

3 | 14

An ABB technical journal for  
Low Voltage products  
Installers, Consultants  
and Panel Builders

# Day <sup>by</sup> DIN



## News and know-how for informed professionals

### **Identifying energy consumption by user and activity**

ABB's energy meters with KNX interfaces enables large office buildings, such as the multiple building complex of University of Göttingen, to assign electricity charges to individual users.

### **ABB data center solution for Chinese postal company**

Hot pluggable solutions were key benefits for Beijing Post Company.

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for a better world™





## T Line Twilight Switches. Understanding light to control efficiency.



Designed for automated lighting control, the new ABB T Line twilight switches can be used in all public areas where an optimal and efficient management of brightness and energy is required at sunset. The T1 versions are preset to 10 Lux and equipped with a switching delay and two LED indicators to display the setpoint value, while the advanced versions T1 PLUS, adjustable on four different scale values up to a maximum of 15,000 Lux, allow you to program the switching delay and are ideal for daytime applications. For installation on poles/walls, ABB offers the T1 POLE version, preset to 10 Lux, with integrated photo resistance and inputs for the wiring including cable gland seals.

[www.abb.com/lowvoltage](http://www.abb.com/lowvoltage)

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Hospital application: how to ensure operational continuity and human safety without compromises (28)

# Day<sup>by</sup> DIN 3|14



**Valentina Surini**  
Product Marketing Manager  
DIN-Rail Products

Dear readers,  
Welcome to the third Day by DIN edition of 2014, I would first like to thank you all for the great response I received for the previous edition and the plenty of emails asking questions about electricity world and trends, which led to the development of most of the articles that you can find in this edition. Many of you asked me about Hospital solutions, a topic that is always under the focus of our business for the great chance it gives to offer an additional value in terms of safety and reliability. The other main subject was renewable energies in terms of wind turbines: thanks to the centuries of windmill development and advanced engineering put together, it helps in generating clean energy. In this issue, we are giving a surprise gift that we hope will be useful to you:

a Day by DIN online portal, in which you find all Day by DIN editions, enabling the possibility to browse them directly and to search with keywords! This way, if you are interested in a particular topic, you can read everything at your convenience by easily accessing all published editions from the last three years with your smart phone or tablet. Now that we are entering into 2015, we are planning the next editions and I request you to feel free to write me the new trends you foresee and the opportunities it brings to your business: I will take those suggestions as inputs and develop content for you. Looking forward to reading your emails at [mail.daybydin@abb.com](mailto:mail.daybydin@abb.com)  
Enjoy reading!

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Hot pluggable solutions were key benefits for Beijing Post Company.

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### **Identifying energy consumption by user and activity**

Energy meters with KNX interfaces are a sensible way of doing this.

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Light is essential to modern human life.

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Thanks to this wide product-range, ABB offers complete solutions for protection of wind-power installation.

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All around the railway tracks there are places which need metering.

### 56 Securing from unstable or untrusted networks.

Some easy, careful habits can make equipment last longer and prevent serious damage to installation. Solutions are common, convenient and established and safety is today at our disposal. Everywhere!

### 60 Making data available is the future of today

Technology is improving every day and mostly times makes life easier for everybody, both privately and professionally.

### 62 Current transformers: a sense of proportion, the value of reliability engineering

Energy efficiency, cost saving and continuity of service are currently three fundamental aspects in the management of an electric system. To achieve these targets you need to know when, where and how energy is used.

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### 72 LED street lighting requires a good overvoltage protection

Light is essential to modern human life. Over 50% of municipal budgets are devoted to public area lighting. LED technology represents a versatile lighting source that meets the joint requirements of cost reduction and energy efficiency.

## Time to relax

### 78 Connect the boxes

Train your brain



# Jump in the box

With the new ranges of Electronic RCBOs, E 90 Fuseholders up to 125A and meters for railway applications, ABB Modular DIN rail components' family continue to grow and to propose new solutions for your business: discover more on the following pages.

Protection

## Quicksafe OVR T2 SPD

The new SPD range complying with latest standard

Quick Safe is our new generation of Surge Protective Devices (SPD) with improved performances!

Thanks to innovative technology this new range of OVR covers residential and industrial applications with an extremely good protection level, simple installation and preventive maintenance. All according to the upcoming new standard IEC/EN 61643-11.

We have now a wide range of products intended to cover stable and unstable networks, a complete new philosophy in surge protection.

**Brochure:** 1TXH000351E0201



### Benefits

- Improved performances; such product for critical situations as End of Life and Neutral Interruption.
- Upstream protection up to 125A for T2 and T2-T3 and 315A for T1-T2.
- Clear Life Status View thanks to the mechanical End of Life Indicator, or Safety System Maintenance Indicator (as option).
- Easy identification, our products are clearly marked as Surge Protective Devices to guarantee the easy identification in the switchboard.

# New DSE201 Electronic RCBOs

## DSE201 6 kA: Compact Design with enhanced Protection



The 1P+N electronic residual current circuit-breakers with overcurrent protection (RCBOs) DSE201 meet the demand for devices that fully protect modern installations against short-circuit currents, overloads, earth fault currents and indirect contacts. It also provides additional protection against direct contacts with 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.

The 1P+N electronic RCBOs DSE201 share the same profile of the System pro M compact® range of modular products, offering a smart retrofit solution for space constrained applications.

The reduced height of the DSE201 increases ease of installation since it provides more space for wiring in consumer units and Sub-distribution boards.

**Brochure:** 2CSC423013B0201



### Benefits

- The System pro M Compact® design enables a much easier use of DSE201 in the consumer units along with other protection devices.
- Real CPI- Contact position indication on the toggle: in this way the installers can easily determine the exact status of the RCBOs (whether ON or OFF) by seeing the marking on the toggle.
- Over voltage protection: DSE201 ELN RCBOs trips the circuit in case of an over voltage situation. Whenever the voltage goes beyond 20% of the rated voltage i.e. 300V the RCBO trips to ensure safety to the installation.
- The unique design of the DIN Rail clip eases dismounting even when the unit is installed in a high density system. The DSE201 RCBO can be removed from the cluster without disconnecting other devices.

Protection

# New E 90 50A/125A Fuse Switch Disconnectors

## Uncompromising performance



The new E 90 50A/125A fuse switch disconnectors range for cylindrical fuses 14x51mm and 22x58mm, is specifically designed to provide protection against short circuits and overloads. It is available in a complete range from 1 to 4 poles (1, 1+N, 2, 3, 3+N) and provides disconnection properties according to IEC 60947-3.

Their compact dimensions, the availability of an optical blown fuse indicator (LED) in each pole, new quality marks and marine approvals, differentiate the ABB fuse switch disconnectors range from any other available in the whole market.

**Brochure:** 2CSC444007B0201



### Benefits

- Family feeling with E 90 range now also for higher currents.
- All kinds of industrial applications covered thanks to the availability of multiple poles version from 1P to 3P+N.
- Flexibility of use, from motor protection with aM fuses to short circuit protection with gG fuses.
- Installation made easier thanks to the reduced height of poles.
- The best safety in your hands: close the cabinet front panel even with the handle open thanks to the optimized fuseholders dimension – maintenance has never been so safe.
- Save time thanks to the front LED which allows you to see which fuse is blown.
- cURus certified according to UL 4248-1
- Expand your worldwide and marine business thanks to CCC, EAC, RINA, BV and Lloyd approvals.



## Softstarters

# ABB's new softstarting solution PSTX is the most complete alternative for any motor starting application

The full potential of motor optimization with ABB's PSTX softstarters



The PSTX offers complete motor control and protection in only one unit and is able to handle both load and network irregularities. With three types (standard, dual and ramp) of current limit you get full control of the motor during start. A user-friendly and clear display saves time and resources during both setup and operation.

**Catalogue:** 1SFC132009C0201



## Benefits

- Secure motor reliability  
The PSTX offers complete motor protection in only one unit and is able to handle both load and network irregularities. PT-100, earth fault protection and over/under voltage protection along with many other functions keep your motor safer than ever.
- Improve installation efficiency  
When reaching full speed, the PSTX will activate its bypass. This saves energy while reducing the softstarter's heat generation. On the PSTX, the bypass is built in and verified by ABB, saving you time during installation and space in your panel.
- Increase application productivity  
The slow speed forward and backward jog feature will make you more flexible when operating e.g. conveyor belts and cranes. The PSTX provides positioning capabilities, letting you take control of your process.
- Reliable in harsh environment  
ABB's PSTX softstarters can be used in various applications and segments, from water (e.g. pumps), marine (e.g. fans) to mining (e.g. conveyors) and HVAC (e.g. compressors). The torque control, coated PCBA, built-in bypass and detachable HMI make the PSTX a very reliable component in any harsh or humid environment.

# EQ meters G13 gateway

## Integration made easy

The latest addition of communication device for EQ meters for sub-metering. G13 providing a simple integration of an energy meter system. By connecting up to 32 EQ meters, all measurement data can be read at baud rate of up to 500 000 bits/s. By connecting the G13 via an Ethernet connection to an Ethernet network all data can be read either using the inbuilt REST API by making simple HTTP request or using the built-in webserver. It has never been easier to setup an energy meter network, just connect the communication bus using RS-485 cables, set the unique address in the meter, connect to the G13 via Ethernet, scan and register the meters using the webserver, set user permissions and everything is ready.

**Brochure:** 2CMC481006B0201



### Benefits

- Connect up to 32 EQ meters to one G13 for the most efficient installation - no need for several gateways points.
- Very fast communication – baud rate up to 500,000 bits/s.
- Ethernet connection interface to be connected to a local area network (LAN) or larger networks.
- Built-in web server for easy commission and setup of the meter network.
- Built-in REST API for fast and easy integration of the meter with any kind of system that works with HTTP
- JSON formatted data which is a small and fast syntax with close relationship with JavaScript which makes it easy to implement in any system.
- Both simple and advanced configuration of the meters through the REST API or through the inbuilt webserver. Not necessary to be on site to do configurations of meters setting or functionality after meter has been installed.
- Automatic data routing and protocol conversion between the meter network and the system side.
- No knowledge needed about serial bus communication thanks to easy commission, reading and configuration of meter via the inbuilt web server and the REST API.

# EQ meters A42 552 - 120 and A42 553 - 120

## Meters for railway infrastructure



The two latest members of the EQ meters family are intended for the infrastructure around the railways where 16.7 Hz network is used. The new EQ meters A42 552 – 120 and A42 553 - 120 in Platinum functionality level are primarily intended for single phase metering in any 16.7 Hz network but they work also fine in 50 or 60 Hz networks. This makes them ideal for applications in the infrastructure around railroads with these frequencies but they are not intended for use on the rolling stock. The meters supply high level performance for reliable and trustworthy metering values. The meters have built-in communication interface for connection to meter reading systems either for Modbus RTU or M-Bus standards depending on type. Besides energy metering, the meters also provide an extensive set of instantaneous values such as voltage, frequency, current, power, etc. Four configurable inputs/outputs can be used for various tasks for example threshold alarms like power above the limit or as pulse outputs. A wide display and push buttons make it easy and intuitive to operate the meters.

**Brochure:** 2CMC481002B0201



### Benefits

- Connection via current and voltage transformers for maximum flexibility at the installation sites.
- The meters support a wide voltage range (100 – 288 VAC) without voltage transformers.
- Four quadrant enabled with active/reactive energy and import/export values in separate registers.
- Wide temperature range (-40 to +70 °C) makes them easy to place in various environments.
- MID approval and verification when used in 50 Hz environment. Metering performance at 16.7 Hz is verified in the same manner as for MID.
- The display is pixel-oriented and can display up to four quantities at the same time.
- Low power consumption keeps operating cost to a minimum.
- Compact modular DIN sized, make them easy to fit in an enclosure.



Command

# T Series

## Twilight Switches



The T Series twilight switches command lighting circuits in relation to the ambient light detected by the designated sensor. Their application is particularly useful in public areas (gardens, parking lots, entrances, courtyards, etc.), where they can reduce energy consumption.

The one-channel T1 version is factory preset at 10 Lux, it features a switching delay and 2 LED indicators, one for the threshold value indication and one for the status of the contact.

The connecting and start-up instructions are on the product side to facilitate installation and future maintenance operations. The advanced T1 PLUS version is equipped with a reference selector that can be adjusted to 4 different scale values, thus making these high-Lux-value twilight switches ideal for daytime applications.

- 2...40 Lux
- 20...200 Lux
- 200...2000 Lux
- 2000...15000 Lux

The T1 PLUS version also allows adjustment of the switching delay in a time-range between 15-20s and 90-120s. As with the basic model, also the PLUS version is factory preset at 10 Lux and equipped with 2 LED indicators.

**Brochure:** 2CSC441022B0201



### Benefits

- Two LED indicators: one for the contact status and one for the threshold value
- Sensor factory preset at 10 Lux
- Four different scales for more accurate adjustment of the brightness value on PLUS version
- IP65 protection degree on pole/wall version
- Connection and operating diagram on the product back on pole/wall version



Is it possible to keep the lights on?

Absolutely.



Thanks to continuous innovation on surge protection, ABB improves the protection of the lighting systems equipment by launching the new OVR T2-T3 N1 15-275S SL. OVR SL is a very compact SPD, equipped with a patented thermal disconnecter and a safety reserve system. This new range is specifically designed in order to prevent the risks of overheating and fires in LED lighting systems. [www.abb.com/lowvoltage](http://www.abb.com/lowvoltage)

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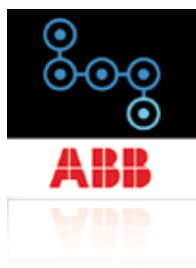
# In the news

Many apps, software, brochures and leaflets are available to provide support and in-depth or detailed product information. Documents and software can be downloaded from <http://www.abb.com/abblibrary/DownloadCenter/>

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
- 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



## Measurements

## Meter for traction application

Get your energy on track



In this leaflet you will find information about the new meter that can be used at 16.7 Hz for traction applications. It includes an overview of the functionality of the meter, technical data sheet, wiring diagram, and order codes. Everything you need to know before ordering.

**Leaflet:** 2CMC484007L0201



## Measurements

## G13 EQ meters Gateway folder

EQ meters made for interaction



The G13 EQ meters gateway brochure provides an overview of communication alternatives for EQ meters. Read about the new G13 gateway, which enables clear data display of other networked meters or learn about how to use the G13 including the built-in REST AP and web server.

**Brochure:** 2CMC481006B0201



## Measurements

## EQ meters B series leaflets

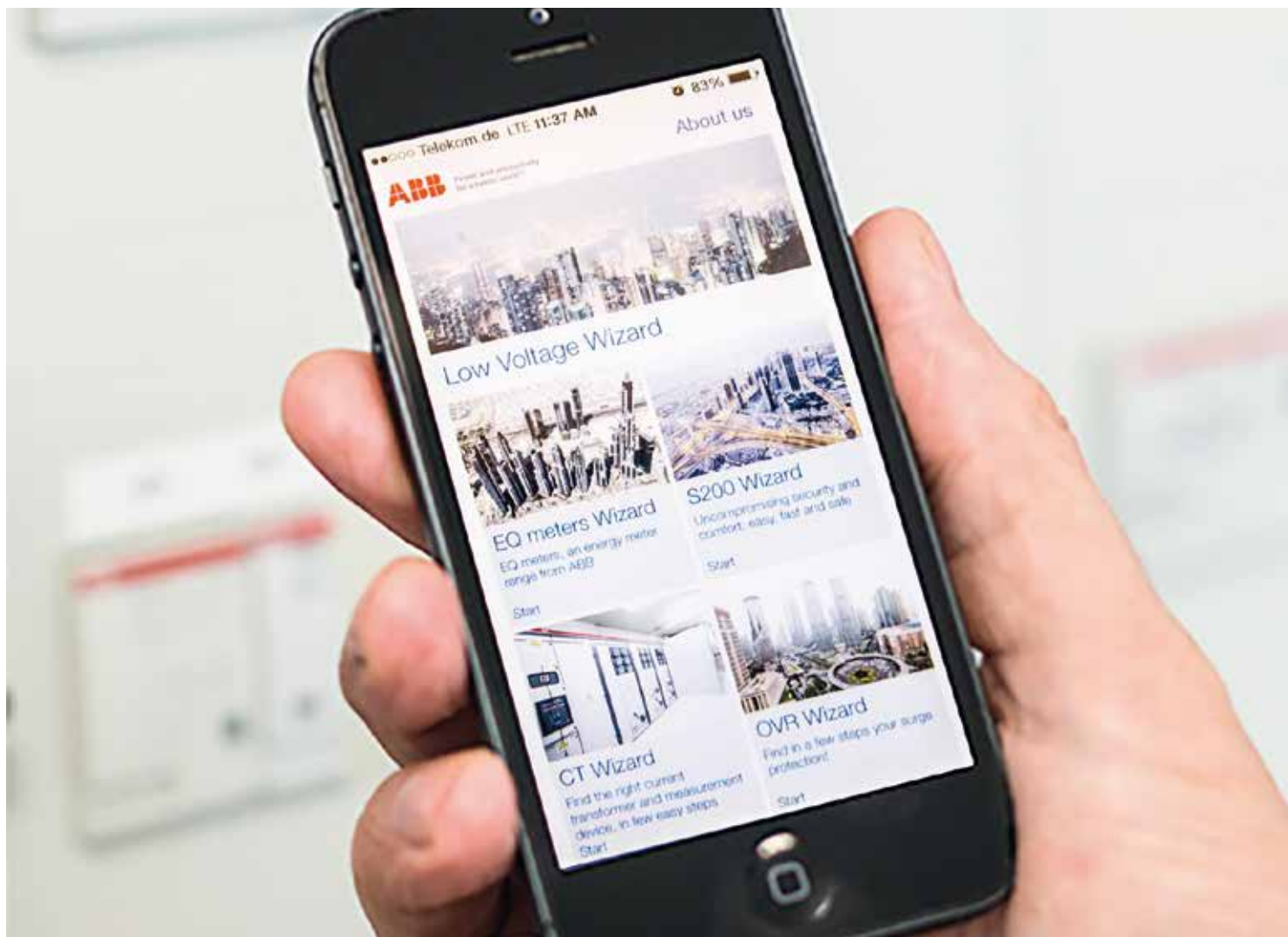
The compact and versatile energy meter



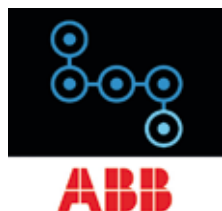
In these leaflets you will find the information for each meter type. You will find leaflets for single and three phase meters, direct and transformer connected meter, and for each functionality level. It includes an overview of the functionality of the meter, technical data sheet, wiring diagram, and order codes. Everything you need to find the correct meter for your needs.

**Leaflet:** 2CMC485001L0201





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](http://www.abb.com/lowvoltage)



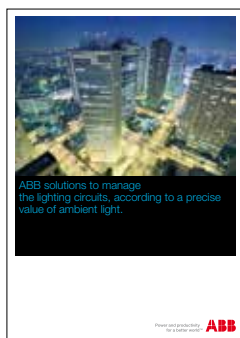
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Command

## T and TWA Series Twilight Switches

Savings and efficient  
energy use for external  
lighting



To control the automatic activation of a lighting circuit when the natural ambient light lessens and, accordingly, to ensure an efficient energy use, ABB offers a full and high-performance range of twilight switches designed to solve from the most common to the more complex applications where lighting circuit control is required.

Discover our solutions, their benefits and further information in the new Twilight Switches catalogue!

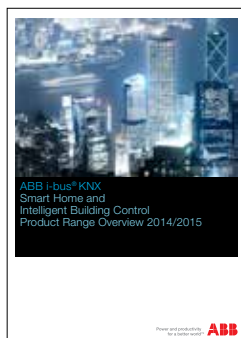
**Brochure:** 2CSC441022B0201



Intelligent Building Control

## ABB i-bus KNX Product range overview 2014/15

Updated version now  
available



The ABB i-bus KNX product range overview gives a concise listing and description of all the products in the ABB Smart Home and Intelligent Building Control portfolio including the necessary ordering information. The new 2014/15 edition includes the latest product innovations in the field Intelligent Building Control and furthermore features e.g. a new functional overview of all ABB i-bus KNX operation devices.

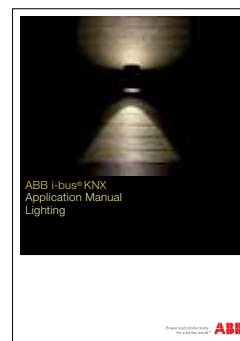
**Brochure:** 2CDC500098C0202



Intelligent Building Control

## ABB i-bus KNX Lighting control application manual

Application know-how for  
System Integrators and  
Electrical Installers



Lighting control is one of the basic functions of ABB i-bus KNX. In this Application Manual, which has been recently updated, you can find detailed information on how to plan, configure and commission KNX devices for lighting control applications.

**Manual:** 2CDC500051M0202

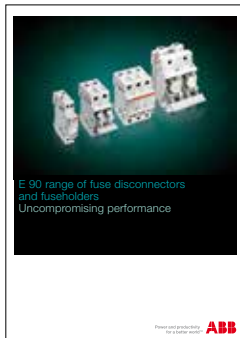




Protection

## E 90 fuseholders brochure

Uncompromising  
performance



In this brochure you will find the complete offer of fuseholders E 90: discover the ABB range, from IEC to UL standard, CCC and marine approval. Plenty of codes that allow you to expand your business worldwide, together with diagrams, tips about application and much more.

**Brochure:** 2CSC444002B0204



Protection

## New fuse switch disconnectors E 90/50A and E 90/125A brochure

Uncompromising  
performance



Discover in this small brochure the features, worldwide approvals and benefits of new fuse switch disconnectors 50A/125A specifically designed by ABB to accept cylindrical fuses gG, aM, gR and many more. Industrial application safety is now in your hand!

**Brochure:** 2CSC444007B0201





## S800 B. High performance miniature circuit breakers. Simply innovative. Safety has never been easier



Limit downtime in industrial electrical systems while ensuring maximum safety for operators and ease of access to devices: S800 B high performance circuit breakers are efficient products at a reasonable cost and designed for overload and short-circuit protection in distribution systems with 16 kA breaking capacity. They comply with Standard CEI EN 60947-2 and feature 80 to 125 A rated current values with B, C, D and K characteristic curves. Thanks to a red/green signal, showing the position of internal moving contacts, and to a switch lever, that stops in the middle position in case of thermal or magnetic tripping, they show why tripping occurred at a glance, enabling prompt maintenance. [www.abb.com/lowvoltage](http://www.abb.com/lowvoltage)

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## Troubleshooting

### H+Line troubleshoot

One click to install and  
configure H+Line



Do you want to configure H+Line devices? Do you have questions about how it works? Download this software following the link at the end of this section, install it on your laptop and run it every time you need support for your H+Line system.

**Link:** <http://goo.gl/58mXvh>

## Software

### e-Design

New engineering software  
suite



ABB presents e-Design, the new engineering software suite to meet the needs of electrical sector professionals working in a constantly changing market. e-Design makes it possible to design an electrical system, optimizing production times to the maximum, thanks to the ability to access a product portfolio to be used in synergy through intuitive and simple functionalities. The suite's appealing and brand-new look, combined with a general optimization of the functionalities that have always characterized ABB software, make it an innovative tool in step with the technologies currently available in the sector.

**Download e-Design suite:**

[www.abb.com/edesign-software](http://www.abb.com/edesign-software)







e-Design. Everyone has a project.  
We have the solution to make it happen.



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.



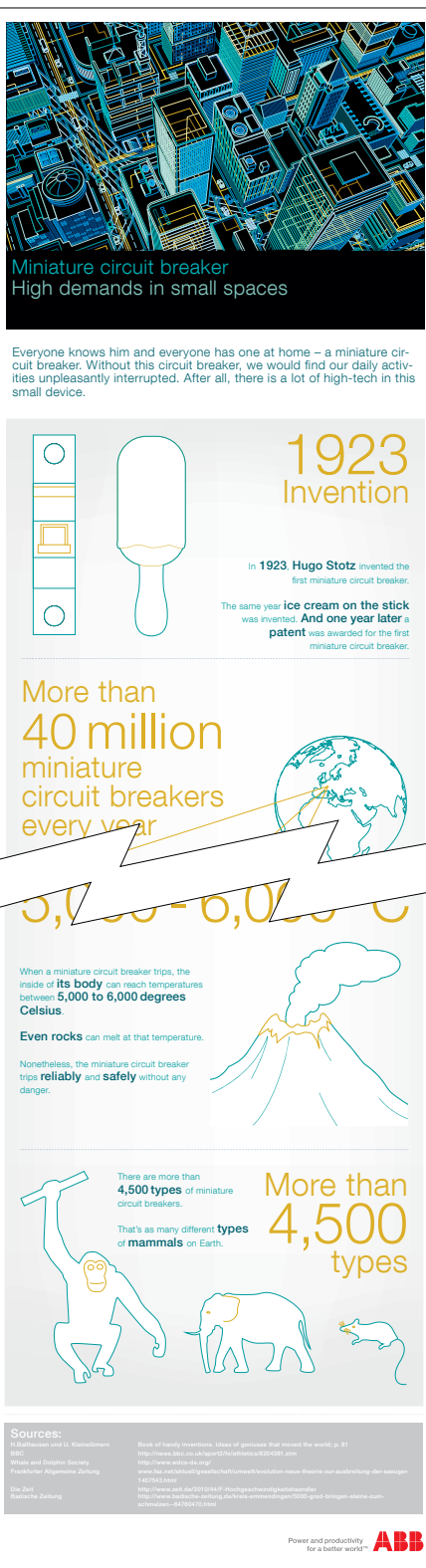
Download e-Design suite  
[www.abb.com/edesign-software](http://www.abb.com/edesign-software)

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## ABB celebrates the miniature circuit breaker's 90th anniversary

**Infographics:** 9AKK106103A8142





## 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](http://www.abb.com/lowvoltage)

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# Top 5

The requirements for railway are increasing and will continue to do so. During their everyday work, the trains are exposed to very high environmental, electrical and mechanical loads. This means a constant stream of new, more demanding safety standards for railway. ABB DIN-Rail range offers highly reliable and easy to install products developed for railway applications, fully compliant with the main standards for the railway segment.

## S 200

Miniature circuit-breaker for railways



The miniature circuit breaker S 200 M UC extends the established ABB System pro *M* compact® product range with an MCB for DC and AC applications. Its high inbuilt short circuit breaking capacity across the entire model line, and its flexible AC and DC application make it truly unique. Whether warehousing or project engineering, planning, installing or maintaining your equipment, the S 200 M UC is a simple and flexible solution. In the S 200 MT range of MCBs for traction, specific materials are used that are classified with an hazard level R26/HL3 according to EN 45545-2. Plastic materials are also classified I2-F3 according to the NF F 16-101/102 ("Railway Rolling Stock Fire Behavior-Choice of Materials" and "Railway Rolling Stock Fire Behavior-Choice of Materials, Application to Electrical Equipment").

## S800

High performance circuit-breaker for railways



S800S and S800S UC are the high performance circuit breakers that meet requirements and satisfy needs of high demanding railway application. Compliant with the main international and national standard for railway applications, the S800S range provides also many advantages and technical features that make them the right choice for installation in rolling stock: housing materials, specific for traction with hazard level R26/HL3 classified in accordance to EN 45545-2 and also classified I2-F3 according the NF F 16-101/102 thus responding to exigency 3; products are tested according to shock and vibration resistance test considering Category 1, Class A and Class B.

## S500

High performance circuit-breaker for railways



S500UC series, K characteristic is an alternative solution for railways application when it is needed with an MCCB or as a back-up for downstream MCBs. The range features several types of adjustable thermal releases, which are ideal for protecting motors or applications in direct current circuits. S500UC-K guarantees an hazard level R26/HL3 according to EN 45545 and exigency 4 according to NF F 16-101/102 (I2-F0) Category 1 - Class A/B as shock and vibration resistance.



# EQ meters

Meters for railway  
infrastructure



The new EQ meters A42 552 – 120 and A42 553 - 120 in platinum functionality level are primarily intended for single phase metering in any 16.7 Hz network but they work also fine in any 50 or 60 Hz networks. It makes them ideal for applications in the infrastructure around railroads with these frequencies but they are not intended for use on rolling stock. The meters supply high level performance for reliable metering values.

# DS201T

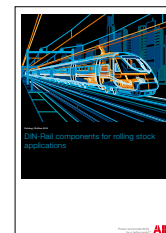
RCBO for rolling stock



The DS201T range of RCBOs are designed for rolling stock applications. The Materials used in DS201T are classified according to EN 45545-2 including the plastic materials which are also classified according to NF F 16 - 101/102.

Additionally to the high quality standards and the flammability requirements, rail applications have specific demands that have to be fulfilled like resistance to shocks and vibrations.

The resistance to vibrations and shocks of RCBOs DS201 T has been positively tested according to: IEC 61373 - 2010



DIN-Rail components rolling  
stock application catalog  
2CDC002053D0204



Railway poster  
9AKK106103A8168



Technical article in Day by DIN 2|14:  
"Powering the railways: overview  
of main standards concerning  
railways application and product  
requirements".  
2CSC007060G0209

Following DIN-Rail products are compliant to meets R26 requirements and are classified with the highest hazard level HL3.

Family	Product name	EN 45545	NF F 16 - 101/102	IEC 61373	GOST 9219-88	IEC/EN 60898-1	IEC/EN 60898-2	IEC/EN 60947-2	IEC/EN 61009
Miniature Circuit Breaker	S 200 MT	R26/HL3	I2F3	Category 1 - Class A/B	x	x		x	
Miniature Circuit Breaker	S 200 MT UC	R26/HL3	I2F3	Category 1 - Class A/B	x		x	x	
Miniature Circuit Breaker	S 200 M UC	R26/HL3	I3F2	Category 1 - Class A/B	x		x	x	
Miniature Circuit Breaker	S 200 P	R26/HL3	I1F1	Category 1 - Class A/B	x	x		x	
Miniature Circuit Breaker	S 280 UC	R26/HL3	I1F2	Category 1 - Class A/B	x		x	x	
High Performance MCBs	S800S	R26/HL3	I3F2	Category 1 - Class B	x	x		x	
High performance MCBs	S800S UC	R26/HL3	I3F2	Category 1 - Class B	x			x	
High Performance MCBs	S500 UC	R26/HL3	I2F0	Category 1 - Class A/B	x			x	
High Performance MCBs	S800HV	R26/HL3	I3F2	Category 1 - Class A/B	x			x	
RCBO	DS201T	R26/HL3	I2F3	Category 1 - Class A/B					x

# Good morning DIN-Rail

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

Marco Castoldi: *Product Manager - DIN-Rail Products*  
Angelo Di Iorio: *Product Manager - DIN-Rail Products*

**About your article “Selectivity and Backup” published in Day by DIN 2/12, how does the “overvoltage category” of circuit breakers tie into the backup issue?**

**What is the overvoltage category?**

The overvoltage category is defined by the IEC EN 60898 and IEC EN 61009-1 Standards, relating to products for use in residential and commercial environments, in which users do not require any special knowledge in the electrical field.

The overvoltage category of a circuit breaker is its ability to limit the amount of energy that is allowed to pass until the time of extinction of the short-circuit. This energy travels downstream circuits (cables, switches) and therefore impacts their sizing. The overvoltage category provides only a rough indication of the product’s features as it only defines the upper threshold of the  $I^2t$  value actually allowed to flow through the circuit breaker. In the same overvoltage category, two or more circuit breakers may feature different  $I^2t$  values.

There are three overvoltage categories: Category 3 has the highest performance because it prescribes the lowest  $I^2t$  threshold values.

The information that can be inferred solely from the overvoltage category is therefore not sufficient to verify the coordination between circuit breakers in series. Unlike the overvoltage category, the overvoltage curves of the specific let-through energy give the  $I^2t$  values in relation to the value of the presumed short-circuit current, crucial information both for verifying

the protection of conductors against short-circuits to properly choose cables, and for the theoretical analysis of the coordination of devices in series in short-circuit conditions as well.

To assist in verifying the cable protection, ABB indicates in its documentation the bearable energy of the most commonly used cables in relation to their section.

**How can I ensure the short-circuit coordination of circuit breakers?**

The backup tables available in many ABB publications, including the System pro M compact® technical catalog, are the most useful and simple tools to use for selecting components. The backup values shown are derived from the lab tests specifically laid down in the product standards and carried out for the circuit breakers shown in the tables.

- If the backup value is equal to or greater than the short-circuit current at the installation point of the downstream circuit breaker, coordination of the two products is assured.
- Moreover, if the short-circuit current value at the installation point of the downstream circuit breaker is less than or equal to the value indicated in the selectivity table, selectivity is also guaranteed.

**An example**

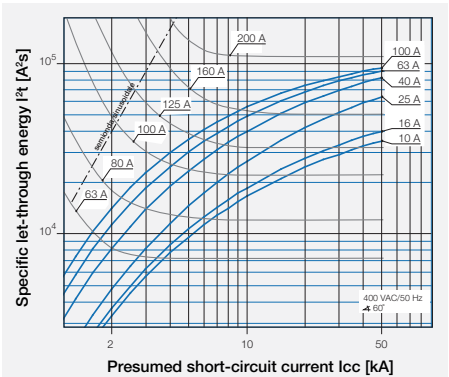
In a system in which the presumed short-circuit current is equal to 40kA, you need to verify the protection against short-circuit composed by a Series S 800 S circuit breaker with a C curve and rated current of

100 A installed upstream of a number of start devices protected by Series SN 201 circuit breakers with a C curve and rated currents up to 25 A. Consulting the overvoltage curves of the specific let-through energy  $I^2t$  of the S800 S-C100 circuit breaker published in the System pro M compact® catalog (Figure 01) we obtain an  $I^2t$  value of 90,000 A²s. Comparing it, as prescribed by the IEC 64-8 Standard, with the  $K^2S^2$  value bearable by the cables (Figure 02), one can verify that protection against short-circuits is guaranteed already starting from 2.5 mm² sections for EPR insulated cables or from 4 mm² sections for PVC insulated cables. These sections are definitely smaller than those of cables which guarantee an adequate flow rate ( $\geq 100$  A) and a proportionate voltage drop.

Once the cable protection has been checked, you can then verify the short-circuit coordination of the circuit breakers.

For the combination of S800S upstream and 201 SN downstream, ABB declares a backup coordination up to 50 kA. This means that it is proven and able to interrupt short-circuit currents up to 50 kA. The combination thus more than meets the protection requirements against short-circuit in the case taken as an example.

This example shows that overvoltage curves allow verification of the protection of conductors against short-circuit, while the backup tables allow verification of the short-circuit coordination of circuit breakers in series.



01

Specific energy bearable by cables			
Section mm²	PVC	EPR	HEPR
50	33.062.500	39.062.500	51.122.500
35	16.200.625	19.140.625	25.050.025
25	8.265.625	9.765.625	12.780.625
16	3.385.600	4.000.000	5.234.944
10	1.322.500	1.562.500	2.044.900
6	476.100	562.500	736.164
4	211.600	250.000	327.184
2,5	82.656	97.656	127.806
1,5	29.756	35.156	46.010

The cable sizing depends, in addition to the specific let-through energy of the circuit breakers, also on the voltage drop of the line and on the flow capacity.

02



Reliable low voltage solutions for rail applications.  
Personal safety is our highest requirement.

ABB is a market leader in supplying reliable products and services to the rolling stock manufacturers and for the rail infrastructure. With a truly global organization, we are committed to local competence and local service. Rail applications require the highest possible safety level. Therefore special regulations and standards are in place. Our products are designed to provide the safety level required and comply with the standards in this industry. For more information please visit [www.abb.com/lowvoltage](http://www.abb.com/lowvoltage)



# Hospital application: how to ensure operational continuity and human safety without compromises

Francesca Sassi: *Product Marketing Manager - DIN-Rail products*





**To ensure operational continuity without compromising human safety.**

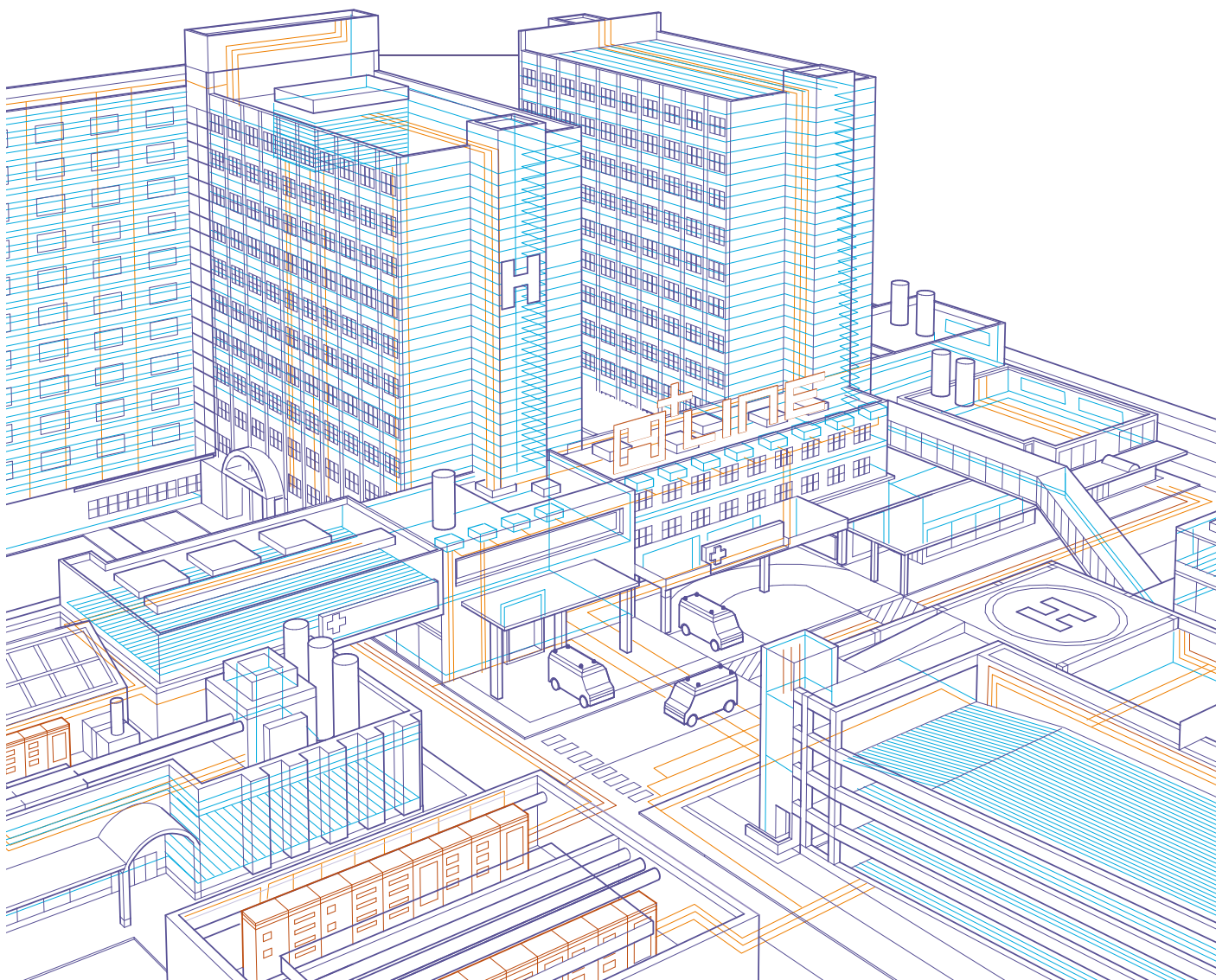
Operational continuity is the lifeline of any hospital installation and the availability of electricity is a major aspect when it comes to continuity. To maintain continuity, the electrical network should be available even in case of unexpected events. The devices being used in this environment should protect without hampering the continuity. This will help in preventing the power failures and downtimes and allow the patients to be treated without interruptions. The critical installations in a hospital include Emergency rooms, Intensive Care Units, Operation Theatres where there cannot be any stoppage of power supply. It is extremely important to ensure the continuity of medical services for patients and at the same time guarantee high levels of comfort to maintain healthy environment.

**Serving efficiency in the hospital environments**

Hospital environments are complex installations where several different applications exist and to always ensure service continuity is a very big challenge. To handle this environment a deep knowledge of the installation practices with appropriate characteristics is required.

For this reason, the products installed in the hospitals must be certified according to IEC 60364, which is the specific standard that applies to electrical installations in medical locations to ensure safety of patients and other persons in the environment.

In particular, the IEC standard 60364 paragraph 7-710 refers to group 2 medical locations *“where applied parts are intended to be used in applications such as intra-cardiac procedures, operating theatres and vital treatment where discontinuity (failure) of the supply can cause danger to life”*.



In group 2 medical locations installed products must be designed and manufactured to operate in a perfectly integrated manner.

Choosing a reliable partner is the key to reach the objective in terms of safety and efficiency.

#### **Safety prescriptions for medical locations**

The hazard of electrocution may arise from direct contact with a live part of the circuit, or from indirect contact with a metal part, for example the metal body of a sterilizer, which is not normally live, but which has become live due to an insulation malfunction. The standard IEC 60364-7-710 allows the following protection systems against direct and indirect contact in medical locations.

#### **Protection against direct contact**

For protection against direct contact with live parts only insulation of the active parts or the segregation thereof through the use of barriers or casings with a protection level no less than IPXXD (or IP4X) for horizontal surfaces within reach are allowed, and IPXXB (or IP2X) in all the other cases.

#### **Protection against indirect contact**

Protection against indirect contact in medical locations is based on the following provisions:

- a) Protection through automatic disconnection of the power supply.
- b) Supplementary equipotential bonding for the conductive parts and the extraneous conductive parts present in the patient environment, or which may enter the zone;
- c) Medical IT System;
- d) Use of equipment with Class II insulation;
- e) Systems with very low safety voltage (SELV and PELV).



## H+LINE

With its H+LINE product line, ABB offers its expertise and technical experience in a sector, namely the hospital sector, that requires a very high degree of innovation and research, as well as a constant guarantee of safety and results. ABB System pro M compact® H+Line hospital equipment is a complete and high performing solution to assure safety and service continuity in group 2 medical locations. H+Line products are specifically designed for group 2 medical environments in full compliance with Standard IEC 60364-7-710, specifically:

- Intensive therapy wards, operating rooms, cardio surgical rooms, ICU, etc.
- Day hospitals, clinics, rest homes, dental and veterinary clinics, etc.



**ISOLTESTER**  
Monitors earth leakage in 230V IT-M circuits



**SELVTESTER**  
Monitors earth leakage in 24V SELV circuits which supply scialitic lamps



**QSD**  
Provides acoustic and luminous indication inside medical locations in case of first fault to earth



**TI**  
Provides separation between the distribution network and the downstream loads



**QSO**  
Floor standing and wall mounting switchboards for supplying and protection of medical locations

### a) Protection through automatic circuit breaking

This protection must be applied in a way that is compatible with the earth connection method used by the network (TN or TT) and bearing in mind that the value of the limit contact voltage  $U_L$ , in the event of a malfunction, is reduced to 25 V (for the section of system in low voltage).

### b) Supplementary equipotential bonding

The standard IEC 60364-7-710 prescribes the implementation of main equipotential connections, at the base of each building, in order to guarantee the equipotentiality of all the extraneous conductive parts entering the same building, and of supplementary equipotential connections in the environments at greatest electrical risk. Group 1 and 2 medical locations are expressly covered by this prescription

because the differences of potential between conductive parts and extraneous conductive parts and therefore the currents that could affect a patient in contact with such conductive parts are limited to the maximum with the additional equipotential connections. Each room for medical use must therefore be equipped with its own equipotential bonding bus bar to which the electrical devices and all the metallic parts that can close an electrical circuit to earth must be connected, so that if an indirect contact of a device (even external to the premises) occurs, all the conductive parts and the extraneous conductive parts assume almost the same potential instantaneously (no significant difference of potential between the devices accessible to the patient).

### c) Medical IT System

According to the IEC EN reference standard 60364-7-710, as group 2 medical locations, the use of Medical IT System is mandatory, in fact it makes it possible to:

- limit the indirect contact currents by containing the contact voltages;
- reduce leakage currents;
- guarantee continuity of service in the event of a first earth fault of a device.

With the Medical IT System, the circuits branched to the secondary must be protected with fuses or thermomagnetic automatic circuit breakers, but not RCDs because the RCD would not be effective in this particular system.

### d) Class II components

Medical electric equipments too can be implemented with insulation in class II and carry the “double insulation” symbol. For these devices there is no obligation to connect them to earth if installed in ordinary or group 1 locations; instead they must be connected to the equipotential bonding bus bar (or to a sub-node) if used in group 2 medical locations.

### e) Protection against direct and indirect contacts (SELV and PELV systems)

The combined protection against direct and indirect contacts is assured by very low

safety voltage which can be implemented with SELV (Safety Extra Low Voltage) and PELV (Protection Extra Low Voltage) systems, provided that their rated voltage is not higher than 25 V in alternating current and 60 V in non inverted direct current. The power supply must arrive from a safety transformer or from a battery and the SELV and PELV circuits must be installed in the manner prescribed by IEC 60364-4. The active parts, if not adequately insulated, must be protected with a protection degree that is at least IP XXB and, for higher horizontal surfaces within reach (for example, beds, tables or other surfaces), at least IP XXD. The use of these systems in Group 2 rooms requires the following additional provisions:

- the safety transformer must be powered at the primary by the Medical IT System if devices that enter the “patient environment” are connected to SELV or PELV systems;
- the devices powered must be connected with the equipotentialisation system of the medical locations (equipotential node).

SELV and PELV systems are rarely used, except for supplying power to dedicated devices, such as scialytic lighting devices or infusion pumps.



## ABB i-bus® KNX technology

ABB i-bus® KNX is the intelligent installation system that meets the highest requirements for applications in modern home and building control. It is the first open STANDARD for home and building control approved as ISO/IEC 14543 standard as well as EN 50090 and EN 13321-1 and it fulfills requirements of comfort, security and economy in the electrical installation of buildings.

- With the ABB i-bus KNX buildings is to manage and control more easily, resulting in increased flexibility, security, economic efficiency and convenience.
- The operational flexibility of an ABB i-bus KNX makes the workplace or everyday life to be easily adapted to individual needs, present and future.
- The range of ABB i-bus KNX covers all applications found in modern buildings, ranging from lighting and shutter control to heating, ventilation, security, energy management and many others

Read on the website all the information about ABB KNX solution



<http://new.abb.com/low-voltage/products/intelligent-building-systems/abb-i-bus-knx>





## SMISSLINE plug-in devices



Small cause, large effect: as the world's first pluggable socket system, SMISSLINE 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 flexible installation, quick and safe maintenance and service continuity, all aspects very important in hospital installation.

SMISSLINE TP at a glance:

- SAFE: load-free plugging in and unplugging possible under power
- FLEXIBLE: rapid replacement, easy expansion
- TIME AND SPACE SAVINGS thanks to the plug-in technology

The SMISSLINE TP pluggable socket system is completely finger-safe (IP2XB) – when devices are plugged in and unplugged, the system is always touch-proof. This means that SMISSLINE TP prevents any danger to personnel from switching arcs or accidental arcing.

SMISSLINE TP Range is composed by:

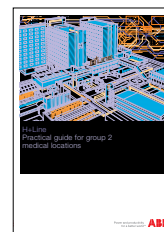
- Miniature circuit-breaker 1-, 2-, 3- and 4-pole
- Residual-current circuit-breaker 2- and 4-pole
- Combined RCCB-MCB 2- and 4-pole
- Surge arrester type 2
- Switch disconnector
- Motor protection switch
- Busbar system, contact rails max. 100 A; incoming system with max. 200 A
- Wide range of accessories



**Francesca Sassi**  
Product Marketing Manager  
DIN-Rail products



**Technical catalogue SMISSLINE TP**  
2CCC451059C0202



**Technical guide H+LINE**  
2CSC470010B0202



**KNX systems**  
2CDC500098C0202





# ABB data center solution for Chinese postal company

Hot pluggable solutions were key benefits for Beijing Post Company.

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

**W**ith its 51,000 branches, the China Post Group is not your typical postal operation as it offers many additional services besides mail delivery. From online greeting card services to booking your flight or hotel reservations to financial bank services, its communication infrastructure is critical to serving one of the most populous countries in the world.

## **Saving space and lowering costs**

To meet the increasing public service needs, the China Post Group decided to invest in a modern data center. ABB was able to provide a complete solution for the core data center of the national postal information system in Beijing. A key decision factor was ABB's switchboard with low voltage components that would save space in cabinets and lower costs.

## **Offering complete solution**

Specifically, ABB supplied power distribution cabinets, Uninterrupted Power Supply (UPS) cabinets, and power counters. One requirement was that the protection Miniature Circuit Breakers (MCB) should be hot pluggable and adjustable for phases.

"We were able to offer the whole solution with outstanding technology and convenience service," says Cheney-ZhaoZhen Chen, ABB's Product Group Marketing Manager for Enclosures & DIN Rail products in China. "Especially, the solution of SMISSLINE busbar and adaptor with S200 MCB met China Post's requirement of hot pluggability and also saves costs for the power counters."

In addition, the auxiliary contactors installed at the bottom of the MCBs for status detection helps save a significant amount of space in the cabinets. Besides S200 MCB and SMISSLINE, ABB also provided all other low voltage components such as Tmax breakers, OVR surge protection devices, the monitoring system (EM-PDU) with a touch screen, which displays all electric parameters and controls of the power cabinet.



# Identifying energy consumption by user and activity

ABB's energy meters with KNX interfaces enables large office buildings, such as the multiple building complex of University of Göttingen, to assign electricity charges to individual users. With energy costs exceeding millions of Euros every year, it is critical that the amount of energy consumption is clearly visible to individual users as well as facility management.

*Dominik Zerweck: Product Marketing Manager - DIN-Rail Products*

**A**round 26,300 students are currently enrolled at the University of Göttingen. They are accommodated in 235 individual campuses constructed between year 1330 and 2011. The building management system also supports 15 leased buildings or parts of buildings, with a total area of approximately 600,000m<sup>2</sup>.

Minimizing the consumption of electricity, water, heat and cold is one of the most important ways of ensuring efficient facility management. The cost of energy has increased steadily in the past few years. In the year 2000, EUR 7 million had to be paid for electricity and heating (not including the University Medical Center), a figure which had risen to EUR 11.5 million by 2007.

An eleven-point plan adopted in 2006 to reduce consumption and costs is already showing significant results. It was possible to reduce the consumption of heat by 10.7% compared with 2005 and electricity by just under 8%, a figure which rose to 17.2% and 14.7% when adjusted to compare the same circumstances as in 2005. In spite of this, energy costs rose in 2011 to EUR 13.8 million.

## Changing times

Alongside the replacement of refrigerating and heating systems and the renewal of windows or façade heat insulation, precise load profiles enables energy savings. Energy meters have therefore been installed in all buildings. On the one hand, this enables the detailed documentation of energy consumption.

On the other, this facilitates the billing of costs to the respective user, i.e. the individual faculty or third parties, such as non-academic research institutes. Because usage behavior is a vital factor in energy consumption, energy managers and users have jointly established and implemented additional technical and organizational energy saving initiatives.

Initially, analogue pulse counters were mainly used which had to be read manually. An automatic remote transmission system was retrofitted in order to enable the assignment of consumers as accurately as possible. Now, electronic energy meters with KNX interfaces from ABB are mainly used. As Gabriel Keller from the department GM 360 ZWS/KNX explains, due to their functionality and excellent features, these devices have proven to be ideal for remote reading of energy measurements on all property owned by the University of Göttingen, including the University Medical Center (UMG).

The consumption data from all buildings are automatically registered and evaluated by the energy management software "Energio". It is runned centrally on a visualization PC. From here, consumption data can also be read directly via KNX which is the state of the art in refurbished buildings and new constructions. In addition to primary energy metering and water and district heating metering via KNX binary inputs, the bus system is mainly used to control shading and lighting and for connection to weather stations.

Error messages, e.g. from energy meters, are also transmitted via KNX to the 24hr central error message receiving station. This station records each message, determines which actions are necessary and identifies who should be informed.

## Transparency of consumption

One of the sites where A series energy meters from ABB are being installed is at the Schwann-Schleiden Research Centre for Molecular Biology on the North Campus - one of the university's largest construction projects. Five institutions for the science and zoology have been working here under one roof since April 2011. Of a total area of 3200m<sup>2</sup>, 2200m<sup>2</sup> is taken up by laboratories. In addition, 20 climatic chambers are available for use by the scientists.

As far as possible, the aim is to provide institute-specific billing in consultation with the users. This means that consumption readings must be determined separately, i.e. that individual consumers, such as corridor lighting, climatic chambers or laboratories, are precisely assigned to the respective energy meters. This results in a KNX structure with 380 addresses and 15 lines, which for the land occupied by the University of Göttingen means development of a comprehensive KNX system with a total of 2148 addresses and 104 lines, which must be operated as far as possible in a failsafe manner.

The ZS/S 1.1 meter interface from ABB reads data from energy meters via its infra-red interface and converts them into KNX





telegrams. To enhance reliability, all information is transmitted from a technical network which has a special security system.

#### Load profile function

Gabriel Keller emphasizes that A44 energy meters from ABB with Platinum functionality are proving to be the best way to address the nature and extent of the challenges faced. The four-line display can also be read by "non-expert" employees. The decisive criterion, however, is the load profile function. This records energy consumption at predefined intervals. The meter also registers pulses to the inputs from other meters, assigns profiles for the active and reactive energy and communicates the amount of energy consumed and generated. Because one PV system feeds into the university network, 2 directional (imported and exported energy) meters are used for this purpose.

The A series energy meters are IEC-certified and additionally certified and tested in accordance with the Measuring Instruments Directive 2004/22/EG (MID) of the European Commission. The latter is mandatory for meters in billing-related applications within the EU and the A44 energy meters are therefore ideal for the primary metering carried out here.

The integrated real-time clock (RTC) with a calendar which automatically takes account of leap years and adjusts for daylight saving changes, is used in meters for tariff switching according to IEC 62052-21 and IEC 62054-21. In the event of a power failure, the time is saved for the incident.

The meter readings can be saved for all energy registers with a date and time stamp per day, week or month. In this way, the energy consumption from a previous period can be compared with the current period. Furthermore, it is possible for meters with a tariff function to store the meter readings of the individual tariffs (1 to 4) as well as the overall meter reading.

The Platinum version of the A44 energy meter can determine minimum and maximum values. The average values are derived per interval for various measurements and saved together with the data and time stamp. Values are also available for active, reactive and apparent power as well as the number of pulses counted on the inputs from other meters.

The event log can register over-voltage and under-voltage and voltage failure per phase, negative power, power failure, and alarms - each recorded with date, time, event code, and duration of their occurrence.

In addition to the high-end model, the A44 with Platinum functionality, which is used for primary metering, other meter versions are used as for example as sub-meters, depending on their version, Steel, Bronze, Silver, Gold or Platinum - i.e. their functionality level. All devices in this EQ meters series operate with very low power input, for example, the own consumption is only 0,001VA per phase - which conforms to the energy objectives of the University of Göttingen.



**Dominik Zerweck**  
Product Marketing Manager  
DIN-Rail products

# Doktor Wise

## The expert answers

Francesca Sassi: *Product Marketing Manager DIN-Rail products*

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

### Phase-to-neutral circuits

#### When it is necessary to isolate the neutral

In TT and TN systems, overcurrent protection of phase-to-neutral circuits is typically composed of two fuses or a circuit breaker with two protected poles (Figure 01).

In fact, it is sufficient to protect only the phase against overcurrents, and not the neutral as well, with a unipolar circuit breaker or with a fuse: this way, however, the neutral cannot be isolated.

In TN systems, isolation of the neutral is not required, except in special cases where the phase-to-neutral circuit is derived from another phase-to-neutral circuit with a fuse or a unipolar circuit breaker on the neutral conductor, because otherwise the neutral would be put under voltage if the upstream fuse trips. (Figure 02).



The new S 200 series of miniature circuit breakers ensure the protection of systems from overload and short-circuit conditions.

#### TT or TN Systems

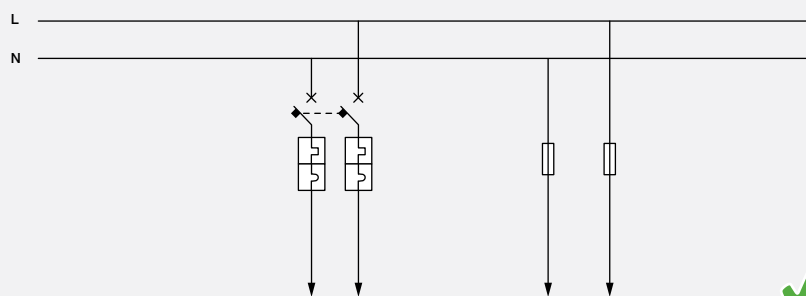
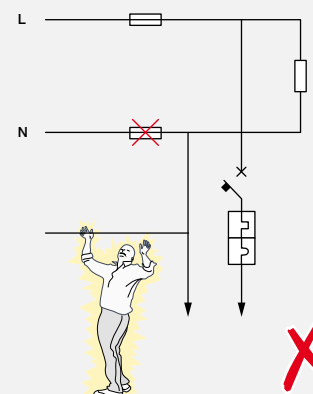
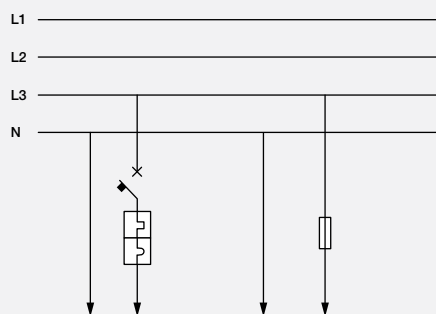
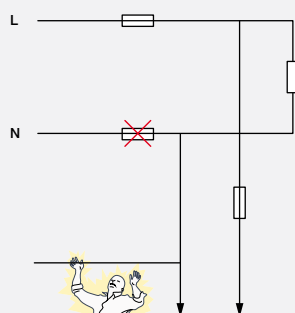


Figure 01

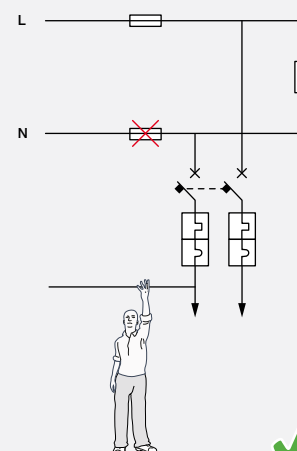
#### TN Systems



a)



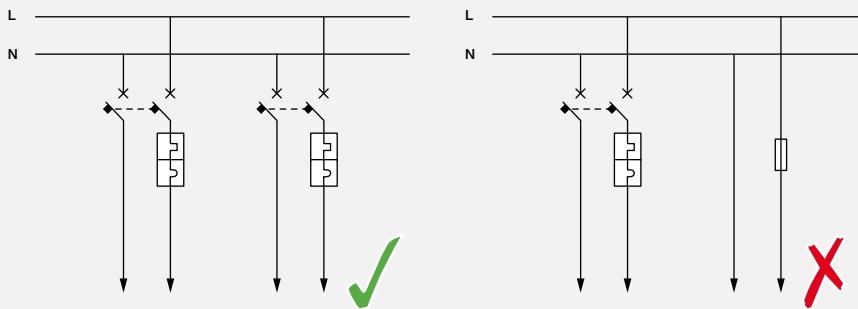
b)



c)

Figure 02

### TT Systems



In TT systems, the neutral must always be insulated and so it is not possible to interrupt only the phase. You can therefore use either two unipolar circuit breakers or a bipolar circuit breaker with only one protected pole (Figure 03).

The insulation can be achieved using a device upstream, if the two downstream circuits can be taken off voltage simultaneously for work operations without compromising service continuity (Figure 04).

IT systems allow only bipolar circuit breaker with two protected poles. Neither unipolar circuit breaker, nor bipolar ones with only one protected pole, nor fuses are acceptable (Figure 05).

Figure 03

### TT or TN Systems



Figure 04

### IT Systems

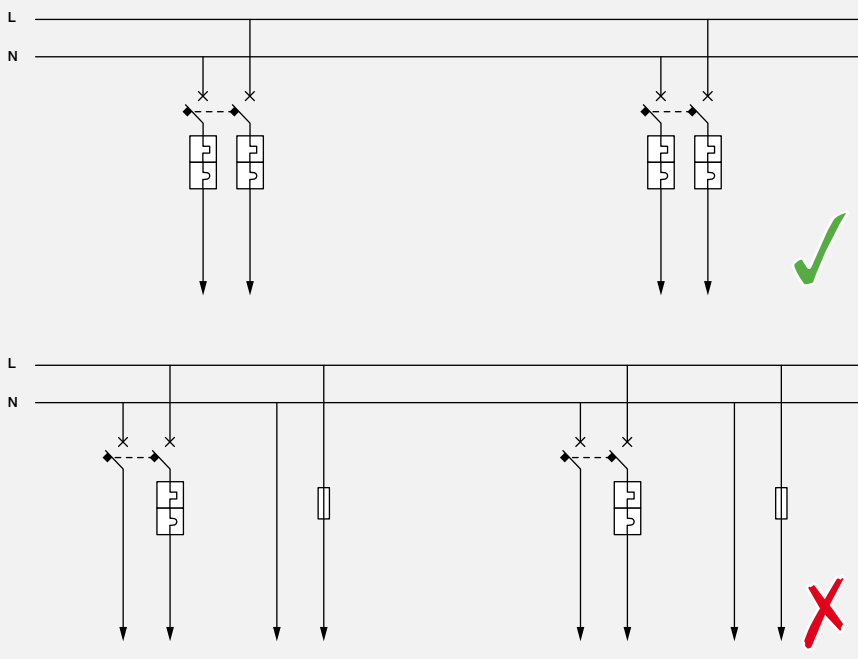


Figure 05



The S800B series is particularly suitable for protection against overloads and short-circuits in power distribution systems

# Comfort and efficiency for hotels

ABB i-bus KNX is the worldwide standard for home and building control offering a broad range of solutions for the automation of modern hotels.

Thomas Rodenbusch-Mohr: *Product Marketing Manager Intelligent Installation Products*

A hotel is made up of much more than just hotel rooms, it is a building teeming with life and emotions. A hotel possesses many different spaces with diverse usage. Here too, ABB's intelligent building control offers outstanding options for assuring efficient and environmentally friendly operation in receptions, public areas, seminar rooms, conference centres, health and fitness areas, restaurants, kitchens, service areas and outdoor facilities.

The use of KNX solutions in hotel facilities helps to provide maximum comfort for guests and to efficiently manage all functions: room climate control, lighting control, shutter and venetian blind control, real-time energy consumption monitoring, visualization of all building functions and many more.

Added to all this is the reliability of a KNX system, which combines quality and flexibility, and significantly simplifies build-

ing monitoring and maintenance activities thanks to the ability to view and control the entire system from a central point (via a panel or the supervisory software) placed, for example, at the front desk.

For a hotel, the advantages are obvious. The realization of KNX systems allows not only the streamlining and optimization of installation costs, but also to significantly reducing the management and maintenance expenses, namely through the centralized display of the most important parameters and the immediate reporting of possible failures to the staff. Furthermore, the significantly increased energy efficiency as a result of an efficient control of, e.g., lighting and room climate form a strong advantage for the use of KNX in guest rooms and public areas.

Energy saving and efficiency offer hotels not only cost savings but also a great opportunity from a communication perspective. By promoting green building concepts it is possible to inform guests of

the efforts made by management to minimize environmental impact, not only with regard to the waste of water (commonly seen for years in many hotels in relation to washing towels), but also - and especially - with regard to an efficient intelligent building control system.

## **Modularity and flexibility to serve needs of operators**

The KNX solutions are marked by high flexibility afforded by the ability to reprogram the devices during their operation, even months or years after installation, to respond to the changing needs of the customer which can then be met easily and quickly.

The progressive upgrading of the system is facilitated, compared to traditional installations, by an architecture based on lines and areas that communicate with each other via a low-voltage bus, to which additional components for the integration of new applications can be added at any time.

The expansion and modification of the system without limitations at any stage of its life cycle - with the aim of ensuring a safe and profitable investment over time and of being able to adapt to new requirements and to new requested functions - is further facilitated by modular and room based installation concepts. ABB's Room Master range offers combined DIN rail devices, which can be placed in the guest room distribution board to control all main functions: lighting, heating and shading control. For the decentralized installations in public areas ABB offers modular Room Controller devices, which can be placed e.g. in the underfloor or in false ceilings.







### The advantages compared to traditional installations and to proprietary systems

Compared to a conventional equivalent installation, the KNX system is marked by the presence of a single bus that connects all the devices and over which these communicate with each other, by means of telegrams/messages, with the aim of exchanging information for controlling the building's functions. The presence of a single low-voltage bus, decoupled from the power cables but installable in the same conduits, allows to reduce considerably - besides the costs - the wiring complexity and the design and installation times. Additionally, there is the option to integrate new features at any time, without the need to make substantial changes to the wiring, but simply by reprogramming the devices, with an overall flexibility that is unthinkable for conventional installations.

The advantage of the KNX building automation solutions is also evident with respect to proprietary building automation systems, compared to which it is approved in accordance with the international standard (ISO/IEC 14543-3), the European standard (CENELEC EN 50090, CEN EN 13321-1 and 13321-2), the Chinese standard (GB/Z 20965) and the US standard (ANSI/ASHRAE 135). KNX products made by different manufacturers can be combined within the same system to ensure interworking and interoperability and to further protect the performance and reliability of the investment over time. Even commissioning is standardized through the use of a single programming software, ETS (Engineering Tool Software), developed under the responsibility of KNX Association and used for the devices of all manufacturers.

KNX building automation solutions can also be easily interfaced with other external systems, thanks to the availability of



**Thomas Rodenbusch-Mohr**  
Product Marketing Manager  
Intelligent Installation Products

a wide range of gateways. For example, an ABB i-bus KNX DALI Gateway can be used to control DALI ballasts in lighting control applications. Furthermore, KNX IP interfaces allow the integration of KNX to IP networks, e.g., for interfacing to a visualization system.

### The ABB i-bus KNX product range for hotels

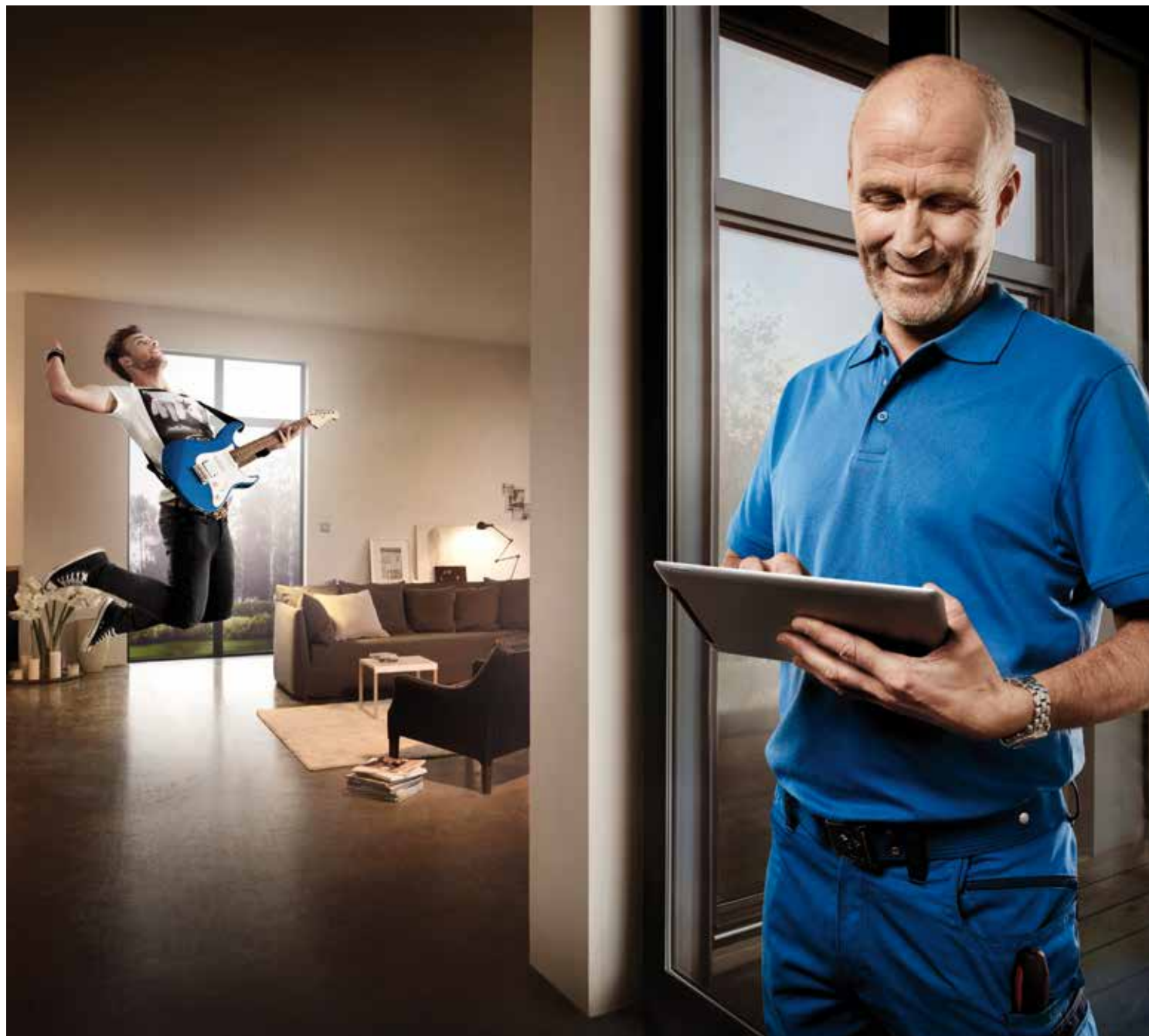
The ABB range for hotel exploits the vast potential offered by the products of the KNX Intelligent Building Control range. In particular, ABB's intelligent building control solution can be easily integrated to guest room management systems. This allows to control the climate system and the electric utilities that are enabled only when the room is occupied, optimizing energy consumption without sacrificing guest comfort.

The ABB product offering also features a full range of KNX devices for building automation: lighting control actuators, dimmers, occupancy sensors, motorized shutter and utility control actuators, temperature control actuators (control of fan coils, solenoid valves, thermoelectric valves, motorized valves), binary inputs for interfacing conventional contacts (for example, door status contacts, bathroom

pull-ropes, window contacts, conventional switches, etc.) to the KNX bus. The wide range of ABB i-bus KNX devices for Energy and Load Management (ZS/S Meter Interface, SE/S Energy Actuator, EM/S Energy Module) allows to control the energy consumption throughout the hotel and to easily identify any inefficiencies: a range that represents a valuable support in the fight against waste. Not to forget the RC/A Room Controller and the RM/S Room Master, indispensable products for streamlining design and installation by integrating in a single device all room control functions (lighting, blinds, temperature).

The ABB i-bus KNX range is rounded out by operation devices with impressive functions allowing a comfortable use of exclusive equipment – at a glance, with a minimum of touches. The KNX touch sensor, for example, is sufficient to dim the lights and operate the blinds. Or the functional elegance of the Bush-priOn® suffices to centrally and intuitively control the lights, the air-conditioning, the blinds and the music. Even more exclusive is the fascinating Busch-ComfortTouch®. For the enjoyment of all networked functions in the suite – from lighting, temperature and shading up to video player, sound system or the Internet.





## Is there such a thing as easy home automation?

ABB-free@home® is totally uncomplicated – from installation to configuration via an app on your tablet or laptop. Whether blinds, light, heating, air-conditioning or door communication – at last, comfort, safety and energy efficiency are easy to network. It takes little effort to meet all your customer's home automation needs. This gives electricians a clear competitive advantage.

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Of course.

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for a better world™





# Discover e-Design. ABB's new software suite.

e-Design. Everyone has a project.  
We have the solution to make it happen.

Pavlo Tkachenko: Product Marketing manager - Main distribution boards

**E**-Design is the integrated suite, fully designed by ABB, dedicated to designers, technicians, engineering companies, panel builders and wholesalers. Thanks to e-Design you can design an electrical installation optimizing the elaboration time, benefiting from a products portfolio to exploit with synergy and from intuitive and simple functions. Software is structured with four integrated functional modules, allowing to support all planning stages of an electrical installation. All solutions are studied in detail, from the electrical network dimensioning, to the switchboard configuration, up to the final estimation stage.

The registration procedure is very easy and, once completed, you can immediately download installers and upgrades.

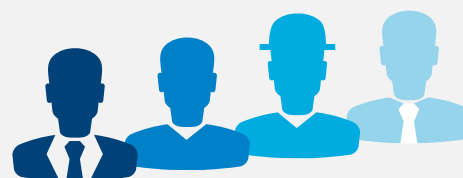
e-Design can be considered a versatile tool because of the perfect connection and communication among its modules, which determines its main added value, allows all professionals involved in the project to cooperate.

Each one of them can have different modules, functions, depending on his/her needs, and requirements bound to the type of activity carried out, considerably optimizing the execution times and drastically reducing the possibility of errors. This together with the advanced additional functions of e-Design, such as registration, download, installation and automatic upgrade, help desk and on-line documentation, ensure a high performance for all types of projects.

The suite has been designed focusing especially on the needs of field professionals - thanks to the help of experienced ABB technicians.

This feature determines one of the most valuable benefits of the suite, which marks a net difference with the other solutions on the market. In fact, it makes possible a direct connection between the single line diagram and the definition of the front view, the design and automatic configuration of the front view, the guided config-

DESIGNERS  
PANEL BUILDERS  
INSTALLERS  
WHOLESALE'S TECHNICAL OFFICES





uration of the devices, even for inexperienced people, and the creation of default configurations.

### Selection and configuration of products and accessories

The selection and configuration process, in which the technical features of devices are defined, is simple and intuitive even for less experienced users.

But, for the more experienced the process is even more straightforward, and involves entering the product code or its description. The experienced user can also use the product search function by code or by description.

A dedicated function is available if changes have to be made to configurations during the project. This enables product configurations already finalized to be changed, which results in significant time savings.

### Quotations

The software ensures effective product organization, with a similar tree view as for files and folders, so that the user can work methodically, view the relevant product immediately and define the switchboards with ease.

Practical and prompt product management is assured through the controls: Cut, Copy, Paste, Duplicate and Modify (that can also be applied to groups of components), speeding up the estimate completion stage.

In addition, the “Favorites” function allows lists of products to be created and reused for subsequent projects, whilst the personalization options can be used to create individual customer records, ad hoc discount profiles and price lists. Finally, print reports can be produced with different levels of detail, designed to meet a wide variety of needs.



**Pavlo Tkachenko**  
Product Marketing manager  
Main distribution boards



#### FLEXIBILITY

4 interconnected modules accessible during all stages of the project.

Project reusable by all the professionals involved in its creation.



#### SPEED

Ability to save, duplicate and edit product and switchboard configurations.

Guided configuration of switchboards and products.

Calculation of single-line diagram and automatic dimensioning of conductors and control and protection equipment.



#### SIMPLICITY

Drawing of single-line diagram using predefined macros.

Guided configuration of switchboards and products.

### Switchboard configuration and engineering

Thanks to the switchboard automatic design guided process based on the list of devices, this functionality simplifies one of the most complex design stages, so that there is no need for an in-depth knowledge of ABB switchboard features. This prevents product compatibility errors.

Several controls are available to speed up any changes to the initial solution, and a dedicated module is provided to configure busbar systems. e-Design's temperature-rise calculation functionality allows switchboard size to be carefully optimized.

### Electrical dimensioning

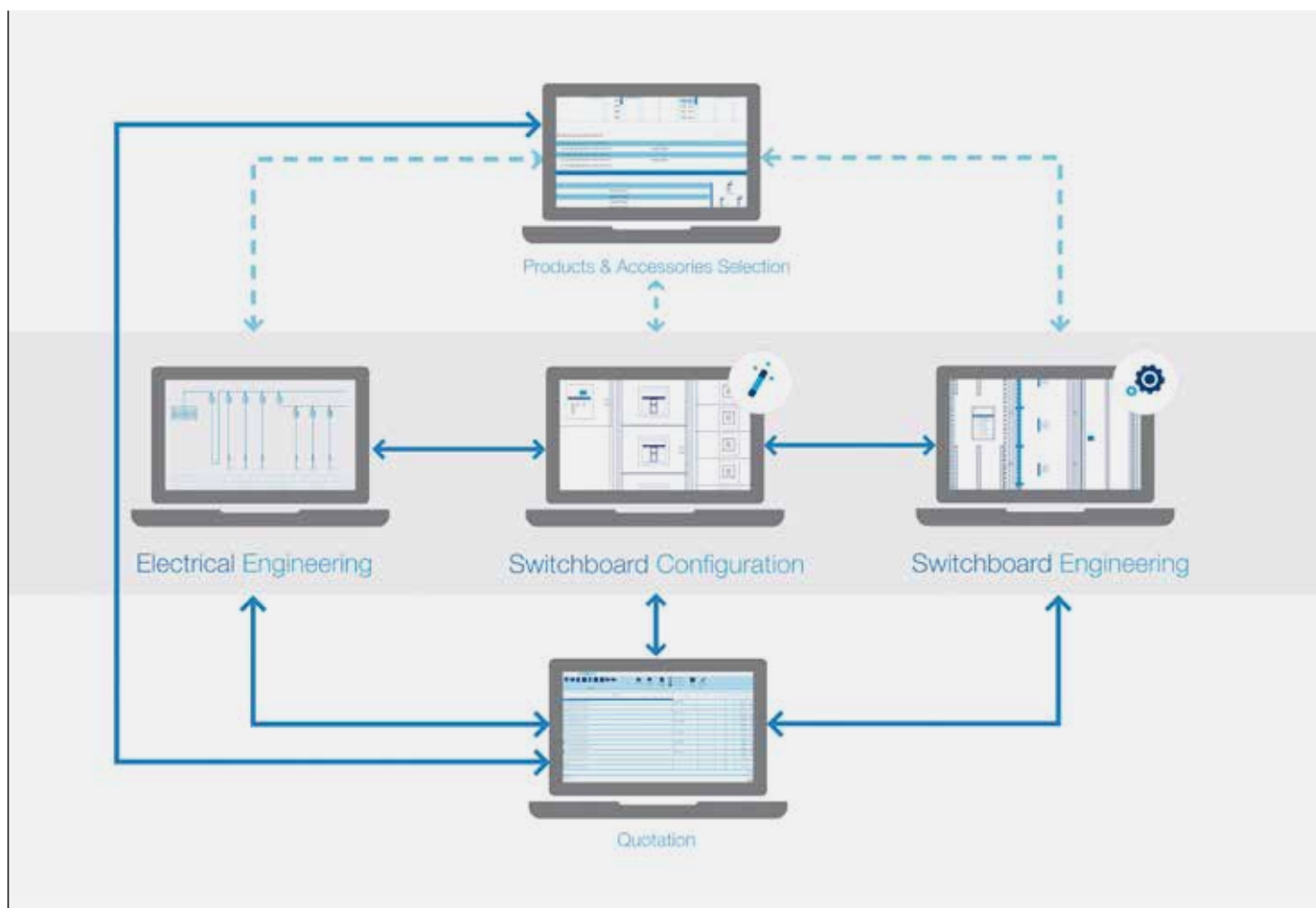
The software enables the single-line diagram to be drawn very easily, both in regards to power distribution and command and control circuits.

The automatic process for dimensioning cables and choosing protection equipment is designed to provide an optimized result both from the technical and economic standpoint. The management of different feed sources and the possibility of creating various system operating scenarios provide further flexibility during the system dimensioning stage.

The curve drawing modules allow the checks of cable protection and coordination between protection devices to be carried out in a smooth and linear way.

Finally, there is the option to calculate load currents, voltage drops, short circuit currents, in accordance with the standards for the sector.

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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's devices to perfection and can be fully accessorized. System pro *E* power, your enterprise has a new key resource.

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# Aluminium vs Copper. Alternative conductors.

## Conductors in real-world applications.

Pavlo Tkachenko: Product Marketing manager - Main distribution boards

**P**lant facilities become more expensive to construct and maintain, and the necessity of looking to alternative materials becomes increasingly critical to cost-conscious builders.

Electrical parts of any project play an important role. Besides external electrical networks and cable lines cost, here we will discuss the conductor's material in distribution switchgears. Cost of copper conductors in distribution boards is significant, and this option affects vastly the overall solution. Simple estimation of materials cost for standard main distribution configuration shows us, that part of copper conductors is around 20-30%, depending on the solution. Therefore, there is an opportunity to save costs.

It is hard to overestimate the role of copper conductor because of it has the best quality for electrical energy transmission. Despite competition from other materials, copper remains the preferred electrical conductor in nearly all categories of electrical wiring. One of the alternative materials for the bus bars is aluminium, especially as copper prices continue to increase while the aluminium market remains steady.

### Precise look at technical background

Cu and Al are the two most commonly used materials for conductors and bus bars in electrical equipment. Each has positive and negative characteristics that affect their use in various applications. Both materials have been in continuous use in the electrical industry for many years. The electrical and mechanical properties of a material are dependent on its alloy.

The copper used in electrical equipment is nominally pure 98% conductivity commercially hard based on the International Annealed Copper Standard (IACS). Pure Aluminium is not used as an electrical conductor in equipment since it is

too soft for mechanical assemblies and is thus alloyed with other materials. Al alloy 6101 is the predominant aluminium bus bar material being utilized because it has been hardened by heat treatment, but it only has 56% of copper conductivity. The reduced conductivity of Al does not mean that the Al conductor will run hotter than the Cu conductor, but does mean that the Al conductor for the same ampere rating must have a larger cross sectional area. According to IEC standard normal, ambient air temperature for indoor installation should not exceed the upper limit of 40 °C. Therefore, selection of proper Al bus bar cross section size shall be considered thoroughly with IEC 60364-5-52 and 61439-2. Then, because of Al bus-bars softness, amount of holders should be increased as well to ensure the equal strength and stability to dynamic short-circuit current. Every original manufacturer is responsible for the proper electromechanical solution to ensure safe operation of equipment under normal and emergency modes, and normally, such data is available in the catalogue of each producer. Ratings established for aluminium busbars are valid for copper busbars with the same cross sectional dimensions and configuration. However, ratings established for copper busbars shall not be used to establish ratings of aluminium busbars.

Then another interesting fact, when the density of Cu ( $8.96 \text{ g}\cdot\text{cm}^{-3}$ ) is compared to that of Al ( $2.70 \text{ g}\cdot\text{cm}^{-3}$ ) and taking into consideration the conductivity ratio of Al to Cu of 56%, the result shows that on a kilogram per kilogram basis, Al has an amperage capability that is approximately 1.85 times that of Cu. In other words, one kilogram of Al has the same electrical capability as 1.85 kilogram of Cu. Cu has a greater conductivity on an equal volume, cross sectional area and basis.





For applications where weight is a concern, Al may be the better choice. Depending on the equipment type and its application, and if space and size are a consideration, Cu may be the better choice. Despite of the bigger size and more insulator holders elements amount, solution with Al conductor is considered less expensive and lighter without any technical limitation, although in some circumstances it can be complicated to maintain and process.

### Environmental concerns

Both Al and Cu will oxidize when exposed to the atmosphere. Oxides, chlorides, or sulphides of the base metal are much more conductive for copper than aluminium. For a low resistance aluminium joint, the aluminium bar conductors must be plated to minimize oxidation. Concern over the Al oxidation away from the joint is not an issue, and will act to protect the conductor from further corrosion in most environments. Aluminium bus conductors depend upon the plating for the integrity of the electrical connection. In general, bolted connection of unplated aluminium to copper bus bars is discouraged. The majority of Al to Cu connections are

made by applying silver or tin plating to the joint areas of either or both of the conductors. The presence of hydrogen sulphide (H<sub>2</sub>S) in the atmosphere is of main concern for base metal Cu and silver plating. Both corrode heavily in a relatively low concentration of H<sub>2</sub>S and most intensely in locations with an elevated temperature while the equipment is energized.

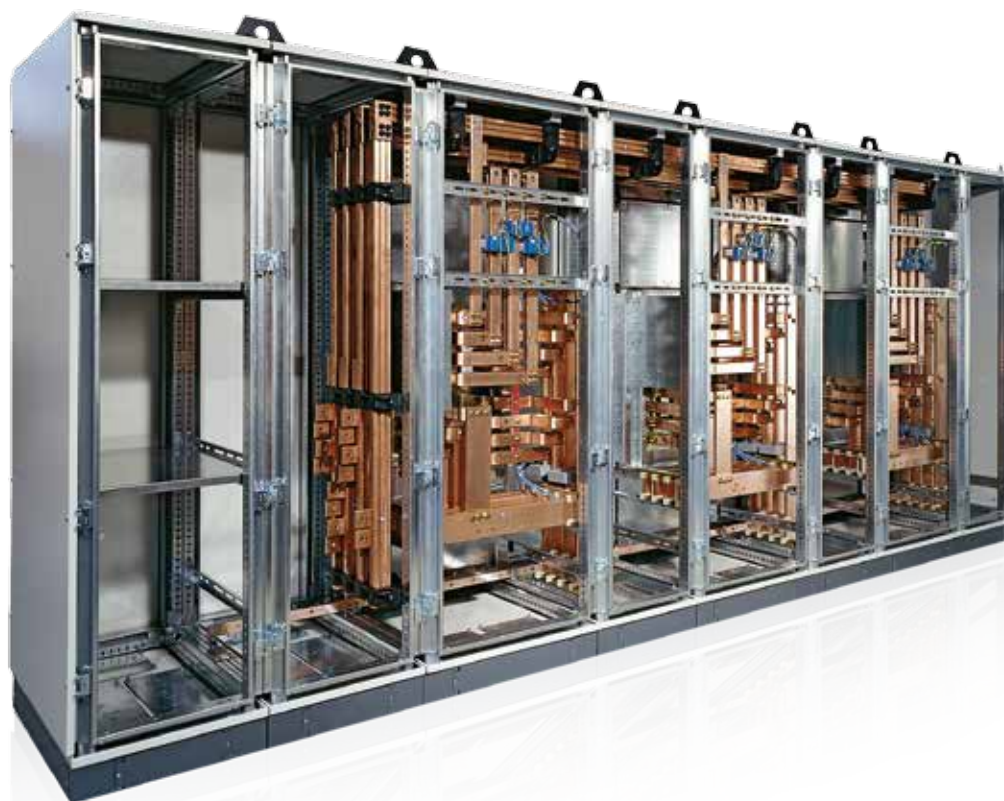
This process, if allowed to continue, leads to failure due to over heating or short circuit. From this prospective we can conclude, that mostly for all environments Al solution is appreciated, though Cu needs to be plated for some applications.

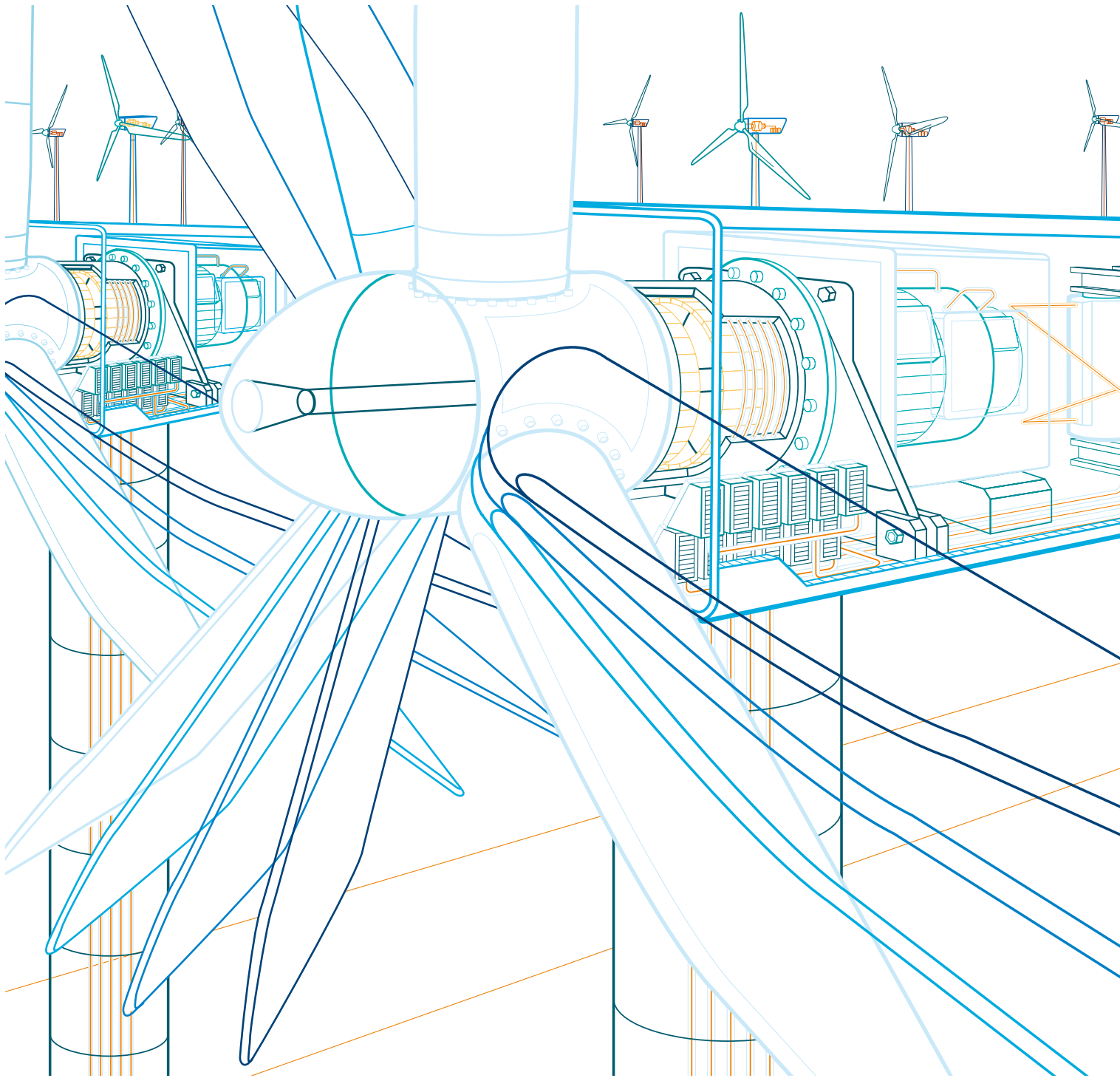
### Offerings

Today, for main distribution, ABB recommends a busbars solution based on only copper conductor except some special applications. With the new System pro *E* power and its choices, we have gotten new cost reduction solution to propose alternative choice to our partners and more flexibility in projects. Cuponal is the aluminium bar with outer layer of high conductivity copper. The copper cladding is nominally 15% by volume. This solution reduces cost up to 40% and weight up to 60% compared with a copper bar of

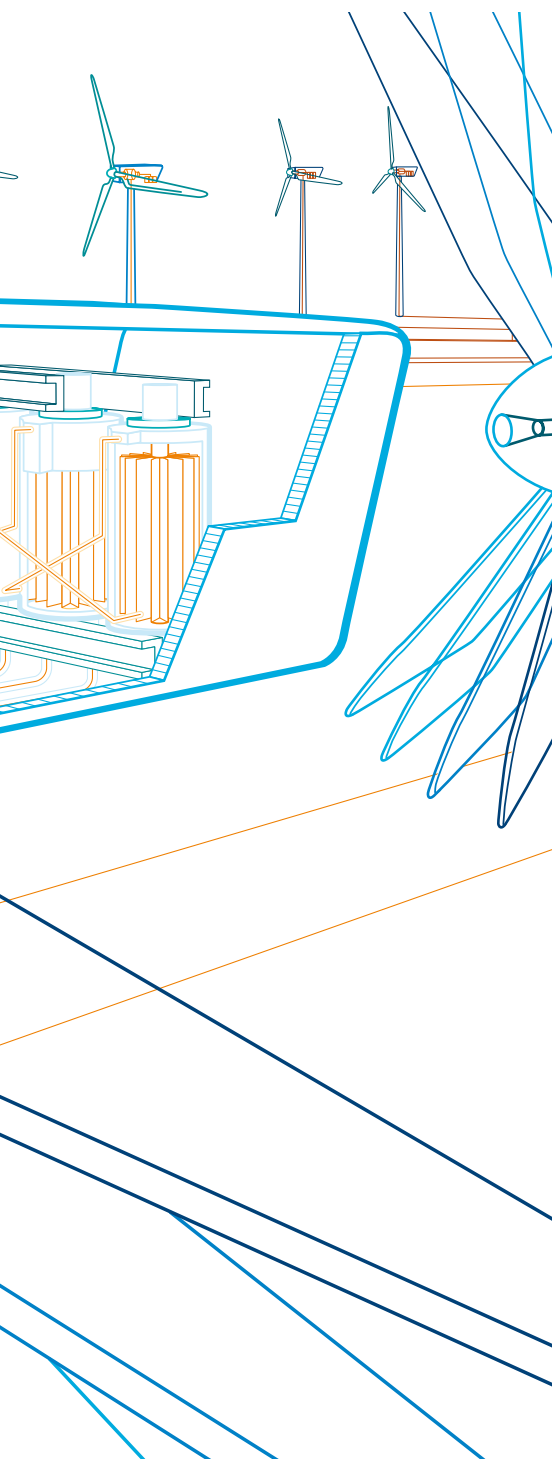
equal dimensions. Compared to aluminium, Cuponal has better conductivity about 65% the conductivity of copper. The prices of Cuponal are more stable over time and lower weight means lower freight costs to your customer. It has already been test with ABB's new family of main distribution boards.

At last, it is worth mentioning that when using proper bolt joint connection among busbars, it is necessary to use joint connection components such as split lock washers and Bellville washers. This can minimize the effects of thermal expansion with conductor materials.





Based on the experience we gained over the last decades, ABB provides state-of-the-art low-voltage surge protection devices (SPDs), medium and high-voltage surge arresters (SAs) and earthing and lightning protection (ELP) materials to protect against the impact of direct lightning and transient overvoltages caused by the secondary effects of lightning. Thanks to this wide product-range, ABB offers complete solutions for protection of wind-power installation.



# Earthing, lightning and overvoltage protection. ABB complete offer to protect Wind Turbine.

Adrien Fournier: Wind & Solar segments manager - Enclosure and DIN-Rail products

## Earthing, lightning and overvoltage protection

With its wide product range, ABB can offer:

- Surge arresters for medium voltage (MV) networks such as the POLIM family and the MWK / MWD range
- Surge protection devices (SPDs) for low voltage (LV) systems with the OVR modular range, the Lovos-W and POLIM-R surge arresters
- Earthing components, designed to withstand mechanical damage and the thermal electromechanical stresses from the earth fault and leakage currents expected within an installation.

## Wind power

Wind turbines provide electrical power from a renewable energy source to the public power networks. Because of their height (over 100 meters) and exposed location, wind turbines are prone to direct lightning flashes entering through the blades, the nacelle or the lines.

Transient overvoltages due to the lightning current can cause severe damage to the wind turbine installation and to the equipment. They can also create expensive downtime that can be avoided by installing a complete lightning protection system (LPS).

This LPS should include both external and internal lightning and overvoltage protection and should be designed, installed in compliance with IEC 62305, protection against lightning and with the IEC 61400-24 for wind turbines.

The risks associated with lightning can be assessed in a global risk analysis, according to IEC 62305-2 and IEC 61400-24. The risk analysis will define a lightning protection level (LPL), and will propose the right protection measures to be applied.

## Different types of drive train

In wind turbines configuration, two main types of drive train are usually used: variable speed doubly-fed or full converter version.

## Doubly-fed drive train

In a variable speed doubly-fed configuration, according to the diagram of Figure 01, it is advisable to place an SPD Type I into the main switchboard at the entrance of the turbine for the protection against transient overvoltages of atmospheric origin and against the surge current from the grid. If the SPD Type I does not have an effective protection level (Up) lower than the maximum withstand voltage (Uw) of the equipment to be protected

or the distance from the equipment to be protected is longer than 10 m, it is recommended to install an SPD Type II near the generator for the additional protection of the stator windings and another one near the converter on the grid side for a better protection.

It is also recommended to install, between the converter and the rotor windings, SPDs Type II suitable for protection in the presence of transient overvoltages superimposed on the PWM (pulse with modulation) control voltage (Figure 03).

### Full converter drive train

In this configuration, according to the diagram Figure 02, it is recommended to place an SPD Type I into the main switchboard at the entrance of the turbine for the protection against transient overvoltages of atmospheric origin and against the surge current from the network. If the SPD Type I does not have an effective protection level ( $U_p$ ) lower than the maximum withstand voltage of the devices to be pro-

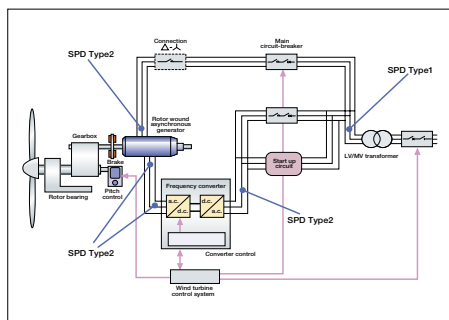


Figure 01

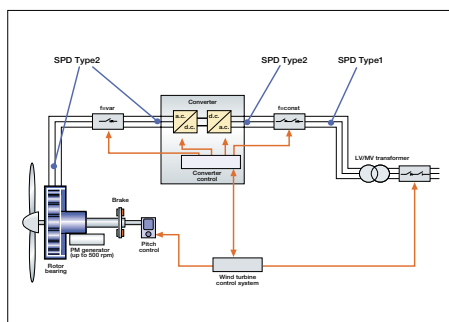


Figure 02

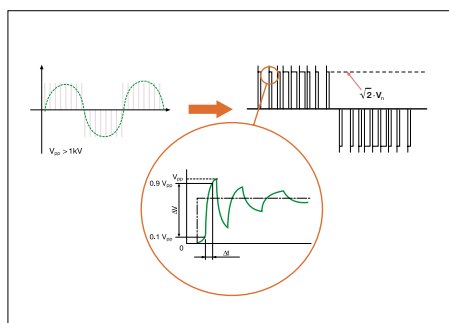


Figure 03

tected ( $U_w$ ) or the distance from the devices to be protected is longer than 10 m, it is recommended to install an SPD Type II near the converter on the grid side for a better protection.

It is also recommended to install between the converter and the synchronous generator, SPDs Type II suitable for protection in the presence of transient overvoltages superimposed on the PWM (pulse with modulation) control voltage (Figure 03).

### Pulse with modulation (PWM)

Actual variable-speed wind turbines are equipped with PWM (Pulse With Modulation) controlled inverters using IGBT or IGCT in order to regulate their output voltage and frequency. These technologies, if not filtered properly, generate peak transient overvoltages superimposed on the PWM control voltage. These peaks, of several kV, will be seen by a standard SPD as transient overvoltages due to lightning, creating unwanted triggering of the surge arresters with a high frequency and therefore reducing considerably their life time. That's why it is necessary to use SPDs with a specific withstand to these PWM, the peak repetitive voltage withstand characteristics ( $U_{rp}$ ).

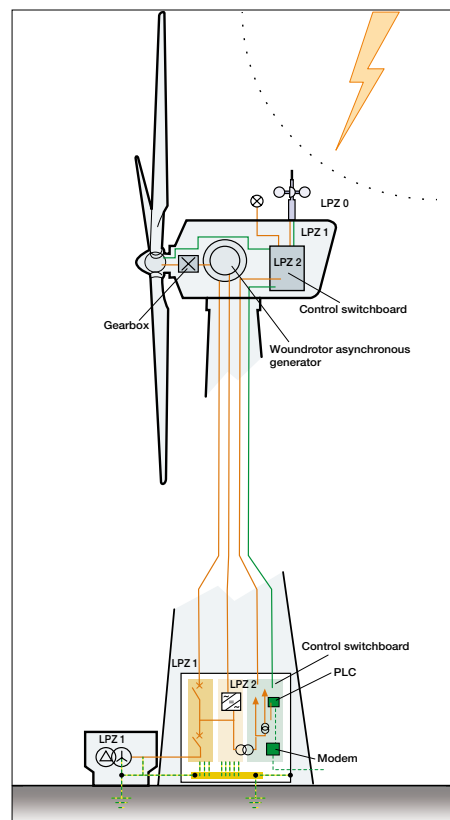
### Lightning protection zones concept (LPZs)

The IEC standard introduced the concept of lightning protection zones (LPZs) to help in selecting the correct surge protection to the right location (IEC 62305-4). This concept ensure the gradual reduction by stages of the energies and surge current caused by direct lightning or transient overvoltages caused by lightning. This logic of coordination in the protection is what we call the "stepping protection".

It consists in dividing a structure in several volumes: the protection zones. The objective is to ensure that the LPZ gives enough protection to the equipment inside a defined zone, which means that the protection level ( $U_p$ ) of the installed SPD is in relation with the maximum voltage withstand ( $U_w$ ) of the equipment. To do so, SPDs are installed at the protection zone boundaries. Each time an SPD is installed, a new protection zone is created.

### Furse earthing

An effective earthing system is a fundamental requirement of any structure or system for operational and/or safety reasons.



Doubly-fed drive train turbine example

Without such a system, the safety of a structure and the equipment contained within it are compromised.

### Earth termination

The earth termination network connects the LPS down conductor network to the base of the structure and provides the means through which lightning current is dissipated to the general mass of earth.

Earthing components must have both a low resistance to earth and have excellent corrosion resistance, as they will be buried in the ground for many years.

The range of furse earthing products including earth rods, conductors, clamps and inspection pits, are all designed and manufactured in line with the IEC and BS EN standards, to ensure they meet the demands of earth termination systems.

Additionally many earthing system conductors and steel rebar are connected by the use of exothermic welded joints creating a connection of virtually pure copper, with a greater cross sectional area of the conductors being welded and therefore high quality, corrosive resistant joints.



### External zones

<b>LPZ 0</b>	Exposed area to lightning flash and which can be subjected to full or partial lightning current. This zone is divided in two: LPZ0A and LPZ0B
<b>LPZ 0<sub>A</sub></b>	Unprotected zone outside the building where items are subjected to direct lightning flash and therefore may have to handle to the full lightning current and lightning electromagnetic field.
<b>LPZ 0<sub>B</sub></b>	Zone protected against direct lightning flash by external air terminal and where the threat is the full lightning electromagnetic field.

### Internal zones (zones inside the building which are protected against direct lightning flashes)

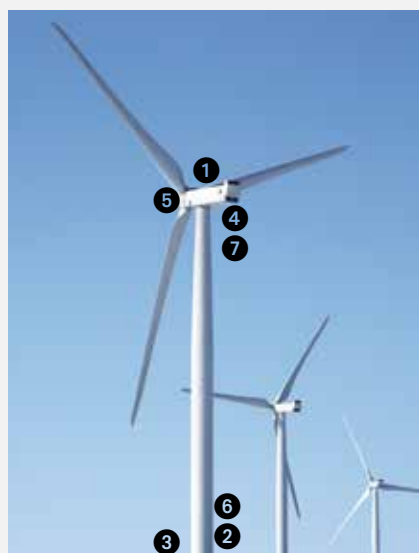
<b>LPZ 1</b>	Zone subject to partial lightning or surge currents. Type I SPDs shall be installed at the boundary between LPZ 0A and LPZ 1 to block the entrance of lightning currents through power lines (i.e. main distribution board of an installation).
<b>LPZ 2...n</b>	Zone where the surge current is limited by current sharing and where the surge energy is reduced by additional surge protection like SPDs. Type 2 SPDs are installed at the boundaries of each zone, i.e. LPZ 1 and LPZ 2, LPZ 2 and LPZ 3, etc..., to divert the remaining surge currents and limit overvoltage (i.e. sub-distribution boards of an installation).



**Adrien Fournier**  
Wind & Solar segments manager  
Enclosures and DIN-Rail products

## Wind turbines: example of protection

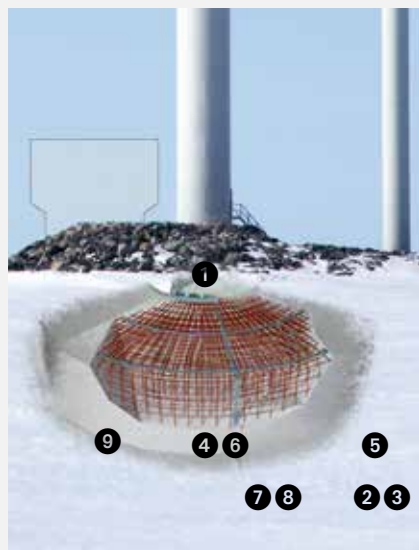
### Lightning and overvoltage protection of full converter drive train turbine



- 1 2** SPD OVR WT for generator protection in nacelle and converter on the generator side in the tower base.
- 2** Polim-R surge arresters for converter protection on the grid side in the tower base.
- 3** Lovos-W for protection of the LV side of the transformer.
- 3** MWD surge arresters for protection of the MV side of the transformer and grid lines.

- 4 5 6 7** SPD Type 2 & dataline for protection of pitch, yaw and control systems.

### Earthing of wind turbines



- 1** LK245-6
- 2** CB070
- 3** TC030/50
- 4** CR705
- 5** RB305 + CG370 + ST300
- 6** PC116
- 7** CC2-4-7070
- 8** BB14-4-253253
- 9** CM025

# Keep track of the rail yard energy!

All around the railway tracks there are places which need metering. Places where locomotives and railway cars are parked. It may be railway roundhouses, workshops or temporary parking places. For these applications we introduce the new A42 Platinum for 16.7 Hz single phase EQ meters. There are two types: A42 552-120 for Modbus communication and A42 553-120 for M-Bus communication

The A42 552-120 and A42 553-120 meters are ideal for many applications in peripheral equipment where 16.7 Hz is needed. They are fully four quadrant enabled with active/reactive energy and import/export values in separate registers. The meters support a wide voltage range of 100 – 288 V AC. The meters are connected via current and voltage transformers in order to suit the railway applications.

The 16.7 Hz meters are intended for stationary use and not for applications on rolling stock. The applications are in the rail yards and infrastructure around the railway. The benefit is that you can measure the energy feed on different locations or energy feed for parked locomotives and railway cars without using any of the specialized more expensive 16.7 Hz meters on rolling stock. In this way the end user can get a less expensive solution.

The wide temperature range (-40 to +70 °C) makes A42 552-120 and A42 553-120 meters easy to place in various environments indoors and outdoors (in a suitable enclosure). The power consumption of the meter is very low, less than 0.8 VA which means that even a larger population of meters is not energy demanding hence cheaper to operate.

Communication with Modbus RTU or M-Bus eases the reading of the meters and makes it possible to supervise energy consumption with a meter reading system. With the G13 gateway for EQ meters, settings and reading of each individual meter can be done with a standard web browser.

## Why not on the rolling stock?

There are many places where the traffic operators and the owner of the railway grid are separate companies and billing for

energy is an integrated part of their business. Metering on trains is quite complex since it includes GPS data and a specific data communication set up. There are sometimes also more than one pantograph where the energy is fed in to the train set and meters communicate on a special bus system.

## Functionality of A42 552-120 and A42 553-120 meters

There are extensive functions besides extra ordinary good metering that come with the EQ meters in Platinum level such as:

- Advanced Real Time Clock (RTC) functions:
  - Tariff control of up to four tariffs by the RTC, communication or inputs
  - Outputs controlled by time
  - Event logs with time stamps
  - Previous values for days, weeks or months maximum and minimum demand with time stamps
- Alarm for threshold values
- THD and Harmonics measurements
- Advanced 8 data channel load profiles in intervals between 1 to 1440 minutes
- Four configurable inputs/outputs
- Pulse counters on inputs
- An extensive set of instantaneous values

## Approval & Standards

EQ meters A42 for 16.7 Hz carry a CoC (Certificate of Conformity), which declare that they fulfill the demands raised by the EN standards. No tests for smoke and fire or vibrations except for the tests performed by ABB to comply with standards.

## MID

When used in 50 Hz applications the A42 552-120 and A42 553-120 meters are MID approved and verified according to appendix D. There are no paragraphs in the EN 50470-3 standards for 16.7 or 60 Hz hence it is not possible to have a MID approval in these frequencies. Still the EQ 16.7 Hz meters are verified in the production for 16.7 Hz according to the same procedure as 50 Hz.

## Standards

IEC 62052-11, IEC 62053-22 class 0,5 S, IEC 62053-23 class 2, IEC 62054-21, GB/T 17215.211-2006, GB/T 17215.322-2008 class 0,5 S, GB 4208-2008, EN 50470-1, EN 50470-3 category A, B & C

## IRIS

ABB AB Meters management system comply with International Railway Industry Standard (IRIS) Revision 02, May 2009 (Certificate-Register-No.: SWE-IR-000 369) which complements the internationally recognized ISO 9001 quality standard introducing rail specific requirements.



**Mats Karlberg Oddy**  
Product Manager - Electricity Meters



Is it possible to switch off AC / DC?

Certainly.



With the S 200 M UC, you need only one miniature circuit breaker for both AC and DC applications. It outperforms its peers with more tripping characteristics, more poles, and more current ranges. Tested and approved by major international standards makes the S 200 M UC ideal for local and global applications. It is also a valuable addition to the existing System pro *M* compact® range, as it can be effortlessly combined with the new product line. For more information, see [www.abb.com/lowvoltage](http://www.abb.com/lowvoltage)

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for a better world™





Some easy, careful habits can make equipment last longer and prevent serious damage to installation. Solutions are common, convenient and established and safety is today at our disposal. Everywhere!

Emanuele Tosatti: *Product Marketing Manager - DIN-Rail Products*



# Securing from unstable or untrusted networks.

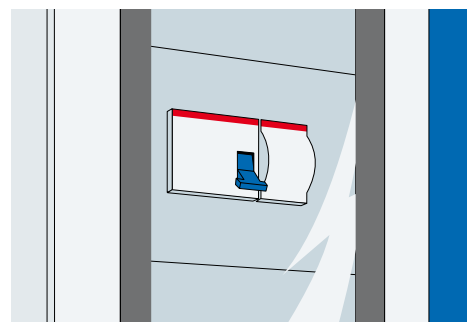
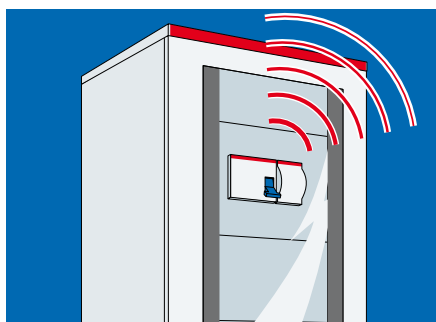
**A**frica. That's where, during an ABB roadshow for installers, the idea came to me to write about securing installation from electric network failures. And the unexpected silence of the audience when I focused on this topic was telling me how interested installers were in this issue, so close to their daily problems. This topic is very familiar to me and recurred often in my engineering career, spanning from Mediterranean Countries to post-soviet Eastern Europe, from household consumer units to industry applications. Despite what we could expect, utilities around the world are "carefully supplying frequency, not voltage". By international regulations in fact, tolerance about power supply frequency is very narrow - much less than 1%! - but voltage can span in a wide interval such as  $\pm 10\%$ . Electric devices are made to withstand such ups and downs, resilient even to fast voltage drops or spikes, so we could expect systems are secured by intrinsic robustness of equipment. But further failures, even small ones, can compromise our installation for a while or permanently, and that's why I decided to focus on solutions to prevent expensive repairs.

One of the most scary failures a network can bring to installation, the neutral break can raise the applied voltage of sin-

gle phase loads connected to a 3 phase system up to 400V, breaking insulation and causing failures and damage. That's why in places where a neutral conductor is considered undersized or at risk of overload, panel builders use maximum voltage relays to protect mains such as ABB System pro *M compact*® HLV or CM range. These devices allow a fine tuning of intervention time, preventing unwanted tripping, while sharply switching as soon as voltage overtakes a preset threshold. Connected to mains supply and with relay wired to a shunt trip, relays can isolate parts of an installation before the rising voltage damages electronics, burns transformers, crashes surge protectors and blasts bulbs – the latter the most evident sign of a neutral break. In addition to relays, ABB developed an accessory to circuit breakers range, namely OVP, made permanent overvoltage the attached breaker and no wiring needed, just mechanical coupling.

Voltage drops on the other hand are often considered less dangerous, maybe because it is associated with lower voltage meaning lower damage. However, everyone in our business knows that an electromechanical coil, such as relay's ones, applies a mechanical force to contacts proportional to voltage: lower voltage on relays' coils, lower contact pressure, lower electric continuity. If in a circuit

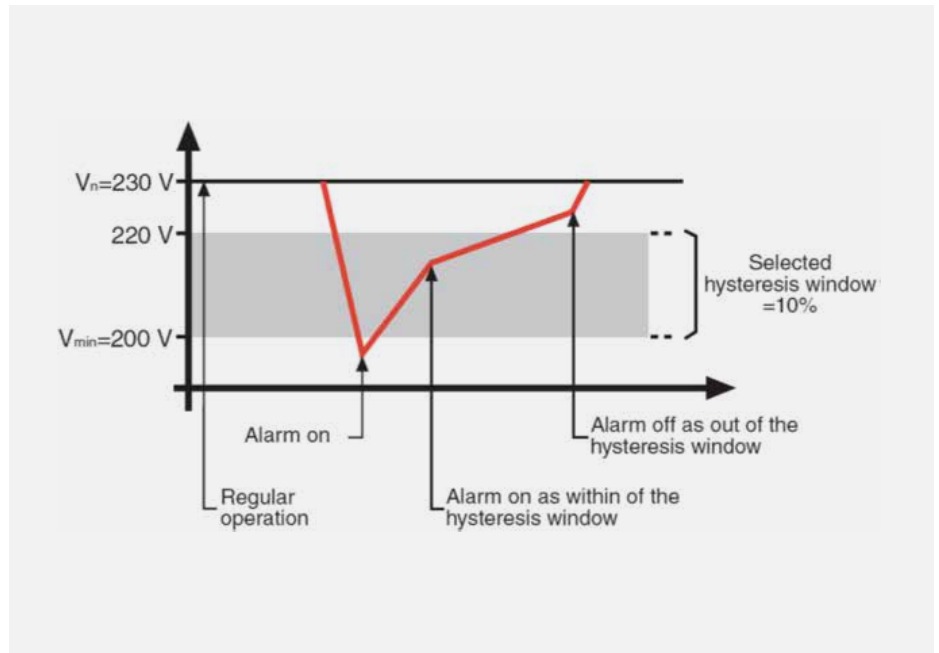
01 ATT-81 module is a GSM terminal with 8 inputs and one output for transmitting commands and alarms via SMS message, free phone call ring, fax or e-mail. The figures illustrate an example application in which ATT-81 is installed in the circuit of an unsupervised facility. In the event of a power outage, ATT-81 sends an alarm notification to the list of authorized users, while at the same time actuating the motor-driven command which reinstates the power supply.



## 02 RH/RL voltage and current relays

How they work: RLV example

Operating principles: Delay is useful to prevent unwanted tripping: whenever voltage decreases below a defined value (200V), low voltage relay trips after 1 second.



02

a certain current flows, and relay's contacts are not solid anymore due to a sudden lowering voltage, an electric arc can easily appear, with consequently heavy temperature rise leading to a fire. When I mention this issue, in Africa as well as in any other place, I still see surprise in the eyes of electricians, as fire is not so easily associated to a voltage drop! On the other hand, fire is more likely to happen because of a voltage drop than because of a voltage rise. That's why we have to take care to protect our switchboards with ABB RLV or CM undervoltage relays, so that switches or isolators are quickly turned off when a voltage drop occurs.

We know now how to protect installation from voltage drops and neutral breaks. But still we can make installation safer, especially when power continuity is required. Unwanted trippings of residual current devices lead to loss of supply continuity, and in case of non supervised applications, this means both unavailability of devices and maintenance costs which can be prevented by simply installing an RCD autoreclosing device ABB ARI or ARH. Equipped with a motor and an automated control system, autoreclosing devices restore residual current devices by closing toggle whenever they trip. In case remote information is required, the GSM module

of ATT's ensure management of installation from a distance through SMS, internet or a mobile phone call. One more trouble can come from low voltage network and compromise the installation. Networks, especially when aerial, can be hit by lightning and lead their current directly to the installation. Here you can protect the installation with a Type 1 Surge Protective Device OVR T1 upstream the low voltage distribution system, possibly before the main circuit breaker and back-up protected by 125A fuses. By following some easy rules and distributing electricity with discipline, even the oldest and less supervised power supply becomes harmless to our installation, providing the electricity we need without consequences to connected appliances. The overall cost of prevention, same as for our health, is lower than the cost of repair, and even the most careless user can be easily advised to a safer supply. That's why I always recommend to include protection relays, autoreclosing units and surge protectors to the part list of any sub distribution board: appliances and equipment will last longer, for the wealth of our end user's pockets!



**Emanuele Tosatti**

Product Marketing Manager

DIN-Rail Products

## Did you know that? Cafe Coffee Day

### **ABCTCL - Amalgamated Bean Coffee Trading Company Limited.**

Cafe Coffee Day is India's favorite coffee shop for the young and the young at heart. They are part of India's largest coffee conglomerate, Amalgamated Bean Coffee Trading Company Limited (ABCTCL). They are the largest producer of Arabica coffee in Asia and have been in coffee business for more than 140 years (since 1970). The company employs 17,500 + people in growing, processing and retailing coffee. Popularly known as CCD, they brought the concept of cafes to India. The CCD cafes are making an international presence with in Austria, Czech Republic and Malaysia.

ABCTCL also retails coffee through a dedicated beverages division. This unit has a big customer base in the corporate world where they lease their coffee machines to the offices and factories for dispensing coffee and other beverages. Supplementing this division a state of the art coffee machine manufacturing division known as Coffee Tech Hub (CTH) was built. Situated in Bangalore, the facility was ISO 9001 certified in 2008 and emphasizes on technology and innovation. It is one of the first in-house coffee machine manufacturing units in India. As a matter of fact, the coffee vending machines can be found in many ABB offices and factories across India. They manufacture approximately 5,000 machines per annum with over 29,000 machines already installed.

ABB is proud to be associated with ABCTCL for providing a solution which is enabling them to offer their customers a safe and reliable coffee dispenser machine. The first generation of machines were equipped with Miniature Circuit Breakers (MCBs) which were basically used for disconnection and the isolation of the machine.

In India it is not yet mandatory to have protection with RCD in all the circuits. Since the coffee machines are powered normally through the consumer or sub-distribution board via the

socket outlets. If no RCD protection is provided in the upstream, then it would become necessary to install a device for earth leakage protection. Coffee machines are normally operated by common people, who could be exposed to in-direct contact - leaving them unprotected if there is no RCD in the upstream supply or the machine itself.

When ABB technical sales team got in contact with ABCTCL R&D manager, a new solution was proposed to use RCBOs instead of MCBs since the RCBOs can protect against earth leakage along with overload short circuit. The technical team at ABCTCL immediately understood the necessity of an earth leakage device for their coffee machines. The team from ABB proposed to use the RCBOs DS201 to address their requirement.

The advantage of having 2 Pole 2 module design of ABBs RCBO DS201, without any extra space, the existing MCBs were replaced in their design and incorporated immediately.



Hats off to ABCTCL's commitment to keeping their customers safe and replace MCBs in all existing coffee machines at customer sites. The revised specifications for all their new machines are now standardized with DS201 RCBOs

ABB is proud to have helped ABCTCL provide safer solutions for their customers.



# Making data available is the future of today

Technology is improving every day and mostly times makes life easier for everybody, both privately and professionally. It has also led to more and more devices being connected and having to communicate with each other. This is often referred to as IoT (Internet of Things).

Aron Svedin: Product Marketing Manager - DIN-Rail Products

To make communication between many different kinds of devices work, there are mainly three parts that are needed and to a certain degree need to be standardized. Data has to be made available and in a predefined format, a medium has to exist to transfer the data from one device to another and finally a device to present data or have the ability to perform some kind of action.

## Specialize in what you are good at

As each of these parts have their own special characteristics, we often find that different stakeholders are focusing on mainly one specific part, becoming specialist in that area. An example, there are only a limited number of meteorological centers in the world providing medium range weather forecasts with enough powerful computers to collect and process the huge and complex set of data. The different news stations and metrological centers use this data and make their own interpretation and analyze to prepare the local forecast. Even if almost everyone is using the same raw data, the end result will look very different and some are more accurate than others to forecast the weather. This is an example where you have one expert in collecting data and making it available to others. Another example is Google. They are indexing many, if not most, of the webpages on the web and make them searchable and available in an attractive way for everyone. The information to index all webpages in the world is open to everyone but still Google does it better than all competitors.

Google is an expert in collecting the

data, processing it and making it available in a format that others can use for their own benefit. In the case of the meteorological center they often charge for their service while Google doesn't. Another example is Facebook or Twitter who provide a platform where users can post information. In these examples the added value is in the collection of data from the users but more important, presenting the data that is of interest for that specific user.

Of course the data they collect could be presented in other ways, such as on other platforms, in other situations, and so on. This would only be possible if they would make the data available to other parties. Technically this is not a problem as the data is stored in databases by making the databases available to everyone. This is not a preferred solution due to many obvious reasons. Instead it is possible to give access to a limited amount of data and in a predefined structure with a so called API (Application Programming Interface).

Using an API makes it possible to, for example, post tweets on Twitter from other webpages, or in a smart phone app or even directly from a software, like a computer game. Another usage is to develop services that are using, for example, data from Twitter as input or to create add-ons.

Have you ever seen a section in a web page showing Twitter posts specifically related to the web page's service or offer?

## Similarities with measurement data

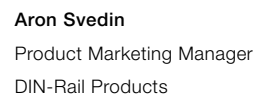
When making measurement values available, why not think the same way? Creating a platform which provide the measurement data in a simple and standardized



One common standardized method to make data available to be requested is using a REST API. This is in principal a set of resources that could be manipulated in a predefined structure and in a standardized format. Any tool that can work with HTTP can also work with a REST API and the data could be formatted such as JSON (Java Script Object Notation), which is an open standard format that uses human-readable text.

**Answer:**

```
... {"importenergy": {"I1": ["1758.29",  
"kWh"], "I2": ["1272.27", "kWh"], "I3":  
["17543.36", "kWh"]}...
```





# Current transformers: a sense of proportion, the value of reliability engineering

Energy efficiency, cost saving and continuity of service are currently three fundamental aspects in the management of an electric system. To achieve these targets you need to know when, where and how energy is used.

*Valentina Surini: Product Marketing Manager - DIN-Rail Products*

### Measuring means to know

In an energy market that is strongly dominated by the need to improve performance and reduce power consumption of the electrical system, it is very important to have a detailed overview of its operation. In this way, it is possible to identify areas to search for optimization of consumption, increase efficiency and help reduce harmful emissions into the environment. Measurement and monitoring of the main network parameters allow to gather information not only upon the level of energy consumption and quality by itself, but also with the objective to prevent failures and to manage the scheduling of maintenance which would lead to a higher level of security both for the systems and for people.

In this context current transformers play an important role to enable indirect measurement of the electrical parameters when the network's current is higher than the measurement device's one.

### Innovation, functionality and safety for all types of applications

The technology behind the current transformers dates back to the late nineteenth century. Since that period it has remained almost unchanged over time, and it can be found in today's current transformers. CT PRO XT and CT MAX series renew the market of the current transformers with cutting-edge products that are distinguished by the introduction of novel features such as:

#### - Safety to its maximum level

For a safe usage of the system, the ideal operating condition for current transformers is when the circuit connected to the transformer's secondary terminals is permanently closed. In fact, an accidental opening of secondary terminals could generate critical conditions such as overvoltage proportional to CT's transformation ratio, a magnetization of its core or overheating inside the switchboard. All these circumstances, not only would affect the measurement accuracy, but they would lead to dangerous conditions for people and objects directly in contact with the switchboard. CT PRO XT SELV and CT MAX SELV ranges, automatically short-circuit the transformer's secondary terminals in case there is a loss of load, avoiding the risks described. By instantly tripping, the circuit protects

the persons and devices by maintaining residual voltage on its secondary terminals always less than 25V RMS, the safety threshold required for any type of application. Moreover, the plastic screws that hold fix the CT to the bar, guarantee insulation for the installers and during maintenance operations.

#### - Flexibility and time saving

One of the first current transformers in the market providing both screw and screwless solution into the same product, CT PRO XT and CT MAX ensure many more benefits in terms of system flexibility and time saving for the installer. The flexibility is guaranteed also by the accessories which allow the current transformers installation in some of the more common mounting systems such as primary cable, primary busbar, DIN rail and wall-mounting installations. Moreover, thanks to the secondary terminal cover fixed to the CT case with sealing wires, it is possible to use the CT PRO XT and CT MAX in billing installations.



**Valentina Surini**  
Product Marketing Manager  
DIN-Rail Products

For more information you can download the ABB Current Transformers brochure



# Day by web

## Day by DIN on abb.com: the hub of contents

Day by DIN on abb.com is a webpage in which all Day by DIN issues can be browsed in just one click. Discover below how to make the most of it!

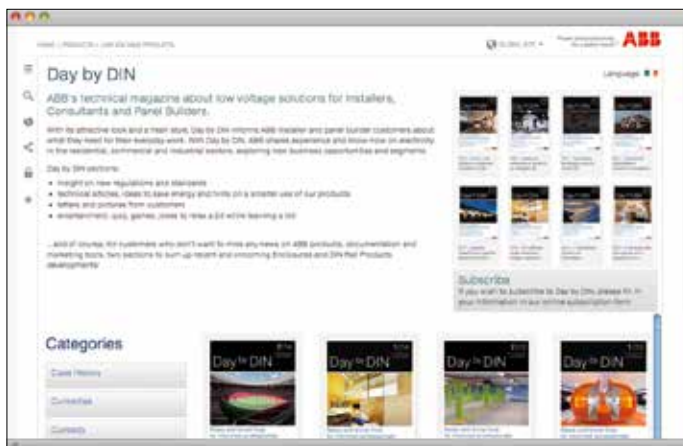
Day by DIN is the magazine that we have been developing with passion for almost three years with the goal to provide, in more than 65 countries, articles about applications and solutions for customers' daily business.

As an improvement, we wanted to offer a place in which you could easily get access to read and utilize the articles to support and help your business grow. In the new Day by DIN web page, you can easily find all the content from our new and past issues. Read the Day by DIN magazines by browsing a single issue focus on a single topic using the following functionalities:

**Browse by categories:** you can choose one single category and read everything written about it. For example: find all "Doktor Wise" contents by clicking on the homonymous section.

**Search by keywords** (e.g. solar, compact, railway...): you will be directed to all content containing these words.

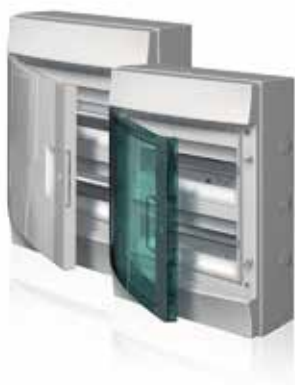
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## System pro *E* comfort® MISTRAL65. Unique design. Endless possibilities.



Versatility, efficiency and a unique, elegant, unmistakable design. MISTRAL65 is ABB's new, pioneering series of consumer units with IP65 protection class. The range includes versions with fully reversible blank, or transparent doors in the exclusive petrol blue colour that open up to 180 degrees. The spacious interior is easy to access and has been designed to speed up the wiring operations plus total integration among modular circuit-breakers of the DIN rail, moulded-case and switchgear front type. MISTRAL65 includes a wide range of sizes, with 4 to 72 modules, and is thus ideal both for residential and industrial installations. [www.abb.com/lowvoltage](http://www.abb.com/lowvoltage)

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for a better world™



# Solutions with auto Reclosing devices for RCCBs

Aravind R.: Product Marketing Manager - DIN-Rail Products

A green garden depends on correct watering. An automatic system cannot operate without power supply. Unwanted tripping of RCCB can destroy months of gardening efforts.

Lift systems have a remote alarm function in order to call for help if they get stuck. An auto-reclosing device allows to solve the situations caused by RCCB tripping.



If during the storm the RCCB protecting a basement's pump trips due to disturbances on the network, flooding can occur and cause serious damage and inconvenience.

If the RCCB protecting the control system for automatic gates and doors trips, it involves the risk of being closed out and having to call a locksmith to break in and then replace the locks.

Coming home from your holidays to find that an RCCB has tripped without any reason and has caused the loss of all the food from a freezer is an unpleasant and costly experience.

Burglars sometimes create faults in power supply network so that the alarm system goes off-line once its batteries run out. An automatic reset device can make things much more difficult for them.

### A solution for every need

Nowadays the modern electrical installations are getting increasingly independent of human presence. Thanks to the technology, installations are moving from manually operated systems to automated systems. With this change in technology it also becomes important to have protection devices upgraded to similar systems without compromising the safety of the installation.

It is now an essential feature not only in domestic but also in commercial and industrial applications to ensure continuity of service and protection.

### Continuity of service

Due to their high sensitivity, RCCBs could be subject to unwanted tripping that affect the circuits to be protected. There are many possible events causing unwanted tripping, for example, impulsive voltage surges of atmospheric or network origin, harmonic components, electromagnetic phenomena and more. Often these situations stop as quickly as they started and to reactivate the circuit it is sufficient to reclose the RCCB. Unfortunately, resetting an RCCB is a manual operation that requires human intervention, with unpredictable downtime of equipment.

In a residential environment, loss of power to freezers and other electrical appliances, alarms, sprinkler systems, lifts or electric doors can have serious consequences such as food's deterioration, alarm back-up batteries depletion and even owners getting locked out of their own houses.

In shops, factories and offices, on the other hand, the consequences can include POS systems, distribution, signs, security systems, computers and production equipment going off-line. ABB offers a solution for every requirement with its range of auto-reclosing units.

Power supply cables (respect the phase-neutral wiring for the ARH-T version)

Plastic teeth for coupling the Greenlight with the RCCB

Connection with RCCB toggle

Sliding cover for activating/deactivating the automatic reclosing function

Test cables (respect the phase-neutral wiring for the ARH-T version)

RCCB's autotest programming button (only for ARH-T)

Minidip for activating the automatic test of the RCCB (only for ARH-T)

LED indicators

Removable signalling contact connection terminals





### In residential applications

#### Improving the reliability of electrical networks: the service continuity

The level of comfort in our houses are increasing day by day: there are several devices and systems that perform a series of periodic and repetitive operations in order to simplify our daily life. Without power supply, they do not work and it could create inconveniences, damage and even danger to human life.

To identify the situations which are at risk due to unwanted tripping of the RCCBs and also to ensure the continuity, it is best to use ABB's auto-reclosing devices as well as increase the reliability of a residential electrical network.

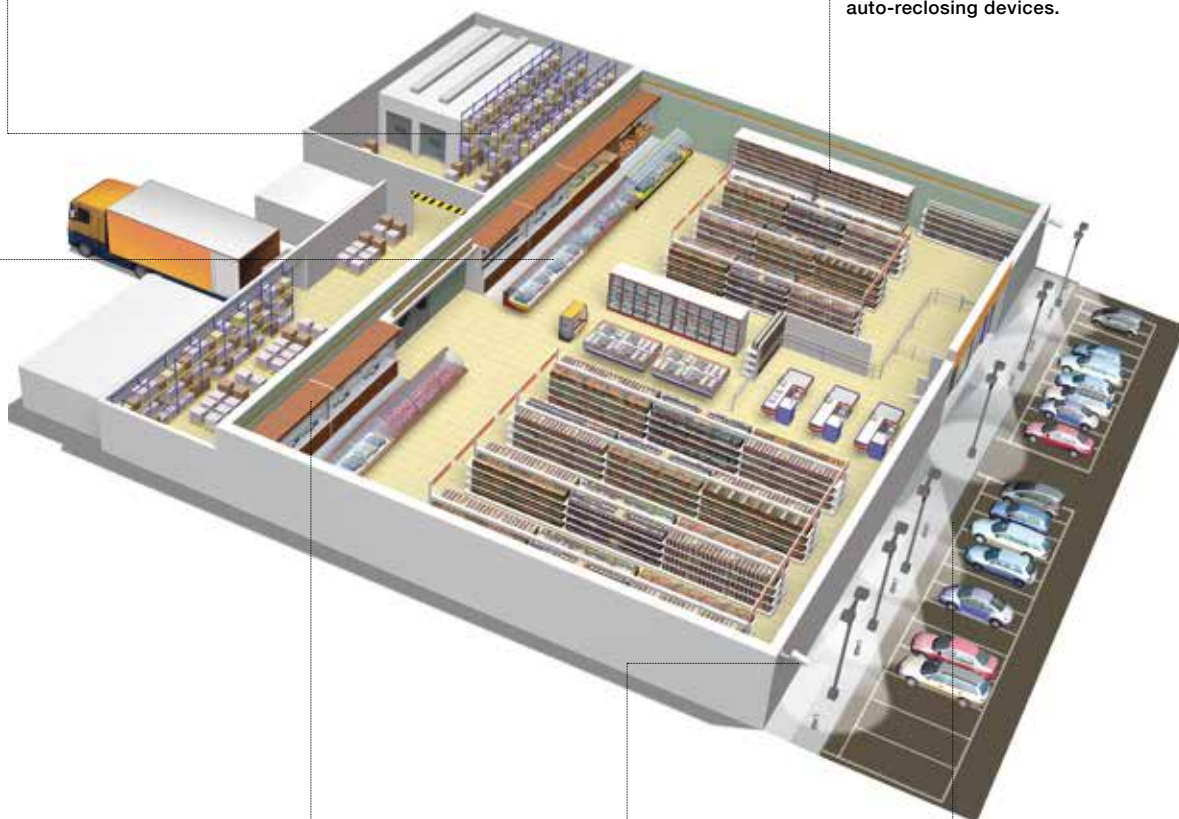
### ARH Series auto-reclosing units

#### The benefit of an effective and reliable product

Most often in domestic installations, the users do not know what kind of problems their electrical installation. If an RCCB trips unexpectedly due to a temporary fault, they will not be able to fix the problem themselves but have to wait until a trained electrical technician will come and fix the problem for them. This consumes a lot of time and money for the user. But if an auto-reclosing unit is installed, it would not require to call upon a technician when there's only a temporary fault. This device will automatically reclose and bring back the electricity in operation. ABB offers the

Loss of power to refrigerators can lead to deterioration of stock. An ABB auto-reclosing device could save a lot of money!

Outdoor lighting and illuminated signs are the tools with which a shopping centre advertises itself to its customers. The continuity of the power supply to these systems is essential and it can be ensured by installing ABB auto-reclosing devices.



Loss of power to freezers can cause serious expense and legal problems. If the problem is not due to a fault in the freezers, but the RCCB is subject to unwanted tripping, ABB auto-reclosing devices can be the ideal solution.

If the cash desk breaks down, the customers in line get irritated and will start getting agitated and complaining. Often all this could be avoided just by installing an ABB auto-reclosing device.

Customer security is essential for a retail activity. Continuity of the power supply depends on the quality of the systems and their maintenance. An ABB reclosing system represents the most effective aid.

A dark, half-empty car park is uncomfortable, especially late at night. Installing an auto-reclosings device which resets the RCCB tripped unexpectedly allows the problem to be overcome.



F2C-ARH range of auto-reclosing devices specifically for single phase RCCBs typically used in residential installations. Designed to be installed in domestic applications, F2C-ARH devices allow ABB F200 single phase RCCBs of 30mA and 100mA sensitivity up to 63A to be automatically reset.

In case of faults the RCCB trips, then the auto-reclosing device automatically resets the RCCBs after checking the healthiness of the system. If an earth fault current is identified, the device locks and does not switch ON until the fault has been corrected.

The device's careful design has allowed to develop a simple and reliable product both for new and existing installations. The

end user needs only to decide whether or not to activate the automatic reclosing function via the specific sliding cover.

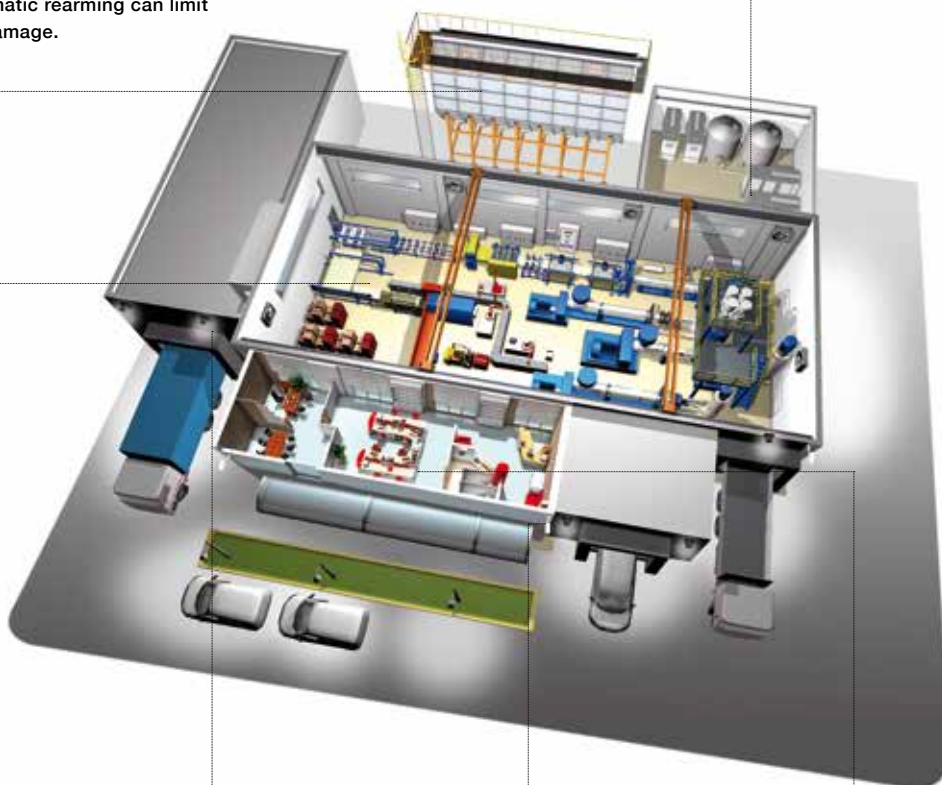
### Commercial applications

#### Improving the functionality of systems: Investing to satisfy customers

In the commercial sector, customer service is the most important requirement as the success of retail outlets, banks and professionals depends on the quality of the service they are able to provide. In a world now based almost completely on electrical energy, any loss of power inevitably becomes an inefficiency.

The raw materials supply system often uses remote warehouses which are not under supervisor of employees. If one of these stops, it can cause the stop of other departments too. Automatic rearming can limit the damage.

Each compressor should be protected by an RCCB fitted with an auto-reclosing unit: if the RCCB tripped without a real earth fault, the device would reset it without affecting production.



One workstation stopped rapidly causes production to shut down: the correct sizing of the power supply and the installation of suitable auto-reclosing units improves production continuity.

External areas for goods handling must always be as efficient as possible. It is also useful to fit an auto-reclosing device, able to reset the RCCB, to external lighting systems.

The power supply for security systems is important for a production company and must not be compromised by unwanted tripping of the RCCBs. An appropriate ABB auto-reclosing system is the most effective answer to these problems.

It is important for all components of the company IT system - from the servers up to the terminal devices - to be protected by RCCBs coupled with ABB auto-reclosing devices.



## Industrial applications

### Improving operation of systems: ensuring production continuity

Industrial production is going through deep changes. The idea of producing, storing and selling is now over. Today JIT (just in Time) methods are used and the time between order and delivery must be as short as possible. Any obstacle will totally hamper the supply chain system and can become a serious problem. Production continuity depends on power-supply reliability, which becomes one of industry's most important structural topics.

### ARI Series auto-reclosing units: Evolution in service and industrial environment

Auto-reclosing units for industrial environment can be used in a wide range of situations, (this version is not suited for household applications). They can be associated with a RCCB with even higher rated currents, for single phase and three phase applications, and they can have different sensitivities from 30, 100 or 300mA suiting the industrial installations.

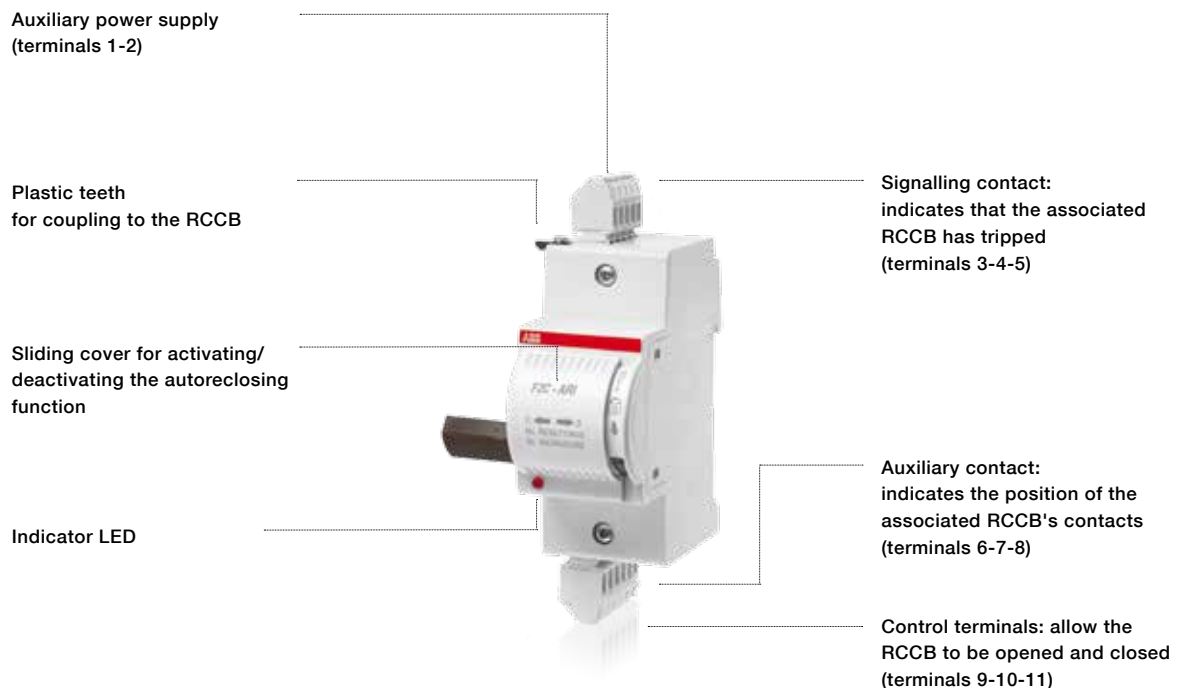
Auto-reclosing units for industrial use (F2C-ARI) have different operating ways from those used residentially. In case of an earth fault the RCCB trips and after three seconds, the device attempts to reclose it without performing any insulation test; the RCCB closes if there is no fault present in the circuit.

Three consecutive attempts to reclose are performed by the AR-I version of auto-reclosing devices and if the third attempt also fails, the auto-reclosing device locks and stays in OFF condition until the fault is corrected. Apart from installations in areas with difficult access, these products may be installed in complex systems where long maintenance times could have consequences for production.

The industrial versions allow the reclosing of RCCB two and four poles up to 100A. Compared to the residential versions, they have an option of multiple supply voltages either with AC or with DC. These devices also perform motor operating functions, by connecting the remote buttons to the appropriate terminals. An auxiliary contact (connected to the mechanism of the associated RCCB) and a signaling contact (lock state following the failure of the third reset attempt) are also available. F2C-ARI-30 has the same operating logic as the F2C-ARI, but it waits 30 seconds between reset attempts. This product is particularly suitable for applications where faults are transitory or temporary.



**Aravind R**  
Product Marketing Manager  
DIN-Rail Products





## DSE201. Compact design with enhanced protection.



The 1P+N electronic residual current circuit-breakers with overcurrent protection (RCBOs) DSE201 meet 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](http://www.abb.com/lowvoltage)

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# LED street lighting requires a good overvoltage protection

Light is essential to modern human life. Over 50% of municipal budgets are devoted to public area lighting. LED technology represents a versatile lighting source that meets the joint requirements of cost reduction and energy efficiency.

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

**T**he LED lighting system is a real solution to decrease the electric consumption (cost saving on electricity bills), but also an ecological solution with a higher lighting efficiency to reduce lighting pollution and less maintenance due to long service lifetime.

However, public street lighting, especially since the advent of LED technology, is highly sensitive to transient overvoltage of industrial origin, or of natural origin caused by lightning. This may cause electrical disturbances due to the AC network (switching operations) or the lightning surge. As LED electric lighting is usually connected to power network via long cables, this disturbance phenomenon is amplified. This is the reason why ABB is offering a new surge protective device for this application.

The OVR T2+3 N1 15-275S SL will provide you all the benefits you need. With its compact design, its DIN rail mounting and the pre-wired cable on line and neutral, this SPD can be easily installed in the small power supply boxes (lamp post enclosure, traffic lights, parking lots, bus shelters, billboard, decorative lighting, etc...).

Its installation in lamp posts enclosure prevents service interruptions, damage and constant replacement of lamps, which are difficult to access without appropriate equipment (e.g. cradle lifts).

The SPD is associated to a circuit breaker or fuse-holder as a back-up protection to ensure priority to system safety or priority to continuity of service. In addition the surge protective device is equipped with the safety reserve system that keep the system protected even after a first high transient overvoltage strike.

This product is bottom wired, with a pre-wired cable (line and neutral) 17 cm long, that allows an easier installation on the terminal block in the power enclosure. The earth has to be connected. This bottom wiring design is the perfect way to prevent condensation problems with its degree of protection of IP32. ABB Lightning protection: always new innovations to protect new applications.

### Overall network lightning protection

As part of a preventive approach, ABB has joined forces with the main market players (lighting appliance manufacturers, fitters, lighting unions, etc.) to propose a full range of surge protective devices for installation at various points of the network. From the switchboard to the lamp post, surge protective devices offer protection and continuity of equipment service:

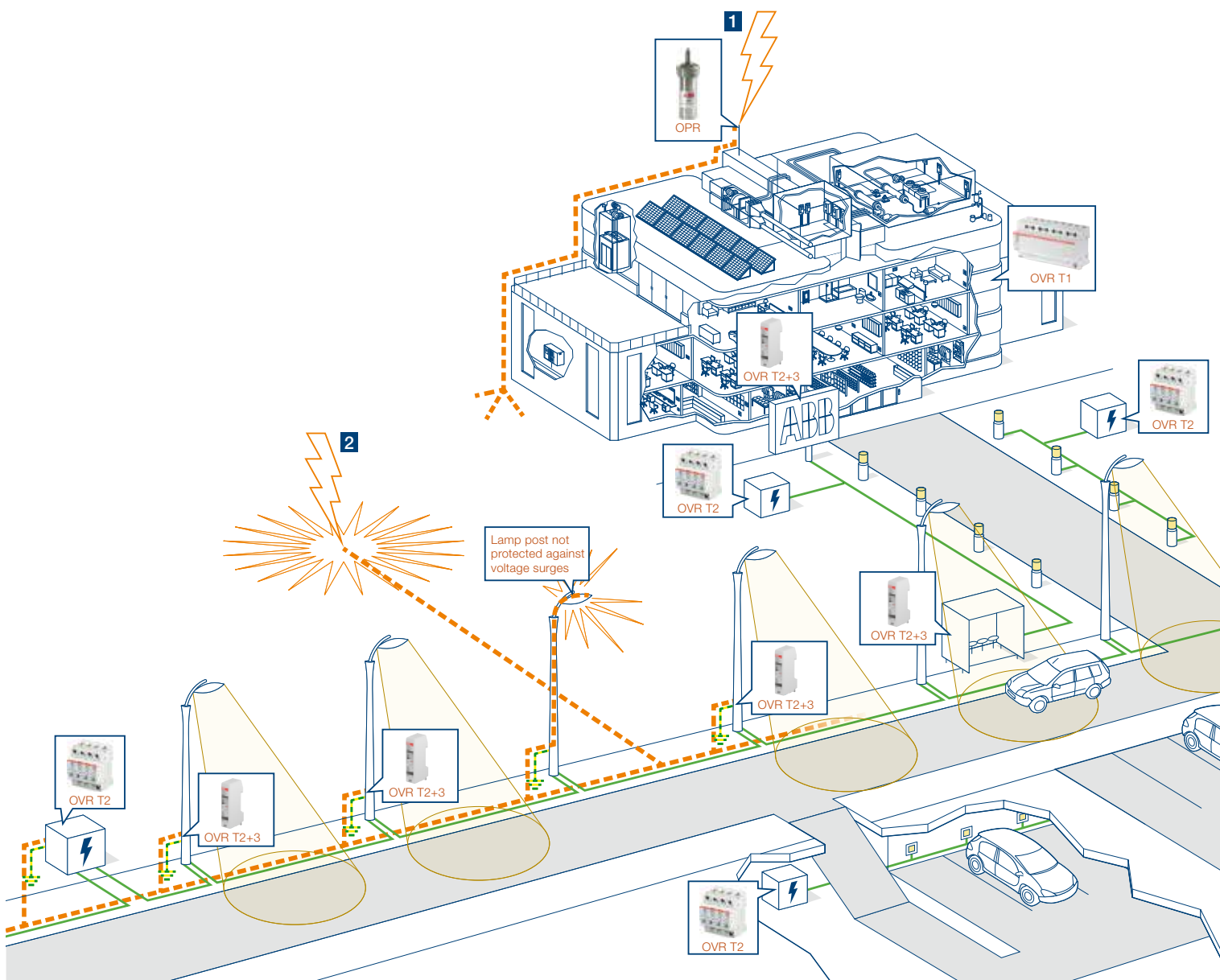
- indoor/outdoor lighting in public and private areas (streets, parking lots);
- street furniture (bus shelters, billboards, decorative lighting);
- light posts to ensure road traffic safety.

In general, public lighting equipment is powered with a TT or TN-S neutral point system. In the event of lightning strike impact, there is a risk of transmission of transient overvoltages via earth cables. This phenomenon can occur in two manners:

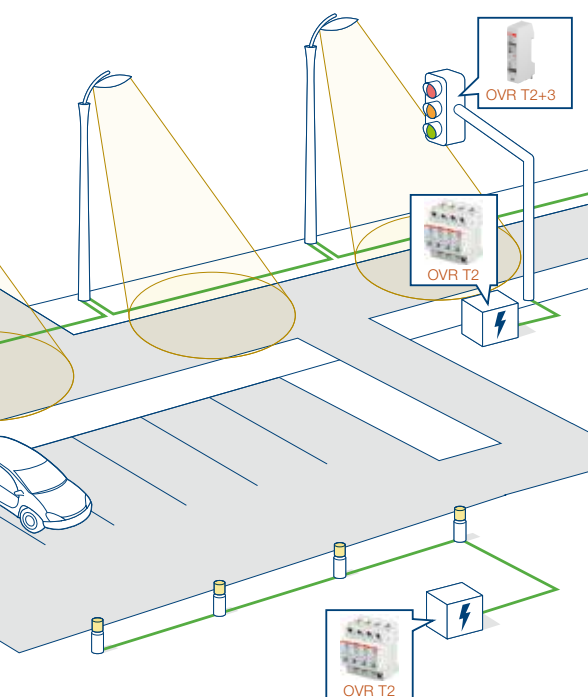
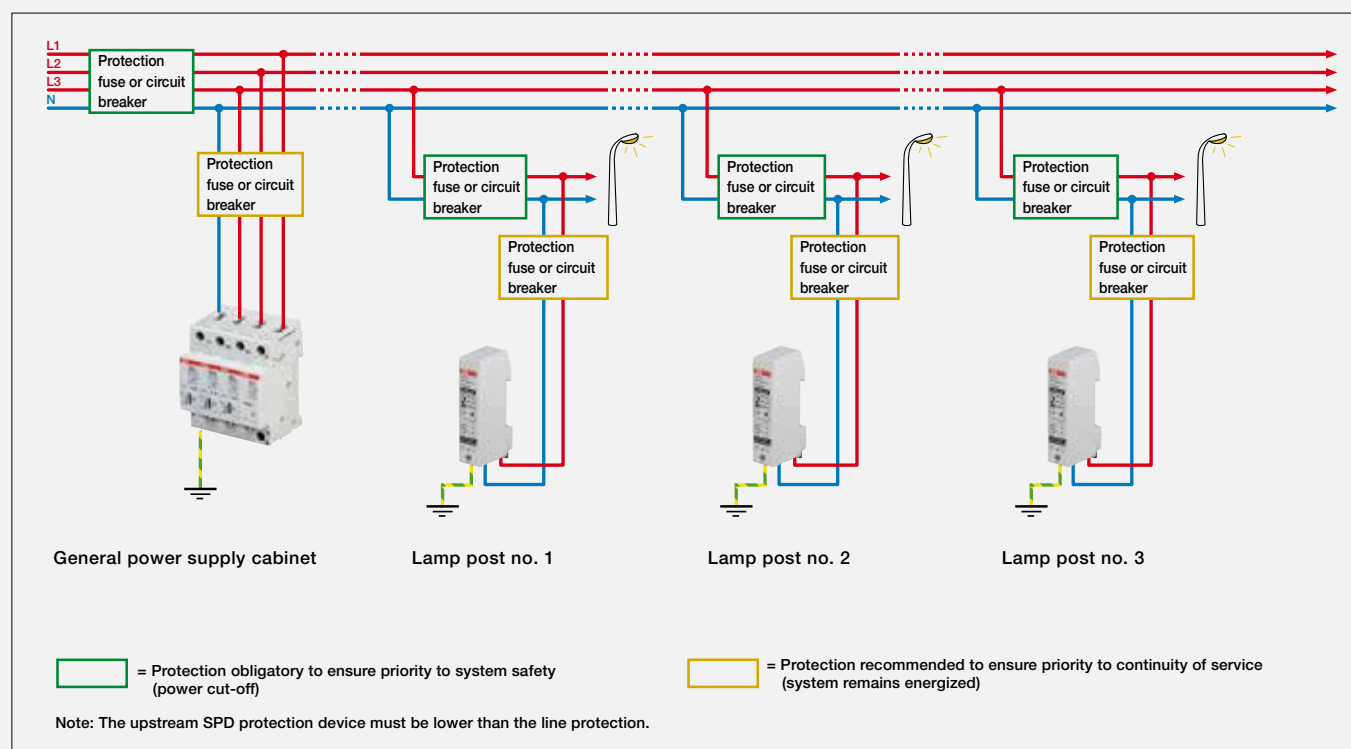
- via a direct **strike 1**, i.e. a direct impact on the metal conductor mast, where the energy will travel to the ground;
- via an indirect **strike 2**, i.e. where lightning strikes nearby to the system on an object or directly hitting the ground. Earth connections transmit transient overvoltages via the power cables, to reach the most sensitive components.

**To protect public lighting equipment, it is recommended to install surge protective devices on the following equipment points:**

- SPD Type 2 in the switchboards supplying the lamp post, traffic lights or street furniture;
- SPD Type 2+3 as close as possible to the sensitive systems, in the power supply cabinets in the lamp post masts.



## Surge protective device installation diagram



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# From electrician to marketer

## Telemarketing

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**Products, technical specifications, performance, 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 and 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 do you do this?".**

Telemarketing is defined as the set of marketing activities carried out via the phone:

- the call center is a physical place, within the company or outsourced, where the activity is carried out;
- the direct marketing activities performed by the call center have several purposes; on the basis of these, they are classified with more specific detail.

The telemarketing activities consist of direct telephone contact, by operators, between one or more affiliated companies and existing or potential customers. The purpose of this contact is to sell goods or services (in this case we speak in the most appropriate way of "telesales"), or more often in advertising and commercial activities of the company's products. In many cases the call ends, if successful, with **the identification of a sales appointment at the customer's home or at the offices of the company.**

### Typology

The telemarketing activities can be carried out by the call center in two modes:

- outbound telemarketing;
- inbound telemarketing.

In the first case, the telephone contact between the customer and the operator takes place at the initiative of the latter, which in turn contacts one or more clients using lists of phone numbers usually provided by the company. In the second case, the calls come to the call center from the customer, usually by dialing a toll-free number; in this case the operator, in addition to providing the information required by the customer, will be responsible for **directing the call to the commercial purpose identified by the company.**

### Tools

As part of their work, the operators of a call center that conducts telemarketing takes advantage of some tools, in addition to the telephone or the PC with headphones which performs the same function. Among these tools, the most important are:

- the script;
- lists of telephone numbers.

### The script

The term script identifies the text of the call that the operator has to follow as a "roadmap", a guideline of the conversation with the person at the other side of the phone. In outbound telemarketing, it usually consists of:

- a short presentation of the company or the sales and marketing initiative;
- an interview stage, that consists of questions addressed to the customer;
- a phase called "motivation", in which the operator has the task of identifying, on the basis of the interview, the potential interest of the customer to the marketing campaign in question;
- a final phase, called "closure", in which the call must reach its purely commercial purposes, obtaining the explicit consent of the customer. This last phase, in some cases, is followed by a brief empowerment, with the aim of positively reinforce the agreement just established with the client.

**It is preferred to employ operators who are able to make their own script and then customize it to create empathy with the other party and not look like programmed robots.** Only those who emerge with a personable own character and a bit of spontaneity are able to have the best phone call and differentiate themselves from the mass of robot operators.





### **The lists of contacts and privacy policies**

About the lists of phone numbers used by telemarketing companies, privacy laws strictly regulate this aspect in different ways in each country, so please check carefully your local situation. Usually companies that operate through the trading system can no longer freely use phone books like white or yellow pages. In fact, sometimes only those persons who have given their explicit consent are allowed to be reached by telephone calls of a commercial nature. This consent may relate to an individual company or, in general, to all activities of commercial nature. This has been done to put an end to the indiscriminating use of the telephone often carried out by companies operating through telemarketing. However, it has caused significant problems in the supply of contact lists by the companies themselves, which must undertake specific marketing campaigns aimed at collecting personal data of potential customers.

In general, the customer contacts are divided by age, gender or geographical area assigned to the agency that works with the call center, so as to divide them according to the commercial target of each campaign.

In 2008, many European countries were experiencing telemarketing through the authorization of advertising calls even without the user's consent, notwithstanding the privacy policy. Such liberalization has introduced a regime of "tacit consent" starting in May 2010, when those who did not want to receive any more advertising calls and had to register, via phone or email, in a special register held and managed by a state office.

### **Professional roles**

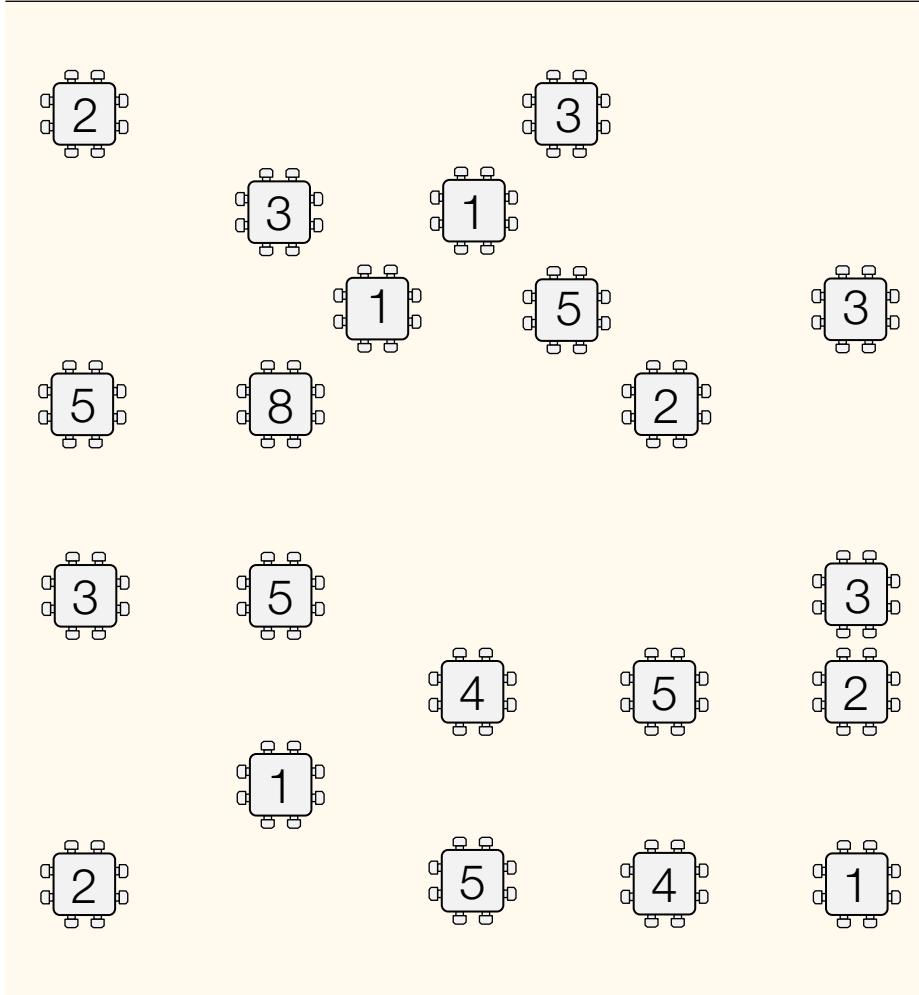
Within telemarketing we can identify at least four different professional roles, not necessarily present in every call center:

- telemarketing responsible
- telemarketing supervisor
- team leader
- telemarketing operator

The telemarketing operator and the team leader, in general, are actively involved in phone calls and data input. In the case of team leader, he also adds the power to actively follow a small group of operators, coordinating their activities during the telephone calls. The supervisor and the responsible, on the contrary, have higher level tasks, such as selection, management and staff training, conducting meetings, preparing of statistical reports and coordinating telemarketing activities with other company's functions.

# Connect the boxes

## Train your brain



### Task

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

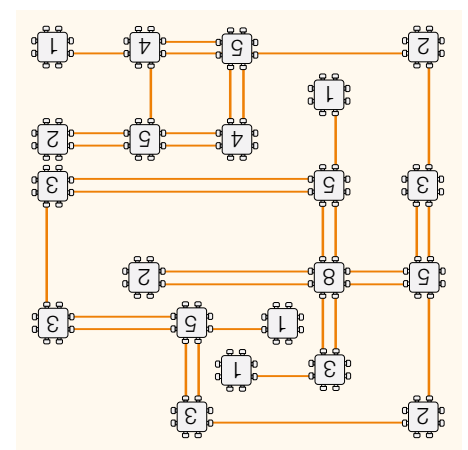
An electrician has already installed all the junction boxes on the wall and laid down the required connections, but then he left the job unfinished without explanation.

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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