildings mainly in the residential segment. The Weather Station allows the connection of all common weather sensors for e.g. wind speed, wind direction, rain, etc. which is typically required in medium to large commercial buildings. Both devices support the ABB i-bus Tool enabling advanced diagnosis and improved commissioning – for saving time on the construction site.

For more information: www.abb.com/knx



Benefits

- Support of the ABB i-bus Tool for advanced diagnosis and improved commissioning
- Worldwide usage due to wide range input voltage (85 V to 265 V AC, 50/60 Hz)
- Detection of several weather data, e.g., twilight and brightness levels, rain, temperature and wind speed for automating building functions

Smart Home and Intelligent Building Control

ABB i-bus KNX Analogue Input

Processing analogue values

The new Analogue Input can be used at places where physical values should be captured, evaluated and monitored via KNX bus. The Analogue Input comes with a new type of screw terminals enabling quick and clear wiring and at the same time improving the speed of connection of sensors. The application program features a comprehensive range of presets for many typical sensors (e.g. for temperature, brightness, fill levels, etc.) for fulfilling several project requirements. The new Analogue Input supports the ABB i-bus Tool enabling advanced diagnosis and improved commissioning – for saving time on the construction site.

For more information: www.abb.com/knx



Benefits

- Support of the ABB i-bus Tool for advanced diagnosis and improved commissioning
- Power supply for active sensors is integrated – no additional device is required in the distribution board
- Comprehensive range of presets for typical sensors is available for an easy processing of the measured data



SlimLine XR ITS2. Easy setup and reliable remote monitoring.



Easy to set up via the software tool Ekip Connect, reliable remote monitoring via bus communication and network communication via Modbus RTU/RS485. Thanks to integrated motor operation it is possible to set up automatic switch off when a fuse is blown. A complete energy management system to analyze and optimize energy consumption in commercial and industrial buildings, datacenters, hospitals and solar applications. www.abb.com/lowvoltage

Measurement

CMS-600

A unique system for branch monitoring

The CMS-600 system is a multichannel branch monitoring system, which is able to measure both AC and DC currents in true RMS up to 160A. Installation and integration in new and existing remote power panel (RPP) has never been easier. Various mounting possibilities allow to install the sensors in nearly any installation environment. Special attention was paid to the menu navigation in order to create an intuitive system. Complex user training is not necessary, either for commissioning or for day by day operation. The measured data can be remotely queried by a 2-wire RS-485 interface (Modbus RTU).

Catalogue: 2CCC481002C0201



Benefits

- Current measurement on branch level up to 64 sensors
- Wide measurement range up to 160A
- Minimal space required for current sensors
- Various mounting possibilities
- Quick and easy installation & commissioning
- Certified according to UL-61010-1

The CMS-770 System

The CMS-770 System

The Energy Monitor is a three-phase measurement device to measure power and energy in low voltage main- and sub-distribution switchboards in building infrastructures. Additionally, current sensors can be connected to the device for branch measurement in residential and commercial applications. With the inbuilt visualization interface consumption analysis and cost allocation was never been easier. Wherever you are, connect your smartphone or tablet with the energy monitor to check out your current energy consumption.

Catalogue: 2CCC481002C0201



Benefits

- 2 in 1 – Energy measurement for mains and 8 additional branch circuits
- Space saving installation with sensors
- Sensor portfolio with various mounting possibilities
- Visualization via smartphone or tablet app
- Consumption analysis and allocation of energy costs
- Transparency of energy consumption
- Quick and easy installation & commissioning

Measurement

EQ meters A series

For industrial applications

EQ meters A series are developed to fit for industrial applications. Available in both direct connected and transformer connected meters for single and three phase networks. It provides the possibility of using both current and voltage transformers and can be installed in either low voltage or medium voltage applications. The meters have been developed to include features that provide useful information about the energy and power usage.

Main features

- Active, reactive and apparent energy – total and per phase
- Imported, exported and net energy
- Instrumentation such as power, voltage, current, frequency, power factor, phase angles
- Maximum and minimum demand
- Load profiles
- THD and up to 16th harmonics
- I/O ports to be set as pulse outputs, alarm outputs, control outputs or inputs

Brochure: 2CMC481002B0201



Benefits

- Flexible installation – With a wide voltage range from 57.7 – 288 VAC or usage of voltage transformers the A series meter can be installed in every kind of application. Also, with its wide temperature range from -40°C to +70°C there is no need for additional climate control
- User-friendly – With its pixel oriented display and intuitive menu structure it is easy to find, read and set values
- Detailed information on every level about the energy usage to make the right decisions – with individual registers for active, reactive and apparent energy for imported, exported and net both the total and per phase. Using load profiles the energy usage can be logged continuously with a set interval giving detailed information over time. With maximum and minimum demand the meter will register with a time stamp when the highest and the lowest energy usage happened to be used for analyzing the behavior if needed measures for example peak shaving
- Power quality information – with the extensive number of instrument values together with THD and individual harmonics measurements. Using the load profile to log the behavior of the different quantities over time enables an overview of the current and past power status of the system
- Signals in case of a deviation – Using the outputs connected to a PLC, an indication lamp or buzzer together with the inbuilt alarm feature to signal if some quantity is exceeding any pre-set levels.
- Integrate the meters in a system – with the inbuilt serial communication it is possible to integrate the meters in a system for read-out measurement data. It could then be used for monitoring or analyzing purposes

Enclosures

TwinLine

The system of wall-mounting and floor-standing cabinets



The TwinLine system is a fully comprehensive product range, available in both protection classes and three cabinet depths and all with the high IP55 degree of protection. With the TwinLine system, ABB has set another milestone in the field of modern distribution. TwinLine has been tested according to IEC 61436 and DIN EN 61439 -1/-2/-3.

Flyer: 2CPC000170L0201



Benefits

- Innovative flange technology
- Significantly more usable area for cable entry
- All flanges are compatible with all flange openings and knockouts within the entire range of the TwinLine system
- Uniform fastening for all internal configurations
- Perfect internal configuration with CombiLine modules
- Optimal accessibility and ease of installation thanks to 180-degree door opening angle
- All cabinets can easily be combined in series both vertically and horizontally
- Simplified accessories concept for reduced stock levels
- New packaging concept

Enclosures

TwinLine

The new touch guard

The touch guards for our TwinLine system have been reworked and adjusted based on customers' needs. The sequence of assembly is now more flexible, while also engaging the touch guard components that have been simplified. Additionally, the CombiLine touch guard covers can now be assembled in even shorter time than before.

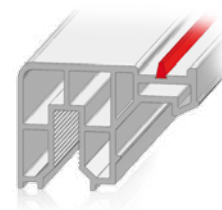
Thanks to four corner pieces, assembling the touch guard is now highly flexible and - depending on the type of application - possible in every sequence. Moreover, new knockouts in the corner pieces allow running of cables using M12 cable screw fittings.

Also, fixing the touch guards has been revised so that a slight push is enough to attach them to the cabinet wall. Last but not least, the stability at the fastening bolts has been improved.

With the new touch guards, assembling CombiLine covers is now much easier and faster than before.

Our stock is now fully equipped, so that the new touch guards will be delivered at once.

Flyer: 2CPC000168C0201



Benefits

- Ease and speed of assembly
- Flexible assembly order
- Knockouts for running cables through corner pieces using cable screw fittings
- Reduced effort to assemble CombiLine touch guard covers

Enclosures

TwinLine

Innovative Packaging Concept



As quality provider of electrical distribution systems, ABB strives for solutions which combine ease of use and protection of the environment. The new innovative packaging concept for the TwinLine cabinet system perfectly meets this objective.

Flyer: 2CPC000115L0201



Benefits

- Practical opening and closing mechanism for fast packing and unpacking
- Direct unpacking of the TwinLine cabinet without additional tools
- Optimum protection during transport and at the construction site
- Repackaging of the cabinet without tools
- Simple transportation by hand truck
- Stable packaging for transportation safety

Enclosures

TwinLine

Transparent doors

With the new transparent doors of the TwinLine series, we introduce another highlight to modern electrical environments. If used with the TwinLine basic cabinets (enclosures without door), the high degree of protection of IP55 is also guaranteed with transparent doors. Thanks to its attractive design, this distribution board combination fits perfectly into every environment. With its door opening angle of 180 degree, the door also excels in terms of accessibility. The door hinges with exterior pivots enable optimum access during operation or for expansion, maintenance and function monitoring.

A visual inspection of the status of individual devices is possible without opening the door. The window allows to conveniently monitor signal lights, for example. A simplified accessories concept guarantees full flexibility with reduced inventory levels.

Flyer: 2CPC000115L0201



Benefits

- Transparent glass for appealing look of the distribution board assembly
- Safety glass offering superb shock and impact protection
- Visual inspection of the device status also with the door closed
- Optimal accessibility and ease of installation thanks to 180 degree door opening angle

Enclosures

CombiLine

The new Touch guard



The highly sophisticated quick mounting system makes the completion of modular cabinets with distribution panels an effortless process. Simple, quick and safe – these are the three attributes of this system that speak for themselves.

CombiLine Modules can be delivered as

- Complete pre-assembled delivery (with or without components)
- Individual parts
- Flatpack

CombiLine modules is a modular distribution panel system up to 850A. Due to the continuous product development process new modules were created to extend the range to suite every application.

Thanks to the uniform screw driving methods using Torx, the distribution panel system CombiLine is now even more convenient to use!

Flyer: 2CPC000115L0201



Benefits

- Extension of existing range, gives you more easy modules
- Modules for Tmax XT 1-4, 3-pole, 4-pole and 4-pole + RC Sel
- Nex Modules for SmissLine TP
- Very high torque transmission
- Excellent lateral support of the insert
- Quick and convenient screwing
- Uniform tool set for the complete distribution system



System pro *E* power. Simplicity is Power.
Your new key resource.



System pro *E* power. The new main distribution switchboard created by ABB to help you work better. System pro *E* power is simple, fast and flexible. Whether it's a standard, or an advanced version up to 6300A, System pro *E* power is incredibly sturdy and extremely quick to assemble. This switchboard houses all ABB devices to perfection and can be fully accessorized.

System pro *E* power, your enterprise has a new key resource.

www.abb.com/lowvoltage

Power and productivity
for a better world™



SNK pluggable terminal blocks

Increase your productivity, optimize your wiring and secure your installation

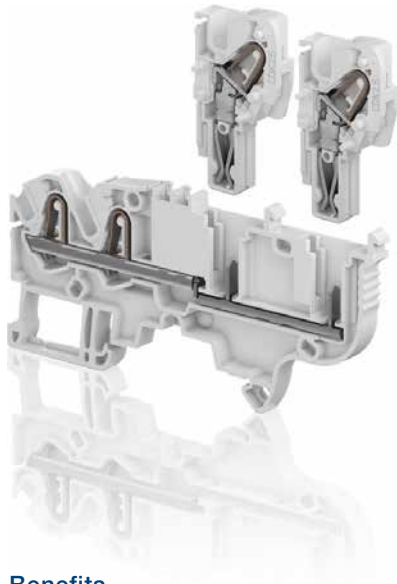


ABB pluggable terminal blocks combines the benefits of SNK smart connections such as PI-Spring and Screw Clamp technologies with the flexibility and performances of the pluggable connection. They have successfully passed the most severe vibration and shock tests required by the railways and marine sectors.

Instead of wiring one terminal at a time, cables can be easily combined into assembled wiring harnesses equipped with plugs. Thus all the manufacturing, testing and commissioning operations are optimized, save costs and reduce labor time by to 90%. The sub-assemblies of the industrial equipment can also be easily disconnected for transportation. Finally, the installation on-site is 100% secured thanks to the error-free coding system.

For more information: <http://new.abb.com/low-voltage/products/connection-devices/SNKseries/pluggable-terminal-blocks>



Benefits

- Reliable in harsh conditions for railways or marine applications
- Cost effective solutions: only two plugs variants required to compose subsets of plugs without tooling. Gain up to 90% of labor time
- Safety and protection against connection errors with coding pegs and accidental tearing with locking devices

Electronic Products

CP-C.1 – Next generation of Power Supplies

Supply to control

Providing a reliable source of power to the application, the highly efficient primary switch mode power supplies CP-C.1 guarantee the continuous operation of all the panel components. With an efficiency of up to 93% the device provide a new level of energy efficiency. Due to its new design the space needed for the power supply is reduced by 66%.

Brochure: 2CDC114092B0201



Benefits

- Space saving due to compact design
- Up to 93% energy efficiency saves costs during operation
- MCB tripping feature that switches off only affected branches in your application – e.g. in case of a short-circuit

Switching

OTDC32U – DC rated UL disconnect switch for photovoltaic applications

The most efficient disconnect switch solution is also available as UL 508I version

We offer a 32 ampere disconnect switch for PV applications tested according to UL 508I. OTDC's compact size and outstanding performance makes it a perfect DC switching solution.

Leaflet: 1SCC301020K0201



Benefits

- High performance and energy efficiency
OTDC has very low power losses and is suitable for applications in high ambient temperatures. The rated currents need no derating even beyond 60°C (140 °F)
- Save installation space, time and cost
OTDC switches offer various DC voltage ratings up to 1000 V DC and a control of up to three circuits within the same footprint area. Three mounting options are available: door, base and DIN rail

Power management

SACE Emax 2. Managing the power

Light up the future with the new SACE Emax 2 for UL 1066



Not just a circuit breaker but a true power manager that controls every electrical system raising the efficiency. SACE Emax 2 for UL 1066 protects the system, manages loads and generators as well as measures and analyses energy quality. It is simply integrated into all projects - from standard systems to the most complex automated networks - all with the simplicity and reliability you would expect.

Brochure: 1SDC200039B0201

+ Benefits

- Exclusive load management to reduce power absorption up to 20% and reduce energy bills
- All plant protections are now integrated to raise reliability and simplify projects
- Up to a 25% cost savings in both footprint and copper

Circuit breaking

SACE Tmax XT UL

New low voltage molded case circuit breakers up to 250A for UL 489 and CSA C22.2 standards

You can find the new SACE Tmax XT in three and four pole, fixed, plug-in and withdrawable versions. They are fitted with the very latest generation thermomagnetic and electronic trip units, with the possibility of interchangeability. The new SACE Tmax XT sets a new technological standard and provides the freedom to build installations with extraordinary performances.

Technical catalogue: 1SDC210059D0201



+ Benefits

- Tmax XT can cover all plant requirements
- Extraordinary performance in minimal footprint – space saving
- Simplicity in installation
- fast installation means cost saving



SACE Emax 2. Managing the power.



Light up the future with the new SACE Emax 2. Not just a circuit-breaker but a true power manager that controls every electrical system raising the efficiency. SACE Emax 2 protects the system manages loads and generators as well as measures and analyses energy quality. It is simply integrated into all projects - from standard systems to the most complex automated networks - all with the simplicity and reliability you would expect. Circuit-breakers switch power. SACE Emax 2 manages it, too! www.abb.com/lowvoltage

Power and productivity
for a better world™



Machine Safety

Orion light guards

A new range of light guards that fits all needs

Orion - the new range of light guards from ABB - offers all the necessary models to fit all needs: finger, hand or body detection, many different heights, detection range up to 50 m, available in basic models or with advanced functions like muting. All are Type 4 light guards compatible with all ABB Jokab Safety control modules.

For more information: <http://new.abb.com/low-voltage/products/safety-products/optical-safety-devices/focus-light-curtain>



Benefits

- Reduced installation time thanks to alignment help, M12 connectors and a large range of accessories
- Cost effective: no need for extra muting modules, local reset without extra control module, integrated muting lamp
- Reduced downtime with easy diagnostic, coding, protective tubes and lens shields
- A complete machine safety solution from only one experienced supplier

Energy measurement and monitoring

SlimLine XR ITS2

The SlimLine XR range is now optimized by offering a complete new generation of the intelligent monitoring unit ITS2



The SlimLine XR fulfils the latest demands in the industry for detailed energy measurement and monitoring. With new developments, it also covers the need for remote monitoring and operation. Installation of the new SlimLine XR is even easier, saving more time than ever before. The increased space in the cable termination area will allow even better access for the cable installation.

Flyer: 9AKK106354A1658



Benefits

- Easy to set-up via the software tool Ekip Connect
- Reliable remote monitoring via bus communication
- Network communication via Modbus RTU/RS485

Softstarter

Increasing uptime of pump systems

ABB launches world's first softstarter with pump cleaning for water and waste water industry

ABB's PSTX softstarters for low voltage motors solves pump clogging and increase application productivity with pump cleaning which enables self-cleaning of waste water pumps. A waste water pump can experience clogging which will reduce flow and efficiency of the whole pump system. With PSTX, the pump can clean itself by using a forward and backward motion pattern that will loosen up clogging. This increases pump availability and secures problem-free water flow.

Brochure: 1SFC132014B0201



Benefits

- Pump cleaning that will help avoid pump jamming from happening and with trouble-free operation at full speed also pipe clogging is avoided
- PSTX solves pump clogging
- Increase uptime of any pump system in water and waste water
- Increase motor reliability

In the news

In this section you will find plenty of brochures, catalogues, apps and videos ready to be consulted. Download it from <http://www.abb.com/abblibrary/DownloadCenter/>

Machine Safety

New safety products animation

[How to create safe working places](#)



Intelligent Building Control

ABB i-bus® KNX for hotels

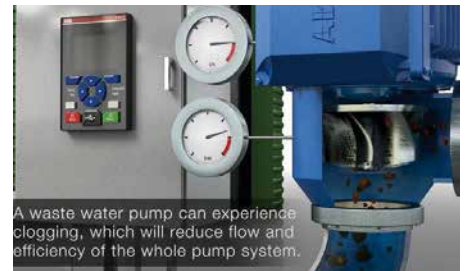
[Energy efficient building automation](#)



Motor starting solution

Softstarters

[World's first softstarter with pump cleaning for waste water industry.](#)



Selecting the right safety components and solutions in order to construct a safety installation that meets the requirements of the valid standards and directives can be a difficult task for machine builders. ABB can help you keeping up to date with the latest regulations and suggesting cost effective solutions meeting the right safety requirements. Watch the video to discover more about it!

Video: <http://goo.gl/SWIWUp>



Hotels like Neu Heidelberg in Germany want to offer their guests the highest level of comfort. The intelligent building control with ABB i-bus® KNX offers an ideal solution for hotels to control lights, blinds and heating in each room. These systems are also easy to use and ensure energy efficient operation.

Case note: 9AKK106354A0445

Video: <http://goo.gl/3b8WrQ>



ABB has launched a new range of softstarters – a solution for reducing starting current and protecting pumps from clogging and overheating. With PSTX, ABB is introducing functionalities that were previously only available in variable speed drives. The PSTX is the world's first softstarter with an integrated pump self-cleaning feature that significantly increases lifetime and reliability of the equipment and system. Watch the video to discover more about it!

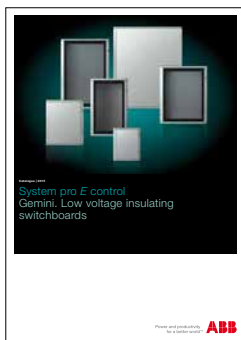
Video: 1SFC132029E0201



System pro E control

GEMINI

The new catalogue of the high performing insulating switchboard



The new catalog, completely revised, offers in 85 pages the complete overview of the GEMINI range. Learn about its environmentally friendly features such as RoHS compliance, fiberglass free, 100% recyclable. The GEMINI range represent a benchmark on the market with IP66, IK10 of mechanical strength, high resistance to chemicals, operating temperature up to 100°C and many more. Furthermore, with the recent improvements in the production and quality control processes, the GEMINI switchboard has become a perfect product for any kind of applications: from the energy distribution indoor, up to the control automation outdoor and in harsh environments as well as photovoltaic installations where it can fully exploit its potential. In the catalog you can find the ordering codes it can as well as the technical characteristics, reference standards and the overall dimensions.

Catalogue: 1SLC805001D0205



System pro E control

GEMINI

New posters



If you are a wholesaler, distributor or a retailer, in addition to the new catalogue, you will also be able to exploit the new posters with a white or black background, to beautify and complete your showroom, store and point of sale.

Poster: 1SLC805001H0201



Protection

OVR PV 1500

For safe photovoltaic installations



Our range of OVR PV, SPD dedicated to protect photovoltaic application, had already a rating of 600V and 1000V. We are now increasing up to 1500V and this to fulfil the need of big solar farm application that are increasing voltage in order to get a better yield even in cloudy conditions. This Application Note is giving you our solution for the AC side as well as the DC side.

Flyer: 1TXH000313L0202



Protection

DSE201

Compact design with enhanced protection



In only one module width, the RCBOs DSE201 combine protection against earth fault currents and overcurrents. The residual current circuit breakers with overcurrent protection DSE201 combine the protection against earth-fault currents and overcurrents, and a breaking capacity of 6 kA. The DSE201 RCBOs are available in A and AC types, with sensitivity of 30 mA and rated currents from 6 to 32A. Type A allows to detect pulsating DC earth fault components generated by modern electronic appliances, such as data communication equipment. A dedicated brochure is available for the DSE201 ELN RCBOs explaining the features, benefits and the product codes available. You can download a copy thorough the below QR code.

Flyer: 2CSC423013B0201



Control

Cam switches OC from 10 to 25 Amperes

Versatility made simple



Thanks to a new patent-pending contact design and the use of high quality materials, OC Cam switches are suitable for even the most demanding applications. With a versatile selection of handles, mounting options, and accessories, it's easy to create the perfect solution for any application.

Easy configuration

- For custom-made switches, configuration has never been easier: CamWeb2 is a powerful, fast and user friendly configuration tool.

Save installation time, space and costs

- Quick installation and easy installation that can reduce labor time by up to 5 times.

Safety and reliability

- Finger-proof tunnel terminals with IP20 protection as standard and handles with increased protection up to IP67 are available. Watch the video to learn more about it!

Video: <http://goo.gl/OV2mXd>





DSE201. Compact design with enhanced protection.



The 1P+N electronic residual current circuit-breakers with overcurrent protection (RCBOs) DSE201 meets the demand for devices that fully protect modern installations against short-circuit currents, overloads, earth fault currents and indirect contacts, providing additional protection against direct contacts (30 mA versions). Each RCBO is fitted with a functional earth wire to guarantee the highest level of safety, even in case of loss of neutral.

In only one module width, these electronic RCBO offer a technologically advanced and comprehensive range with outstanding features, sizes and tripping characteristics.

For more information: www.abb.com/lowvoltage

Tablet Apps

Data Centers 3D

New configuration engine for Remote Power Panels



Let us take you on a tour of a typical Data Center layout using a new configuration engine, augmented reality and 3D functionality.

You can use a full configurator for remote power panel (RPP) solutions enabling you to make a first draft of the power distribution in minutes just by answering some basic questions about your design. In a few steps you are able to e-mail a schematic and part list to your suppliers and request a quote.

In addition the APP will show what products and systems we can provide to make sure Data Centers are reliable and energy efficient allowing our customers to improve their performance while lowering their environmental impact.

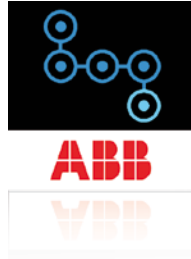


Apple App Store

Smartphone Apps

Low Voltage Wizard

The right choice always in your hand



Low Voltage Wizard is an APP to easily select products for low voltage installations with a few simple steps wherever you are.

Low Voltage Wizard helps you to select ABB codes among the following product ranges:

- S 200 Miniature Circuit Breakers
- OVR Surge Protective Devices
- DS200 Residual Current Circuit Breaker with Over Current Protection RCBOs
- EQ Energy Meters
- E 90 DIN-Rail fuse holders and E 9F cylindrical fuses
- CT current transformers for measuring system
- Power transformers
- OTDC switch disconnectors for photovoltaic application
- EOT enclosed switches

With a few clicks, the Low Voltage Wizard displays the correct product code, lists technical characteristics and documentation links.

Features:

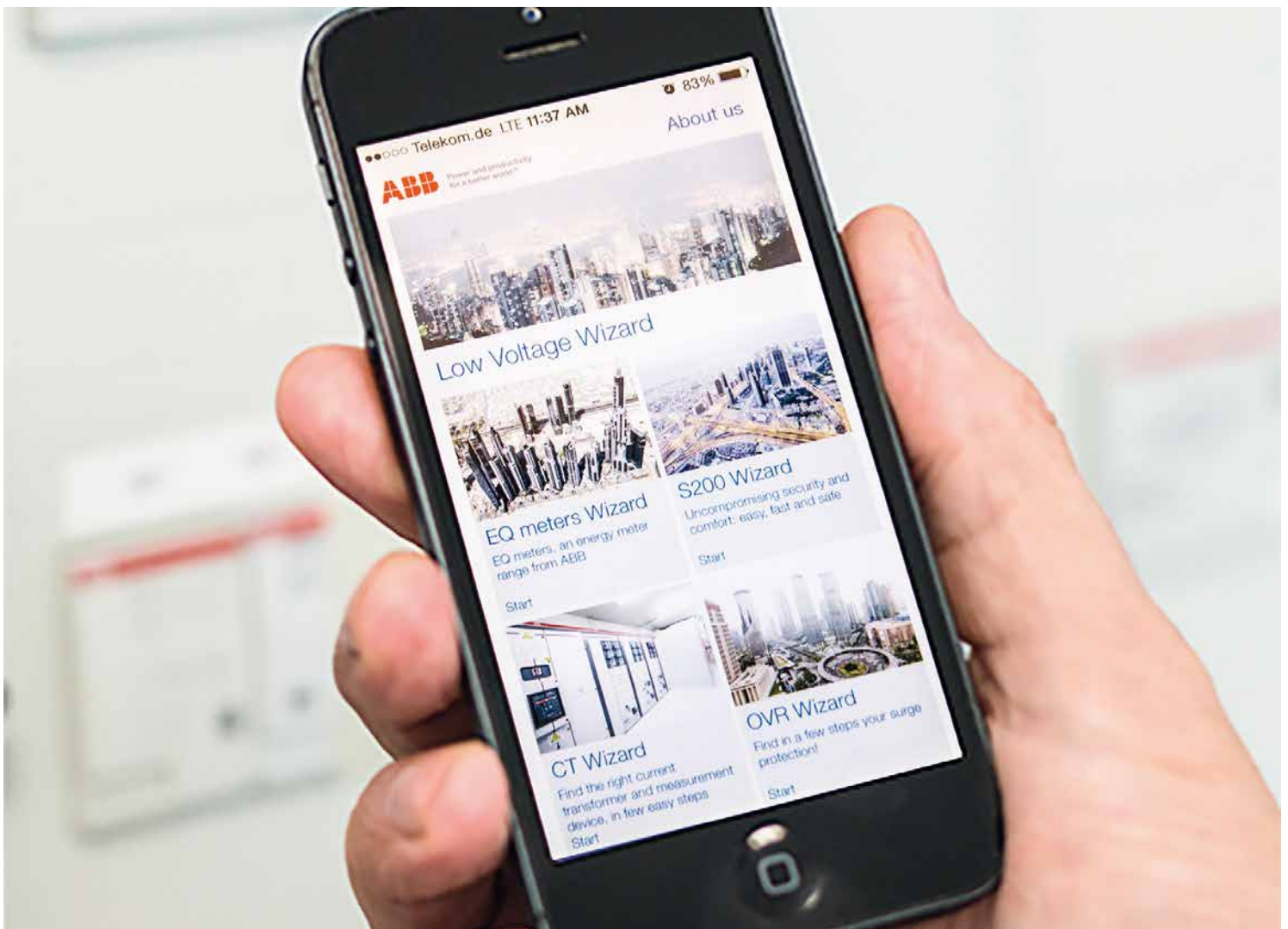
- Step-by-step selection of ABB product code
- Selection starts with installation requirements
- Email export of the results
- Documentation links (web site, technical catalogue, instructions manual and brochures)



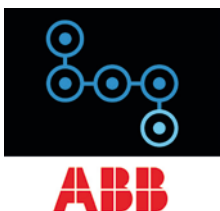
Apple App Store



Google Play



Low Voltage Wizard. The right choice always in your hand.



ABB's Low Voltage Wizard, which allows you to easily find low voltage products for your installation needs. Instead of spending hours searching through catalogs or web sites, use the ABB Wizard anywhere to find the right product at the right time. Navigate quickly to specific product part numbers as well as brochures, catalogs, technical data, etc. Download the app now by clicking on the QR code from iTunes or Google Play store. For more information please visit: www.abb.com/lowvoltage



Power and productivity
for a better world™



Protection

E 90 range of fuse disconnectors for the North American market

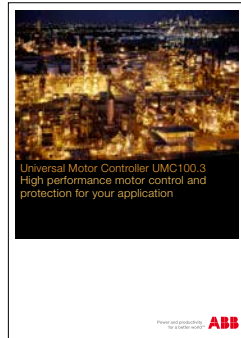
Uncompromising performance



Control & Protection

UMC100.3 - Universal Motor Controller

One device – complete motor control and protection



Find in this brochure the complete Fuseholders' offer for North American market, such as order codes, application examples, technical features and benefits.

Brochure: 2CSC444003B0203



With features like comprehensive diagnostic system, ABB's Motor Controllers provide continuous operation for motor protection and motor controlling applications. Planning and installing is facilitated because all necessary functions are implemented in one device thus improving the installation efficiency. As the product itself is scalable with a large variety of extensions the UMC is ready to be adapted according to your application's necessities immediately and therefore speeding up your business. Find more information about technical features and benefits in the brochure.

Brochure: 2CDC135011B0203





SMISLINE TP. Touch proof system. Power and Safety.



Absolutely safe without protective equipment: SMISLINE TP ensures that load-free devices and components can be snapped on and off under voltage without the need for additional personal protective equipment to guard against electrical hazards. That opens up completely new prospects for you when it comes to installation, operation and flexibility. www.abb.com/lowvoltage

Top 3x3

Top list of products providing as main benefit space saving in both residential, commercial and industrial applications.

Residential and Commercial Building application

SN201

Miniature circuit-breakers
1P+N in one module



The miniature circuit-breakers SN201 protect installations from overload and short circuit, ensuring reliability and safety under all operating conditions. The SN201 series, with its innovative features, is the ideal choice for all the installation configurations required by the residential and commercial market sectors, thanks to its compact design, offering 1 pole plus neutral configuration in only one module. Quick and safe assembly, compatibility with the range and the associated accessories, extremely clear reading of the product codes are just a few of the characteristics that make the SN201 circuit-breakers the ideal solution for an effective, safe and truly integrated technology.

EQ meters

C11

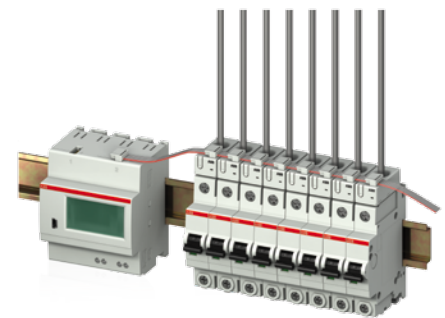
Easy and Compact



EQ meters C11 can serve as the 'building blocks' of a sub-metering system, incorporating functionalities that allows seamless integration in real-time automation and information systems. The C11 meter is an affordable, high-quality, simple-to-install, easy-to-use and truly compact sub-meter for single phase metering. It is mounted on a DIN rail and is suitable for installation in distribution boards and small consumer units, but can also be used in many other applications.

Current Measurement System CMS

Minimal space requirements



Small size, huge performance: Whether AC, DC or mixed current, CMS sensors read all types of current up to 160 A (TRMS). Even upper sidebands in the signal trace are captured. No space wasting: The CMS sensors are among the most compact and high performance sensors on the market. The sensors are installed around the cable, either over or under the MCB, requiring no additional space in the installation. Measured sensor values are transmitted digitally via the CMS-Bus interface to a Control Unit. This reduces the number of cables into the distribution units and maximizes the security of the transmitted measurement values. Disruptions like those for analogue data are finally a thing of the past.

Industrial application

Emax 2

-45 % in space



Saving space in switch boards is becoming increasingly important for our customers. ABB can now offer Emax 2 as a ACB solution that enables space saving. A real life example of this can be seen in I.M.E.S.A. (based in Jesi, near Ancona – Italy) switchboards. ABB provided them with a Emax 1.2, the most compact size of the Emax 2 range of ACBs, it is an innovative product, able to break up to 66 kA @ 440V AC (or 50kA @ 690V AC) and to withstand 50 kA for one second. Thanks to these unique features, I.M.E.S.A. was able to realize a high-efficiency switchboard, with five Emax E1.2 fitted in one column. The E1.2 chosen for this project are equipped with the new Ekip Touch trip units (LSI version). Thanks to its unique features Emax2 was able to save 45 % in space compared to a traditional solution.

S2C-Hxx

Unique bottom-fitting auxiliary contact



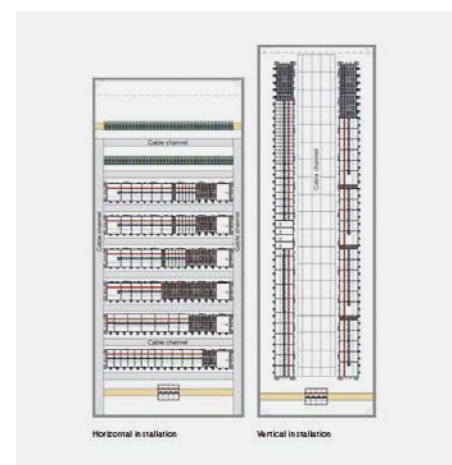
Use ABB's unique bottom-fitting auxiliary contact for S 200 miniature circuit-breakers in new or to upgrade existing installations. No extra space is needed on the DIN-rail as the contact is connected under the miniature circuit-breaker.

SMISSLINE TP

Space saving with vertical installation



Wiring SMISSLINE TP is much easier than with conventional alternatives. The input wiring is already integrated in the pluggable socket system. This reduces the number of cables in the switchgear cabinet, which results in a cleaner and tidier space. If you install the cabinet vertically, you can also dispense with the input terminals at direct outputs. This design needs less space and can be carried out quickly. A vertical SMISSLINE TP cabinet gives you a compact design offering maximum flexibility and time/cost savings in both new and modified installations.



Good morning DIN-Rail

ABB answers many questions posted for our experts through email. Send your technical questions to mail.daybydin@abb.com, the most interesting ones will be published and answered in the next issues of Day by DIN.

Thomas Rodenbusch-Mohr: *Product Marketing Manager - Building Space®*

How can one read the switching current value indicated for device relays or for contactors and what does this value mean?

In the design of systems for buildings, different sets of performance and switching data have established themselves in relation to the various applications, both in the industrial and the residential sectors. These sets of performance data are specified in the national and international standard. The verifications are defined to reproduce typical applications, such as motor loads (industry) or fluorescent lamps (buildings). The standardized use categories set the current values that the relay (or contactor) must switch.

The categories AC1 and AC3 refer to data on the switching capacities that have established themselves in the industrial field.

AC1 – Non-inductive or slightly inductive loads, resistance-type electric ovens (with reference to the activation of ohmic loads). They apply to all alternating current devices with power factor equal to 0.8.

AC3 – Squirrel cage motors: they must have an on-off command during operation (inductive load). The main applications involve, for example, elevators, escalators, conveyor belts, bucket elevators, compressors, pumps, mixers, air conditioners, and so on. The power factor is equal to 0.45.

AC5a – Control of electric discharge lamps.



These switching capacities are defined in the Standard EN 60 947-4-1 (Contactors and Starters - Electromechanical Contactors and Starters). The standard describes the starters and/or contactors that originally were used mainly in industrial applications.

The AX category refers instead to capacitive loads, relating mainly to lighting based on fluorescent lamps.

Switchable capacitive loads (200 μ F, 140 μ F, 70 μ F or 35 μ F) are in fact indicated in reference to fluorescent lamps. This switching capacity refers to the Standard EN 60669 (Switches for household use and similar fixed electrical systems - General requirements), which mainly deals with applications for designing lighting systems.

The specifications for the AC and AX switching capacities are not directly comparable. However, in general the following considerations apply. The lowest switching capacity corresponds to the AC1 specification (particularly for ohmic loads). The following switching capacity is classified as higher:

AX - loads of fluorescent lamps, considering: 70 μ F (6 A), 140 μ F (10 A, 16 A).

The highest switching capacity is represented by:

AC3 - motor loads;

C-load - loads of fluorescent lamps (200 μ F).

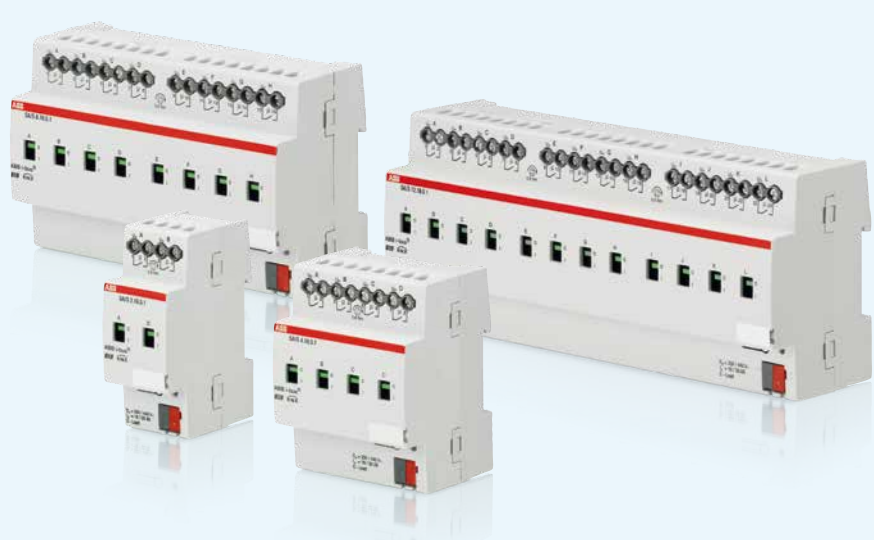
These two specifications are almost equivalent. This means that a device that has passed the AC3 tests according to the Standard EN 60 947, will most likely pass the tests at 200 μ F derived from the Standard EN 60 669.

Summing up, in general:

- users involved primarily in industrial applications tend to refer to the AC3 switching capacity;
- users involved in applications for building automation or lighting systems will refer more frequently to the switching capacity according to AX or C-load (capacitive loads with 200 μ F).



Thomas Rodenbusch-Mohr
Product Marketing Manager
Building Space®



Did you know that?

The ABB i-bus KNX solution for Smart Home and Intelligent Building Control provides a wide range of switching actuators (SA/S), which are fully scalable and flexible not only in terms of number of channels offered (2, 4, 8, 12), but also in relation to the switching capacity according to the Standards EN 60 947 and EN 60 669. There are switching actuators that can handle from 6A to 20A according to AC1, and from 6A to 16A according to AC3. Not to mention the range of "premium" switching actuators that can handle even loads with high inrush current (C-Load), i.e. 20 AX (200 μ F) capacitive loads, according to the Standard EN60 669: these are typically fluorescence lamps. The range of switching actuators able to handle C-Load type loads (SA/S x.16.5.1) is further rounded out by a line of devices with the same features in terms of switching capacities, but with an additional function that detects the current load on each channel using an individual integrated current detection (SA/S x.16.6.1).

ABB Santa Palomba plant. Production efficiency combined with energy savings

An actual example of how to reduce annual electricity consumption and CO₂ emissions, with an immediate return on investment.

Thomas Rodenbusch-Mohr: *Product Marketing Manager - Building Space®*

Today, ABB's plant in Santa Palomba, in the province of Rome, is even more modern and efficient thanks to the recent optimization measures carried out. The decision to promote structural improvement operations and, in particular, to implement a continuous and comprehensive consumption monitoring system at the production site, is both an answer to production efficiency requirements and, at the same time, consistent with our corporate values.

In fact, ABB has been a long-time leading player in the market for technological solutions in the energy and automation fields aimed at improving performance and reducing environmental impact.

The implementation of optimization measures in plants where these solutions

are produced was the logical consequence of our company's commitment in this area. Ultimately, it is no coincidence that significant "energy savings awareness" campaigns were undertaken parallel to the introduction of ABB's most innovative solutions for Building and Automation.

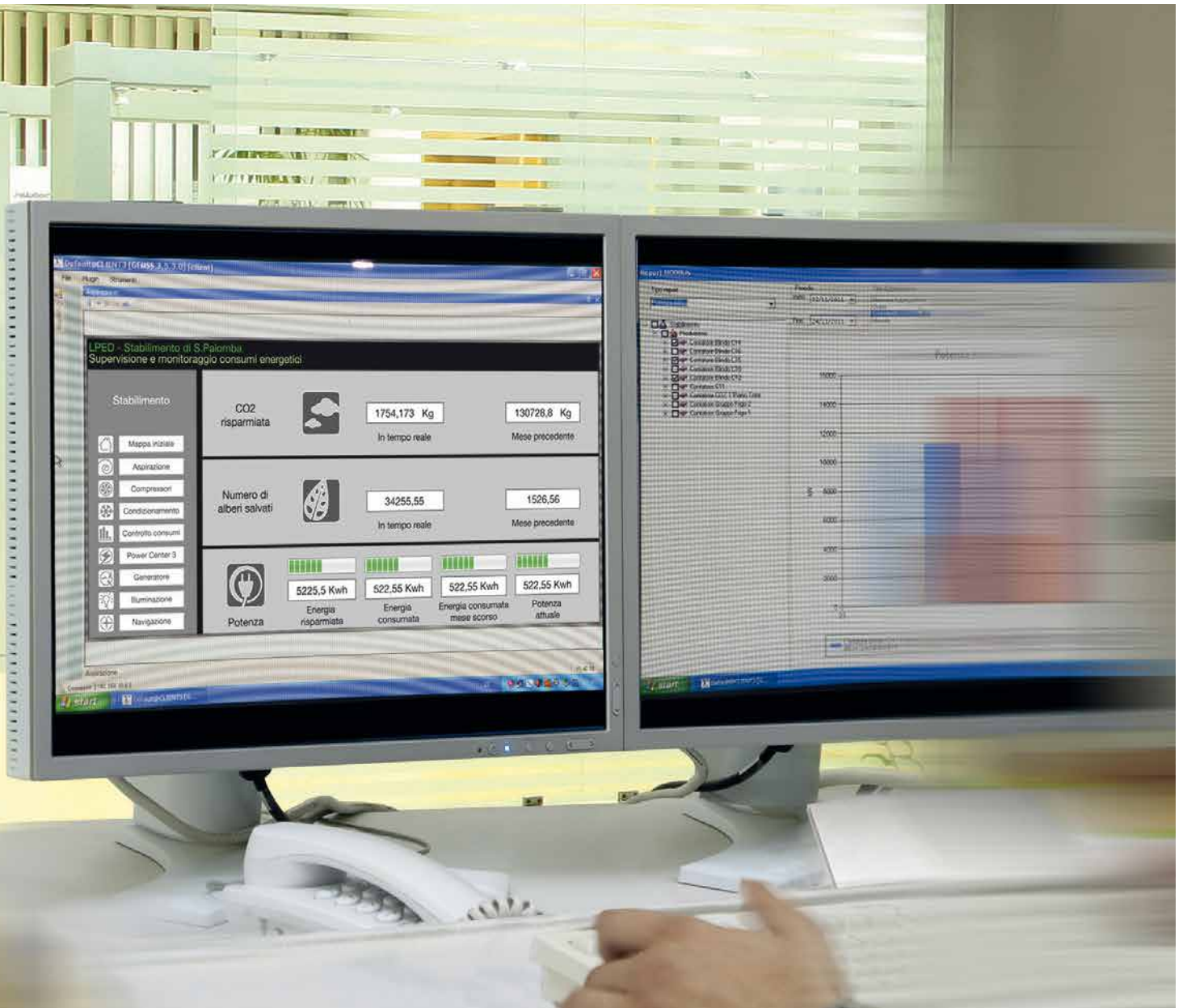
An innovative site since its inception

Since its construction by IBM in the 1980s, the production plant of Santa Palomba featured particularly innovative design criteria. For example, solar concentrators were installed on the roof: bubbles that act as lenses designed to improve the efficiency of interior lighting through the use of natural lighting. Moreover, a special coating to optimize thermal insulation was chosen for the wall covering.



01

01 Production processes are monitored and managed remotely from the control room. The picture shows the screen of the welding fume exhausting fans.



Even the layout of the buildings, with a covered area of 28,000 square meters, follows specific logic criteria of rationality and efficiency. The facility is organized in 60 meter-sided blocks, grouped in building pairs. Each pair is connected to a separate utility building, a technical tower, in which the service technological systems are installed: air conditioning, air treatment, low voltage transformers, fluid circulation and compressed air. The decision to place these systems outside the blocks in a dedicated space responds to the logic of not reducing the space for production activities, thus preventing disturbances and delays to their operation, whether during normal operating times or during management and maintenance cycles.

Starting in 2006, the complex was transformed into a production site of ABB Sace, which already had two other plants - Frosinone and Patrica - in Lazio. Santa Palomba is the ABB Group's global center of excellence for the production of residual-current devices for electrical systems and employs over 350 people.

The Building Automation architecture is based on the KNX bus.

The site's overall supervision is assigned to the GEMSS Control System, which, among other things, oversees the total integration of the two systems: ABB i-bus KNX and SAET for monitoring and control (video surveillance, access control, intrusion detection).

The first is a Building Automation System, manufactured according to the KNX standard, which controls the utility users,

monitoring their consumption and modifying it according to energy efficiency criteria.

The electricity users, about 300 intake points (consumption) located in two areas with 12 production lines, are allocated equally between production machines and auxiliary services (PCs, printers, electric forklift recharger points, exhausters), covering the entire spectrum of business needs.

The second system guarantees efficient intrusion detection, access control and video surveillance services thanks to remote monitoring and control.



02

02 The Santa Palomba plant of the LP Division, with a covered area of 28,000 square meters, is the global center of excellence for the production of residual-current devices for electrical systems.



Thomas Rodenbusch-Mohr
Product Marketing Manager
Building Space®

Three steps towards energy savings

The measures aimed at energy savings were realized in three phases.

Phase 1

In 2008, significant work was carried out on the air conditioning systems. The replacement of a number of cooling groups with more energy-efficient equipment reduced power consumption by about 1,000 MWh/year, a savings of about 15% of the total value.

Phase 2

This phase involved interventions on the functioning of the compressors, the exhausting areas and the climate supply fans; used in most production units, they represent a fundamental portion of the site's energy consumption. The ABB inverters mounted on the two motors of the exhausting systems, which allowed the operating frequency to be reduced, brought about energy savings of 70%.

Phase 3

The measures mentioned above for reducing consumption were recently supplemented by the realization of a complete energy monitoring system, with several measuring points installed in various plant areas. Via the KNX bus, the consumption data (energy and power, in its various forms) is transmitted to the central control system for real-time monitoring, analysis and comparison with historical data.

Consumption monitoring is pervasive

The plant's energy consumption monitoring system was implemented extensively in a number of areas, each of which now features defined energy consumption levels in order to maximize efficiency.

Moreover it is possible to promptly detect unexpected changes in consumption, with the advantage of identifying potential maintenance and/or service operations needed to prevent sudden emergencies and the resulting costly production stoppages.

The implementation of the monitoring system was divided into several steps:

- Installation of meters applied to the following: busways of offices and production lines; Air Treatment Units (ATU) room; air conditioners; compressors and exhausters; outdoor lighting systems.
- Installation of meter interfaces to collect all measured data.
- Creation of a real-time consumption measuring system, aggregated by areas-modules and unit of time.
- Creation of a database with analyses and statistics that allow, among other things, comparison of current and historical consumption.
- Display of the energy savings obtained, expressed in kWh, Euros, CO₂ tons and corresponding equivalent expressed as the number of cars eliminated and/or trees planted.

The most important ABB components used are:

- The DELTAplus DCB13000 energy meter for active and reactive energy components.



03

- The ABB i-bus KNX ZS/S 1.1 Module with infrared interface for collecting and transmitting the data measured by the various meters.
- The ANR96P-230 Network Analyzer for analyzing the quality of the electricity consumed by assessing the nature and extent of phase shifts. This process identifies and locates any abnormalities in the electricity grid and the consumption-related issues.
- The ABB i-bus KNX Energy Actuators SE/S for managing utility user loads, for example to control the on/off function in relation to production schedules.

All solutions adopted are managed and controlled by KNX

The interaction and integration of the various devices and their diverse functions are made possible by the KNX Building Automation System, active throughout the entire plant area, which manages and controls all systems: lighting; monitoring; air conditioning; compressors; exhausters for welding processes; badge access control; intrusion detection.

In this way, all buildings of the production site are integrated into a single system, which improves the staff's personal and working life and has positive impacts on energy consumption.

Depending on the season, the Air Treatment Units (ATU) receive cold water from the air conditioners or hot water from the heating plant to cool or heat the plant's air, mixing it with outside air. This process tests and provides the appropriate tem-

perature and humidity levels for the circuit breaker production. Lastly, the ATUs recover hot air in the winter or cool air in the summer from the air expelled from the plant for air change.

ABB inverters were installed in eight exhausting lines, serving the welding and pad printing areas, to control the speed of motors and the air exhausting flow rate.

The lighting systems, both external and internal, are managed by KNX via twilight switches, occupancy sensors, turn on/off times according to precisely defined scenarios: night, alarm, normal production activity, holiday, vacation.

One of the most significant operations of this new program, with the goal of increasing efficiency by 2.5% yearly, was on the air compressors. The use of the inverter allows to operate at full speed only one of the three compressors, to suitably modulate the operating speed of the second, depending on the required flow rate, while the third remains idle as back-up.

The ability to continuously modulate the second compressor is much more effective, from an energy use point of view, than the previous operating regime, which was characterized by a continuous succession of extremely energy-intensive on/off cycles.

Still thanks to the use of the inverters, the operating frequency of the exhausters was reduced from 50 Hz to 31 Hz, the value which corresponds to the optimal fixed flow rate and ensures the best efficiency for this utility. Moreover, the resulting reduction in power also resulted in significant energy savings.

04

- 03 Panel in the technical tower with meters for measuring the absorption of the cooling units (air conditioners).
- 04 Control panel with multi-meters and energy meters for controlling the compressors.
- 05 One of the most important ABB component in the realization of the plant's consumption monitoring system is the energy meter. Shown is the innovative energy meter EQ meters A series.



05

Acknowledgments

All systems were realized by the Maintenance Team of the ABB SACE Santa Palomba plant, led by **Giorgio Parente**, Plant Manager, and **Lorenzo Capocchetta**, Facility Manager.

This article was made possible thanks to the courtesy and assistance of **Ciro Borriello**, the plant's Head of Prevention and Protection Services and Head of Environmental Management.

Advantages obtained: savings and awareness

All the actions taken resulted in an annual electricity savings of nearly 300,000 kWh, equivalent to about 5% of total electricity consumption. This results in the non-emission of 147,000 kg of CO₂, equivalent to 50 cars off the road or to planting a 50,000 square-meter forest.

The installation of ABB inverters on the motors of the two exhausting groups decreased the power absorption in each of the two groups from 110,000 kWh/year to 31,000 kWh/year.

The introduction of an inverter in the ventilation system of the air-conditioning system helped to reduce annual consumption from 46,000 kWh to 33,000 kWh, a consumption reduction of about 30%.

And a particular aspect not to overlook: the overall return on investment time is very short, approximately a year and a half. Surprising, in particular, is the effectiveness of the inverters in the air exhausting system, which repay their cost in just three months of operation.

To the substantial benefits of an improved plant efficiency, resulting in reduced consumption and environmental impact, must also be added a significant "energy savings awareness" effect.

In the entrance hall, in fact, a large screen on which the significant parameters relating to consumption and, above all, to the savings achieved are clearly shown is placed in a prominent position. One of the screens, for example, simultaneously displays the CO₂ saved, the real-time environmental sustainability indicator and the instantaneous and historical power.

Did you know that?

Discovering MeMo4: data storage for your systems



ABB has expanded its System pro *M* compact® product range, introducing the innovative modular MeMo4 4Gb memory to store, protect and maintain over time all project data relating to the panels/systems and/or electric switchboards in digital format. This DIN rail device has a two-module footprint, one for the memory card and one for the USB version 2.0 connection, with cable sold separately.

MeMo4, based on a high quality memory developed for data storage, facilitates the work of all civil and industrial sector operators, including panel builders, installers, OEMs, maintenance technicians and plant managers. In short, this product is the system's memory, providing immediate availability of all information included in the electrical switchboards/systems: electrical diagrams, floor plans, PLC programs, configuration software of installed devices, operating manuals, assembly instructions, conformity certificates, tests and related results, scheduled maintenance documentation, spare part codes, company promotional documents and photos.

MeMo4 stands out for its ease of use, thanks also to the non loseable protective cap of the connection terminal and to the pad printing of the USB logo which makes it immediately identifiable inside the electrical panel and/or the switchboard.

The device must be connected to the USB port of the PC with a special cable; this operation can also be done prior to installation in the electrical panel. The PC automatically recognizes it as an external memory, making the transfer of the various selected documents easy, fast and reliable (USB 2.0 technology). This means that no additional software is required to view and update any of the stored information. To avoid any manipulation and improper reproduction of the memory's contents, it is possible to install a software to encrypt sensitive data on the MeMo4, thus making it accessible only by using a security password.



EQ meters. Smoother production and increased efficiency.



Improving energy efficiency starts with metering. To identify processes and behaviors that waste energy, use ABB's EQ meters. By using EQ meters you can save energy while getting a complete overview of your electrical system. It tells where power quality needs improvement and helps smoothen production. Install ABB's EQ meters and start improving your bottom line immediately! Read more under Modular DIN Rail Products on www.abb.com/lowvoltage

Power and productivity
for a better world™



Data Center Zürich-West, Lupfig

ABB and Green.ch launch state-of-the-art data center employing HP servers for new levels of efficiency and reliability

Nico Ninov: *Business Developer Critical Power - DIN Rail products*





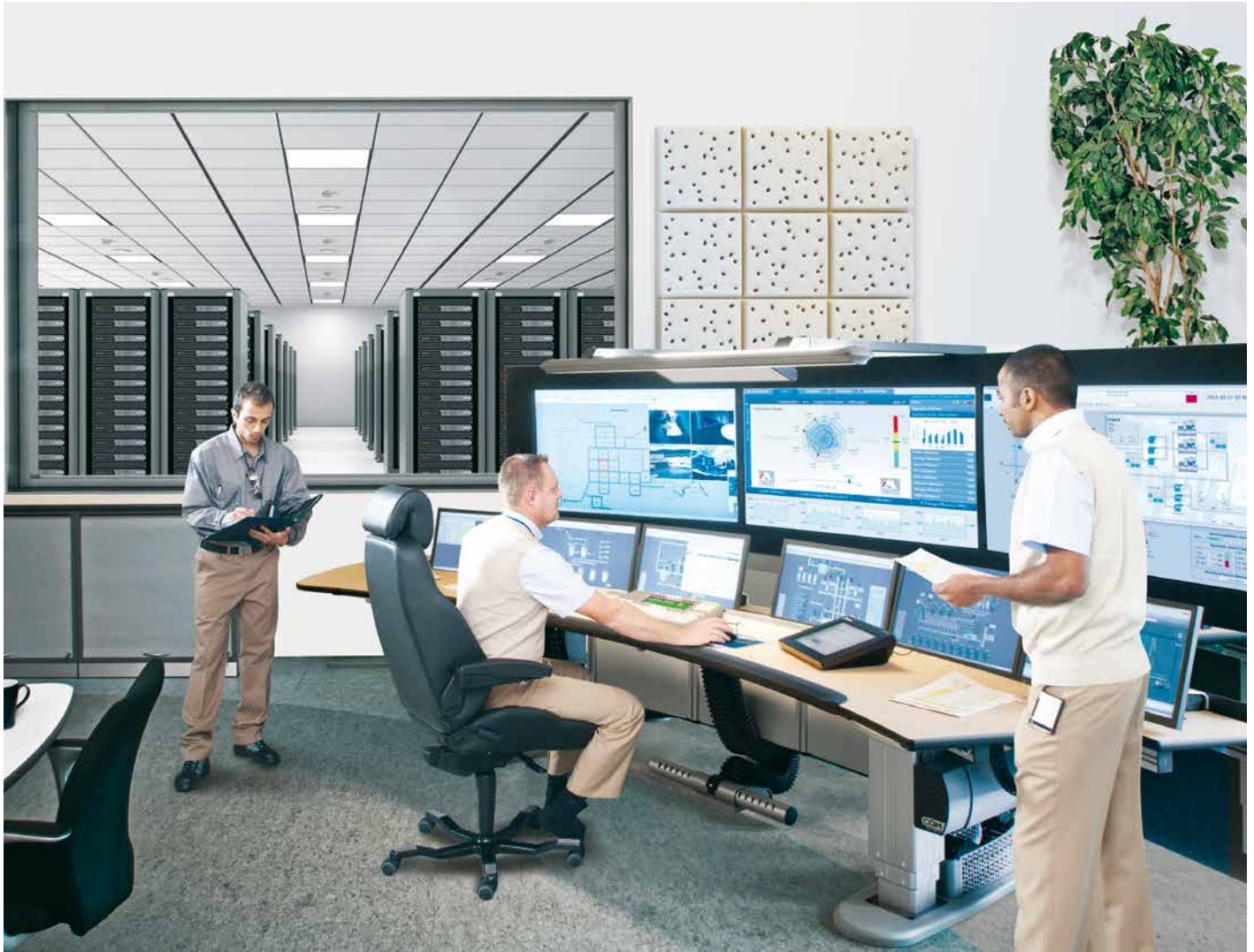


ABB designed and installed an advanced, direct current (DC) power distribution system for Green.ch, one of the top information and communications technology (ITC) service providers in Switzerland.

Located in the municipality of Lupfig, in north-central Switzerland, the Green.ch data center provides customers with secure storage and data management capabilities.

Green's facility, which employs HVDC-capable HP servers, is the most powerful application of DC in a data center to date. Performance tests showed that Green's new power distribution system is 10 percent more efficient than for comparable alternating current (AC) technology. In addition, investment costs for the system were 15 percent lower than for an AC system.

With the addition of almost six million new servers every year, data center energy demand is increasing at a rate of more

than 10 percent annually, requiring more efficient and reliable solutions. DC systems are less complex than AC systems, making fewer power conversions. This requires as much as 25 percent less space, and reduces equipment, installation, and real estate and maintenance costs.

Franz Grüter, the CEO of Green.ch, declared: "Our goal is to employ the most reliable and cost-effective technology while providing global data center services at the highest standards of output, security and environmental stewardship. ABB's experience with DC electrical solutions and skilled technical support means we are very confident of gaining an advantage in this fast-evolving market. Our company name is a statement for ecology. The new DC technology of ABB allows us to fulfill our environmental responsibilities as part of our long-term goals. The implementation of 380 volt DC technology in our data center is part of our long-



term energy optimization strategy, a big step that has set a new standard in the industry. When fully loaded, the system will result in energy savings of up to 20 percent in power consumption from grid to chip and in cooling.” The Data Center meets the maximum security and availability requirements, which are planned, implemented and certified according to the UPTIME TIER III plus security aspect. The first of three stages was completed in 2012. Green.ch can thus offer state-of-the-art server space and comprehensive data center services at an additional facility.

Power is supplied by two separate and geographically opposite substations. Electrical power is distributed to the critical powered units in the Data Center through four 1-MW feeds. Three feeds are laid out with conventional AC technology. ABB supplied for this purpose the low-voltage power supply from the transformers with main distribution units, emergency stand-

ABB Solution for Remote Power Panel for continuous operation of data centers:

Detailed monitoring and maintenance free solutions for redundant power distributions:

- from low voltage income to server
- DC applications increase energy efficiency up to 25 %
- Early warning system by branch and residual current monitoring
- Standard communication concept for easy integration into decentralized DCIM or building management systems
- Type tested Switch and control gear assembly according to IEC 60439-1
- Hot-swappable systems and components for monitoring and remote switching



Nico Ninov
Business Developer Critical Power
DIN Rail products



Find more information
on abb.com website



Apple App Store

by power systems, busbars and energy control system.

The fourth feed is laid out with ABB's innovative and energy-efficient direct current solution. The direct current solution with a 1-MW capacity consists essentially of a 16 kV medium-voltage system, a 380 V rectifier with medium-voltage feed-in and direct current distribution units.

Services provided by ABB:

- Engineering, Project Management
- Interface coordination
- Preparation of construction plans
- Production and supply of the power distribution switchgear (AC & DC)
- Production and supply of the 380 V rectifier
- Supply of emergency power systems and associated auxiliary equipment (cooling, ventilation, fuel supply)
- Supply of the emergency power control and protection systems
- Supply of the busbars
- Installation and commissioning
- Full testing and training
- Customer acceptance, documentation
- Network control system for monitoring the four feeds with load control
- Control connection to process control system

Client Advantages:

- Redundant and independent power supply ensures maximum security and highest availability for the Data Center's IT consumers
- Autonomous operation and monitoring of power supply
- Innovative, energy-efficient, cost and space-saving power supply of the servers through the integrated direct current power supply solution
- A single project manager and contact person for the comprehensive solution supplied by ABB. Customized services such ABB Service Alert via Pager in case of failure.

The Green.ch data center has been selected as ABB's demonstration site for its new DC technology. It is used as a showcase for international data center customers seeking to profit from this groundbreaking technology by reaching new benchmarks in energy efficiency for data center technologies.

Did you know that?



Cabinet with both grid and solarinput

- 1 Change over switch for grid and solar
- 2 Solar pump drive
- 3 PV series MCB
- 4 IP54 air filter
- 5 AC MPCB for AC side
- 6 Terminal blocks for supply termination and pump connection

Solar Pump Drive Cabinets

Applications based on solar power is increasing every day and one of the latest and interesting application is the Solar Pump Drive Cabinets. ABB DM Division India has developed the concept and the solution with their variable frequency drive for a pump application powered by Solar photovoltaic.

This requirement basically generated from the situation prevailing from the agricultural fields in India where continuous power supply is a very big challenge. The farmers need the electrical supply to pump the water to be used for cultivation. Most of the cases due to the scarcity and unavailability of power they have to depend on diesel generators for this applications, which are increasingly expensive and also polluting the environment. Citing this opportunity ABB DM came out with a solution which will help them use their pumps without depending on the utility supply or the diesel generators but by using solar power. These Solar Pump Drive Cabinet basically generates power by the use of Solar PV cells which are fed to the drive panel and converted

directly into AC power supply for the water pumps. The drive has an option to run with both solar PV cell and grid connected supply.

This solution has also paved way for the use of low voltage products like PV MCB, manual motor starter and changeover inside the solar pump drive to complete the solution. The PV MCBs are used for protection against Overload and short-circuit of the strings, the manual motor starter or the motor protection circuit breaker for the AC side and the Changeover for selecting between the grid and the solar. MNRE – Ministry of new and renewable energy in India have allocated a dedicated fund to promote this concept in the agricultural sector. There are several tenders being floated for this solution in India. This concept is expected to spread to other parts of the world and ABB is already getting queries from the neighboring countries in the sub-continent.



Generating energy safely and efficiently?

Absolutely.

Photovoltaic power systems enable homeowners and businesses to cut their energy bills by generating their own electricity with rooftop photovoltaic modules.

The efficiency and quality of each system depends on each individual component. ABB has a comprehensive portfolio of high-performance products and systems for commercial, residential and industrial solar applications.

They meet all installation requirements, cover the entire process on both the direct and alternating current sides, and make solar power generation safe, efficient and cost effective. Everyday the world demands more renewable energy - ABB makes it possible. www.abb.com/solar

GFDI - Ground Fault Detection Interruption

The ground-fault protection is a blind spot and is a major safety concern in many photo-voltaic plants. This can lead to undetected faults in grounded PV array conductors causing major fire accidents.

Aravind Ramachandran: Solar Segment Manager - Enclosures and DIN-Rail products

PV systems may be wired in several different configurations with respect to system grounding. The direct current (DC) side of the system may be directly grounded (e.g., one pole connected to earth) or ungrounded, or the array may be grounded through a connection to the AC side ground.

Systems also may or may not have galvanic isolation between the DC and AC sides. These design factors influence a system's fault tolerance and response to ground faults, and add complexity to properly implementing ground fault protection.

In PV plants, as well as in residential and commercial PV systems, mainly in the USA, the manufacturers of the PV modules recommend or require positive or negative

grounding of the PV generator when using thin-film and back-contact PV module; the positive or negative pole of the generator output is grounded, regardless of the grounding of the module frame.

This configuration is determined by the inverter, which in most cases grounds the DC side by connecting one pole of the array to ground through a fuse or other overcurrent protection (MCB) device: this fuse or MCB is called a Ground Fault Detection Interruption (GFDI).

In these cases we speak about "GFDI negative ground" or "GFDI positive ground" insulation monitoring option.



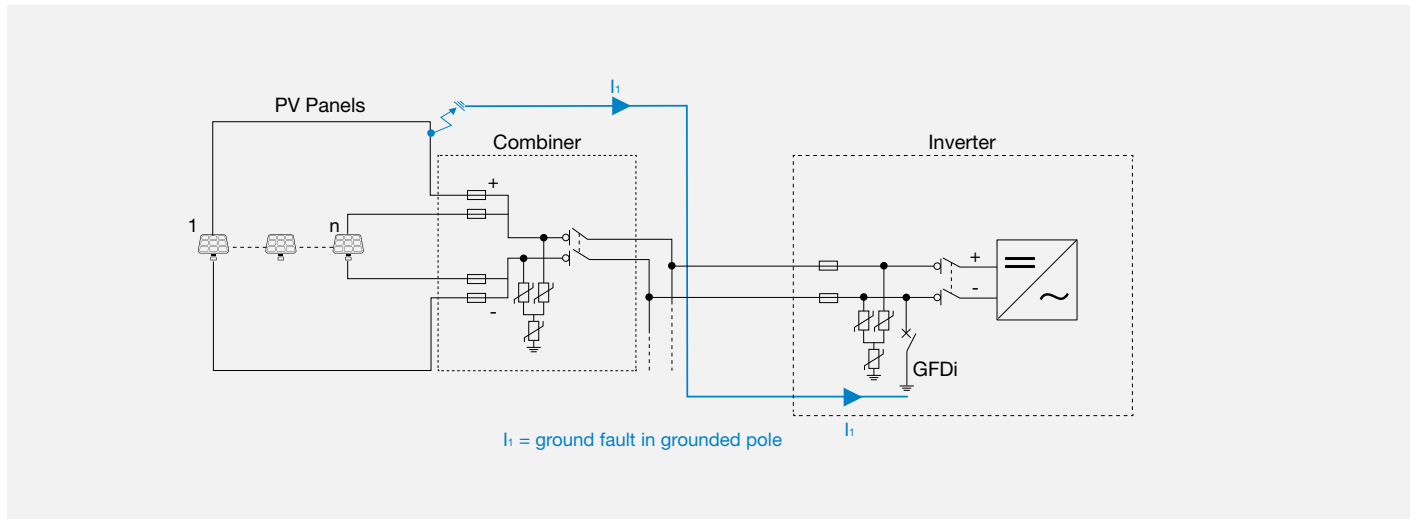


Figure 1

If a fault arises causing a ground fault to occur at the PV generator pole that is not grounded, the leakage current flows through the GFDI and back to the grounded pole, thus triggering the GFDI. The triggering of the GFDI interrupts the leakage current and the PV generator is not grounded by the ground fault (see figure 1, system example with a negative grounded pole). This interruption of the leakage current prevents damage to the system.

During operation, a ground fault in the PV generator's grounded pole causes some of the generator current to flow back to the solar generator via the GFDI (see figure 2). This can also trigger the GFDI.

The triggering of the GFDI is usually coupled with a relay output which will stop the inverter as system should not run without proper grounding.

From a standard view point only the UL 1741 standard specifies the maximum over current protection requirements for ground fault detection and interruption in PV inverters. As shown in the table below, these specifications are dependent on the size of the inverter.

Inverter DC Rating (kW)	Maxium Ground Fault Current (Amps)
0-25	1
25-50	2
50-100	3
100-250	4
>250	5

Table 1: UL 1741 Ground Fault Detection Specifications vs. Inverter DC Rating

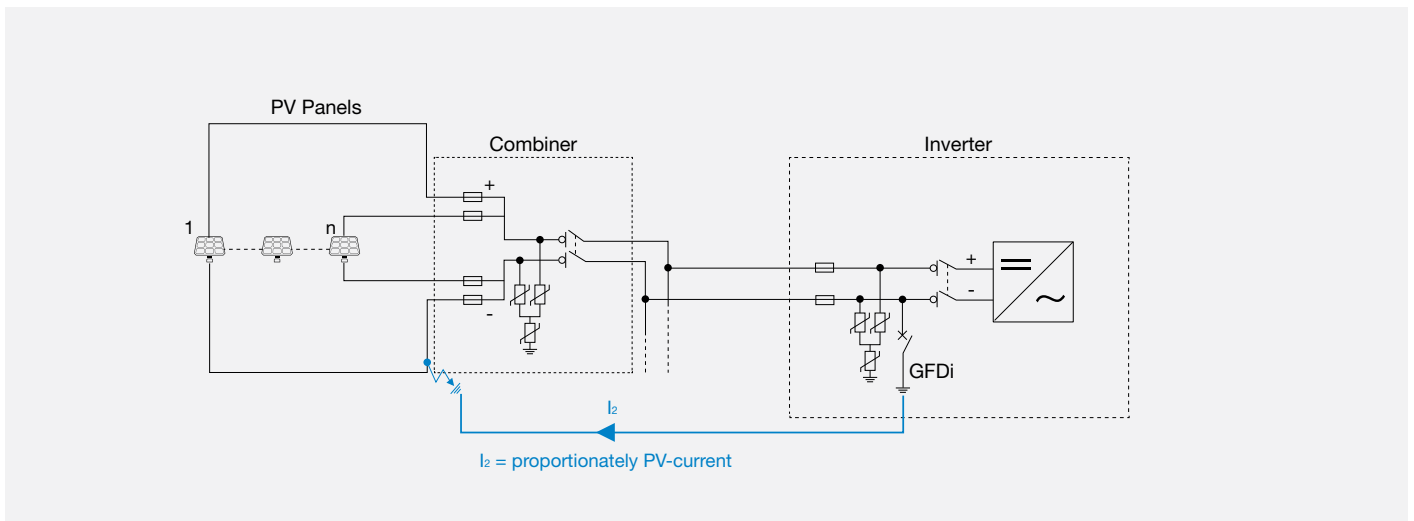


Figure 2

Frequently Asked Questions:

1. What does GFDI stand for?

GFDI stands for Ground Fault detection interrupter, which is a protection most commonly used in PV Plants.

2. What is the basic function?

If a fault arises causing a ground fault to occur at the PV generator the triggering of the GFDI interrupts the leakage current. This interruption of the leakage current prevents damage to the system. Hence the GFDI basically protects the PV system against Ground faults.

3. When do we have to use GFDI?

In case of “grounded PV systems”, meaning when the manufacturers of the PV modules recommend or require positive or negative grounding of the PV generator when using thin-film and back-contact PV modules.

4. Which country is it commonly used?

This is commonly used in USA, however such requirements can basically come from any countries in the world where using thin-film PV modules.

5. Which standard do we have to refer to for GFDI?

UL1741 is the standard referred to GFDI. The products are, however, tested as per UL489-B for 1000V DC.

6. Which application is it used for?

In Utility Scale projects, the GFDI device is normally installed in the central inverter between the negative and the grounding. GFDIs are also used close to the inverter in residential and commercial PV systems mainly in USA.

7. What are ABB solutions for GFDI?

- S804U-PVS5 High performance MCB @ 1000V DC PV are tested according to UL 489B for GFDI Applications


- S500UC-K High Performance MCBs are tested and used by various inverter manufacturers for GFDI applications. These MCBs can be used up to 750V DC in 3 pole and 4 pole versions. They are tested as per IEC/EN 60947-2 and UL1077.

8. Is GFDI requested and used only for PV application?

No, the GFDI is also used in AC systems mainly in the United States of America. In this case they are also referred to as GFCI- Ground Fault Current Interrupter.

9. Is GFDI a kind of RCD but for DC application?


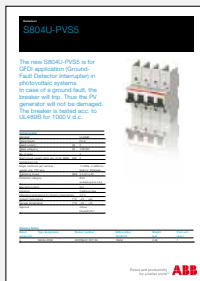
No, the GFDI does not ensure personal protection but only system protection.



The miniature circuit breaker S804U-PVS5 is specifically designed and tested for GFDI application (Ground-Fault Detector Interrupter) in photovoltaic systems. In case of a ground fault, the breaker will trip. Thus the PV generator will not be damaged. The breaker is tested according to UL489B for 1000 V d.c.

S804U-PVS5

Datasheet:
2CCC413010B0201


Aravind Ramachandran
Solar Segment Manager
Enclosures and DIN-Rail products



01

What are some of the dirtiest places to work at? Demolition areas, mines, or excavation sites? These types of construction sites all stir up big clouds of dust that no one wants or should have to breathe in. With a dust suppression machine, however, workers can escape the hazardous air particles. It's companies like the Swedish Duztech AB that specialize in dust suppression equipment and with the help of ABB's low voltage components, they can offer customers reliable operation in extreme environments.

Anne Heeke: Marketing Communication Manager - Enclosures and DIN-Rail products

No job too dirty for ABB products

Duztech's machines look like a snow gun – as some can make snow – but for construction sites, they spray mist. The water mist binds the harmful dust, so that those working on the site don't have to inhale it. Construction dust can cause serious illnesses, such as the incurable disease silicosis (silicosis) that coal miners are known to suffer from. "The cannon's engine is a fairly simple design that clears 80 percent of the dust, which is very good for people and machines around it," says Magnus Engström, co-owner of Duztech.

The company is based in Östersund, Sweden, where it maintains its offices for development and production. All low voltage products in Duztech's machines are made by ABB, which helps sell quality and reliability. And so far, Duztech has been selling its dust suppression machine through distribution channels in some 25 countries including Russia, India and Brazil – all markets with huge potential.

Guarantee quality with ABB products

"Because we sell our machines all over the world, it is valuable to offer a quality guarantee that we use ABB low voltage products. Most customers are familiar with ABB, and we do not need to explain the quality to our customers," says Magnus Engström.

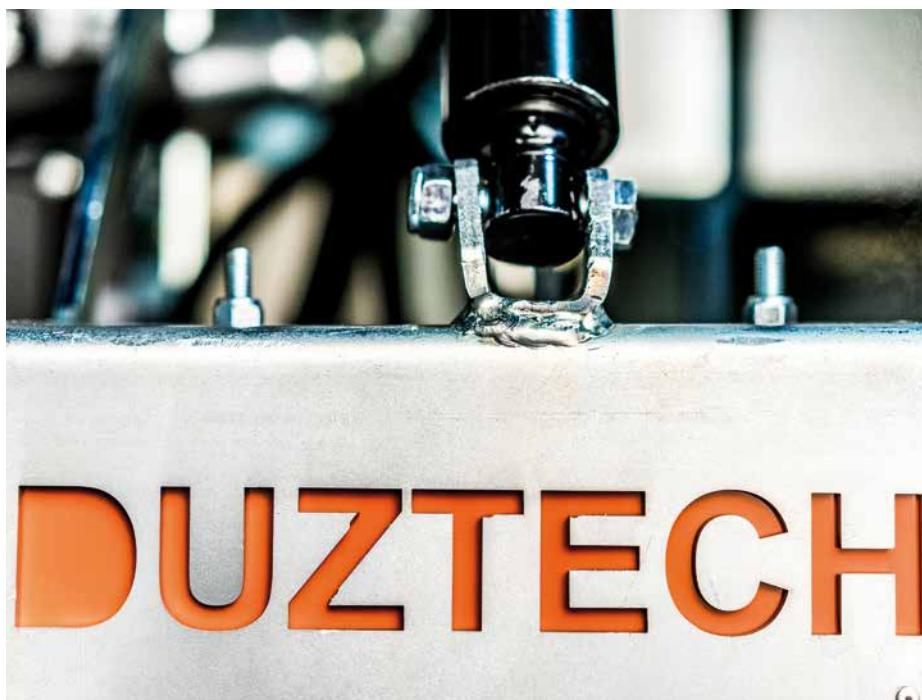
Johan Andersson, ABB's account manager for Duztech, says, "ABB is traditionally seen as a supplier for large, billion dollar projects around the Hydroelectric dams in China. Many are not aware that we also serve smaller companies, and Duztech is a good example of how we help smaller businesses and we are happy to do so!" Duztech also buys from ABB's online ordering system, Business Online; a convenient tool for small businesses that do not have their own IT systems. Duztech is successful in Scandinavia and the next step is to get the spin on global sales. The potential is huge. "Today, there are still workers at construction sites who

squirt water with water hoses to remove the construction dust, but that's time consuming and what does an hour cost? A Duztech machine is so much more efficient and we just need to get more people to realize it," said Magnus Engström.

For more information download the case note:



Case note:
9AKK106354A0700



- 01 All low voltage products in Duztech's machines are made by ABB, which helps sell quality and reliability.



Anne Heeke
Marketing Communication Manager
Enclosures and DIN-Rail products

New container SACE Emax 2

The choice of Sace Emax 2 made it possible to have a container transportable on a normal trailer truck, thus reducing transport and installation time.

Giuseppe Scali: Global Product Manager - Air Circuit Breakers

The customer

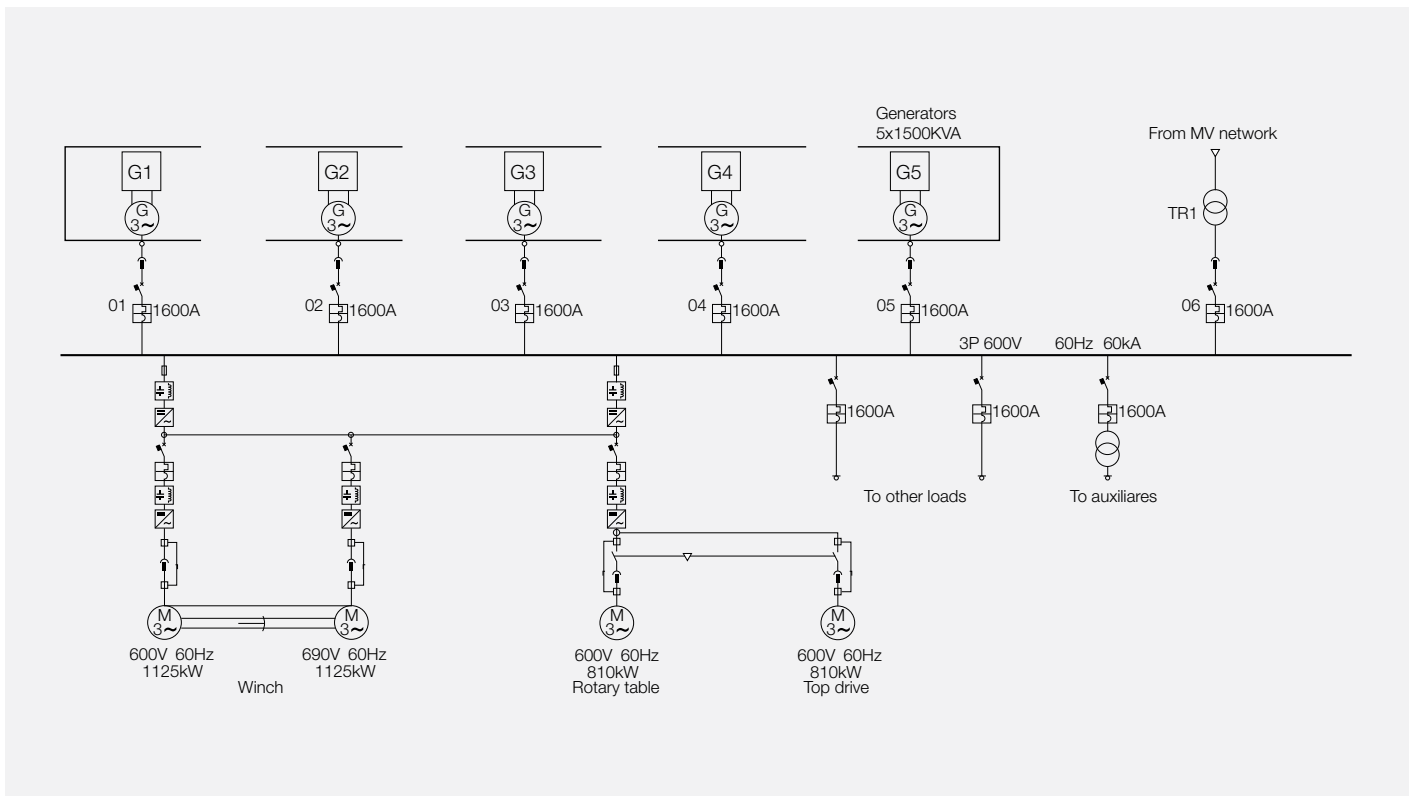
Drillmec is an international leader in design, manufacturing, commissioning and maintenance of oil drilling and workover rigs, both traditional as well as hydraulic ones, for mobile and offshore applications, up to 3,000 hp and depth of 10,000 m.

The challenge

To realize a drilling plant to be located in Southern Italy, in a very short lapse of time: six months only, from design and engineering to putting into service, guaranteeing the highest quality, both in terms of system reliability and operation costs.

The hydrocarbon extraction plant has the maximum depth of 8,000 meters, and is supplied, alternatively, by the grid or by five low voltage generators (1500kVA) in parallel. They allow the downtime risk of the plant to be reduced to the minimum, but increase the short circuit level to 80kA at 600V.





The ABB solution

Taking advantage of the know-how and installation expertise of Elettron (a primary panel builder in Northern Italy), components of the highest reliability were used, allowing outstanding flexibility and ease of installation for fitting into the limited space of a container for road transport.

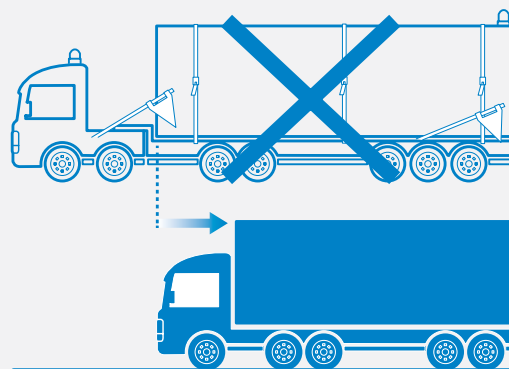
Five circuit breakers E2.2H 1600A, 3-pole, withdrawable version, equipped with Ekip G Hi-Touch to protect the low voltage generators were used for installation in the 400mm columns of System Pro E Power; a choice that guaranteed 1000mm reduction in linear space in comparison with the traditional solutions.

The orientable terminals, which equip SACE Emax 2 by default, enabled the construction of the switchboard from the very preliminary phases (when the busbar system was still to be defined), making it possible to gain significant time for the construction of the container.

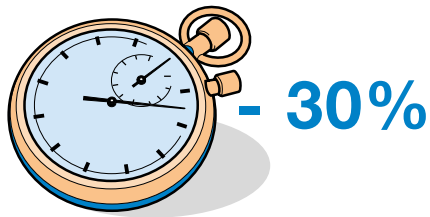
Saving per year

33% space saved

The choice of SACE Emax 2 has made it possible to have a container transportable on normal trailer truck, thus reducing transport and installation times.



Thanks to the use of SACE Emax 2 in the new 400mm columns of System Pro E Power, 1000mm linear space have been saved in comparison with a traditional solution.



The new terminal box allows 30% time saving on auxiliaries and main accessories connection.



01

The use of Ekip G Hi-Touch allowed the time usually necessary to wire and realize the switchboard to be significantly reduced by eliminating external CTs, VTs and protection trip units, concentrating on a single point the access to all measuring, alarm and protection information about the plant, simplifying and speeding up configuration and testing operations.

E2.2H 1600A, 3 poles, moving part with Ekip G Hi-Touch

The circuit-breaker E2.2H offers 85kA breaking capacity at 690V and is equipped with the generator protection trip unit that integrates all the measuring and protection functions necessary for the correct operation of the plant. (Image 01)



02

Furthermore, thanks to Ekip Com Profinet, external concentrators and converters became unnecessary, and the Ethernet network cable was used to reduce the time necessary for wiring and configuring the network of the SCADA supervision system.

E2.2 fixed part

The fixed parts of SACE Emax 2 are always delivered with orientable rear terminals and plug&play terminal box to speed up the construction of the switchboard. (Image 02)



03

All this, together with the cutting-edge quick push-in cabling system, enabled to connect the auxiliary terminals to the SACE Emax 2 terminal box in half the time in comparison with traditional circuit-breakers, and to increase the reliability of the measuring and protection system thanks to the reduced number of components installed.

Ekip Com Profinet

This module enables all SACE Emax 2 circuit breakers to be integrated in the industrial communication network for remote supervision and control of the circuit-breaker. (Image 03)



Can we keep turnarounds brief?

Definitely.



Until the AF range was installed, voltage sags were affecting MacGregor's deck cranes. Conventional contactors welded shut, leading to several stoppages a week. No longer. Known for superior quality and an ability to operate in the most hostile environments, MacGregor deck cranes enjoy a global reputation for reliability. A small but vital component, the AF contactor helps maintain this reputation. To keep things moving, you need Control. Connect to Control. www.abb.com/connecttocontrol

Doktor Wise

The expert answers

Electricity - life can no longer be imagined without. But as helpful electricity is, we need to protect ourselves and our property from failures such as short circuits or overloads. Therefore Miniature Circuit Breakers (MCBs) are used every day. As there are a lot of different applications and various MCBs available, it is important to choose the right device. This article will give some useful hints about the tripping curve of ABB's MCBs.

Stefan Riemensperger: *Product Marketing Manager - DIN-Rail products*

How to read a tripping curve – Part 1

Hugo Stotz invented the MCB more than 90 years ago. Today international standards define the technical details of MCBs. Even if MCB technology seems to be simple at first glance - it isn't!

This article is about the technical background of MCBs and their tripping curves. In the next edition of Day-by-DIN additional influences will be covered.

How an MCB works

An MCB has four major functions:

- Short circuit protection
- Overload protection
- Re-closable, using the toggle in front
- Free tripping mechanism, to prevent from operating error

An MCB can detect two kinds of failures:

Overloads: Too many devices are connected to one cable. To protect the cable from this overload, a bimetal, which heats up and if too much current flows bends and releases the switching mechanism of the MCB.

Short-circuits: Usually caused by defective components - defective devices or damaged cables. The maximum current provided by the power supply can flow through a "shortcut". To protect the cable (and the other devices in the circuit)

an MCB must immediately open the circuit. This is realised by using an electromagnetic tripping device.

The tripping characteristics in numbers

The relevant standards IEC/EN60947 and 60898 define the tripping characteristics. Please see table 1: Let's take as an example the C-characteristic which means thermal tripping between $1.13 \times I_n$ and $1.45 \times I_n$. The magnetic release is 5 to $10 \times I_n$. The table shows us the minimum and maximum values. To see what happens between these values it is necessary to draw a tripping curve.

IEC/EN60898 vs. IEC/EN60947

Both standards define characteristics for MCBs – but it's not the same definition. To avoid offering different MCBs, manufacturers use a "trick": The IEC/EN60898 defines 30°C as a fixed reference temperature. The IEC/EN60947 allows to specify another temperature. This temperature must be printed on the side of the MCB. Setting the reference temperature up to 55°C the curve from the IEC/EN60947 matches the curve from the IEC/EN60898 and we have one device for both standards.

You can find this temperature mark on the side of the MCBs. This does not mean that this MCB is calibrated for use in 55°C .



If the MCB is operated at an ambient temperature of 55°C reduction factors have to be observed (more about in the next edition of Day-by-DIN)!

This is valid for B, C and D-characteristic. K and Z are anyway IEC/EN60947 only and calibrated at 20°C .

Tripping characteristics S 200 / S 200 M / S 200 P / S 200 S / S 200 MUC / SN 201 L / SN 201 / SN 201 M

Acc. to	Tripping characteristic and rated current		Thermal release ²⁾			Electromagnetic release ¹⁾		
			Currents: conventional non-tripping current	conventional tripping current	Tripping time	Currents: hold current surges	trip at least at	Tripping time
IEC/EN 60898-1	B	6 to 63 A	1.13 · I _n		> 1 h	3 · I _n		> 0.1 s
				1.45 · I _n	< 1 h		5 · I _n	< 0.1 s
	C	0.5 to 63 A	1.13 · I _n		> 1 h	5 · I _n	> 0.1 s	
IEC/EN 60947-2	K	0.2 to 63 A		1.45 · I _n	< 1 h		10 · I _n	< 0.1 s
			1.05 · I _n		> 1 h	10 · I _n		> 0.2 s
				1.2 · I _n	< 1 h ³⁾		14 · I _n	< 0.2 s
	Z	0.5 to 63 A		1.5 · I _n	> 2 min. ³⁾			
			1.05 · I _n		> 1 h	2 · I _n		> 0.2 s
				1.2 · I _n	< 1 h ³⁾		3 · I _n	< 0.2 s

¹⁾ The indicated electromagnetic tripping values apply to a frequency range of 16 2/3...60 Hz.
²⁾ The thermal releases are calibrated to a nominal reference ambient temperature; for Z and K the value is 20 °C, for B and C = 30 °C. In the case of higher ambient temperatures, the current values fall by ca. 6 % for each 10 K temperature rise.
³⁾ As from operating temperature (after I₁ > 1 h or, as applicable, 2 h).

Characteristic C IEC/EN60898

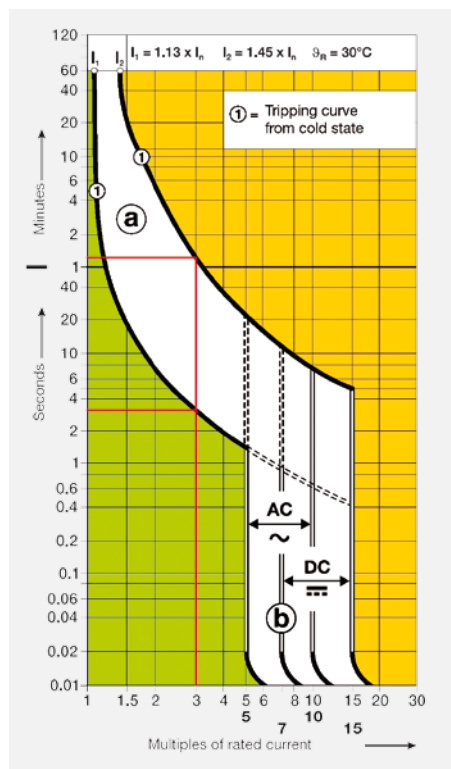


Figure 1

The tripping curve

Figure 1 shows a C-Characteristic tripping-curve.

The tripping depends on the time and the intensity of the current flowing in the circuit. So the graph is set up with “time” on the x-axis and “multiples of the rated current” on the Y-axis.

(a) Indicates the thermal tripping zone. As the bimetal is temperature dependent, a comment reminds that this graph shows the curve from cold state.

(b) Represents the magnetic tripping. This is temperature independent and is different for AC and DC currents!

Why two lines? It's the tolerance. The components used, like the bimetal or the short-circuit-coil are electromechanical parts and underlay a certain abbreviation. This means we have a non-tripping zone – the area under the graph (green). On the other side of the graph, we have the safe-tripping zone (yellow). Between the condition is not defined – it can trip earlier or later.

In the top section the two values from table 1 are mentioned: 1.13 to 1.45xI_n. The reference temperature is 30°C.

Up to 5x I_n only the thermal release will trip. Between 5 and 10x I_n both releases can trip (AC-currents). With more than 10x the nominal current, the magnetic coil will trip for sure.

An example: See the red lines in figure 1

Let's consider an overload of 3x I_n (red line). This means up to 3.2 sec. the MCB must not trip. Between 3.2 sec. and 1.5 min. the MCB can trip. Above 1.5 min. the MCB has to trip for sure.

A short circuit with more than 10x I_n would trip the MCB immediately.

For more technical details please refer to our documentation available online or in printed format.
["How to read a tripping curve - Part 2"](#) will show more details about the topic and will be released with the next edition of Day-by-DIN!



Stefan Riemensperger
 Product Marketing Manager
 DIN-Rail products

How does one choose a surge protective device?

Bertrand Berges: *Product Marketing Manager - DIN-Rail products*

Lightning is a natural phenomenon of great magnitude. Lightning releases a power that can reach several hundred gigawatts and destroy or disrupt electrical systems located several kilometers away from the point at which it strikes.

Lightning can cause various phenomena in an electrical system as a result of both direct and indirect lightning strikes.

Direct lightning strikes on external protection systems (LPS, Lightning Protection System) or external conductive parts connected to earth (antennas, metal pipelines, etc.).

Galvanic coupling

When lightning directly strikes a lightning rod or the roof of a building with earthing equipment, the current disperses through the earth and through the power supply lines. The resistance of the earthing system, as it disperses the lightning current, causes a voltage surge in the protective earth (PE) conductor of up to several thousand volts (ohmic effect). However, the potential of the active conductors is still 230 V for the phases and zero for the neutral (remote potential of the transformer). Electrical

equipment connected between the mains supply and the earth can lose insulation and allow part of the lightning current to flow, damaging such equipment.

Direct lightning strikes on overhead lines Conductive coupling

When lightning strikes a low-voltage overhead line, the line is affected by high-intensity currents that penetrate into buildings, generating high surges. The great amount of energy that enters directly in the systems damages electrical or electronic equipment connected to the mains supply.

Damage caused by direct lightning strikes is generally extensive, with significant economic losses. For example, electrical panels can ignite and cause the destruction of industrial equipment, or indeed of the building that houses it.

Indirect lightning strikes Inductive coupling

The electromagnetic field that is created when lightning strikes near overhead lines or electrical systems generates a surge in each loop of the circuit.

Did you know that?









"In a main distribution board it is always best to use a Type 1 SPD"

It depends! In a very large public building or an industrial unit, the risk analysis pursuant to IEC 62 305-2 will probably provide for the installation of an LPS, acronym for "Lightning Protection System", in other words a lightning rod or Faraday cage.

In this case a Type 1 SPD will be necessary to protect against damage due to lightning striking the building.

If no LPS is provided, however, the installation of a Type 1 SPD in the MDB will cause a notable increase in costs without any benefits - it will simply never have to operate!

Recommendations for the use of surge arresters

Environmental Criteria			
			
Context	The building has a lightning rod	$N_g > 2.5$ and overhead electrical lines	Building located in a mountainous area
ABB installation recommendations	SPD highly recommended	SPD highly recommended	SPD recommended
Surge protection device type	Type 1	Type 1 or Type 2	Type 1 or Type 2 (70 kA)
			
Context	Element higher than 20 m and less than 50 m from the building to be protected	Less than 500 m in direct line between the lightning rod and the main electrical switchboard of the building to be protected	Less than 50 m of land between the lightning rod and the building to be protected
ABB installation recommendations	SPD recommended	SPD recommended	SPD recommended
Surge protection device type	Type 1 or Type 2	Type 1 or Type 2	Type 1 or Type 2 (70 kA)

The electricity lines incorporate loops since the neutral or PE is connected repeatedly to earth (every two or three poles).

Even lightning striking the external protection system (LPS) creates a surge in the loops formed by the electrical system wiring. With a range of hundreds of meters or even kilometers, the electromagnetic field generated in cloud lightning can create sudden voltage increases.

In these cases the damage, less spectacular than in the previous cases, can still have a permanent effect on the most sensitive electronic equipment such as computers, photocopiers and security and communications systems.

The choice of a surge protective device depends on a number of criteria defined during the lightning risk assessment phase, a process that allows the surge protection requirements to be identified.

When it is necessary to provide for a protection device?

First of all it is necessary to take into account the requirements of the standards; additionally, the analysis of these requirements can be integrated with the recommendations based on ABB's industrial experience.

The criteria taken into account derive from the risk assessment of a direct lightning strike on a building or a lightning strike near it. Among the various elements,

it is also necessary to analyze the financial aspect linked to the possible destruction of equipment and the temporary loss of operation. Even in cases where a protection device is not essential, it is appropriate to point out that although it is impossible to achieve a zero risk situation, it is always useful to include a means of protection.

Should lightning protection be recommended, simply select the appropriate device and install it.

The choice of a surge protection device is made based on several elements:

- the type of lightning, direct or indirect;
- the protection level (Up);
- the discharge capacity; Iimp or In (10/350 μs or 8/20 μs pulse wave);
- the earthing system of the mains;
- the operating voltages (Uc and UT);
- the optional features and accessories (end-of-life indicator, removable cartridges, security reserve, remote signaling).

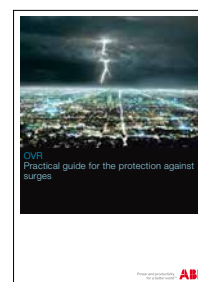
Type 1 surge arresters provide input protection for installations in areas with a high frequency of lightning strikes and are typically used in primary distribution switchboards to protect against direct lightning strikes.

Type 2 surge arresters are suitable for installation at the origin of the system, in intermediate switchboard and close to terminal equipment, and for protecting against indirect lightning strikes.



Bertrand Berges
Product Marketing Manager
DIN-Rail products

For more information, please refer to the "Practical Guide for Surge Protection"



Technical Guide:
1TXH000309C0201



New ABB SACE building Load Management with Ekip Power Controller for SACE Emax 2

Thanks to Ekip Power Controller up to 400 kW of HVAC loads can be controlled with about 11,000 € saving per year!

Giuseppe Scali: *Global Product Manager - Air Circuit Breakers*



The customer

ABB SACE, leading company in the research and development of LV air and moulded-case circuit-breakers, is now fitting out its new building in Bergamo (Italy) with advanced automation technology systems.

The challenge

The goal is to reduce the total power absorbed from the Utility by this new building in order to save money and to contribute to a better behavior of the whole electrical system.

The electrical plant consists of 4 MV/LV transformers. For each of them a circuit-breaker SACE Emax 1.2 is installed as a general low voltage circuit-breaker. The purpose is to control the HVAC loads in an easy and automated manner.

The ABB Solution

To meet this goal, ABB offers the Ekip Power Controller solution. It is a software embedded into the electronic trip unit already used for overcurrent protection; hence, neither complex control systems nor dedicated software are necessary.

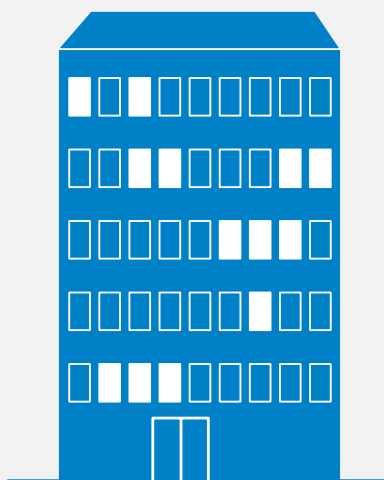
To realize the system, it is enough to have a single circuit breaker provided with this function, installed as main LV circuit-breaker; therefore, in this application only one of the four main Emax 1.2 has to be equipped with Ekip Power Controller.

It is this circuit-breaker to decide, according to the set parameters and to the total energy absorbed by the grid (sum of the energy flowing through the four Emax 1.2), when and which load must be disconnected. A dedicated communication system called Ekip Link performs the remote command sent to the downstream device, and the communication among the four main Emax 1.2 to get the total power absorption.

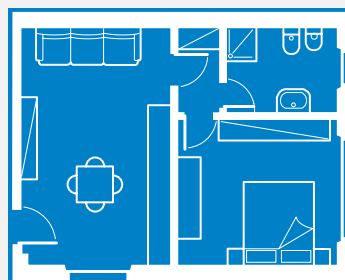
This enables wiring between switchboards to be simplified to the use of only one Ethernet cable.

Saving per year

11,000 €



Thanks to Ekip Power Controller up to 400 kW of HVAC loads can be controlled with about 11,000 € saving per year!



400 kW equivalent to the power absorbed by 133 apartments without changing the grid configuration



01

4 x Emax 1.2 with Ekip Hi-Touch + 1 x Ekip Power Controller function

Ekip Hi-Touch features the measuring and protection module Ekip Measuring Pro and can be fitted with the additional features provided by the internal modules and by the external accessories.

Ekip Power Controller is the new patented function that controls the power absorbed, thereby increasing the efficiency of the system. (Image 01)

4 x Ekip Link module + 1 x Ethernet switch

The Ekip Link module enables SACE Emax 2 to be connected to ABB communication system, for local supervising of switchgear by means of the Ekip Control Panel, and to act as Power Controller. It is suitable for all Ekip trip units and can be fitted at any time to the circuitbreaker terminal box, even when Ekip Com communication modules are present. (Image 03)



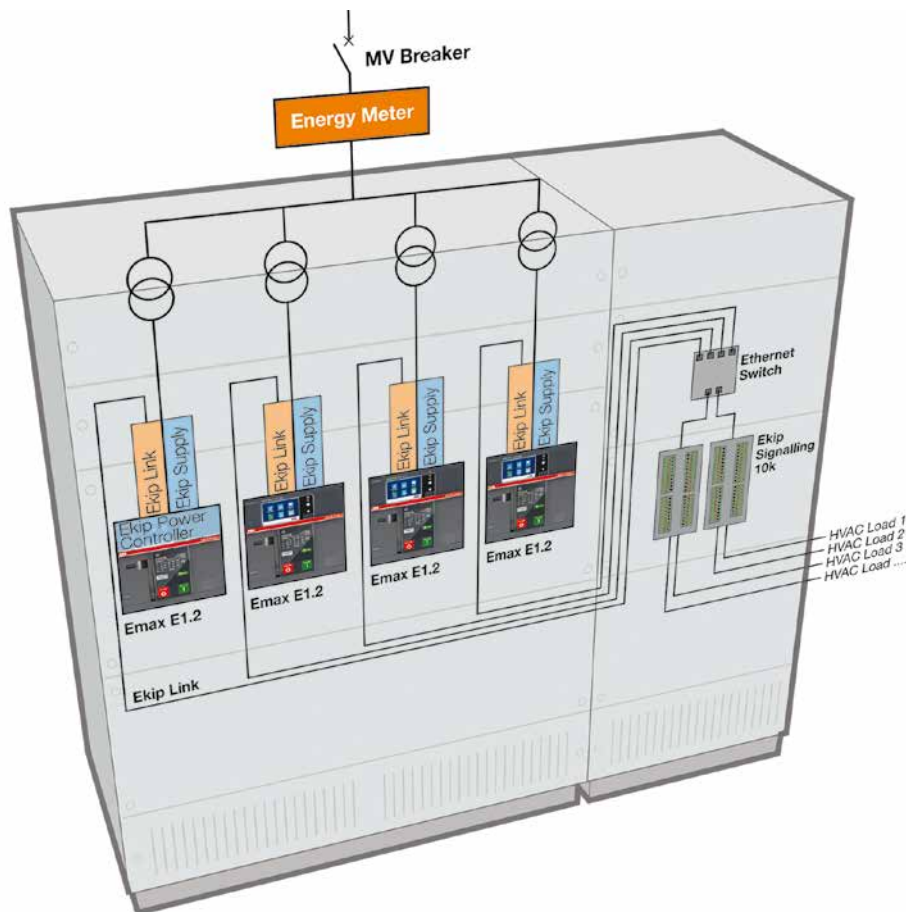
02

2 x Ekip Signalling 10K

Ekip 10K Signalling is a signalling unit on a DIN rail for SACE Emax 2. The unit provides 10 contacts for electrical signalling of timing and tripping of protection devices. The Ekip 10K Signalling module can be powered both in DC and in AC and can be connected to Ekip Touch and Hi-Touch trip units via internal bus or Ekip Link modules. (Image 02)



03



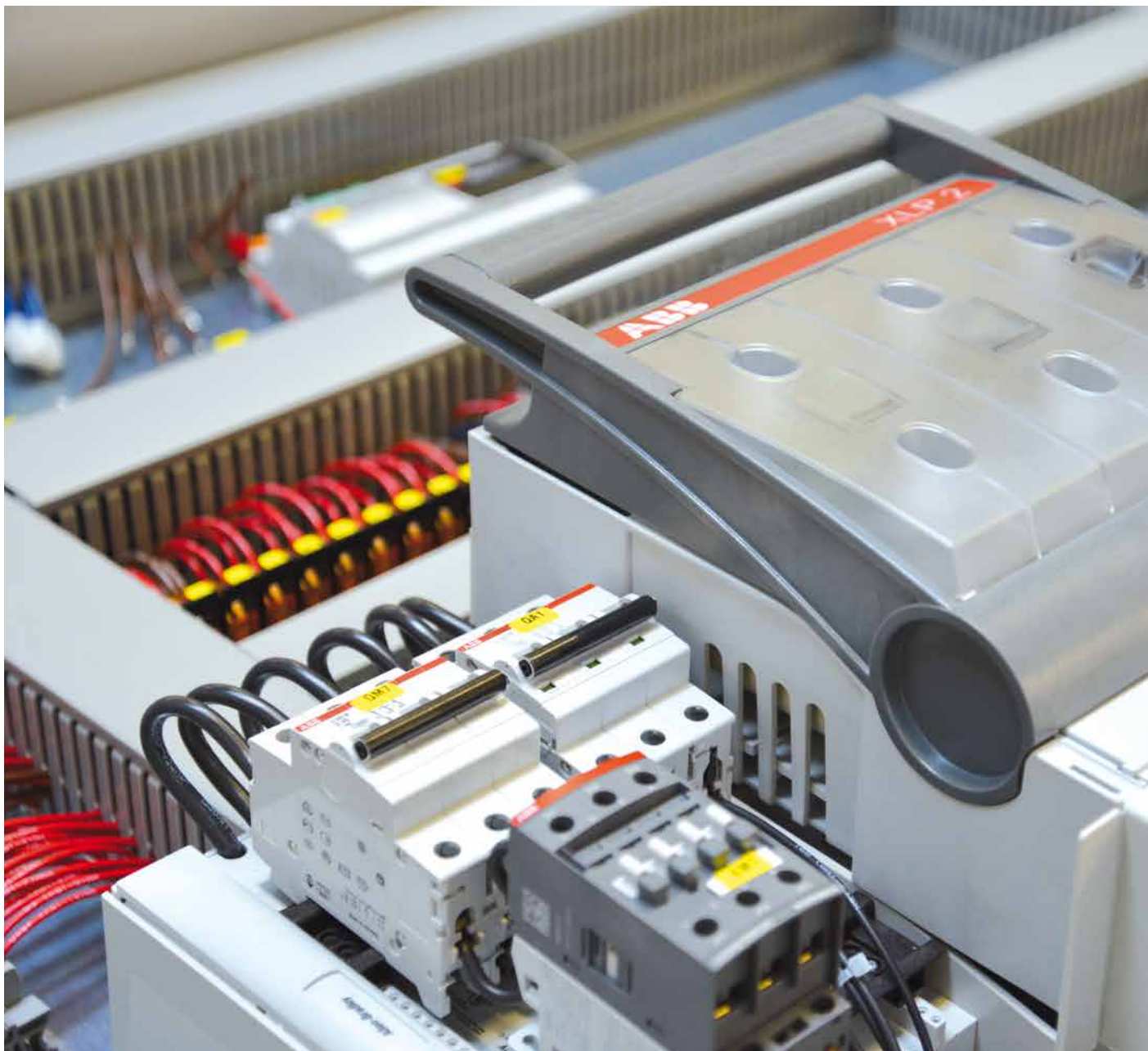


Solar pump drive cabinets From 0.37 up to 18.5 kW



Our new Solar Pump Drive Cabinets manage the power generated through solar PV cells and convert it directly into AC power to supply water pumps. The drive can run the load with both solar PV cell and grid connected supply, offering the maximum of mechanical and electrical protection of the connected pumps.

Low voltage operations, built-in Maximum Power Point Tracking system (MPPT), manual motor starter, automatic changeover and multiple-pump logic, along with the IP54 protection from the enclosure, offer an ideal solution for open field applications where power supply continuity is a big challenge. www.abb.com/lowvoltage



Investing in technology to produce UL switchboards faster and at lower costs

The introduction of tablets in the production of switchboards customized following customer's specifications

Federico Mai: Marketing Communication Account - LP Division

This is seemingly a very simple project. Indeed, any installer is quite sure of having enough expertise to wire a switchboard.

For this reason, very frequently switchboards are made individually and mostly by hand, especially in the case of custom projects, and cannot be reproduced industrially in series.

However, what is very often overlooked is the burden of the production costs, which can in fact be quite high precisely because of the manual nature of the process.

By investing in automation technology and using appropriate components, an innovative company specializing in the design and production of high-quality switchboards has managed to achieve the goal of meeting the market's needs in less time and with less cost.

Technological innovation in the production of custom switchboards

Connection Srl of S. Vendemiano (Treviso) designs and manufactures an average of 115 industrial switchboards weekly. With a staff of 23 employees and an area of 900 sqm, the company has a turnover of about 3 million euros. Connection's core business and major strength is the ability to develop and assemble custom switchboards quickly and at lower costs. The switchboards are made either according to the specifications of the project prepared by the client or designed directly by the Technical Department of Connection Srl based on the functional, dimensional and electrical data supplied by the customer.

It was possible to achieve the goal of producing quality switchboards in a shorter than average time thanks to the investments made to innovate the production process, which now guarantees an average lead time of six working days from order to delivery of the finished product, even for custom switchboards.

All wiring is made with fully automated processes. This ensures optimal response times to market needs and greater price competitiveness.

Constant and precise monitoring is the criterion behind the organization of the production, which takes advantage of the real-time availability of data collected and disseminated via the workstations and tablets used during the assembly phases. Detailed and continuously updated data make it possible to maintain full control of the production and make the appropriate changes where necessary. And more. The constant display of the production process

phases has allowed a tracking method marked by a level of accuracy and detail still extremely rare in industrial production, particularly of custom products.

What is the status of my switchboard?

By accessing the reserved area on the website www.connection-italia.it, customers and contractors can check in real time the correct order entry, the production status of their switchboard (also custom ones) expressed as a percentage, the expected delivery date and, at the end of the process, they can download the transport document.

It is an important support to customers' planning activities, especially when, in turn, they have to integrate their switchboards in a larger project. Furthermore, the ability to track via web makes the relationship between Connection and its customers much more efficient. In fact, since they no longer have to call on the phone for "reassurance" on their orders, they save time and, consequently, so does the manufacturer. Moreover, the information provided on the production progress, which by phone was obviously approximate, is now updated every 10 minutes.

Connection's message is very reassuring. This regime of maximum transparency is only possible thanks to full confidence in its ability to plan production and to the credibility and reliability of the data transmitted over the web.

The customer has the opportunity to take part in the process, requesting and frequently obtaining a change in the estimated delivery times.

Fully automated wiring

In 2007, the conventional manufacturing method was radically innovated to enable the fully automated production of all switchboard wiring thanks to a software specially developed by the Technical Department. This was a very significant development, because until then industrial production of wiring was normally used only for industrial series, making it economically not viable for small custom series owing to the high start-up production costs.

This innovation was followed in 2011 by the creation of a new computer system, a change in the management system and, in particular, the implementation of a platform allowing operators to use tablets in the production process.

The goal was twofold: on the one hand, to make the wiring diagrams, specifications and technical information of the switch-

Acknowledgments

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OEM's channel account

ABB S.p.A. - LP Division
Marco Vergani

- 01 The use of tablets in the manufacturing process simplifies the access to the necessary information (such as wiring diagrams) and allows the acquisition of data on the typical parameters of the production cycle.
- 02 Since the production cycle is fully automated, the manual interventions on the line are reduced to a minimum.
- 03 From left, Marco Vergani of ABB and Roberto Zuccaro, founder and owner of Connection.



01

boards to be manufactured significantly easier to read; and on the other, to collect information on the production process from the tablets and workstations for automatic transmission to the central system.

This series of operations has improved the quality of the cycle and provided higher profit margins, making it possible to fund new investments.

UL certification to appeal to profitable markets

In 2011, Connection was certified UL/ CSA both for switchboard production and for wiring.

The recognition of compliance with North American standards is particularly important for the Veneto Region company, because its customers exporting to those markets have the best sales performance.

There are two main reasons why the North American market is particularly interesting.

The first factor are good growth rates and, therefore, a strong propensity to invest. The second is that, unlike other equally emerging areas, this market recognizes and rewards high technological value and excellence.

In this manner, not having to fight impossible price wars, the most advanced Italian companies can create attractive margins and fund additional investments in technology.

The fact that ABB, of which Connection has been a long-time customer, had meanwhile launched specific initiatives of collaboration with UL with the precise goal of accessing such a promising market, did much to cement the relationship between the two companies. Therefore, Connection has chosen to share its increasing and in-depth expertise regarding UL requirements with ABB to help orient at best the development of new products.

A value-added partnership

Based on a steady growth in its 15 years of activity (+15% from June 2013 to June 2014), Connection proved to be the ideal company to undertake a process of collaboration outside the usual patterns. Moreover, the strong focus on technological innovation, evident, for example, in the use of tablets for the production phases, the new warehouse organization and the technological equipment of the Technical Department showed a vision aligned with ABB's objectives.

After a 15-year business relationship based on traditional customer/supplier dealings, this common will to innovate and the personal affinity stemming from similar age brackets laid the foundations for a long-term collaboration.

ABB has a good knowledge of the market in command and control devices, and, therefore, of potential customers for Con-



03

02

nection. In particular, ABB is very familiar with the technical requirements and contact data of the real corporate decision-makers of the main players in this sector: this important support for Connection's access to the market is one of the key factors in developing an effective technical and commercial alliance.

Another positive aspect is sharing technical information on ABB components during training meetings for Connection staff (Technical Department staff, wiring assemblers in the Production Department), which contributes to their professional growth.

On the other side, the expertise gained by Connection, both in terms of production phases and by listening to the needs of end users, is useful information for ABB, enabling it to better understand and meet customer requirements.

The advantages of ABB products

One of the advantages for which Connection selected ABB as a partner is the opportunity of being able to deal with a single supplier with a wide range of products, one of the largest available on the market, allowing it to meet most requirements for executing the projects.

Moreover, the worldwide distribution coverage of ABB products makes it easy to obtain them anywhere and the worldwide distinctive product code makes it easy to identify them.

There are many ABB solutions used in the two main Connection product families.

The full range of ABB modular components (Series S 200 automatic circuit breakers, Series E 90 modular fuse-holders, modular transformers) is used in the production of distribution switchboards.

Control and power switchgear, instead, use mainly electromechanical components:

- Series OT, OS disconnect switches and OTP enclosed disconnect switches;
- Series AF contactors;
- Series MS motor protection switches;
- Series XT modular circuit breakers;
- Pushbuttons - diameter 22;
- Command and control electronics;
- System pro *E* comfort MISTRAL control units;
- Gemini switchboards;
- Series XLP disconnectable fuse-bases;
- Series SRN metal cases.

The Series AF contactors deserve a special mention. In fact, they can be powered either with alternating current or with direct current thanks to an electronic coil with a wide range of operating voltages. Their operating versatility allows the use of a single component in the most varied conditions and thereby reduces the number of product codes to be used. Moreover, the extremely low current consumption at start-up and at full operation allows the use of compact and low-cost transformers.

Hermes Systeme GmbH

Keeping a close eye on power consumption: cost savings with ABB electricity meters

Aron Svedin: Product Marketing Manager - DIN-Rail Products

Energy efficiency is becoming ever more important for businesses, but is contingent on measurements and evaluations of consumption levels. ABB electricity meters excel here with top performance, for example in combination with the ProView software from Hermes Systeme GmbH.

The B series electricity meters from ABB record the energy consumption of the lighting, air conditioning and ventilation at Hermes Systeme GmbH; the information is then transferred to the power management software developed in-house for analysis. Tables, charts and diagrams assist in evaluating and analyzing the data.

This monitoring solution is the ideal platform for optimizing electricity consumption, thereby reducing costs and conserving resources.

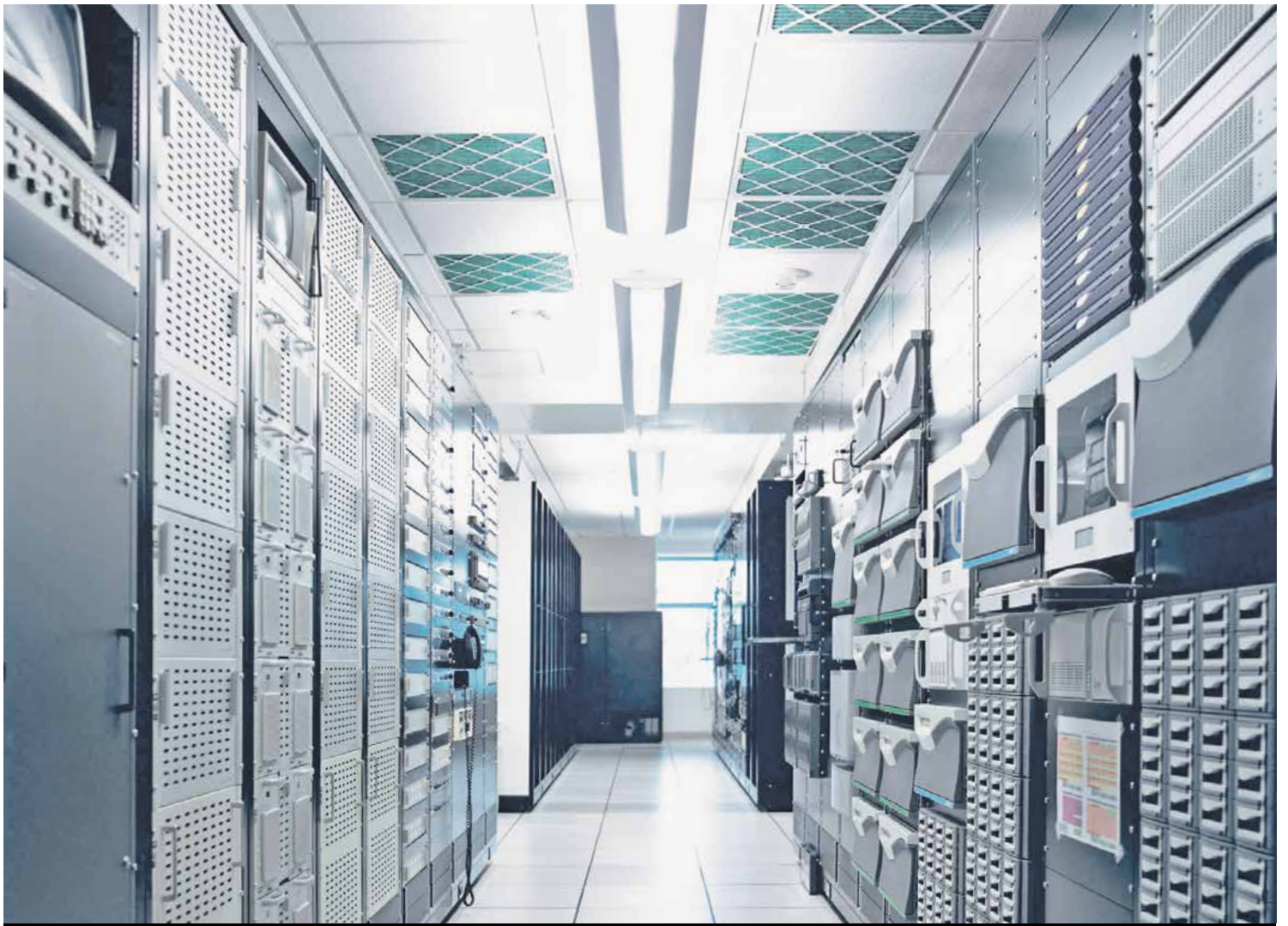


More information can be found in the case note:



Case note:
9AKK106354A1774





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To minimize energy and downtime costs, CMS offers an unique and highly efficient branch monitoring solution. The ultra-compact CMS sensors can be easily integrated in existing and new installations within power distribution units. This provides an unprecedented transparency of the consumption which increases the energy efficiency and service continuity of the plants. www.abb.com/lowvoltage

From electrician to marketer

Organizing Events: are they effective? Is it worth?

Federico Mai: *Marketing Communication Account - LP Division*

Products, technical specifications, performances, features and application examples are essential items of knowledge to work as a professional electrical system installer. However, it is equally clear that in today's ever increasingly competitive market it becomes even more essential to acquire skills in areas that lie outside the technical sphere and allow you to stand out from the competition in order to increase your business volume. And for this reason this article offers you information, tips and some "tasty tidbits" that we believe can help you better understand certain marketing and communication concepts and practices that can make a difference in approaching a client by stimulating creative thinking for new ideas and solutions. Or simply to help answer questions like, "Where do I start from?" or "How could I do that?"



In times of crisis, economic resources are scarce even for activities vital to the proper functioning of a company. On the other side, in small sized companies, very often nobody even considers to use this kind of communication tool to collect new prospects or grow the turnover. One always wonders if organizing events is an effective tool and still relevant to ensure the development of the company. Very often it is just seen as an activity in its own to be done as a "we too" effect.

Events are certainly an effective and versatile communication tool. They can provide advantages either in terms of "corporate image", when they are "memorable" regarding the place or the spectacle offered, or in commercial terms when, for example, aside the main event is set up an adequate opportunity to get in touch with potential customers. Moreover, this could be the real

aim of the operation, even if not explicitly stated.

Nevertheless, of course, there is no single answer unless you ask the Specialists working in the MICE sector (Meetings, Incentives, Conferencing and Exhibitions). As usual, the first consideration links to the **target you want to reach**, to evaluate immediately with accuracy whether the implementation of an event could be **attractive and viable** especially for those you want to invite.

This first consideration makes clear that it is essential to plan and organize the event giving the same weight to the **expectations of the audience** and the **goals you want to achieve**. You must avoid the mistake of taking into account only the latter, because it leads inevitably to waste the opportunity to communicate effectively the messages you want

to transfer to the audience. They would be distracted from their **unfulfilled needs** instead of being focused on what we are communicating.

The three main conditions for effective communication during an event

First: always have clear and precise messages that you want to transfer to your guests. They must be few, often repeated and shared across your company before the event.

Second: the event must be designed as a **unitary model** of global communication, in which all components, aspects, facilities and services are consistent with this model. This is because during the event the company in its entirety is "staged" and this must be perceived by the audience as a **unique message**.

Third: to avoid some mistakes, trivial but frequent, that often make the difference. Let's see some of them here below.

Mistakes to avoid / Attention points

The location (the place where the event takes place) communicates much more than people commonly believe. Making the choice, you must be careful that the charm of the destination does not hide any deficiency or structural logistics problem. This has to be cleared during onsite **inspections**; to choose a location just because it "is famous" sometimes causes unpleasant surprises and the "wow" effect sought with an attractive destination is then seriously compromised. In contrast, little known or newborn locations could reserve big surprises and give a strong benefit to your company image. On the other hand, it is not advisable to choose a location basing only on technical evaluations without considering **the appeal**, emotional ingredient necessary for the success of an event. Finally, it is important to take into account the time needed to your guests to reach the place of the event. Destinations within easy reach and in a short time are always highly appreciated.

Invitations and R.S.V.P. (Répondez s'il vous plait): in the invitations it is not advisable to seek the amazing effect or use its opposite, a gray conventional or bureaucratic language. The invitation should be **simple, brief, clear** and contain all the **necessary information** to allow the invitee to make an informed and immediate choice. Reason why to attend the event, main message, place, time and how to get there, participation and confirmation modes must be explicit and clear at a glance. Using complex or too long communications in a simple invitation makes no sense. Use the appropriate media to the importance of the event: the medium is the message. Invitations by e-mail are today the most practical and effective if graphics are not sloppy. Best if they are accompanied by an **invitation on paper** or followed by an adequate **telephone call**, to avoid being lost among the daily e-mails or not delivered or blocked by some computer firewall of the recipient.

Reception Desk is the first impression the guest has of the event: the first impression does **not have a second chance**. For this reason, it is unwise to rely on outsourced services recruited without first hav-

ing them personally supervised in every detail. Very often it is not enough to have attractive hostesses!

Gadgets and gifts: they are "the icing on the cake" and give a personal touch to the event. We need to tell the participant that we take care also of his **personal life**, we want to be kind to him and we intend to build a **human relationship** as well as a business one. Currently "green" gadgets and gift, environment friendly or related to the preservation of the nature and the planet, are the most popular, but it is not advisable to skimp on price: better distribute fewer pieces and only to the most important prospects rather than run out of gifts. Offering useful and quality giveaways also helps to avoid that they end up in the waste basket.

Public speaking. During the event, the "speech" should be limited to a minimum so as not to bore the guests and must repeat the messages that permeate the entire event. Avoid prolixity, technicalities, self-reference, boasting and escape the questions from the audience that, as far as practicable, need an adequate time to answer. In addition, never forget to **thank** anyone who submits a question, even if it is "annoying"!

Technology must be at the forefront yet **perfectly mastered** to avoid bad impression. In addition, it is not advisable to repeat the words projected on screens with your back to the public; it is much more effective if you **comment images and graphics** and use them to support your speech. Strictly avoid unreadable slides full of contents: do some tests before going live and you will see right away what doesn't work. If you must give details that do not fit into a slide, better distribute to participants a separate document focusing on the topic.

Dress code. Not recommended wearing flashy clothes and accessories, out of date or out of place. They attract attention on you, taking it away from the communication and contents you want to transfer to the audience.

Cocktails, lunches and dinners. Not recommended food design or drinks and foods challenging to manage, especially those that require the use of both hands if you plan a standing buffet: all the efforts

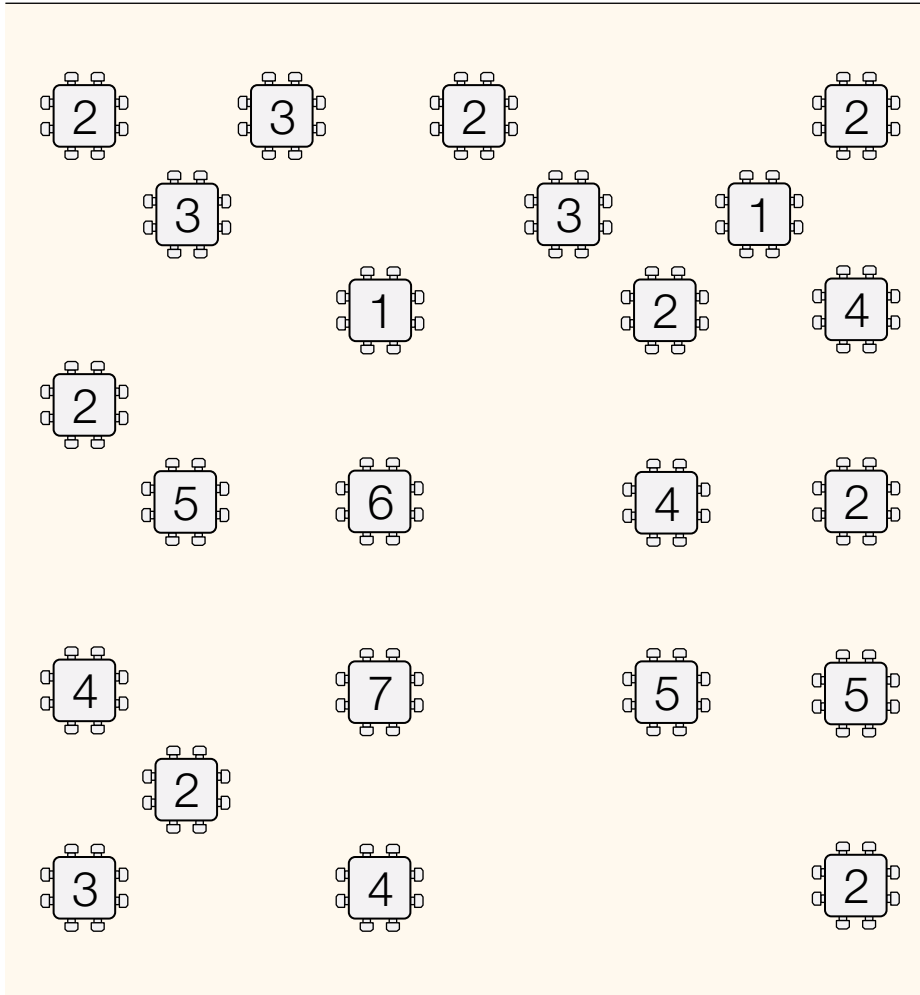
made to achieve your goals would be lost in comments on the discomfort of the meal offered!

Press relations: if there is media at the event, it is recommended to not forget... that journalists are not omniscient (so do not take anything for granted), have tight deadlines (i.e. maximum synthesis) are skeptical (then argue all) and malicious (then never evade the questions). Always provide a **press kit in both digital and paper formats** ready to be published with the minimum of effort on their side: just a press release or an editorial coupled with images or graphics "Copyright free" and completed with captions that explain the content.

Follow-up: it is important to send a message via e-mail or letter to those who attended the event **thanking them for spending their time with us**. Follow-up often strengthen relationships much more than the event itself, as gadgets and gifts do, because they say that we are also attentive to the participants personal sphere.

Connect the boxes

Train your brain



Task

You must complete an electrical system by connecting junction boxes with cable conduits.

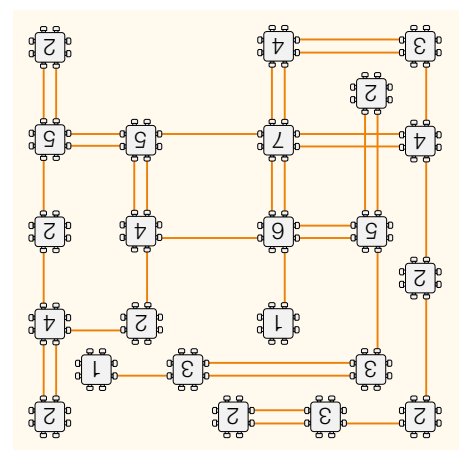
An electrician has already installed all the junction boxes on the wall and laid down the required connections, but then he left the job unfinished without explanation.

Your task is therefore to connect all of the boxes indicated.

Instructions

- Each box must be connected to the others and the number of connections must correspond to that indicated on the box.
- Two different boxes can be connected with each other, but without exceeding two connections.
- Connections can be made either horizontally or vertically. Cross-connections are not allowed.
- There is only one correct solution and can be found purely by logical reasoning. No specific technical skills are required.

The solutions to Connect the boxes





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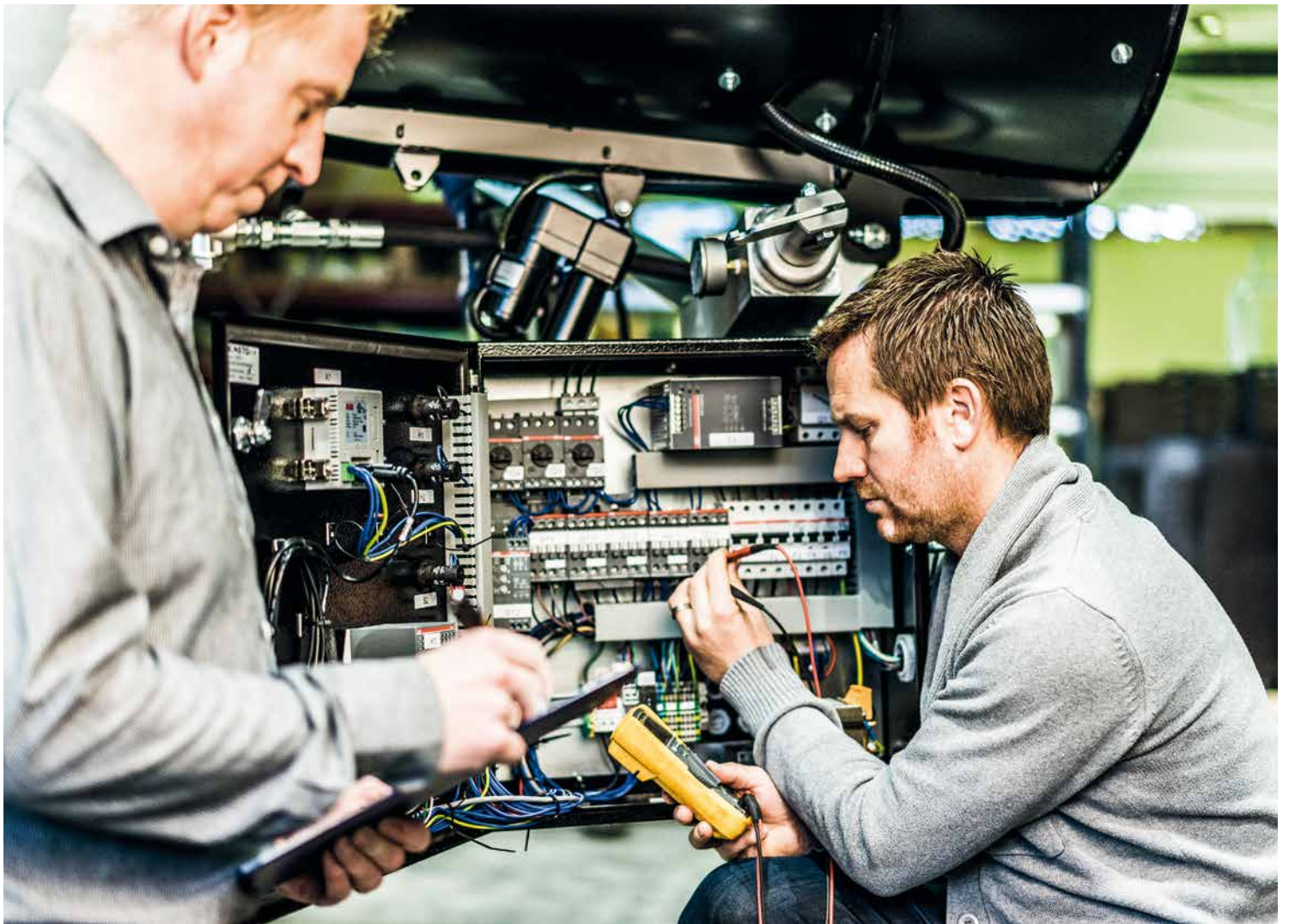
e-Design is the new integrated suite, designed and produced by ABB for all professionals working in the electrical sector: designers, panel builders, installers and wholesalers' technical offices. e-Design enables an electrical system to be designed optimizing processing times, thanks to simple and intuitive functionalities and management of a full product portfolio.



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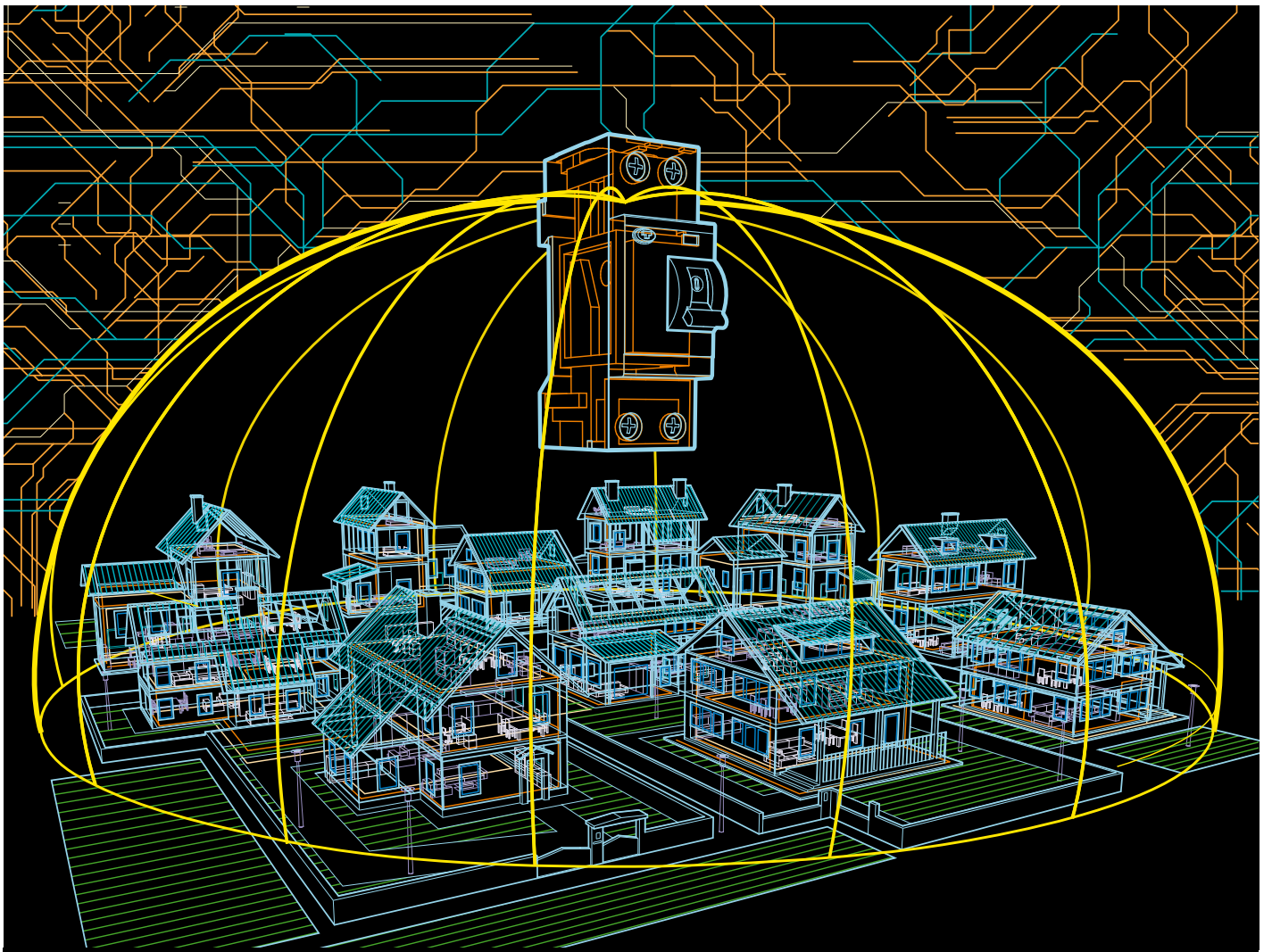




No job too dirty for ABB products. Highest reliability in every working condition.

What are some of the dirtiest places to work at? Demolition areas, mines, or excavation sites? These types of construction sites all stir up big clouds of dust that no one wants or should have to breathe in. With a dust suppression machine, however, workers can escape the hazardous air particles. It's companies like the Swedish Duztech AB that specialize in dust suppression equipment and with the help of ABB's low voltage components, they can offer customers reliable operation in extreme environments. For more information please visit www.abb.com/lowvoltage





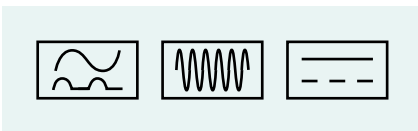
Special Insert

Everything you wanted to know about
Type B residual current circuit breakers
but never dared to ask

Type AC or Type A RCDs, compliant with the Standards IEC/EN 61008 and IEC/EN 610091), are suitable for most types of household and similar applications. However, the increasing use of power electronics technologies in Consumer appliances with earth connection can result in leakage currents having waveforms with a high DC component and/or high frequency, in both fault and fault-free conditions. These currents, not intended for Type A or Type AC residual current circuit breakers, could affect their proper operation. It must be said that Type A RCDs, as a rule, are immune to the residual current overlap of a direct current up to 6 mA. In case of direct current leakage over 6 mA, the proper operation of Type A circuit breakers is not guaranteed.

Depending on the case, the Type A or Type AC residual current circuit breaker could therefore present the following drawbacks:

- desensitization of the residual current circuit breaker which may not trip properly in the event of a ground fault of equipment that generates currents with a high DC component or high frequency (failed tripping, delayed or excessive residual current values);
- desensitization of the residual current circuit breaker which may not trip properly in the event of a fault on another circuit powered from the same RCD (even if this fault current has a sinusoidal alternating shape);
- nuisance tripping with no fault.



1

Figure 1 - Marking of the Type B residual current circuit breakers

To solve these problems, Type B residual current circuit breakers were introduced in the 1990s, whose First Edition of the IEC 62423 product standard dates back to 2007 (and in more recent years, Type F RCDs were introduced, with intermediate characteristics between Type A and Type B RCDs). Pending an actual product standard for Type B residual current circuit breakers, one referred to the IEC 60755 Technical Report (General Requirements for Residual Current Operated Protective Devices), which contains the general characteristics of RCDs, including those for Type B.

With the issuance in 2013 of the Second Edition of the Standard IEC EN/62423 (Type F and B RCDs with and without integral overcurrent protection for household and similar installations), derived with a few minor changes from the corresponding Second Edition of the international Standard IEC 62423, the regulatory evolution of Type B RCDs for household and similar use came to a conclusion. This Second Edition contains some small changes in the requirements for Type B circuit breakers. In addition, it introduces the bipolar Type B RCDs and the Type F RCDs previously not contemplated by the standard.

Type B RCDs that comply with the latest edition of IEC/EN 62423 can be identified by the marking of Figure 1, whose graphic representation recalls the various residual current forms 't' for which the Type B circuit breaker is designed.

The Standard IEC/EN 62423 must be used in conjunction with the Standard IEC/EN 61008 or the Standard IEC/EN 61009 as it contains only the requirements and tests in addition to those laid down in the cited standards for Type A RCDs. To these standards, only for industrial applications, must be added the Standard IEC/EN 60947-2.






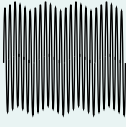




¹⁾ The Standard IEC/EN 61008 covers "pure" RCDs; the IEC/EN 61009 covers RCDs with integral overcurrent protection, including those obtained by adding a residual current block to an overcurrent circuit breaker.

Residual current waveforms for Type B residual current circuit breakers

The new edition of IEC/EN 62423 further enriches the set of residual current waveforms with which the Type B circuit breakers must be tested. The vast number of waveforms contemplated - which include various unidirectional forms, direct current without ripple, high-frequency currents and different combinations of these - allows it to be said that a Type B RCD guarantees proper tripping with every possible fault current, no matter how strange and complex the device that generated it. Therefore, the attribute "universal" by which the RCD type B²⁾ is sometimes denoted is fully justified.

The test residual current waveforms now contemplated for Type B circuit breakers are³⁾:

- sinusoidal alternating current at rated frequency;
- pulsating unidirectional current, with or without phase angle delay;
- unidirectional current generated by two or three-phase rectifiers;
- sinusoidal alternating current up to a frequency of 1 kHz;
- direct current without ripple
- current obtained by overlapping direct current on alternating current;
- current obtained by overlapping direct current on pulsating unidirectional current;
- current obtained by the overlap of several frequencies.

	Residual current form	Tripping current limit values
alternating		0.5...1.0 I _{Δn}
unidirectional pulsating		0.35...1.4 I _{Δn}
unidirectional pulsating with phase angle delay		Cutting angle 90°: from 0.25 to 1.4 I _{Δn} Cutting angle 135°: from 0.11 to 1.4 I _{Δn}
alternating overlapped on direct		max. 1.4 I _{Δn} + 0.4 I _{Δn} DC
unidirectional pulsating overlapped on direct		max. 1.4 I _{Δn} + 0.4 I _{Δn} DC
multi-frequency		from 0.5 to 1.4 I _{Δn}
two-phase rectified		from 0.5 to 2.0 I _{Δn}
three-phase rectified		
direct without ripple		
alternating up to 1 kHz		Current frequency 150 Hz from 0.5 to 2.4 I _{Δn} Current frequency 400 Hz from 0.5 to 6 I _{Δn} Current frequency 1000 Hz from 0.5 to 14 I _{Δn}

2

Figure 2 - Tripping waveforms for all Type B

²⁾ This terminology should not mislead: Type B RCDs are intended for use on AC voltage mains networks (non-sinusoidal waveforms are those of residual current). RCDs for DC mains networks are being studied (the so-called "Type DC" circuit breakers).

³⁾ See also the article "Residual current protection devices" on Day by DIN 2|14 and the ABB Technical Guide "Protection against ground faults with residual current circuit breakers".

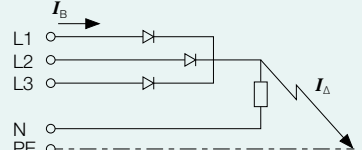
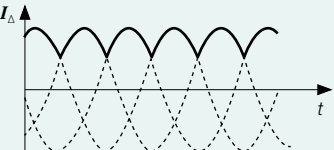
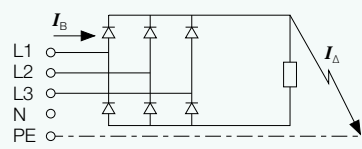
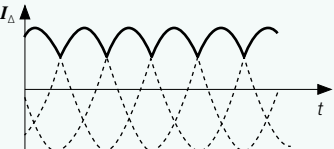
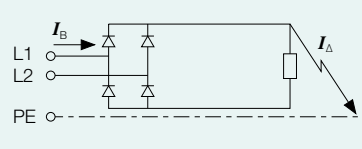
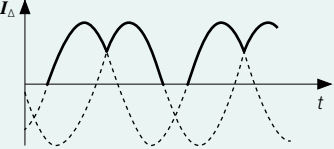
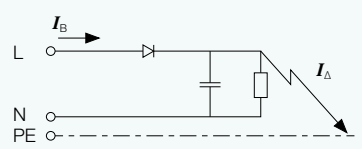
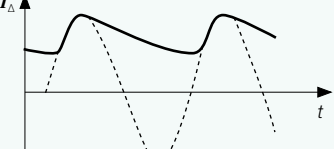
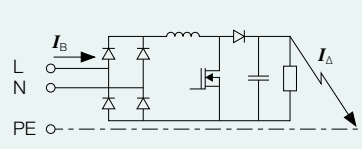
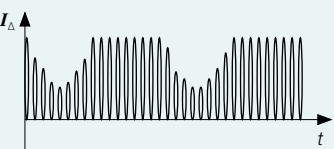
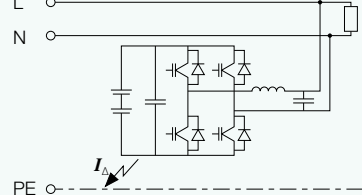
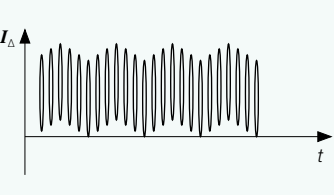
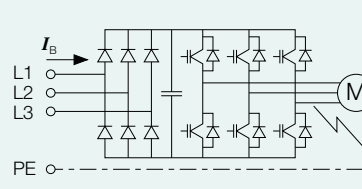
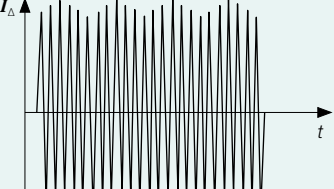
The tests on RCDs are performed with both polarities, positive and negative, with the residual current applied both slowly and suddenly. Different tripping and non-tripping values are contemplated for the various waveforms, expressed as a multiple of the rated tripping residual current $I_{\Delta n}$, which is always referred to the AC mains frequency. The limit values of the tripping residual current take into account the different types of hazard for people of the various waveforms, and, at the same time, allow for an increase in service continuity while reducing the risk of nuisance tripping in the absence of fault (noise is filtered).

For example, a Type B RCD with $I_{\Delta n} = 30$ mA, when direct residual current without ripple is applied, has a maximum tripping threshold of up to 60 mA to take into account the lesser danger of DC current. For the same reason, for a 400 Hz frequency residual current, the maximum tripping value allowed is 180 mA

Application of Type B RCDs

Type B RCDs are suitable for non-linear circuits capable of generating ground fault current with a high direct component (more than 6 mA⁴⁾) and/or high frequency; the main ones are shown in Table 1.

Table 1 - Power circuits that require Type B residual current breakers

Non-linear circuit	Fault waveform
<p>1</p> 	
<p>2</p> 	
<p>3</p> 	
<p>4</p> 	
<p>5</p> 	
<p>6</p> 	
<p>7</p> 	

⁴⁾ Type A RCDs are suitable to detect pulsating residual currents that, for a period of at least 8.33 ms in each 20 ms period of the mains frequency (equal to 150° electrical degrees at 50 Hz), take on a null value or one not greater than 6 mA.

These are essentially:

- rectifiers, in general three-phase or two-phase (cases 1, 2, 3);
 - half-wave rectifiers with high smoothing capacity (4);
 - rectifiers with active power factor correction (PFC) (5);
 - direct voltage generators permanently connected without galvanic separation to alternating current networks (e.g. solar panels) (6);
 - variable frequency drives (7).
- static transfer systems (STS) and uninterruptible power systems (UPS) (see Fig. 3);
 - charging systems for electric vehicles powered by alternating current (see Fig. 4⁶⁾);
 - drives in direct current;
 - frequency converters;
 - medical diagnostic imaging equipment (CAT, MRI, etc.);
- and others.

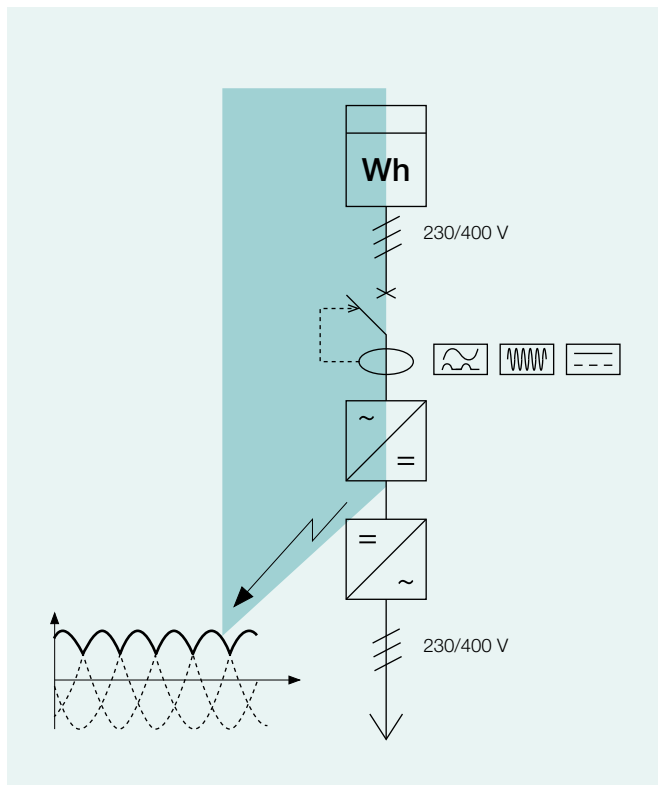
The main types of equipment that contain these circuit configurations are:

- variable frequency motor drives with three-phase power supply (industrial machinery, elevators, etc.) (see fig. 5);
- photovoltaic plants (fig. 6⁵⁾);

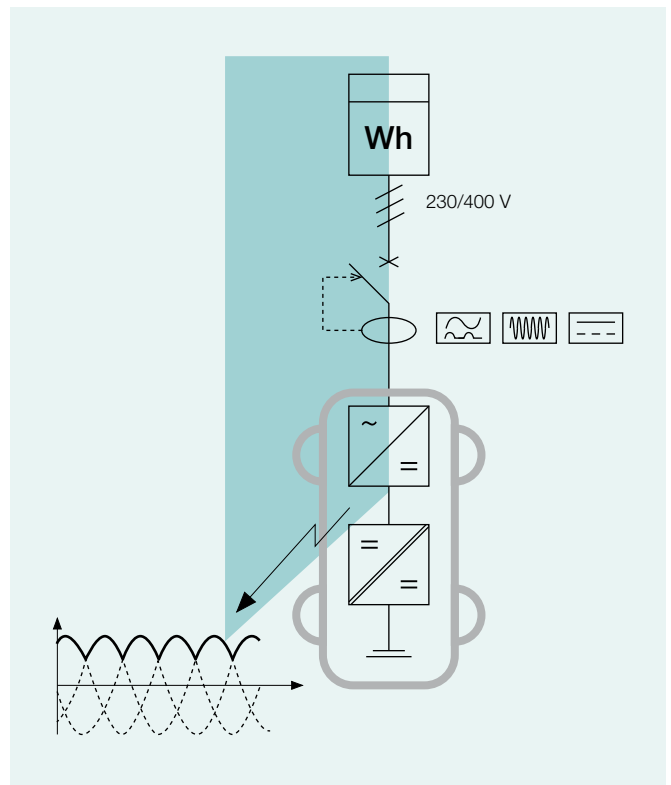
Please note that the most typical applications of Type B RCDs are three-phase, but also single-phase applications are not excluded, especially those with higher power.

Figure 3 - The Type B residual current circuit breaker with use of UPS devices

Figure 4 - The Type B residual current circuit breaker for charging electric vehicles



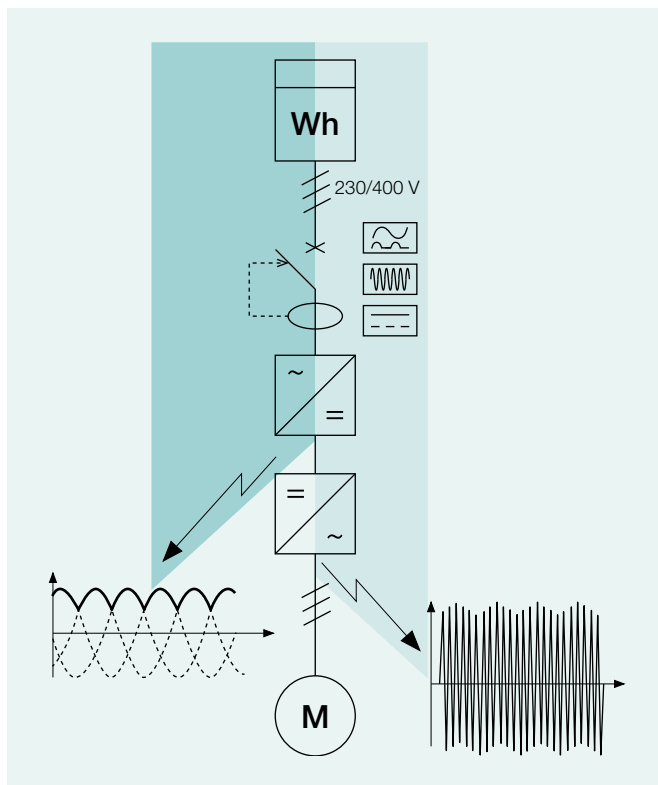
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⁵⁾ In case of ground fault on the direct current side, the RCD located downstream of the inverter would be passed through, based on the characteristics of the inverter, by a non-alternating current, containing a high direct component and high frequency. See the ABB Technical Application Paper N° 10 "Photovoltaic Plants".

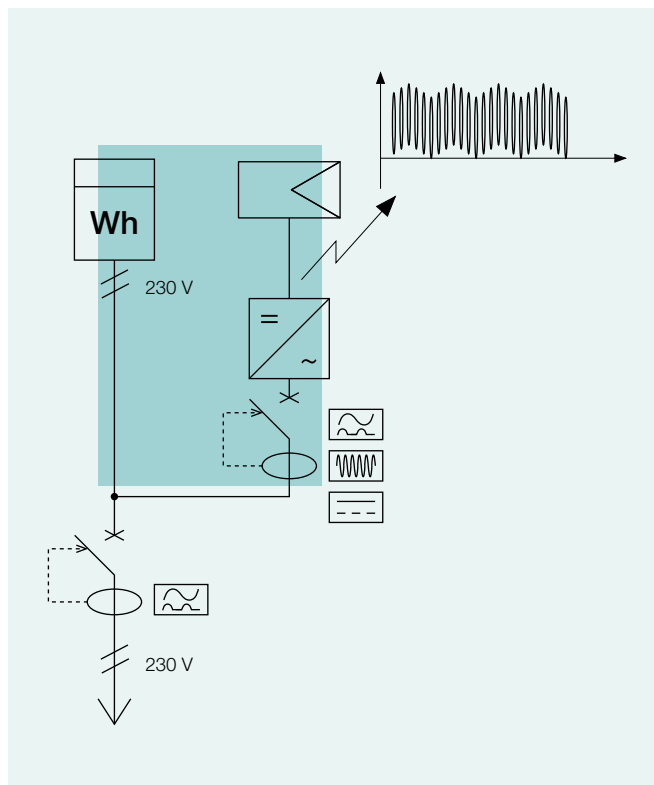
⁶⁾ See "Power supply for electric vehicles" in Day by DIN 2|12 and Day by DIN 2|13.



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Figure 5 - Application to motors powered by variable frequency

Figure 6 - PV systems without isolation transformer



6

Immunity to nuisance tripping of Type B RCDs

For Type B RCDs, stringent tests of immunity to nuisance tripping were added in addition to those already provided for Type A RCDs. These tests are⁷⁾:

- normalized surge current withstand $8/20 \mu\text{s}$ up to the value of 3000 A (Fig. 7);
- insensitivity to residual currents of duration up to 10 ms of amplitude up to $10 I_{\Delta n}$ (Fig. 8).

With these properties, Type B RCDs turn out to be RCDs with high immunity to nuisance tripping caused by grid surges, electronic loads and EMC filters.

Therefore, Type B circuit breakers are the ideal solution for all “difficult” loads, not only from the point of view of protection, but also in terms of service continuity.

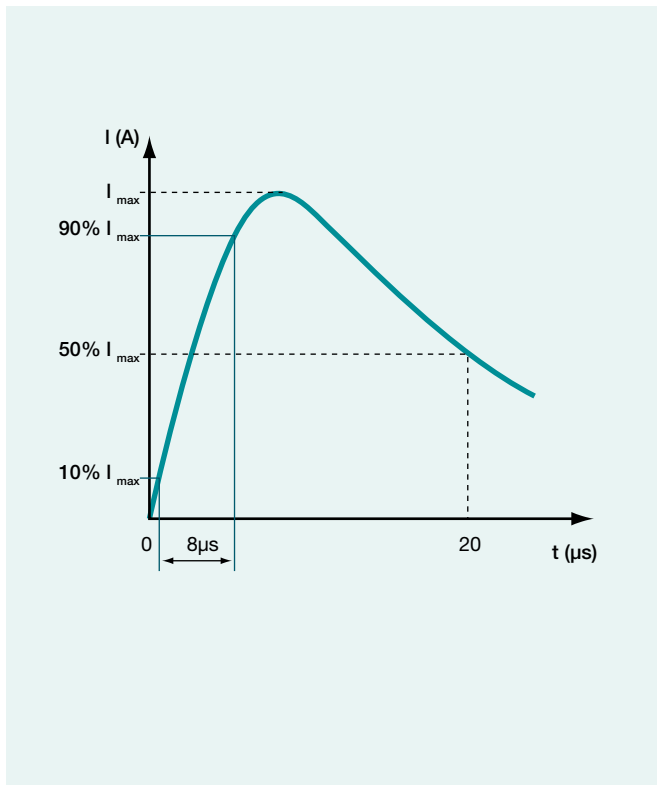
Where regulations require Type B RCDs

For photovoltaic systems - in the case of systems without at least a simple separation between the AC side and the DC side - if the converter is not exempt by construction design from injecting direct fault currents into the electrical system, one must install a Type B RCD on the AC side (see IEC 60364 Art. 712.413.1.1.1.2).

In group 1 and group 2 rooms for medical use, only Type A or Type B RCDs must be used, according to the type of possible fault current (see IEC 60364 Art. 710.413.1.3).

For STSs and UPSs, if their design contemplates the possibility of ground fault current with direct current components, their installation instructions must state that the building’s residual current circuit breakers must be Type B for the UPSs and the three-phase STSs, and Type A for the single-phase STSs (see IEC/EN 62040-1 Art. 4.7.12 and IEC/EN 62310-1 Art. 4.1.10).

⁷⁾ This is essentially the same type of test passed by ABB’s Type A APR series RCDs, which feature high resistance to nuisance tripping. See “Continuity of supply” in Day by DIN 1|12.



7

As for the charging of electric vehicles, where the charging station is equipped with a socket-outlet or vehicle connector complying with the IEC 62196 series, one must take protection measures against DC fault current, for example Type B RCDs (see IEC 60364 Art. 722.531.2.101⁸⁾).

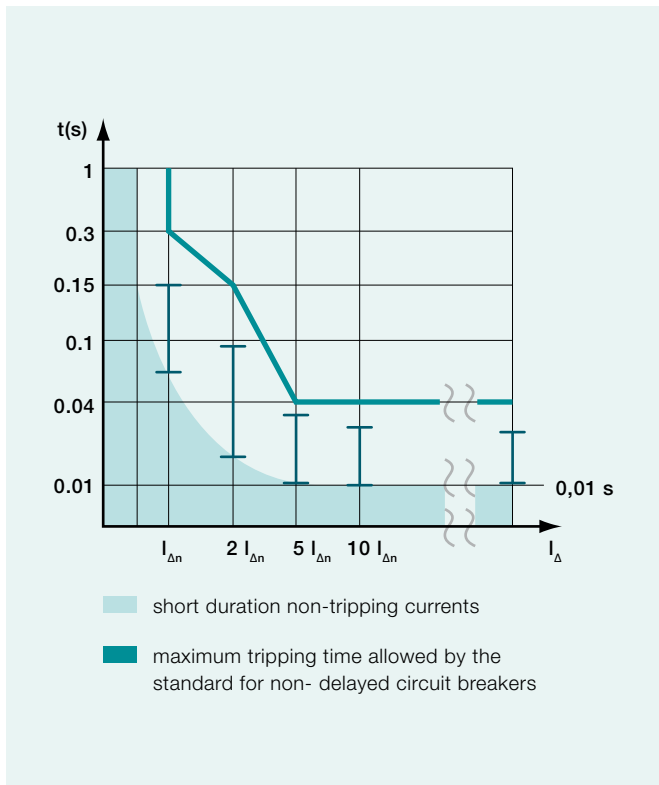
More generally, as to the correct choice of the residual current circuit breaker for power electronics equipment not included in the previous cases, see IEC 62103/EN 50178 (Electronic equipment for use in power installations), according to which (Article 5.2.11.2):

- mobile electronic equipment with rated input power ≤ 4 kVA must always be designed to be compatible with Type A RCDs;
- mobile electronic equipment with rated input power > 4 kVA or fixed at any power, which are not compatible with Type A RCDs, must be provided with a warning on the device and in the operating manual to require the use of a Type B RCD or another protection method (e.g. isolation transformer).

How does a Type B RCD work?

Type B residual current circuit breakers manufactured according to the Standard IEC/EN 62423 are equipped with two ferromagnetic toroids in series: one is intended to detect alternating and pulsating residual currents, the other is for direct currents. All live conductors pass through both toroids (phases and neutral) so as to form a primary winding of a transformer on which the residual current circulates.

The first toroid works in electro-mechanical mode like in a conventional Type A or Type AC circuit breaker: a residual current oscillating at the mains frequency generates by electromagnetic induction a voltage across the secondary winding, which, if it reaches a preset threshold value, causes the release of a demagnetization actuator that acts on the opening mechanism of the contacts.



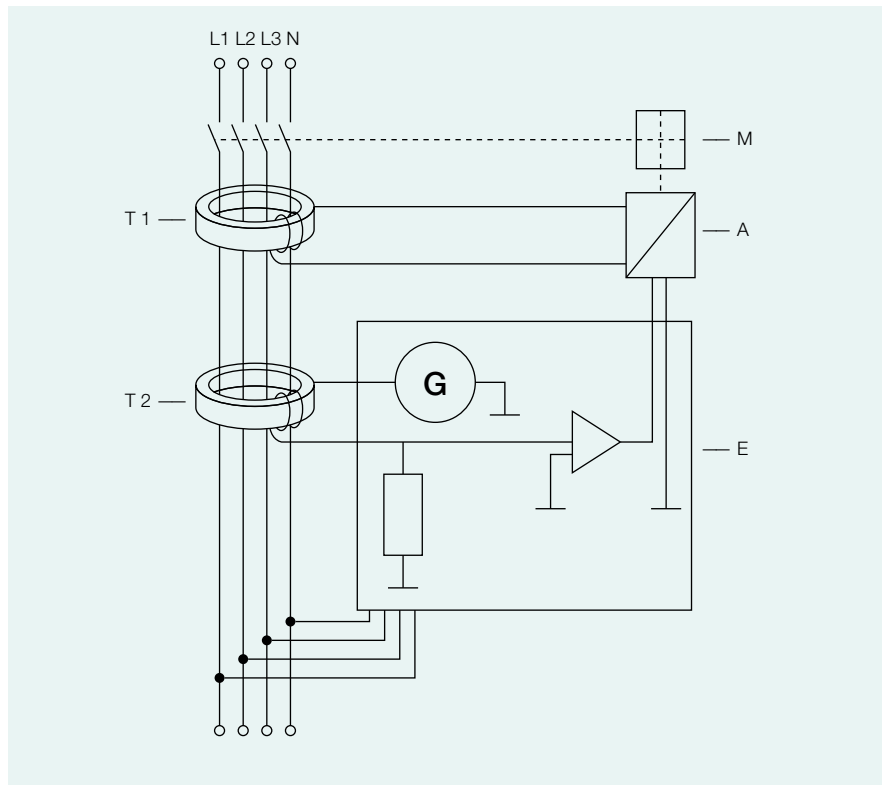
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Figure 7 - Surge current 8/20 μ s

Figure 8 - Insensitivity to short duration residual currents

⁸⁾ Protection device against DC fault current can either provided by EV charging station or be part of the upstream installations.

- T1 - Toroid Core for Detection of AC Sinusoidal and Pulsating DC residual current
- T2 - Toroid Core for detecting pure DC residual Current
- M - Mechanical Trip Unit
- A - Actuator
- E - Electronics for tripping in case of pure DC leakage Current



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Figure 9 - Schematic diagram of a Type B circuit breaker

Figure 10 - Examples of the proper installation of a Type B circuit breaker

Figure 11 - Example of the improper installation of a Type B circuit breaker

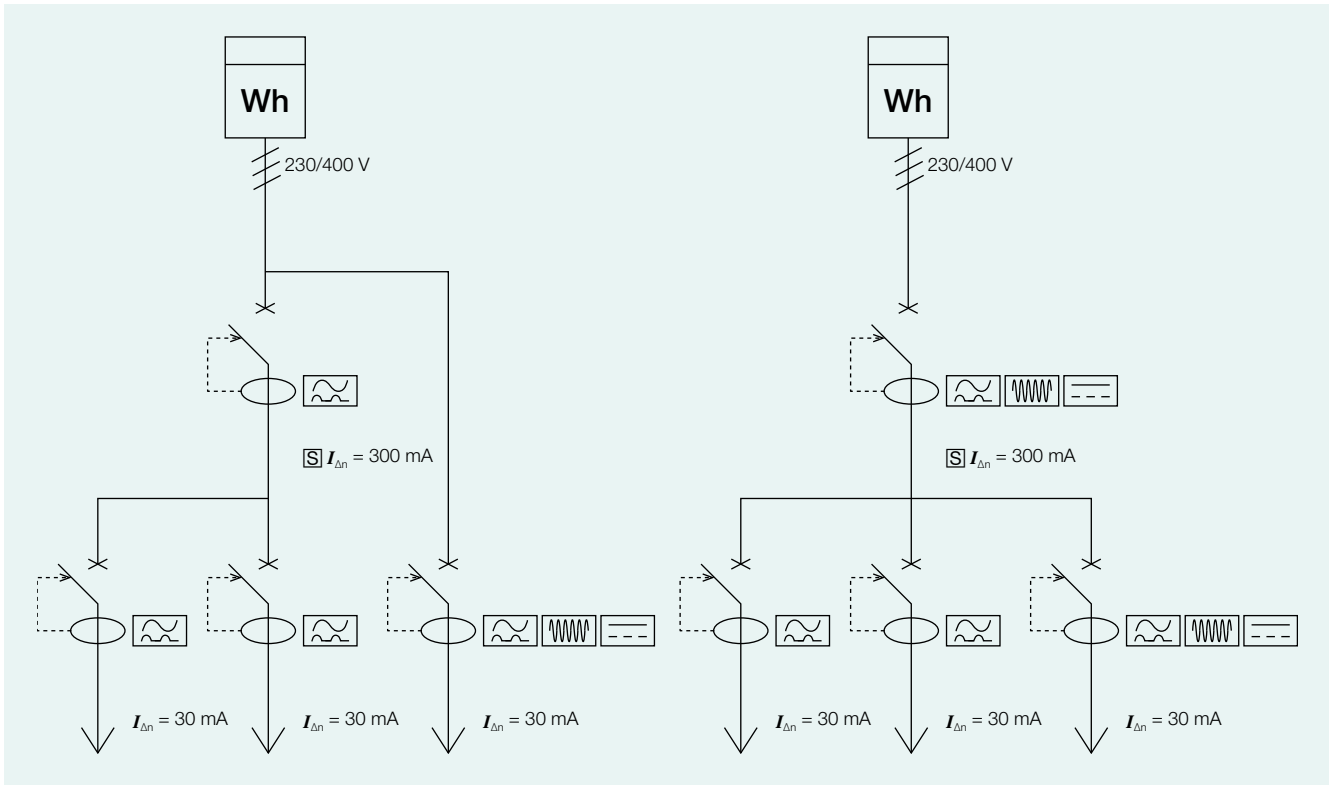
The second toroid is used by taking advantage of the magnetic saturation of the ferromagnetic material. To its secondary winding is permanently applied an alternating voltage that magnetizes the material. An electronic circuit is capable of detecting the inductance across the secondary winding. The appearance of a direct residual current brings the material to saturation and, consequently, changes its magnetic permeability. This variation, suitably processed, is the signal that determines the release actuator command.

As required by the currently applicable European standards, the operation as a Type A RCD, i.e. the detection of faults with alternating or pulsating waveform, is guaranteed even in the total absence of voltage between the active conductors (phases and neutral). The operation as Type B, however, requires the presence of a minimum voltage on at least any two active conductors.

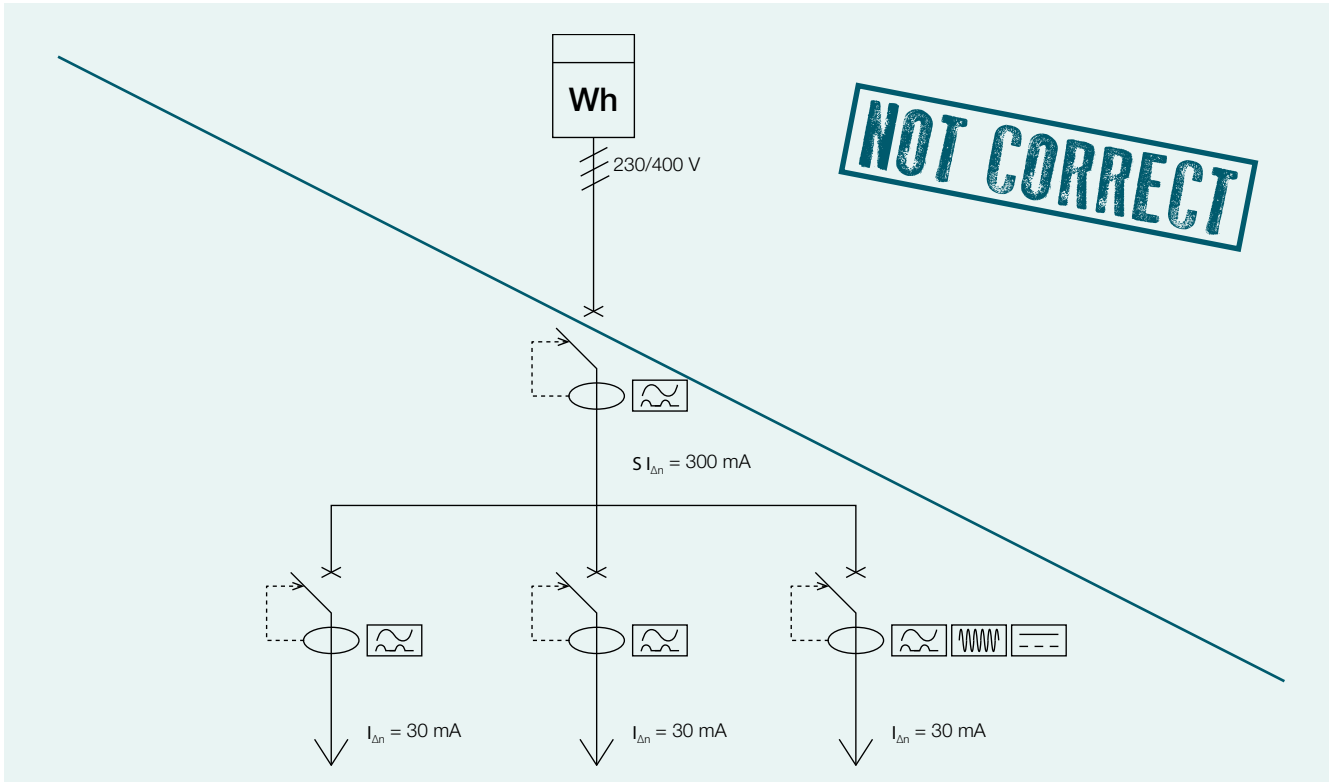
Proper installation of Type B RCDs

Since Type B residual current circuit breakers are used in the presence of loads that are able to generate also earth current with DC component, when designing the electrical system it is necessary for any other RCD installed upstream of a Type B RCD, passed through by the same fault current, also be of Type B⁹⁾. Any direct leakage could impair the proper operation of the upstream Type AC, A or F residual current circuit breakers, which are not suitable in the case of direct residual currents. In fact, even if the Type B RCD protects against direct fault currents, the tripping value (for example 60 mA for a circuit breaker with $I_{\Delta n} = 30 \text{ mA}$) is high enough to compromise the regular operation of another non-Type B RCD. It is therefore necessary to derive the power supply of the Type B RCD upstream of any non-Type B RCDs, or, if an upstream RCD is required, choose a Type B also for this one.

⁹⁾ See the Standard IEC 62103/EN 50178 "Electronic equipment for use in power installations", Art. 5.3.2.3.



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11

Protection against indirect contact (fault protection) at high frequencies

The maximum tripping values for Type B RCDs with $I_{\Delta n}$ not exceeding 30 mA, for the purposes of additional protection against direct contacts, are below the limit curve of the ventricular fibrillation threshold established in Publication IEC/TS 60479 also in the case of direct or high-frequency current.

To provide fault protection (protection against indirect contact in TT systems, the circuit breaker must be coordinated with the resistance of the grounding system with the customary ratio:

$$R_E \cdot I_{\Delta n} \leq 50 \text{ V}$$

With this coordination ratio the protection against indirect contact is automatically checked in the case of direct current faults, since the permissible limit contact voltage in direct current is 120 V, which corresponds to 50 V in alternating current.

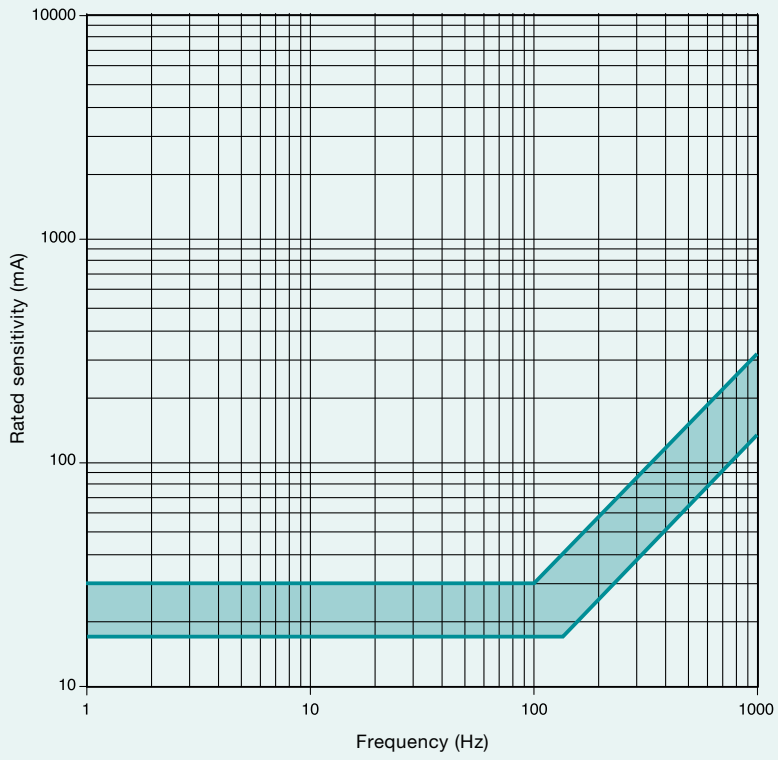
In the case of high-frequency faults, however, a permissible limit contact voltage has not yet been established at the regulatory level. Although the risks for the human body decrease as the frequency increases, until the standards have set these values, the Standard IEC/EN 62423 recommends as a precautionary measure to maintain unchanged the value of 50 V also at higher frequencies. To do this, it is necessary to take into account the actual tripping value of a possible fault frequency. For example, in the case of a type B circuit breaker whose tripping characteristic is that shown in Figure 12, at 1000 Hz tripping is guaranteed with a residual current of 300 mA (lower than the regulatory limit of 420 mA). Therefore, if the consuming equipment can generate a fault current at 1000 Hz, the ground resistance must satisfy the ratio

$$R_E \cdot 0,3 \text{ A} \leq 50 \text{ V}$$

i.e.

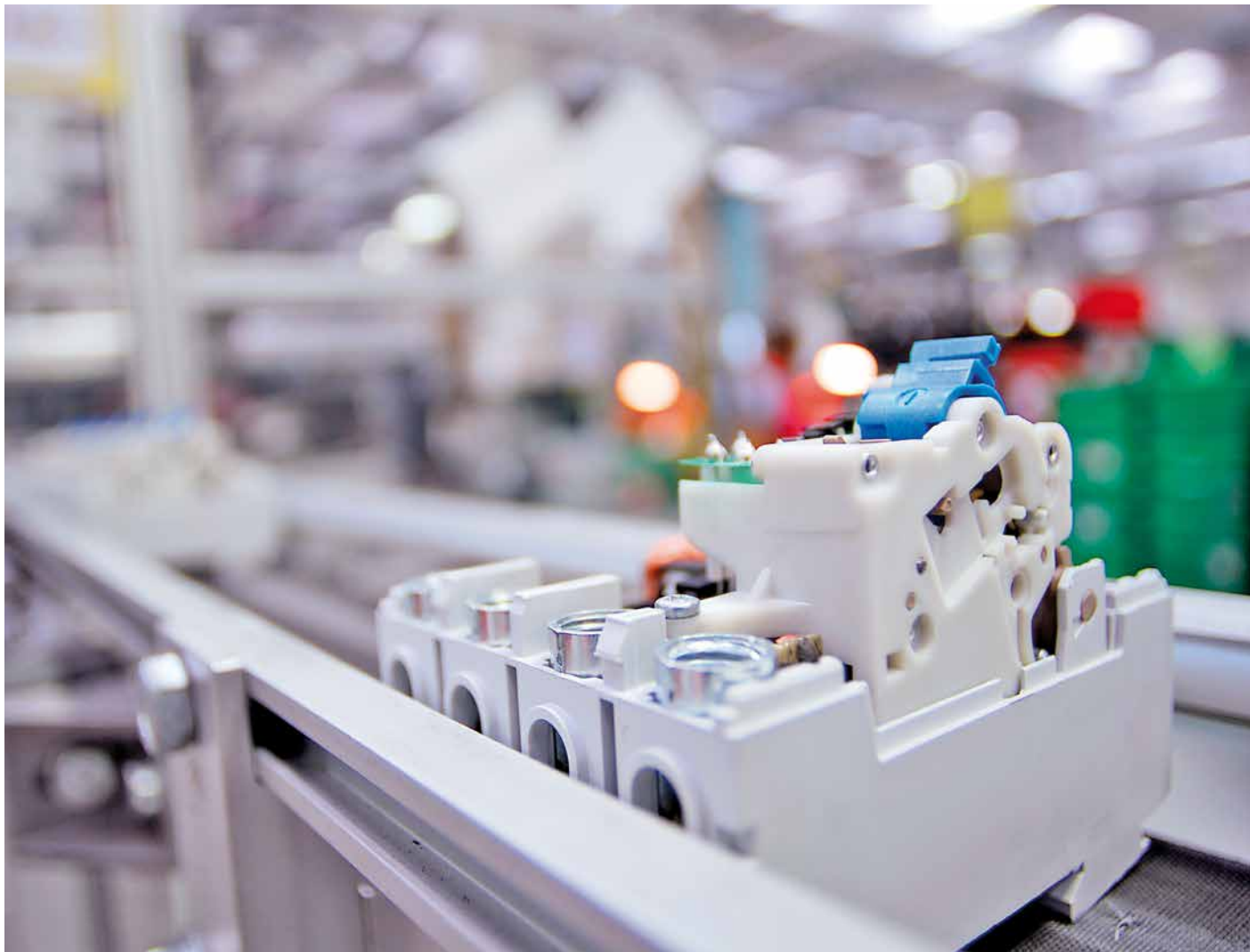
$$R_E \leq 166 \Omega$$





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Figure 12 - Tripping curve in the frequency of a given circuit breaker



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