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Day by DIN

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

News and know-how for informed professionals

The DALI protocol
Modern lighting must provide more than just “brightness”
Conversion of the Toni site in Zürich
Dairy product factory 7 becomes a center for the arts and sciences
Sunshine from within
Renovation as the new renewable

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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

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Energy efficiency in buildings: – Leadership in Energy and Environmental Design – LEED® (40)

Day by DIN 1|16

Valentina Surini
Marketing & Communication Manager
BU EPBP Global Marketing and Sales
Electrification Products Division

Dear readers,
Welcome to the first 2016 edition of our magazine!
The first thing I would like to say to you all is: Thanks! We open 2016 with a record number of subscription to our magazine and I am very glad of it, it means that our articles are useful for your daily business, do not stop writing to us at mail.daybydin@abb.com. With the continuous exchange of information, we can adapt our content to your needs and expectations.
Since we have had many questions in the last weeks about protection in residential and commercial installations, you will find interesting articles on lightning and surge protection, insights on how safe a smart home is and what it can be done to improve it and a very useful article on rapid shutdown systems, especially for photovoltaic applications in residential buildings.
When we speak about residential and commercial applications, one of the first topic is the lighting: nowadays the solutions to control the lights are more and more innovative and smart, find on page 32 the Top 6 ways to control the lights, including solutions for motion detection and for remotely operating lights according to the end user needs.
Looking forward to receiving plenty of emails from you all,
Enjoy the reading!

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News and facts

The expert answers

Doktor Wise

Report

Energy saving ideas

Technical

Time to relax

Jump in the box

Discover in this section brand new solutions offered by ABB for surge protection, energy monitoring, intelligent installations in buildings and protection in industrial applications.

Measurement devices

EQ meters gateway G13

Export your energy data with one click

When there are several meters at one site a solution to read out the meter remotely is usually desirable. The meters are connected on a serial communication bus to a single point where the user can read out the meters. With the new sub-meter gateway G13 from ABB it is possible to not only read the values via a browser on the computer or tablet, for example, it is also possible to do any kind of configuration on the meters and with one click, export the energy data to a CSV file, which could easily be imported into Excel, for example. By exporting the data on a regular basis it is possible to save the energy values over time, use the data for analyzes and more.
It is possible to connect up to 32 EQ meters and all measurement data can be read at a baud rate of up to 500,000 bits/s. The G13 is connected via an Ethernet connection to an Ethernet network and all data can be read either using the inbuilt REST API by making a simple HTTP request or using the built-in webserver to read data, configure the meters and export the energy values.

For more information: 2CMC481006B0201

Benefits

- Connect up to 32 EQ meters to one G13 for the most efficient installation
- 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
- Export energy data to a CSV file to be imported in for example Excel
- 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 making it easy to implement in any system
- 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

Connection

DBL distribution blocks

The clever distribution concept

The new DBL distribution blocks allow economical and convenient distribution of electrical circuit from a single input source to several devices in branch circuits of industrial control panels.
The exclusive compact and modular design of DBL distribution blocks allows easy installation combined with a great flexibility of use.
Thanks to the exclusive reversible cover they can also be used as a grouping devices in solar applications combining several circuits of solar strings into one single output for the solar inverter.
DBL distribution blocks are well suited for commercial and industrial control panels as well as solar combiner boxes.

For more information: http://new.abb.com/low-voltage/products/connection-devices/solution-series/terminal-blocks/dbl

Benefits

- The benefit of 3 configurations in 1 product: single or multiple poles splitter and grouping
- Flexible cover facilitates identification and wiring
- Save up to 50% rail space compare to conventional distribution bars
- Voltage rating up to 1500VDC IEC and 1000VDC UL for solar applications
- Accept aluminum or copper conductor
- Reduced assembly time by 80%

Surge Protective Devices

New OVR T1-T2 QS with QuickSafe technology®

Best in class solution to guarantee a safer solution to end users.

The new OVR T1-T2 QS series was developed with the new patented solution QuickSafe® in order to pass the new and reinforced tests within the updated IEC/EN 61643-11 SPD test standard.
It's Quick! Now, OVR T1-T2 QS disconnects 5 minutes quicker than typical competitor SPDs under the same conditions. It's Safe! QuickSafe thermal disconnection is now capable to safely disconnecting the SPD at the lower temperature of 70°C (instead of 102°C) thereby significantly reducing the risk of any potential damage to the installation.

Technical catalogue: 1TXH000375C0202

Benefits

- Reliability: certified products to the latest IEC 61643-11 for a safer installation
- Continuous operation: Extended installation life protection with the patented Safety reserve® feature
- Cost effective solution: avoid end of life issues without purchasing additional back up protection.

Building Automation

free@home voice control

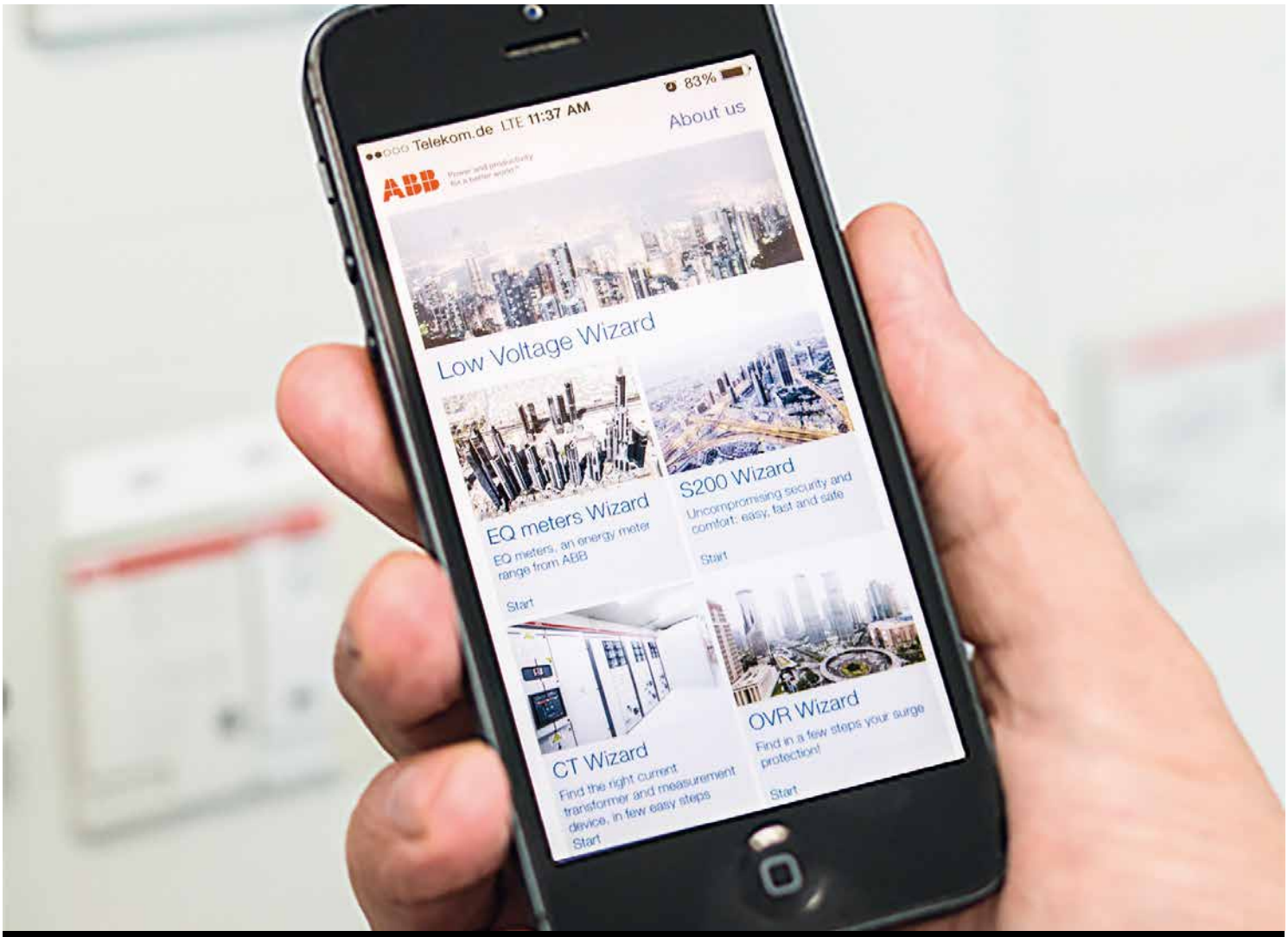
Your home listens to you

Controlling your home becomes even easier. Now, free@home can be controlled easily via voice commands. The user can interact with the system intuitively, as if he or she was speaking with another person. The system understands commands like “Switch on all lights!” and even responds by saying “Okay. All lamps have been switched on.” It can also respond to the user’s questions such as “Are the lights still on?” The voice control is initiated by pushing the microphone button on the user interface of the free@home app.

For more information: http://new.abb.com/buildings/livingspace/free@home-voice-control

Benefits

- Executes and responds to voice commands
- Responds to questions about the state of lights, blinds and temperature
- Understands names of objects, rooms and floors given by the user during the programming of the system (e.g. “Turn on all the lights in the basement”, “Turn on the desk lamp in Tommy’s room”)
- Full control of blinds, heating, scenes and lighting (incl. Philips HUE)
- Available in English, German, Dutch, Spanish, French, Italian
- For iOS and Android
- Download from the App Store / Play Store via “in-app purchase”



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

ABB's Low Voltage Wizard 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 everywhere 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**

Available on the App Store

Google play

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Protection

S200 MR

Supplementary protector S200 MR for ring-tongue applications acc. to UL 1077

The S200 MR is a high-performance supplementary protector with ring cable lug connections conforming to UL, CSA and IEC standards. The integrated captive connecting screws simplify the connection of electric lines, providing extra protection and saves time.
This supplementary protector is a valuable addition to the well-known System pro *M* compact® range, which allow most of the UL1077, CSA 22.2 No. 235 and IEC-approved components to be combined effortlessly with the new model line.

Technical Data Sheet: 2CDC001183D0201

Benefits

- Rated breaking capacity 10kA acc. UL1077/ CSA 22.2. No. 235 and 15kA acc. to IEC/EN 60947-2
- Certified up to In= 63 A at 480 Y / 227 V AC acc. to UL1077, CSA 22.2 No. 235
- Captive connection screw
- Busbar connectivity
- Clear contact position indication in red/ green ‘real CPI’
- K Tripping Characteristics

Busbar

Ring Tongue Busbar

Phase rails PS … BP-CR and accessories according to UL and CSA

Busbars of the PS..BP-CR series are designed for the safe and economic connection of Ring-tongue MCBs S200MR and SU200MR. The complete range is cULus listed and therefore can be used for branch and supplementary protection.

Technical Data Sheet: 2CDC446003D0201

Benefits

- cULus Listing
- Nominal current: 100A
- Nominal voltage: 600 V AC
- Cross section 25 mm²
- individually cuttable, therefore a perfect fit for every application
- Suitable for MCBs acc.UL1077, series S200MR as well as for MCBs acc. UL489, series SU200MR

Protection

SU200 MR

Circuit breaker SU200 MR
for ring-tongue applications acc. to UL 489

The SU200 MR is a high-performance circuit breaker with ring cable lug connections conforming to UL, CSA, and IEC standards.
The integrated captive connecting screws simplify the connection of electric lines, provides extra protection and saves time. This circuit breaker is a valuable addition to the well known System pro *M* compact® range, which allow most of the UL 489 and CSA 22.2 No. 5 approved components to be combined effortlessly with the new model line.

Technical Data Sheet: 2CDC002184D0202

Benefits

- Rated breaking capacity 10 kA acc. UL 489 / CSA 22.2 No. 5 and 15 kA acc. IEC 60947-2
- Certified up to In= 35A at 480 Y/ 277 V AC and up to In= 63A at 240V AC acc. to UL 489 / CSA 22.2 No. 5
- 40 °C reference temperature acc. to UL and CSA
- Captive connection screw
- Busbar connectivity
- Clear contact position indication in red/ green ‘real CPI’
- K tripping characteristics

Building Automation

myABB-LivingSpace

Remote access and control

Controlling your home remotely from anywhere offers a lot of comfortable advantages, like being able to open doors to family or friends, being able to check the status of lights, windows and blinds, or turning on the heating when leaving the office so it is warm and cozy when you arrive at home. Achieving that comfort, up to now required a DynDNS access and in-depth knowledge of IT networks. MyABB-LivingSpace makes remote access and control easier than ever. It merely bridges the free@home system with the smart phone, tablet or computer and all you need is an internet connection. The communication between myABB-LivingSpace, the free@home system and the device TLS and end-to-end encrypted. This way, you do not need to worry when exchanging data over the internet.

For more information: https://my.abb-livingspace.com

Benefits

- Remote access and control of the free@home and door communication system
- Easy set up via registration at www.my.abb-livingspace.com
- Safe communication due to end-to-end and TLS encryption
- Different rights can be assigned to different users
- One system can be controlled by more than one device, and one device can control several systems

Generating energy safely and efficiently?

Absolutely.

Photovoltaic power systems enable homeowners and businesses to cut their energy bills by generating their own electricity with rooftop photovoltaic modules.
The efficiency and quality of each system depends on each individual component. ABB has a comprehensive portfolio of high-performance products and systems for commercial, residential and industrial solar applications.
They meet all installation requirements, cover the entire process on both the direct and alternating current sides, and make solar power generation safe, efficient and cost effective. Everyday the world demands more renewable energy - ABB makes it possible. **www.abb.com/solar**

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Protection

OVR404; New SPD for SMISSLINE TP System

QuickSafe technology to ensure the best protection level to SMISSLINE TP system

The new range of OVR404, SPD pluggable version for SMISSLINE socket, are derived from the standard DIN-Rail OVR QS Type 2 range. Thanks to the new-patented QuickSafe technology, OVR QS disconnects 5 minutes quicker than typical competitor SPDs under the same conditions. The device can be directly plugged in to the SMISSLINE TP bus bar system. The new devices are fully compatible with SMISSLINE installation devices and the surge arresters in the ABB System pro *M* model series

Technical Catalogue: 2CCC451059C0203

Benefits

- Reliability: certified products to the latest IEC 61643-11 standard for a safer installation.
- Continuous operation: Extended installation life protection with the patented Safety reserve® feature
- Pluggable cartridges for easy and fast maintenance

Intelligent Building Solutions

Valve Drive EnOcean

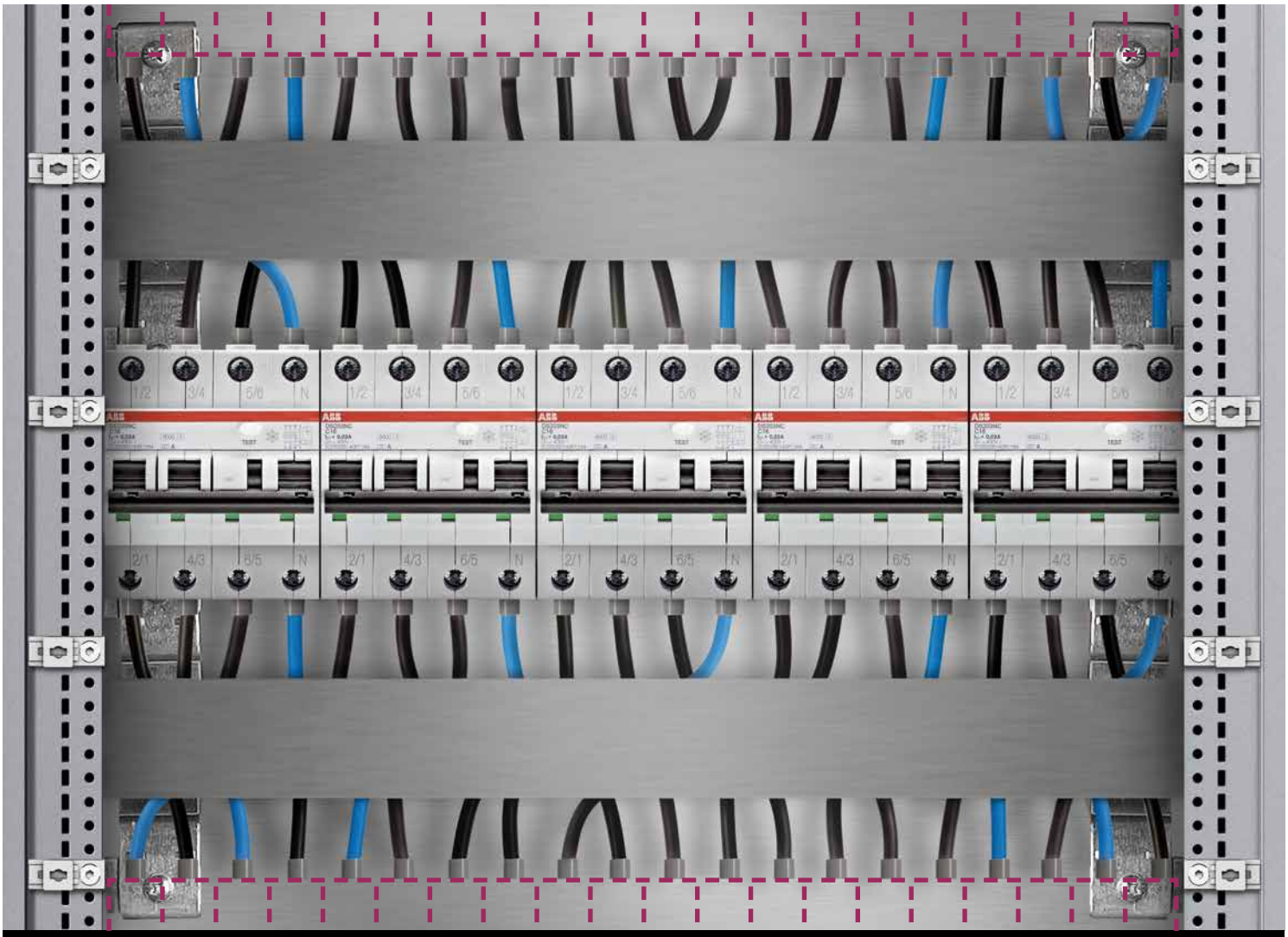
Wirelessly controlling valves in retrofit applications

The new Valve Drive EnOcean SE/K 1.868.1 supports the efficient control of the room's climate in residential and commercial buildings. It is a proportional valve drive controlling heating or cooling valves and communicates wirelessly via the EnOcean standard with, for example, KNX room thermostats. Therefore, no wires need to be run to the valve facilitating energy efficient temperature control especially in retrofit applications. The battery supply warrants a maintenance free operation for four years, additionally, a clear display provides the current target temperature and informs about errors and alarms. When using the ABB i-bus KNX EnOcean Gateway, the signal strength of each connected valve drive can be easily measured facilitating installation and warranting reliable operation.

For more information: www.abb.com/knx

Benefits

- Easy mounting on valve bases without the need to run any wires
- Display indicating the current target temperature and alarms
- Target temperature can be easily adjusted directly at the valve drive
- Quick and easy configuration with ABB i-bus KNX EnOcean Gateway by measuring the signal strength of each connected valve drive with the ABB i-bus Tool
- Less maintenance due to four years battery life time



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

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

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Intelligent Building Solutions

ABB i-bus KNX Logic Controller

Maximum design freedom for KNX professionals

With the new ABB Logic Controller ABA/S 1.2.1 system integrators can quickly and flexibly deal with the most challenging project requirements – with a maximum of design freedom. That is because the logic controller can easily and reliably accommodate altered or extended functionality requests during construction or usage of buildings. The Logic Controller comes in a newly developed housing for mounting on a DIN rail, enabling easy dismounting without the necessity for a tool.

What makes the device so compelling is not just the graphical programming interface in the ETS software environment. It comes also with a comprehensive library of functions to control all building applications. The library includes solutions for heating, ventilation and climate control. The installation of extra software is not necessary. Another benefit is the innovative technology. The device uses state-of-the-art and energy-efficient microcontroller technology.

Furthermore, the system comes with a simulator function. Using simulation the system integrator is able to make sure that the logic controller performs all commands correctly before commissioning the device on the project's site.

Adjusting the settings later – according to a possible changed building usage – is easy and cost-effective for the system integrator. Thus the Logic Controller is a reliable companion for KNX system integrators to successfully implement their projects.

For more information: www.abb.com/knx

Benefits

- Maximum design freedom for KNX system integrators by easily extending functionality during a building's construction and usage
- Graphical programming interface in ETS software environment without the need to install additional software
- Comprehensive library of functions for all typical building applications
- Inbuilt simulator facilitates efficient and reliable commissioning on the project's site. All functions can be tested before going live
- Newly developed housing enabling dismounting on DIN rail without any tools

Industrial plugs and sockets

IP67

The new generation of industrial plugs and sockets

The new IP67 industrial plugs and sockets, part of Easy & Safe offer, are an excellent choice for most applications, where liquid or dirt can occur and where the requirements for reliability and safety are high. Now in a new attractive design.
IP67 classification guarantees water and dust tightness of electrical contacts, which brings reliability, reduces downtime and lowers maintenance costs.
The contact parts of connectors are precisely manufactured from solid brass. The innovative design ensures contact self-clean during connection and disconnection preventing arcing.

For more information: http://new.abb.com/low-voltage/products/industrial-plugs-and-sockets/IP67

Benefits

- Modern robust design
- Water and dust protection of contacts avoids overheating and burning, and thus prolongs plug and socket lifetime
- Minimizes the risk of accidents, injuries and damage of the connected equipment
- Self-cleaning contacts
- Wide scope of application: industrial applications, food and beverage industries, construction sites, infrastructure applications, mines, marine applications such as the connection of reefer containers

Electrical distribution

Switch disconnectors OT160G 160 Amperes

Savings through simple and smart design

Whenever and wherever a switch-connector is needed, the OT160G by ABB provides reliable and economical performance. It is a high-quality basic switch-connector designed to deliver tangible benefits in all AC applications. It is a device that gives you a competitive edge, all packaged into one smart and compact unit.

Leaflet: 1SCC301018B0201

Benefits

- Universal application - Multi-purpose switch-disconnector that is particularly well suited for use in power distribution and in various building sector applications
- Up to 20% lower stock expenses thanks to the wide coverage of simple and effective switch-disconnectors with an integrated side-operation feature
- Easy to use and install thanks to various configurations and mounting options
- Compact and powerful design that achieves savings of up to 30%
- IEC60947-3 and UL98 versions

Electronics

Innovative LED dimmer for control cabinet installation

Comfortable control of light for a wide range of lamps – ABB care for clarity and safety in the selection of dimmers

The innovative MDRC LED dimmer now makes comfortable dimming of so-called retrofit LEDs also possible from the electrical distribution. Aside from perfect light control of LED lamps, this device also offers the end customer the option of reliably activating conventional incandescent lamps, 230 V halogen lamps, as well as low-voltage halogen lamps with conventional inductive or electronic transformers.
In this way Busch-Jaeger not only care for clarity and safety in the selection of dimmers, but also offer the customer the advantage of equipping existing lamps with new LED lamps (retrofit LEDs) without having to go without the current dimming comfort.

For more information: http://new.abb.com/low-voltage/products/residential-products/dimmer/mdrc-led-dimmer

Benefits

- Reliable and comfortable dimming of LED lamps
- Tuned to replacement lamps (retrofit LEDs)
- Brightness regulator downward compatible - also suitable for conventional incandescent lamps, 230 V halogen lamps and low-voltage halogen lamps with conventional inductive and electronic transformers.
- Touch-dimmer with local operation
- Adjustable minimum / maximum brightness
- Staircase light function with automatic switch-off function and pre-warning function according to DIN 18015-2
- Perfect function and comfortable operation
- Harmonious and flicker-free dimming process
- No humming or buzzing due to transistor technology
- Numerous practical special functions
- Extremely compact construction as MDRC device (1 MW)

Electrical Distribution

Switch disconnectors OT up to 4000 A

High performance, compact solution

Thanks to the new switch-disconnectors, our OT range becomes more comprehensive, from 16 to 4000 A. The new switches are available from 3200 to 4000 A (IEC) and 1600 to 2000 A (UL98).
OT provides high performance in a compact size and allows optimized switchgear design. The switch design is optimized for a standard 600 mm cubicle solution and fits 140 mm standard busbar width.
Wide phase distance versions (185 mm) are available. This is the only type in the market with visible contacts.

For more information: 1SCC301019B0201

Benefits

- On-load switching up to 4000 A (IEC) and 2000 A (UL98)
- High withstand performance (80 kA) – can be used as main switch at full current values
- Avoids customization costs
- Clear and reliable position indication

Electrical distribution

Kabeldon IP-system

Safe, proven and reliable

The Kabeldon IP-system consists of a unique, screen-protected busbar system combined with a wide range of outdoor enclosures, switching devices and connectors. It is suitable for all kinds of low-voltage distribution systems in buildings and infrastructure: water industry, airports, railroads, tunnels, highways, commercial and residential buildings. Kabeldon IP-system can be installed indoors or outdoors. Thanks to the Connect IT software, our customers can plan distribution boards and cable cabinets in an easy and simple way based on our offering.

Technical catalogue: 7ABA115586

Brochure: 7ABA102598

Benefits

- Configurable system that adapts to customer needs
- Enabling installation of low-voltage distribution outside in an enclosure designed for outdoor usage, reducing the need for electrical room
- Possibility to connect and disconnect modules when the system is live
- Only one tool needed for installation
- Enclosure, busbars and switching devices are type tested together as a system
- Fully IP2X insulated system
- Enclosures are tested per standard IEC 61439-5 and have degree of protection IP34D

Enclosures

TwinLine N 55

The system of wall-mounting and floor-standing cabinets

The TwinLine N 55 system is a fully comprehensive product range, available in both protection classes and three cabinet depths and all with the high IP55 degree of protection. With the TwinLine N 55 system, ABB has set another milestone in the field of modern distribution. TwinLine N 55 has been tested according to IEC 61436 and DIN EN 61439 -1/-2/-3.

Flyer: 2CPC000170L0201

Benefits

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

One system for all application?

Certainly.

TwinLine N 55 – ABB's innovative Sub-Distribution system. This fully comprehensive product range includes wall-mounting and floor-standing cabinets in three depths and all with the high IP55 degree of protection. CombiLine N is available in the three cabinet types TwinLine-G (depth of 225 mm), TwinLine-L (275 mm) and TwinLine-W (350 mm). All CombiLine N cabinets meet the requirements defined in IEC 61439 and DIN EN 61439 Part 1 and Part 2, and are designed according to the protection classes I and II. Intelligent adaptations such as the innovative flange technology, uniform fastening for all internal configurations, optimal accessibility, ease of connection and the modular plinth concept guarantee its ease of installation. **www.abb.com/lowvoltage**

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Enclosures

CombiLine N

The new Touch guard

The highly sophisticated quick mounting system makes the completion of modular cabinets with distribution panels an effortless process. Simple, quick and safe – these are the three attributes of this system that speak for themselves.
CombiLine N Modules can be delivered as
– Complete pre-assembled delivery (with or without components)
– Individual parts
– Flatpack
CombiLine N module is a modular distribution panel system up to 850A. Due to the continuous product development process new modules have been created to extend the range to suite every application.
Thanks to the uniform screw driving methods using Torx, the distribution panel system CombiLine N is now even more convenient to use!
Flyer: 2CPC000115L0201

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

Intelligent Building Solutions

Busch-ControlTouch KNX

Intelligent control of a KNX system via App

The Busch-ControlTouch KNX IP-Gateway connects the KNX system with the IP-network and controls all KNX functions in a building. The solution consists of a Din Rail product and an app, which is available for iOS and Android. It enables the user to operate a building intuitively with his or her smart phone, tablet, and soon even the Apple-Watch. Apart from controlling lights, blinds and heating, the scope of function even includes IP-cameras, Sonos wireless speakers and the Philips Hue system.
The product is commissioned using the my.abb-livingspace.com platform and allows the assignment of different rights to different user profiles.

For more information: http://new.abb.com/low-voltage/products/residential-products/knx-building-systems-technology

Benefits

- Enables the user to control a building via smart phone and tablet
- Commissioning and programming using my.abb-livingspace.com
- Intuitive and comfortable operation
- Connection and controlling of IP-cameras, Sonos wireless speakers and Philips Hue
- Easy and safe remote control from anywhere around world through my.abb-livingspace.com
- Setup of logic functions using scripts
- Push and alert notifications in case of malfunctions

Protection

S750DR-AUX

Auxiliary contact for S750DR selective main circuit breaker (SMCB)

In many cases it is valuable to be able to check the status of a circuit breaker without directly standing in front of the distribution board. The S750DR-AUX auxiliary contact now offers this function for the S750DR-range.

Datasheet: 2CDC415036D0101

Benefits

- Two change-over contacts independent and potential-free indicating the position of the contact of the S750DR pole(s)
- The change-over contacts fulfill the requirements of protective separation to the main circuit connected to the pole(s)
- Test button for verification of the correct indication of contact position of S750DR pole(s) without switching the pole(s)
- Can be easily assembled within seconds on the right side of each 1-, 2-, 3- and 4-pole S750DR without any tools
- Accurate and safe monitoring of contact position
- Fast, time-saving and easy to assemble

Building Automation

ABB-free@home® Wireless

Expanding freedom

ABB-free@home® Wireless is the latest supplement to the free@home success story. Alternatively or in addition to the wired components ABB-free@home® Wireless opens new possibilities, offering new products, which communicate with the free@home system via radio frequency. Quick and budget friendly installable, adaptable and future-proof: these terms describe the system now even better than ever.

For more information: http://new.abb.com/low-voltage/launches/free-at-home

Benefits

- Intuitive system for intelligent building control
- Intuitive operation via smart phone and tablet even via voice commands
- Remotely controllable
- Budget friendly installation
- Attractive option for renovation projects due to the new ABB-free@home® Wireless components
- Easy adaption and expansion of the system
- Available in various designs, colors and materials

In the news

Many apps, software, Web pages and catalogues are available to provide support, in-depth and detailed product information. Documents and software can be downloaded from http://www.abb.com/abblibrary/DownloadCenter/

Connection devices

Terminal blocks in a washing machine?

Watch the new ABB SNK blockhead video series and find out.

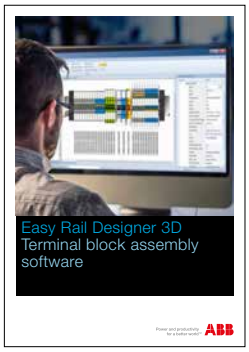
What do ABB terminal blocks do in a washing machine? Intrigued to find out? Simply watch the series of six humorous episodes featuring SNK series PI-spring and screw clamp terminal blocks. Each video presents a new challenge putting to test the reliability and quality of our products. Do you think our terminal blocks can withstand salt, water and spinning in a dishwasher? Explore our product values, experience your moments of suspense and have fun!

Video: 2CCC441020C0201

Software

Easy Rail Designer 3D

The terminal block assembly software



Explore the features and benefits of our new software that simplifies the whole rail assembly design process thanks to user-oriented features. Easy Rail Designer 3D offers advanced functions such as 3D drawing, CAD/CAE integration, autocorrection and much more!

Brochure: 1SNC160038B0201

Electrical distribution

Securing power to perform

With ABB you are never left in the dark

Visit our new web pages to learn more about our enhanced range of motorized and change-over switches! You will find a promotional video, a brand new catalogue, video manuals and answers to frequently asked questions.

Web: http://new.abb.com/low-voltage/products/switches/motor-operated-change-over-switches

Virtual Building

Building Space® | Office

Discover the office building of the future

The world of business is evolving at a rapid pace. Today, we no longer work in rigidly defined surroundings – smart building solutions give us more and more freedom. Thanks to the intelligent control of light, air-conditioning and security, it also strikes a healthy balance between human needs and energy efficiency. These impressive new ideas can be discovered now in a detail online virtual office building of the future.

Web: new.abb.com/buildings/offices

Website

Discover the new ABB lighting webpage

From stylish to functional lighting

Natural lighting solutions for all tastes. ABB / L'Ebenoid Lighting have developed a contemporary new range of energy saving bulkheads and wall mounted lighting fixtures, with an emphasis on beauty, functionality and design. Specifically aimed at residential and commercial living, these products are ideal for residential and commercial buildings, reducing maintenance and fitting costs, while offering superior energy efficiency.
We offer a range of traditional, stylish design solutions which are simple and functional to use, including products ranging from movement detection and dimming, to standard and vandal resistant devices. Our latest range of quality, energy saving products are all 'made in France,' and can be found on our new and easy to navigate ABB Lighting website.

Web: http://new.abb.com/low-voltage/products/lighting-emergency-lighting/lighting

Smartphone Apps

Low Voltage Wizard

The right choice always in your hand

Low Voltage Wizard is a collection of Apps to easily select solutions and products for low-voltage installations with a few simple steps.
The collection of Wizard is now enriched thanks to the release of the new **MISTRAL Wizard**, with which you can configure the consumer unit for residential application, selecting the DIN-Rail devices and obtaining the right code of the MISTRAL Consumer Unit, calculated according to the occupied space and power losses of the selected components.
You can choose among the following DIN-Rail devices:

- Miniature Circuit Breakers S200
- Residual Current Devices F200
- RCBO DS200
- Surge Protection Devices OVR
- MDRC like Timers and Load Management Devices

The MISTRAL Consumer Unit can be selected according to several characteristics such as: installation method, IP rating, door type and much more…

Features:

- step-by-step selection of ABB Solutions and Products
- Selection starts with installation requirements
- Email exports of the results
- Documentation links (web site, technical catalogue, instructions manual and brochures)

Apple App Store

Google Play

Software Tool

Software Configurator Tool for SMISSLINE TP

Software Configurator in PDC and as a stand-alone version on the ABB e-Design platform

The Software tool is for easy project planning for the SMISSLINE system. The user can manage and optimize a project. It's possible to plan devices together with an ABB Enclosure or only Smissline rows with an enclosure.
The SMISSLINE tool is also available on the ABB E Design platform.

Download: http://new.abb.com/low-voltage/software/e-design/download

Flexibility without complexity?

TwinLine S 43

ABB's innovative sub-distribution System pro *E* energy – TwinLine S 43. With its new modular system, ABB offers a tailored and proven concept of modular wall-mounting and floor-standing cabinets. This fully comprehensive product range includes the cabinet types TwinLine-G (depth of 225 mm) and TwinLine-L (depth of 275 mm) and provides solutions for every application. All cabinets are designed according to IEC 61439. This modular system is simple in planning, quick in assembly and safe in application. Highlights such as the innovative flange technology, optimal accessibility, ease of cabinet connection, the modular plinth concept and the flexible assembly of the new internal configuration, guarantee a modern energy distribution system.
Simple in planning – quick in assembly – safe in application!

Power and productivity
for a better world™

Video

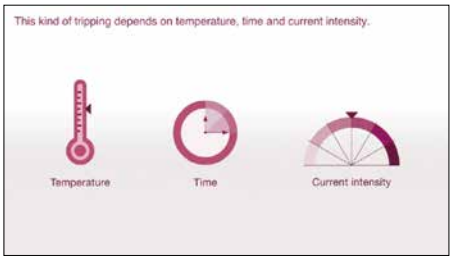
Garage Nuggets

Multimedia content for multichannel marketing

Point your smartphone to the QR code and quickly access the new ABB Garage Nuggets videos developed to provide interesting curiosities about how a Miniature Circuit Breaker works, about why having a Residual Current device at home is the best way to guarantee electrical safety, and much more! Find out more in the descriptions below.

How Miniature Circuit Breakers (MCBs) replaced melting fuses
This Nugget explains how the MCBs evolved right from the innovation of Hugo Stotz in 1923, replacing the melting fuses and protecting the dangers of electricity. With this chronological evolution of the technology, we discover how ABB continuously kept ahead by introducing new products to meet the growing needs of the industry.

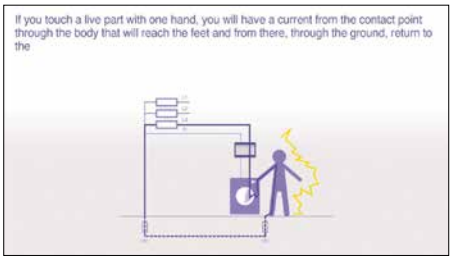
Line protection. What MCBs are there for
This nugget explains in detail the functions of Miniature Circuit Breaker (MCB) and the valuable protection it can give against overload and short-circuits in the electrical installation.



How does a Miniture Circuit Breaker (MCB) works
See inside a Miniature Circuit Breaker (MCB) and understand how it functions. The operation of the mechanism occurs in milliseconds. Discover the product's functionality and the sequence of events that safeguard against an over current or short-circuit.

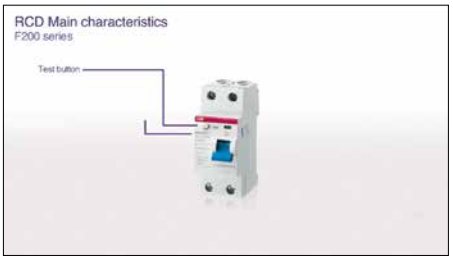
Miniature Circuit Breakers (MCBs) specifications

The selection of the correct Miniature Circuit Breaker (MCBs) is application dependent and critical for protection. In this nugget, we explain the various characteristic curves, their significance and the application-based selection criteria.



The best way to guarantee electrical safety at home

Know from this nugget, why residual current devices were invented and how these devices have evolved over the past 50 years. ABB has contributed to the development of this product and designed to protect against direct and indirect contact, guaranteeing electrical safety against leakage in your installation.



How does a Residual Current Device (RCD) work

Residual Current Devices (RCD) as seen from inside. This nugget explains how RCD works and how to select the right RCD based on your application to ensure the utmost protection in your installations.

Top 6

Innovative solutions for residential and commercial lighting

ABB-free@home® Making home automation easier than ever

Once futuristic dreams, intelligent buildings are now a reality and ABB-free@home® automation technology offers the lifestyle, comfort and safety people want in their homes.
ABB-free@home® is a central control system residents can use to monitor and control an entire living area: Light dimming and switching, blind control, temperature regulation, ABB-Welcome Door Entry System integration and the recently launched voice activation feature allows consumers to use voice commands to control the home automation functions. Coming home after dark, you can just command: 'turn the hall lights on' and lights are activated, or as you leave your house you can call: 'switch all lights off' and it's done. Users can program the system to choose the names of rooms and areas. The system can be set so that users receive confirmation that a command has been activated, so when you state: 'close the blinds in the living room', you would hear 'the living room blinds are all closed', etc. Additionally, users can ask the system questions about the status of the functions, such as: 'are the lights off in Thomas' bedroom?' and the system will provide an answer.

Solutions for ambient lighting and motion detection

Customizing the color of the hall or balcony, or the type of furnishing and finishes of doors or windows are common place. To allow greater flexibility the ABB / L'Ebenoid external lighting range has just been extended with the launch of new colored rings within the D2L and Axiome series. These entry lights follow the Sextan Premium range, which offers a variety of bulkheads and wall mounted lighting fixtures in different colors to suit customers' needs. Its key benefits are stylish aesthetics, thanks to the Aluminum ring in a large choice of finishes such as Quartz, Metallic & Anthracite greys and Aged iron, as well as providing energy savings and convenience through the embedded movement sensor.
Increasing users' comfort is one of our priorities. Complementary to the Infra red movement sensor, ABB / L'Ebenoid range puts a strong focus on the Hyperfrequency (HF) detection.
ABB is the first one on the market offering on-off dimming function integrated in a 24GHz high-frequency sensor. This innovation brings accuracy to the settings, repeatability and an easy mounting for the installers, providing comfort and safety to the end-users as well as energy savings and an embedded invisible technology for building managers.

Twilight solutions (Tline, twilight sensors)

Nowadays everyone has got used to the fact that when the sun sets, the lights switch on. This is not magic but a simple automation mechanism achieved by installing a twilight switch in buildings, which can work when connected to an external sensor, as with T1 Plus or using the T1 Pole directly fixed on an exernal wall. Alternatively, when pollution or the risk of vandalism prevents the installation of an external sensor, the TWA astronomic twilight switch can be set according to the time of sunrise and sunset with reference to the geographic location by providing longitude and latitude coordinates.

Modern light management saving costs with innovation

Presence detectors automatically detect the presence of someone inside the room. Their precision is far superior to that of conventional movement detectors. Not only lighting systems but heating systems and air-conditioning systems can be controlled intelligently and efficiently with presence detectors. Empty rooms in which the lights are on and the air-conditioning runs at full power are now history. There is one presence detector for every need.
The high-quality, technically adept KNX Busch-Presence detectors provide the optimal answer for modern buildings automation. Controlling, monitoring and integrating lights, blinds, heating and many other amenities is made easy using the native ETS4 application.

Shade control for optimized daylight usage

Whether winter or summer, shutters, blinds and curtains are used to provide shade from the sun and ensure privacy to the building's occupants. Modern building control "works with you" and helps to automate daily routines, offering increased convenience and reduced running costs. Sensor controlled shading systems help optimize lighting conditions and contribute towards the maintenance of a perfect indoor climate.

ABB's illuminated emergency escape route signs point the way forward

Guideway emergency escape route signs are clearly visible and easily understood with simple illuminated pictograms that can bee seen clearly, even in daylight, with light intensities of 500 cd/ m^2.
The minimalist design and uniform illumination ensures the signs achieve the difficult balance between remaining unobtrusive yet clearly visible. In conjunction with Serenga 2 escape route lighting, Guideway provides you with a range of emergency lighting to cover all project-type requirements. ABB offers more choice than ever to achieve the practical requirements of emergency signage, while harmonizing with the aesthetics of building design.
Visit http://new.abb.com/low-voltage/products/lighting-emergency-lighting to learn more.

Good morning DIN-Rail

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

Bertrand Berges: *Segment Marketing Manager - Building products*

ABB proposes "Class 1", "Class 2", and "Class 1 and Class 2" surge protective devices (SPDs). The last product type would seem to include the first two, but is it actually so?

ABB proposes three types of surge protection devices, which offer global protection for low-voltage electrical networks:

- "Class 1" (or Type 1) SPDs protect against direct lightning strikes, in other words lightning striking the external lightning protection system (LPS) or the overhead supply line of a building. The current generated by the lightning strike penetrates the electrical system. The phenomenon is unusual but high in power. In this case, ABB recommends the use of OVR T1 "Class 1" SPDs, which are installed at the source of the electrical system.
- "Class 2" (or Type 2) SPDs protect against indirect lightning strikes, when lightning striking near a building induces a surge in its electrical system. The power is lower in this case, but it is a much more frequent phenomenon. To protect systems against this phenomenon, ABB recommends the use of OVR T2 "Class 2" SPDs, to be installed on the equipment requiring protection;
- "Class 1 and Class 2" SPDs, known as OVR T1+2, protect against both direct and indirect lightning strikes. They are used when there is minimal distance between the MDB and the terminal device and it is necessary to protect them from both types of lightning strikes. They are used, for example, in shelters, telecommunications panels and power centers with monitoring.

ABB recommends OVR T1+2 "Class 1 and Class 2" SPDs, to be installed at the source of the electrical system near sensitive devices.

OVR T1+2 "Class 1 and Class 2" SPDs are the best solution for direct and indirect lightning strikes in terms of performance and compact sizes.

How to choose protection when there is a risk of direct lightning strikes?

Some simple rules for a quick choice:

- If there is no sensitive equipment in the system, install an OVR T1 "Class 1" SPD at the source of the system;
- When there is sensitive equipment located at more than 10 meters from the MDB, install OVR T2 "Class 2" SPDs on it too;
- If the sensitive equipment is inside or near the MDB (<10 m), install an OVR T1+2 "Class 1 and Class 2" SPD.
- If the system is at risk of indirect but not direct lightning strikes, the correct choice is OVR T2 "Class 2" SPDs. In this case, using lightning current protection (OVR T1 and OVR T1+2) would not provide any benefit and would increase the overall cost of the system.

The right protection saves space, time and money, while ensuring maximum safety!

Bertrand Berges
Segment Marketing Manager
Building products

OVR TC 48 V P - ISDN
Protection of telephone lines

OVR TC 24 V P
Protection of entry-phone systems

OVR T1 3N 25 255 TS
Protection against direct lightning strikes

OVR T2 1N 40 275s P
Protection of system

Residual current circuit breakers: Dependent or independent?

Claudio Amadori: *R&D - EP Division*

The residual current circuit breakers (RCD), according to their manufacturing technology, are divided into

- RCDs functionally independent of line voltage (**voltage independent**);
- RCDs dependent on line voltage (**voltage dependent**).

In both cases, RCDs are equipped with a differential transformer that detects and measures the fault residual current. The differential transformer integrates a winding for each switching pole (two for the two-pole circuit breakers, three for three-pole circuit breakers,…). In the absence of a fault condition, these windings generate equivalent magnetic flows through the transformer that, when summed up, vectorially cancel each other out. In case of difference between the pole currents, the corresponding magnetic flows differ accordingly. Under these conditions, the total magnetic flow is no longer zero and, on a further winding, generates a voltage proportional to the residual current. This voltage, when the current residual current exceeds a threshold value, causes the opening of the circuit breaker contacts.

To enable the opening of the contacts, the circuit breakers independent of the line voltage, also referred to as "direct drive actuators", use only the energy from the fault current. They make use of suitable demagnetization release actuators with a very low activation energy, and passive-type coupling electronic circuits, that is, without auxiliary power supply.

To activate the opening of the contacts, the circuit breakers dependent on the line voltage, or with indirect drive, need instead an auxiliary power source derived from the line voltage of the protected circuit. They integrate an electronic amplifier directly connected to the power supply (phase, neutral, or two poles predefined inside the multipolar circuit breakers). The amplifier detects and processes the weak signal from the differential transformer and feeds the release actuator, usually a traditional electromagnet.

Although in most cases the behavior of the two types of RCDs is quite similar, there are specific system conditions where the circuit breakers dependent on the line voltage do not guarantee protection. The most common case is the accidental interruption of the neutral wire upstream of the RCD, whether this occurs on the three-phase distribution network or in a single-phase circuit. The causes may be related to poorly executed work on the power grid or to the loosening of a junction. Among the many drawbacks that can result in the interruption of the neutral wire, there is also the prevention of the RCD operation in the event of a fault to ground or an accidental contact with a live wire. In fact, in case of interruption of the neutral wire, the circuit still produces a phase voltage (230 V), dangerous in case of a failure. In this occurrence, the RCDs dependent on the line voltage do not guarantee any protection.

The risk is more deceitful in the case of loads and circuits divided among many RCDs: the interruption of the wire of just one of them is hardly detected by the user, who does not promptly notice any abnormality of the system.

The argument is discussed undersections 531.3.4.1 and 531.3.6 of European Harmonization Document HD 60364 (Low-voltage electrical installations, selection and erection of electrical equipment), stating that:

In a.c. installations where residual current devices (RCDs) [for fault protection] are accessible to ordinary persons (BA1), children (BA2) or handicapped persons (BA3) residual current protective devices shall comply with:

- **EN 61008-1 and EN 61008-2-1 for RCCBs; or**
- **EN 61009-1 and EN 61009-2-1 for RCBOs; or**
- **EN 62423 for RCCBs and RCBOs of type F or type B.**

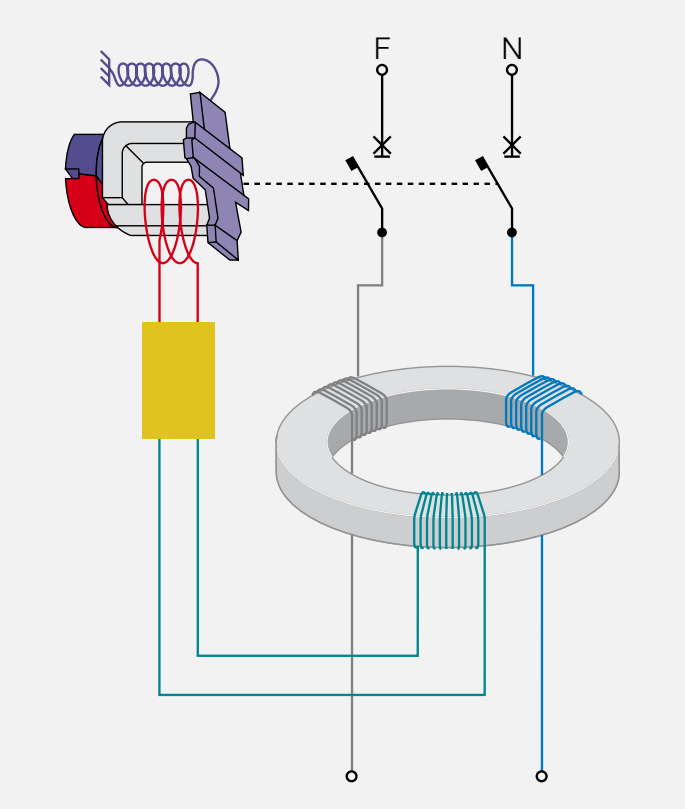
[...]

Residual current devices (RCDs) for additional protection in a.c. installations shall comply with:

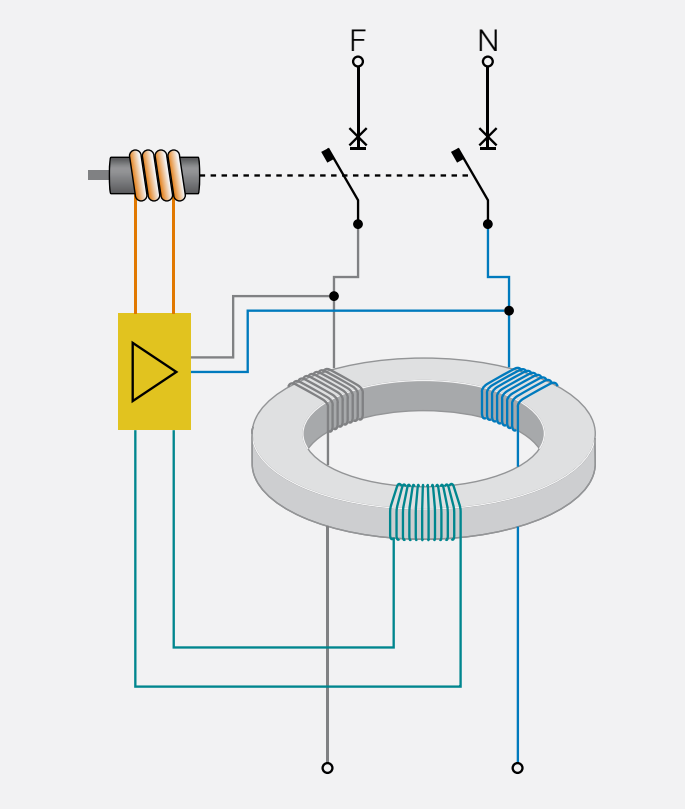
- **EN 61008-1 and EN 61008-2-1 for RCCBs: or**
- **EN 61009-1 and EN 61009-2-1 for RCBOs; or**
- **EN 62423 for RCCBs and RCBOs of type F or type B.**

It must be said that the IEC product standards for RCDs targeted to household applications, without integrated magneto-thermal protection, is structured as follows:

- IEC 61008 Residual current operated circuit breakers without integral overcurrent protection for household and similar applications (RCCBs) –
  - Part 1: General rules;
  - Part 2-1: Applicability of the general rules to RCCB's functionally independent of line voltage;
  - Part 2-2: Applicability of the general rules to RCCB's functionally dependent on line voltage.



Basic diagram of a residual current circuit breaker independent of the line voltage: the energy necessary for opening the contacts originates only from the residual current.



Basic diagram of a residual current circuit breaker functionally dependent on the line voltage: the energy necessary for opening the contacts comes from the line voltage.

RCBOs refer to the same structure:

– IEC 61009 Residual current operated circuit breakers with integral overcurrent protection for household and similar appllications (RCBOs) –
  - Part 1: General rules;
  - Part 2-1: Applicability of the general rules to RCBO's functionally independent of line voltage;
  - Part 2-2: Applicability of the general rules to RCBO's functionally dependent on line voltage.

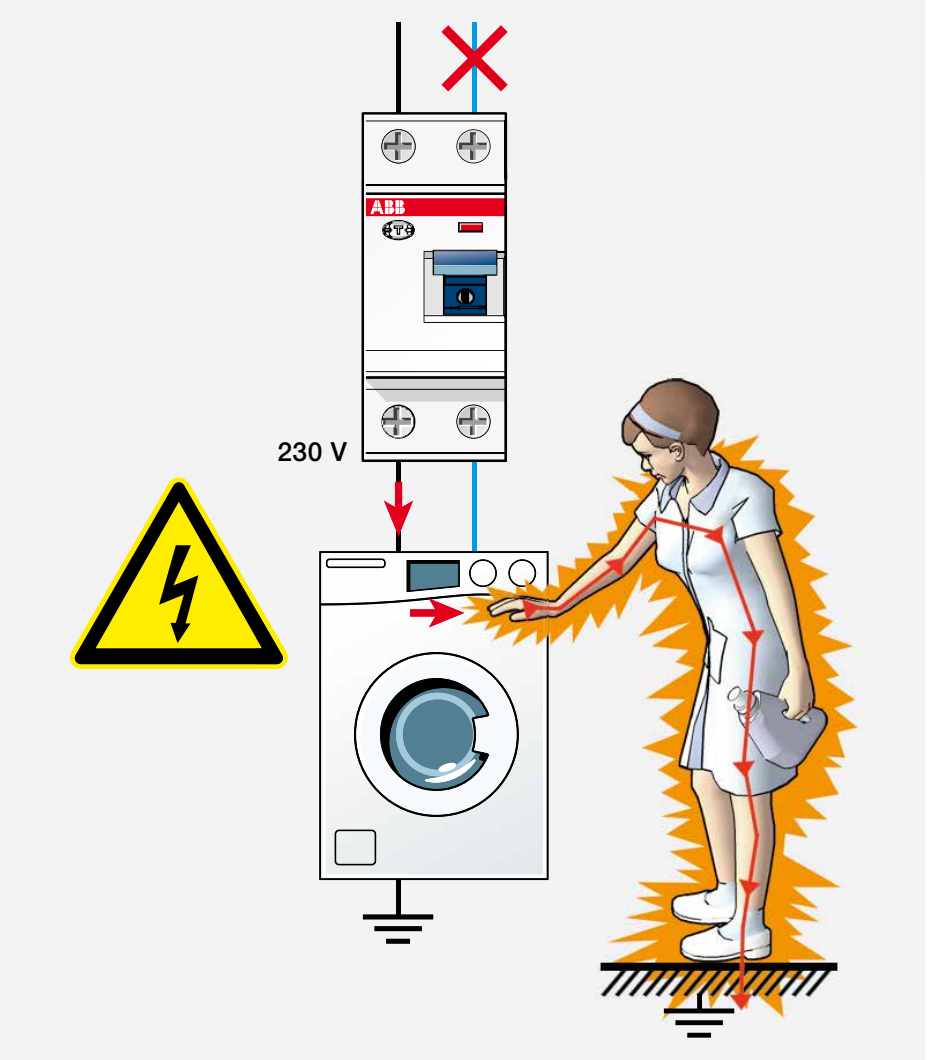
Parts 2 of those product standards complete or amend the general requirements of Parts 1, extending them to circuit breakers independent of (Parts 2-1) or dependent on (Parts 2-2) line voltage. In other words, Parts 1 must first be used together with the corresponding Part 2-1 or 2-2.

As for the corresponding CENELEC standards, the following standards were issued, derived with modifications from the IEC standards (the EN initials indicate that each member of the CENELEC is required to adopt the EN standard as a national standard without changing it):

– EN 61008 RCCBs without incorporated overcurrent release for household and similar installations
  - Part 1: General specifications;
  - Part 2-1 Applicability of the general requirements to RCCBs functionally independent of line voltage;
– EN 61009 RCBOs with incorporated overcurrent release may be used for household and other similar applications
  - Part 1: General specifications
  - Part 2-1 Applicability of the general requirements to RCBOs functionally independent of line voltage.

CENELEC, the European standardization body did not issue Part 2-2 of the standards. Therefore, the RCDs dependent on line voltage, do not conform to EN 61008 or to EN 61009 standards (they could be

Residual current circuit breaker dependent on line voltage, in case of interruption of the neutral, do not provide any protection.



compliant with the relevant IEC 61008 or IEC 61009 standard). It can be concluded that the use of residual-current circuit breakers dependent on line voltage is a violation of both the HD 60364 (the system can not be declared compliant with it) and the CENELEC product standards. However, there are two important exceptions: RCDs for industrial applications compliant with product standard EN 60947-2 (Low-voltage switchgear and controlgear, Part 2: Circuit breakers), in particular its Annexes B and M, which cover circuit-breakers incorporating residual current protection designed for use by qualified persons. This case is covered by 531.3.4.2 of HD60364:

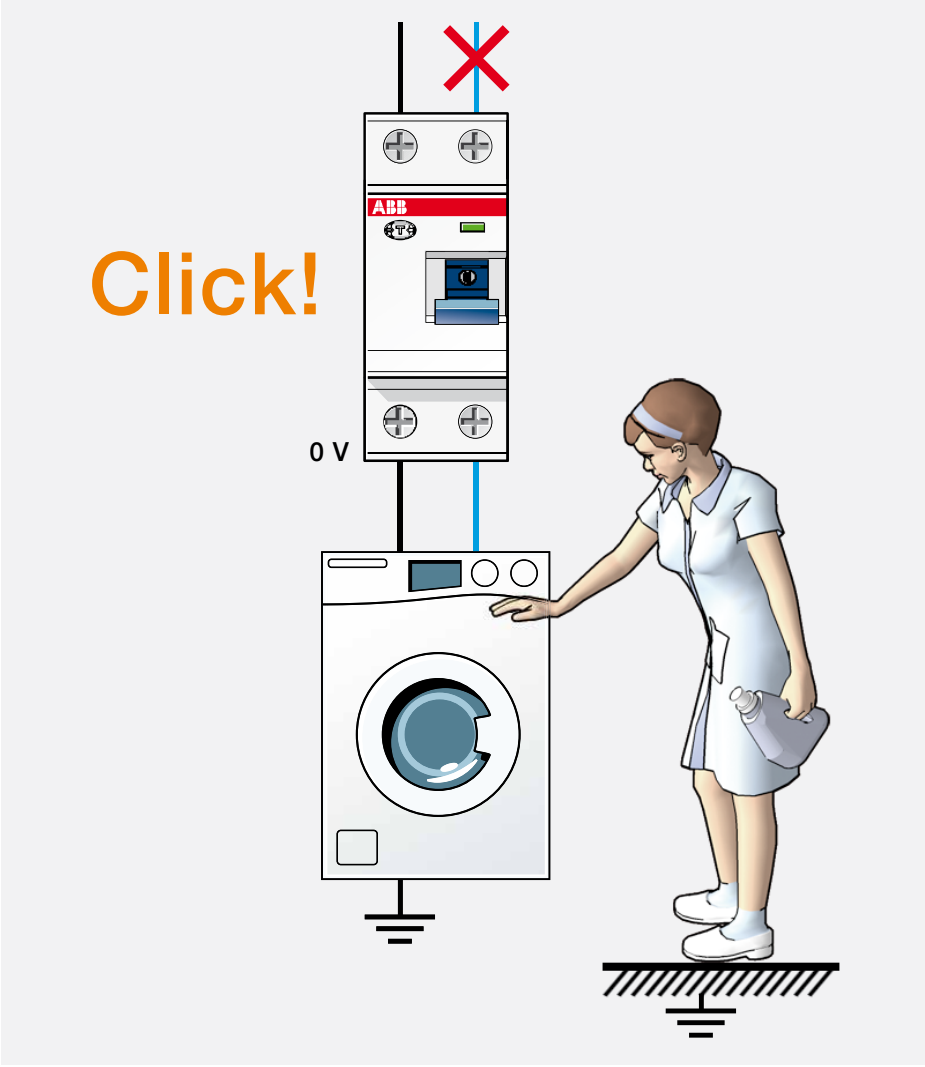
In a.c. installations where residual current devices (RCDs) are accessible only to instructed persons (BA4) or skilled persons (BA5) residual current protective devices shall comply with:

- EN 61008-1 and EN 61008-2-1 for RCCBs; or
- EN 61009-1 and EN 61009-2-1 for RCBOs; or
- EN 62423 for RCCBs and RCBOs of type F or type B; or
- EN 60947-2 for CBRs and MRCDs (CBR is a circuit-breaker incorporating residual current protection, MRCD is a modular residual current device).

The other exception concerns portable residual current devices (PRCDs) or socket-outlet residual current devices (SRCD) for household and similar use.

These are residual-current devices incorporated in, or specifically intended for use with socket-outlets. Their use is legitimate, even if they are dependent on the line voltage, because they provide increased protection, and they are intended for use in circuits where protection is already assured upstream by RCDs in the installation.

Claudio Amadori
R&D
EP Division



Circuit breakers independent of line voltage ensure protection even in case of interruption of the neutral.

Energy efficiency in buildings: – Leadership in Energy and Environmental Design – LEED®

Aron Svedin: *Segment Marketing Manager - Building products*

The LEED® is a voluntary standard that governs the management, design and construction of buildings that are sustainable from the social, environmental, economic and occupant wellbeing aspects. Established in the United States in 1993 by the US Green Building Council, the standard covers all building design issues: from the choice of the site on which the building is to be erected to management of the construction site, efficiency of the building enclosure and systems, use of renewable energy sources and sustainable materials, through to the quality and comfort of the indoor environments.

It is a voluntary standard widely recognized by the market. An open, transparent tool backed by a vast technical-scientific community that's periodically updated and is therefore continually evolving.

LEED® focuses and outlines the “best practices” for principals and professionals involved in integrated design. Whether they are professionals or enterprises, the competitive advantages of those who opt for LEED® for their buildings are the certifications issued by third-party authorities (considered essential if a positive response is to be obtained from the market) and the certainty of having built with care and attention to environmental issues. Certification provides the market with a shared definition of quality, thus providing an internationally recognized value to the building. By embracing the entire process, from design to construction and including everything the building comprises, LEED® works towards a holistic view of sustainability and does all in its power to reduce the environmental impact and harmful emissions of buildings as they are under construction.

Certified LEED® is the world's most widespread building certification system: to mid-2015, there are approximately 29,500 LEED certified commercial buildings.

The statistics published in the website of the Green Building Certification Institute (www.gbci.org) are constantly updated. The Institute is an independent organization that manages the LEED® certification program, the technical audits and assesses the projects to establish whether they comply with credit requirements. The LEED® assessment system is based on a score awarded after "credits" have been obtained in different areas. The score obtained for each individual credit is awarded when the project and/or building complies with the specific requirements involved. The level of certification achieved depends on the total score obtained: Certified, Silver, Gold and Platinum.

The system is flexible, detailed and, while maintaining the same sort of general approach for the various rating systems; Building design and construction (BD+C), Interior design and construction (ID+C), Building operations and Maintenance (O+M), Neighborhood development (ND) and Homes.

Each rating system is created by a combination of credit categories.
– Location and transportation
– Materials and Resources
– Water efficiency
– Energy and atmosphere
– Sustainable sites
– Indoor environmental quality
– Innovation
– Regional priority credits

Projects under certification must meet all the required prerequisites, which are obligatory, while the credits are ascribed on the basis of the level reached by the requirements considered and assessed in accordance with established criteria.

Examples of solutions that will earn points are
– Sustainable sites
  - Night lighting control
  - Reduce environmental impact by using alternative transportation
– Water efficiency
  - Water use monitoring
  - Efficient irrigation water management
– Energy and atmosphere
  - Constant adjustment of indoor light intensity
  - Monitoring of energy usage
– Indoor environmental quality
  - Control of shutters and glare reduction
  - Control of indoor air quality
  - Individual control of lighting and shutters

(Read about how to achieve the above example in Day by DIN 2|13 page 16-18)

The final score is obtained by adding all the points acquired within each thematic area. This establishes the certification level obtained. LEED® certification for Commercial Interiors is the system used for the high performance certification of indoor environments that are healthy workplaces, less costly to manage and maintain, and with low environmental impact. LEED® for Commercial Interiors allows sustainable decisions to be taken by design engineers and lessees, who are not always in control of the operations that take place in the entire building.

Aron Svedin
Segment Marketing Manager
Building products

Doktor Wise
The expert answers

How safe is a Smart Home and what can be done by the manufacturer, installer and system integrator to increase safety to a maximum

Igor Schitkow: *Global Marketing Communications Specialist - Building Automation*

Intelligent building technology is an integral part of modern installations

A Smart home provides maximum comfort to its owners. It can be operated via push buttons on the wall, or even via smartphone and tablet. It opens new possibilities of building control, which cannot be carried out with a conventional installation. On top of that there is no easier way to adjust functions in order to fulfil new arising requirements, which may occur in the future. That makes a Smart Home not just comfortable, safe and efficient, but also future-proof.

Intelligent building technology is nowadays an integral part of modern installations. A house is defined as a Living Space, which adapts to changing individual needs. The advantages of a Smart Home are obvious. Via smartphone or tablet one can control cameras, light, heating – even from outside the house itself. At the same time, however, it is important to secure and protect your own data in order to lower risks to a minimum.

The risks

One risk for example is allowing others to have an insight into your private life and habits. As soon as you connect basic elements of your privacy, such as doors, windows or cameras with the internet, taking precautions is of utmost importance. Especially if you access your cameras through the internet, there is the increased risk, that this data might be intercepted. Even the interception of simple commands such as turning lights on or off can bear risks, because they allow conclusions about your daily habits, which may be useful to intruders.

Another risk is the external control or reprogramming. Should somebody manage to gain unauthorized access by hacking the system, then this person may be in a position to control the building or reprogram functions.

What does ABB do in order increase safety?

The industry faces intensifying cyber security risks. In order to increase stability, security, and robustness in its solutions, ABB has formally established cyber security robustness testing as part of the product development process.

Cyber security is important in all phases of a product's development process, including design, implementation, testing, release and life-cycle support. One key activity in this process is robustness testing. As a result ABB has established an independent Device Security Assurance Center (DSAC).

The test center performs a multitude of different tests, including port scanning, network flooding, vulnerability scanning and protocol fuzzing. This is done by using a variety of best-in-class testing platforms such as the examples listed above, as well as other complementary testing tools.

Testing is performed by highly trained specialists in close collaboration with the suppliers of the test platforms. For example, ABB testing specialists receive instruction, support and accreditation directly from the test platform suppliers.

Products are tested continually in different configurations with an explicit focus on operational performance. In order to evaluate product performance as precisely as possible, they are tested without additional protection such as firewalls. As a formally established practice, results from the independent DSAC testing are returned to the respective development group for resolution. Why does the ABB process not formally include product certification by third parties? ABB has chosen to concentrate its efforts on a continuous improvement process able to quickly adapt to the changing environment.

What needs to be taken into consideration by the planner, installer and system integrator?

However, it is not only the manufacturers who need to take precautions in order to make a Smart Home or building safe. Many aspects need to be considered by the planner, installer and system integrator during the planning, installation and commissioning of a system.

The following information serves as a guide for these parties and describes mechanisms, which are used to increase the safety of KNX / free@home systems.

Prevention of access to the different media

The careful isolation of the system against unauthorized access is the basis for each protective concept. In case of a KNX / free@home system it is only authorized persons (fitter, caretaker, user) who are allowed physical access to the KNX/free@home system. During planning and installation the critical points must be protected as best as possible for every KNX/free@home medium. As a general rule, applications and devices should be permanently installed to prevent their easy removal and thereby allow access to unauthorized persons to the KNX / free@home system.

Sub-distributions with KNX/free@home devices are to be locked or located in rooms to which only authorized persons have access.

Igor Schitkow
Global Marketing Communications Specialist - Building Automation

Twisted pair-cabling

- All components connected to the system should be installed in a fixed manner and should not be easily removed
- The cable ends of the KNX/free@home Twisted Pair cable should not be visible or project out from the wall, neither inside nor outside the building.
- If available, the theft protection facilities of the application modules should be used.
- Bus lines in outdoor areas represent an increased risk. Here the physical access to the KNX/free@home Twisted Pair cable should be made exceptionally difficult. If, for example, cables are necessary in - outdoor areas, laying them underground should be considered.
- Devices installed in areas with limited protection (outdoors, underground car parks, WC, etc.) can be designed as an independent line for additional protection. The activation of filter charts in the line coupler (only KNX) prevents attackers from gaining access to the entire system.
- In case of a KNX system the BAU password should be made use of, as it additionally protects the system against reprogramming

IP-cabling within the building and IT security

- For building automation a separate LAN or WLAN network with its own hardware (router, switches, etc.) should be used.
- It is absolutely essential that the normal safety mechanisms for IP networks are used independently from the KNX/free@home system. These are, for example:
  - Networks and computers should be protected by a Firewall and anti-virus software
  - Wireless networks should be encrypted using WPA2 or higher
  - Use of complex passwords and protection of these against unauthorized persons
  - Using MAC filters provides additional security

Generating secure passwords

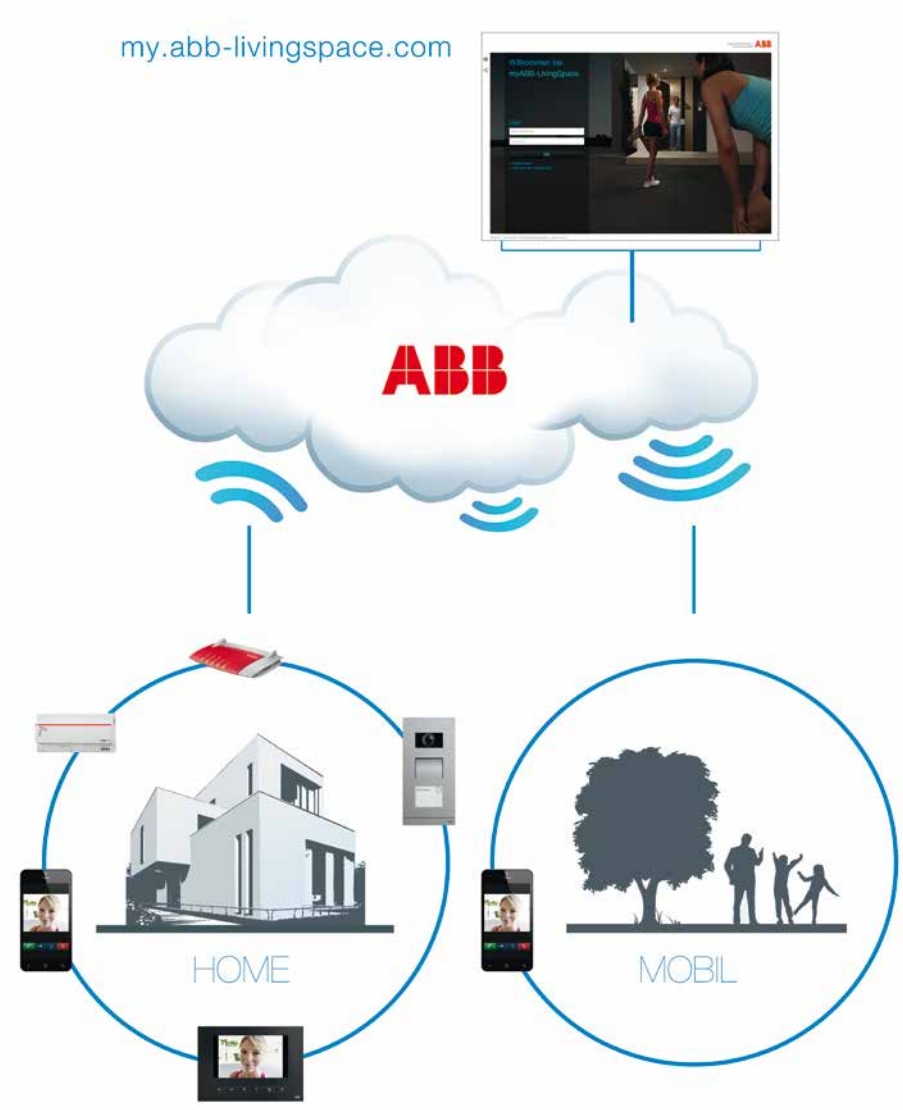
- A password should have a minimum of 8 characters
- It should include
  - Punctuation characters
  - Numbers
  - Upper and lower case letters
- It is recommended to vary passwords
- Password Managers help to manage all the different passwords in a secure way

Remote access and control

- KNXnet/IP routing and KNXnet/IP tunnelling use data transmission without encryption and are not safe for use with the Internet. For this reason no ports of routers should be opened in the direction of the Internet: this prevents KNX/free@home communication from becoming visible on the Internet.
- Access to a system from the Internet is possible with the following method:
  - Access to the KNX/free@home installations via VPN connections
  - Use of manufacturer-specific solutions or visualizations, e.g. with access via https.

myABB-livingspace is ABB's solution for remote control

The main advantage of myABB-livingspace is the easy setup, which does not require in-depth IT knowledge. Access is achieved simply by registering on my.abb-livingspace.com and following the instructions. MyABB-livingspace merely bridges the house with the portable device. The communication is TLS and end-to-end encrypted. This way the user can control his or her house without any second thoughts.



Did you know that?

Rapid Shutdown system for Residential and Small Commercial Installations

Aravind Ramachandran: *Segment Marketing Manager - Building products*

The goal of Rapid Shutdown system requirements is to decrease the risk to emergency workers - particularly those faced by firefighters when they work on a fire at a building with a PV system. Ideally, they should be able to shut off the Photovoltaic (PV) system along with the utility service (if present), preferably with a single switch or disconnect.

The risks for them are due to:

- A power source—the PV array—that continues to be energized when the sun is shining on it.
- The array is often wired for high-voltage DC, which increases arcing hazards, and could become re-energized after fire damage occurs, possibly reigniting a fire.
- Batteries: even if they are just in a building that catches on fire, the batteries will be energized.
- Circuits that may be energized by a PV system even if the AC utility service or meter is pulled, or main disconnect is shut off.

Such requests indeed introduces some significant changes for designers regarding the closure of PV systems on buildings. For example, to minimize shock hazard, there are restrictions on the duration that conductors in a certain zone can remain energized after a shutdown is initiated.

Such requirement of Rapid Shutdown is mandatory for installations in residential and commercial buildings in the USA, and is becoming a requirement for other parts of the world.

Taking the specific existing regulation in the USA, provisions are required for the rapid shutdown of PV for the safety of first responders/firefighters. All PV circuits (AC or DC) greater than 30 V and 240 VA and meeting the following conditions must be shut down within 10 seconds after the rapid shutdown initiation:

- The portion of conductors that are located more than 10 feet (3 meters) from a PV array.
- The portion of conductors that are more than 5 feet (1.5 meters) in length inside of the building

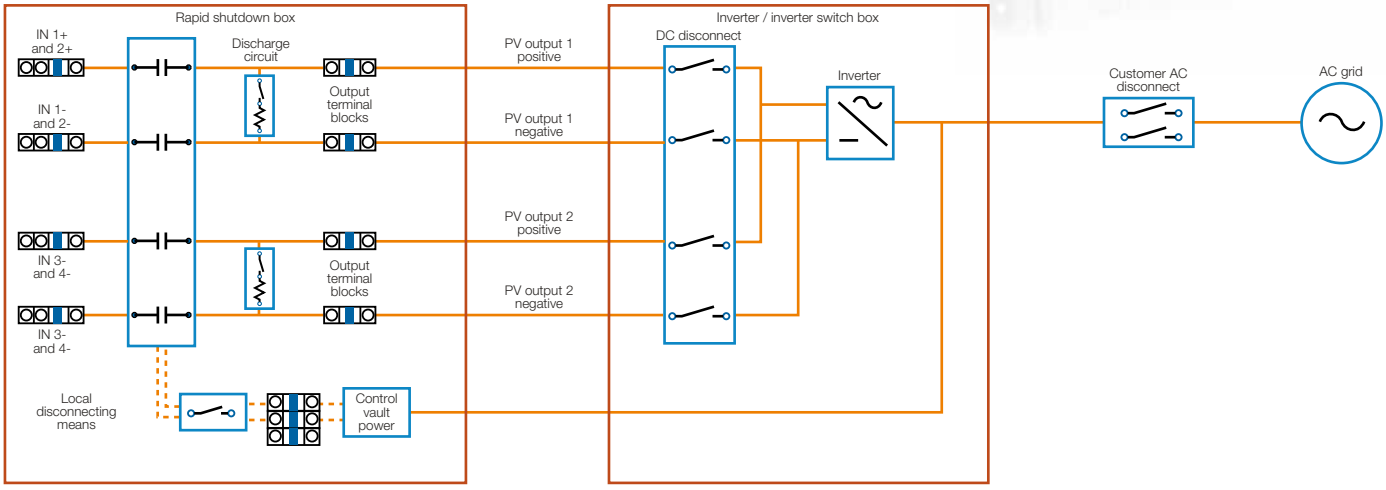
Also the Rapid Shutdown equipment shall be listed and identified as suitable for the purpose, but no specific method of design is prescribed. It is expected that multiple solutions will evolve within the solar industry, such as contactor-controlled solutions or module/ string inverters that are opened when there is a loss of utility power.

ABB offers a Rapid Shutdown (RSD) system call “PV VAULT” designed to provide compliance with 2014 National Electric Code (NEC) section 690.12 by opening the photovoltaic (PV) circuit(s), disconnecting them from the inverter and removing all residual voltage and current on the conductors. The array’s PV source circuits (strings) are to be connected directly to the input terminals of the PV VAULT box. Depending on the model chosen, the strings may pass through the box or combine two strings together. Each output conductor is individually disconnected in the event of rapid shutdown initiation. A +24V control conductor provides power to the normally open contactors, which perform the rapid shutdown.

There are models available for 2 strings pass through, 2 strings combined and 4 strings combined versions to suit the different installation options in buildings.

Scan the QR code below to find more information on the offerings: Rapid Shut Down.

PV Vault: PVV20-4S26. Four input strings, two outputs. Shown with Control Vault Power Kit.



The DALI protocol

Modern lighting must provide more than just “brightness”. The aim is to create atmospheric moods through light and color, while ensuring comfort and energy conservation. The DALI protocol offers all the necessary features for a holistic lighting control.

Thomas Rodenbusch-Mohr: *Global Marketing Communications Specialist - Building Automation*

The great advantages of DALI (Digital Addressable Lighting Interface) are the standardization and compatibility of the protocol on which it is based. Thanks to this feature, it is possible to tap into a wide range of products from different suppliers. The DALI technical features are described in the EN IEC streichen, nur IEC standard. First DALI standard was part of IEC 60929, conventional ballasts. The DALI part was transferred to IEC 62386. This standard defined DALI technique in different parts, beginning from DALI voltage up to special DALI Device types. Below are summarized some important aspects:

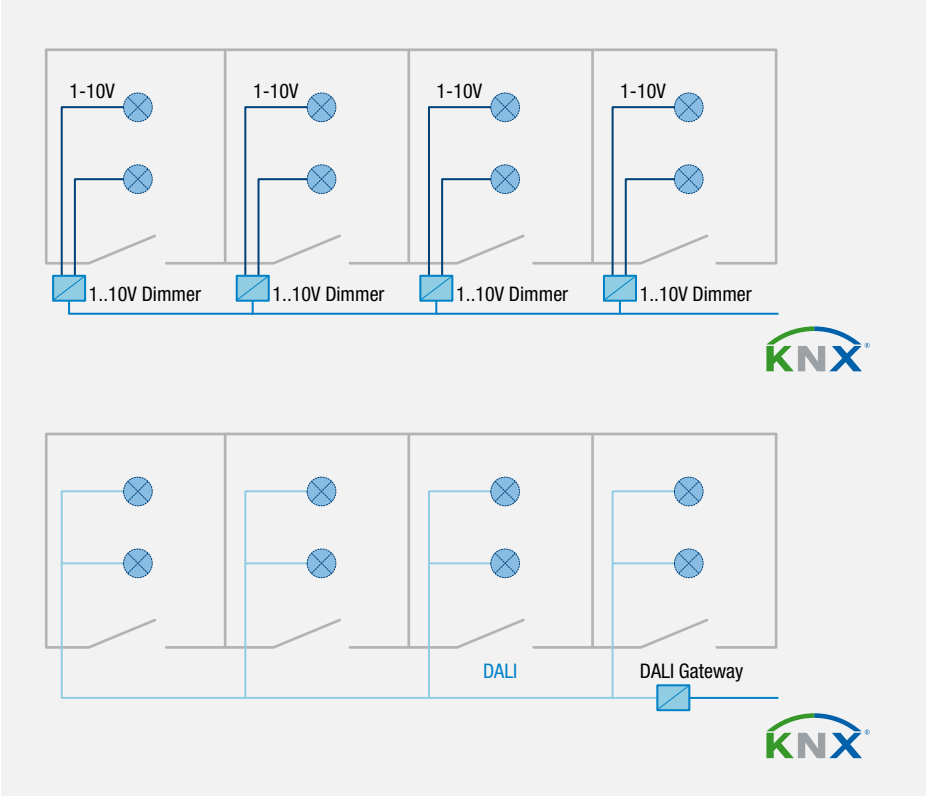
- DALI was defined in 1999 by the leading producers of lighting technologies as a "standard interface for the control of lighting systems"
- DALI is a digital communication protocol between the components of the lighting system
- each single lamp can be controlled individually
- you can send "telegrams" to control 64 devices/ballasts, 16 groups and 16 lighting scenes
- lighting control telegrams that can be transferred to the DALI bus include: brightness value, dimming speed and error feedback
- as a subsystem, DALI can operate with bus solutions for intelligent installation systems; DALI alone is not a bus system for intelligent installations, but a control system for the lighting
- DALI provides a two-pole control cable
- the structure of cable laying can be chosen as desired (for example, a tree structure)
- a DALI signal cable is independent of polarity
- the cable can lay together with the power cable in a five-pole cable
- signal inputs are isolated from the line
- the feedback concerning the ballast state takes place directly: for example, lamp ON/OFF, current brightness value, lamp error
- you can adjust various settings, including: speed of light change, dimming limits, behavior in case of system problems
- when the individual scenes are recalled, all DALI ballasts reach their dimming value simultaneously
- the dimming range, which depends on the ballast used, varies between 0.1 and 100%
- the logarithmic dimming curve corresponds to the sensitivity of the human eye
- dimming and switching are performed via the control line without the need of a switching relay. The DALI ballast is responsible itself for the switching
- Turning the lights on/off is a silent operation
- special DALI devices like self contained emergency devices are available
- it is a universal system for the control (dimming) of LED or color lights.

Technical and installation specifications

DALI allows wiring both in series and as a star or tree configuration. Therefore, there are no limitations in the type of installation topology that you can choose, apart from the recommendation not to create closed loops. The existing networks can be easily expanded to provide greater installation flexibility. The digital protocol for data transfer between devices (DALI slaves) is based on a 16-bit, 1.2 kbit/s serial transmission. With regard to the electric signal, the "low" level is set to 0 V (-4.5 V to 4.5 V) while the "high" level is set to a 16 V (9.5 V to 22.5 V), allowing for a 2 V maximum voltage drop between transmitter and receiver. The maximum current supplied by the DALI power supply is equal to 250 mA; each DALI device can draw max. 2 mA. The control signal is galvanically isolated from the main power supply (230 V), then all DALI devices in the system can operate with different stages, if necessary. Given the low data rate (1.2 bit/s, as mentioned before), it is non mandatory to use special cables (isolation withstand voltage 230V) such as wrapped or shielded twisted pairs. You can then choose any standard cable available on the market, with the only care being to respect the minimum diameter depending on the total max. length required: the DALI control cable and the network cable can be placed together using a standard product (for example, a 5 x 1.5 mm2 cable). Unlike the 1-10 V control, there are no negative effects on the command signal. This is an advantage of the digital technology. Please remember not to exceed the maximum distance of 300 meters of DALI line. Conversely, it is not necessary to complete the installation with end-line resistors.

Comparison with a 1 ... 10 V system

Compared to a 1 ... 10 V, a DALI device differs in many ways, with features that make it more suitable, efficient and flexible. Another important advantage linked to the use of the DALI lamps, is the possibility to realize a better and more flexible topology compared to a corresponding installation based on the 1 ... 10 V system: in the examples of the figure, it is in fact evident that different 1 ... 10 V controllers can be replaced by a single DALI gateway, which allows the control of 64 DALI ballasts that can be divided into a maximum of 16 groups.



1 ... 10 V and DALI compared

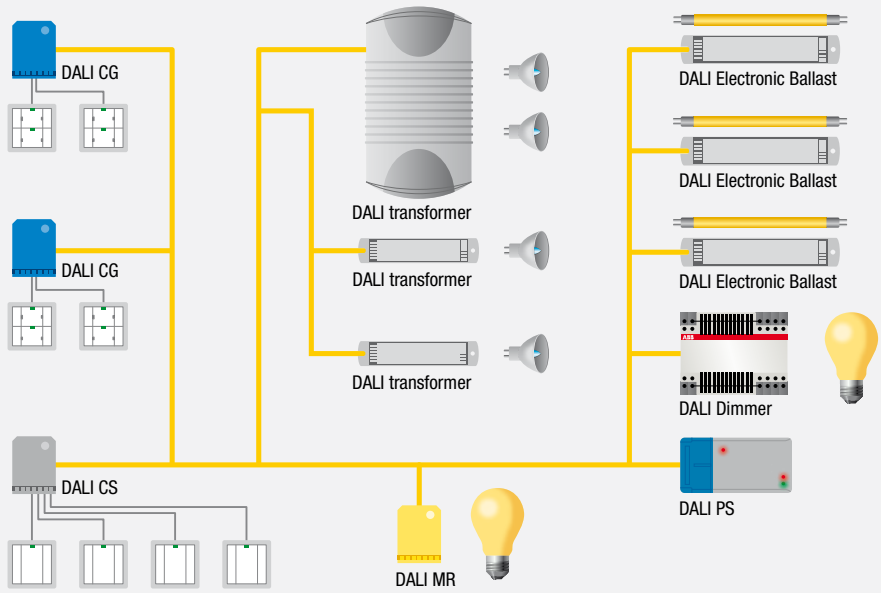
System typology

DALI allows you to manage the different variants, listed below.

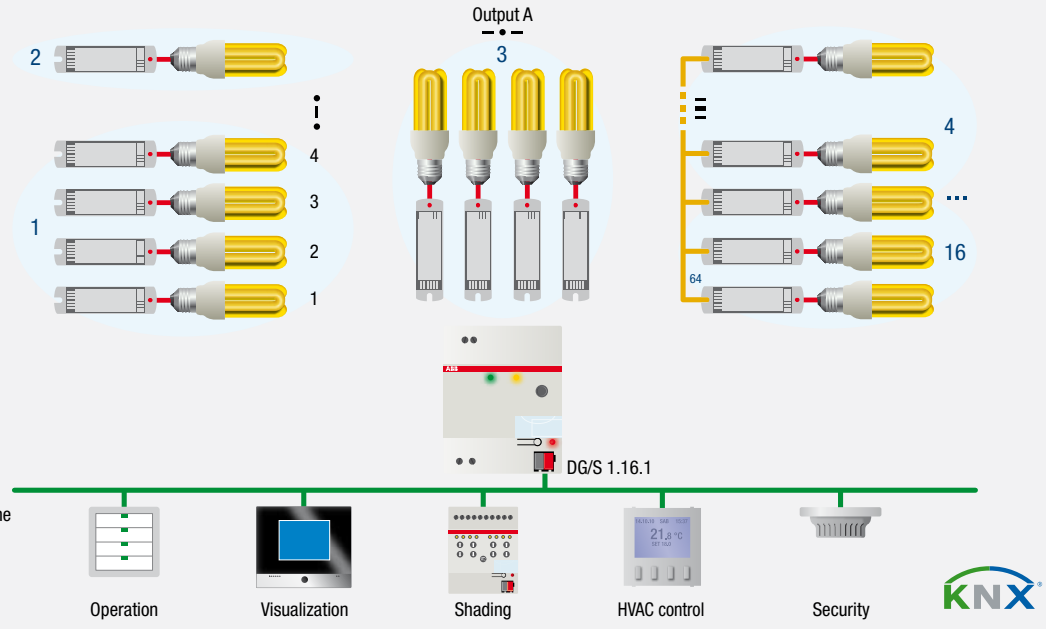
Standalone system: the DALI system is exclusively devoted to lighting, without connection to any systems dedicated to the management and supervision of the building. All functions can be performed locally via DALI.

Standalone subsystem: in this case the DALI installation is connected to the building management system and allows the exchange of some important basic information, such as feedback on the ballast state of failure. Under this mode, the DALI system is still fully functional even in the absence of a building management system.

Subsystem of a building management system: this is the typical application where DALI only handles the lighting control and interfaces to a Building Automation system (e.g. KNX) by means of gateways that transmit the messages from one bus to



The devices can be controlled through a communication object
- Changeover switch
- Changeover status
- Relative dimming
- Brightness value or slave brightness value
- Fault lamp or ballast



another, thus making it possible to control the DALI ballast via buttons, presence sensors or other KNX devices.

The range of KNX-DALI gateway from ABB

When a DALI network is a subsystem of a KNX Intelligent Building Control system, the DALI gateways that are part of the ABB i-bus KNX offering can meet every need.

In this regards, it is important to consider that the KNX-DALI gateways from ABB are the master units, that is, devices with integrated power supply for the operation of other DALI devices.

Since a DALI system is based on a single master, you can not integrate other DALI master devices in the system in addition to the DALI-KNX gateway.

Furthermore, you should not connect other DALI units, as well as other functional devices such as DALI buttons. The only DALI system devices required will be other DALI slave devices, such as electronic ballasts, dimmers, transformers, RGB converters, and so on. All these units can be controlled by the DALI-KNX gateway, which in turn will receive commands from the KNX devices installed in the system (buttons, presence detectors, time switches, logic modules, touch screens, visulization software, etc.). These commands will be forwarded to the DALI bus to control the various devices involved, e.g. the ballast.

In turn, from the DALI bus a variety of information can be sent via the DALI-KNX gateway to the KNX bus, e.g. feedback on the failure of a ballast.

The interface between KNX Intelligent Building Control systems and DALI systems for lighting control, is the ideal solution for combining the advantages of both worlds, creating an open, efficient and flexible way to automate residential and commercial buildings.

The summary table shows an overview of the range of DALI-KNX gateways, part of the ABB offer, highlighting features, advantages and applications.

Thomas Rodenbusch-Mohr
Global Marketing Communications Specialist - Building Automation

Choice of DALI gateways

Control type	Description	Advantages and main applications	Devices
Broadcast	**The creation of DALI groups is realized physically through the wiring:** several DALI ballasts connected to the same channel of the DALI gateway, are part of the same group and are controlled together by a switching or dimming command.	– Absence of DALI addressing and programming – Fast commissioning in all applications that do not require changes to the group structure over the time. – Examples of possible applications: hospitals, hotels, …	DG/S 8.1
Individual	**It is possible to control each single DALI ballast** of the 64 devices that can be connected to the gateway. The creation of DALI groups is not supported, but it is still possible to create ballast groups by means of KNX programming, via ETS, using the relevant group address.	– Individual control of DALI ballasts – If necessary, small-sized groups (1-10 ballasts) can be created on the KNX bus side. – Examples of possible applications: villas, offices, open-spaces, …	DG/S 1.1
Groups	**The DALI ballasts can be controlled only in DALI groups and not individually** (each gateway manages 16 DALI groups formed within the 64 DALI ballasts that can be connected to the gateway).	– The groups of DALI ballasts are created on the DALI bus side, with no limits to the size (the only limit is the max. number of devices, 64, established by the DALI protocol). – Over the time you can redefine the DALI bus side groups. – Examples of possible applications: shopping centers, universities, schools, …	DG/S 1.16.1 DGN/S 1.16.1 DLR/A 4.8.1.1 DLR/S 8.16.1 (constant light control is available)

Integration of Renewables in buildings

Aravind Ramachandran: *Segment Marketing Manager - Building products*

Traditional public grids were typically made up of a few large (GW) production sites and many smaller consumers. With renewable energies emerging in the last couple of decades, electrical grids have faced some new challenges. Today, there are not only a few large production sites but also many smaller production sites as well. Often these smaller production sites are owned by independent power producers or private households, some of which consume electricity as well. In such households where more power is generated than is consumed, typically from a rooftop solar PV installation, the installation becomes a producer on the public grid. The generation peaks of renewable generation do not align, generally, with the demand peaks, so typically there is low demand on the grid when renewable generation is peaking. This presents a major challenge to the grid operators - how to integrate the growing number of dispersed power generators into the grid.

Integrating increasing amounts of solar energy into the public power supply puts various demands on PV installations. For example, special protection devices are required to prevent the risk of danger in the event of mains interference. The more PV plants that feed into the public grid, the greater the demands placed on the grid services that they must perform. This is why inverters are incorporated into the grid management system in bigger installations. In smaller installations in residential and commercial buildings the requirements are different.

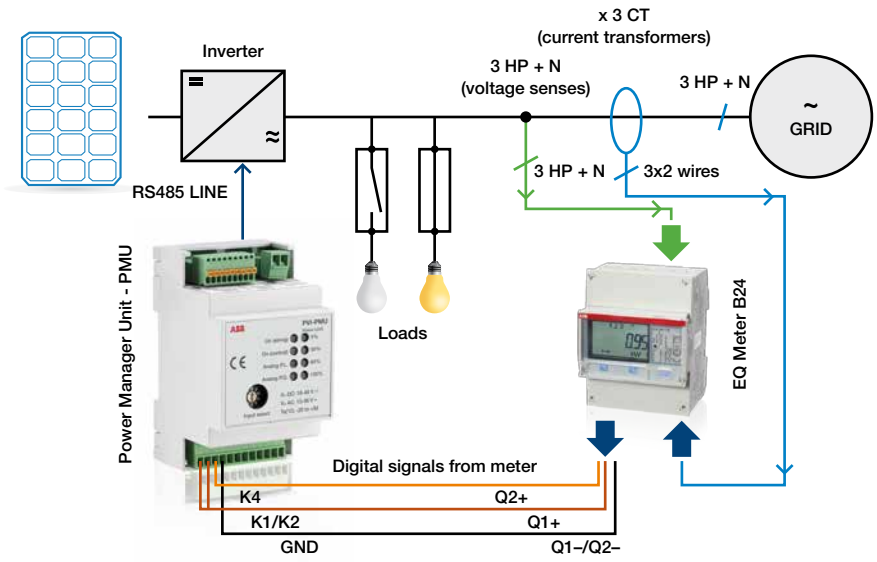
In some countries, the utilities have stopped accepting a supply to the grid from standalone residential and commercial installations and often charge a fine in case energy is fed to the grid. To avoid such situations and at the same time to continue to produce power from renewable source it has become necessary to install products that will limit or restrict the supply to the grid.

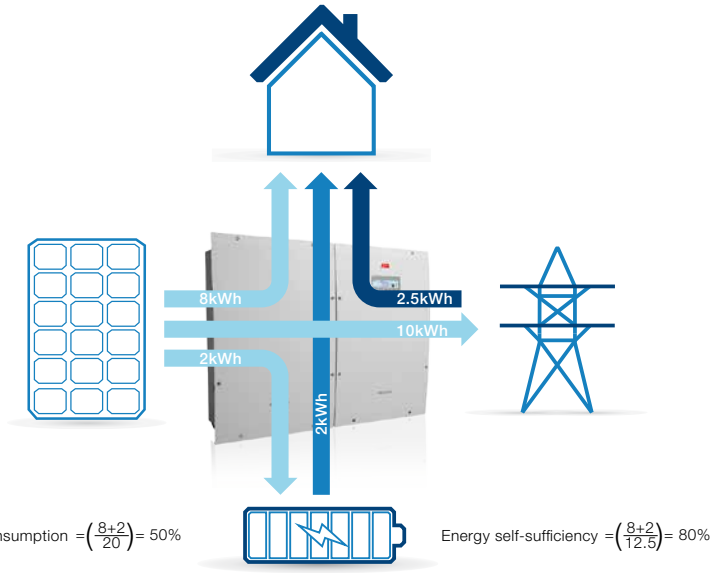
There are few ways of taking care of such situations

- Produce power that is less or equal to the demand in the installation so that supply to the grid is avoided
- Prevent the supply to the grid by means of relays to control active and reactive power from the inverters to the grid
- Install Energy Storage Systems, which enables excess energy to be stored until required.

High demands for feeding in power

Guidelines and standards regulate exactly how PV plants should be connected to the public grid, which gives rise to two highly important requirements. Firstly, when solar power is fed into the grid the power quality of the grid should not be reduced. Secondly, personal safety must be ensured in the event of mains interference. Another requirement has also recently gained importance: Instead of shutting down at the first sign of a fault (fault ride through, FRT), PV plants should support the power grid and perform grid-related control functions.





Aravind Ramachandran
Segment Marketing Manager
Building products

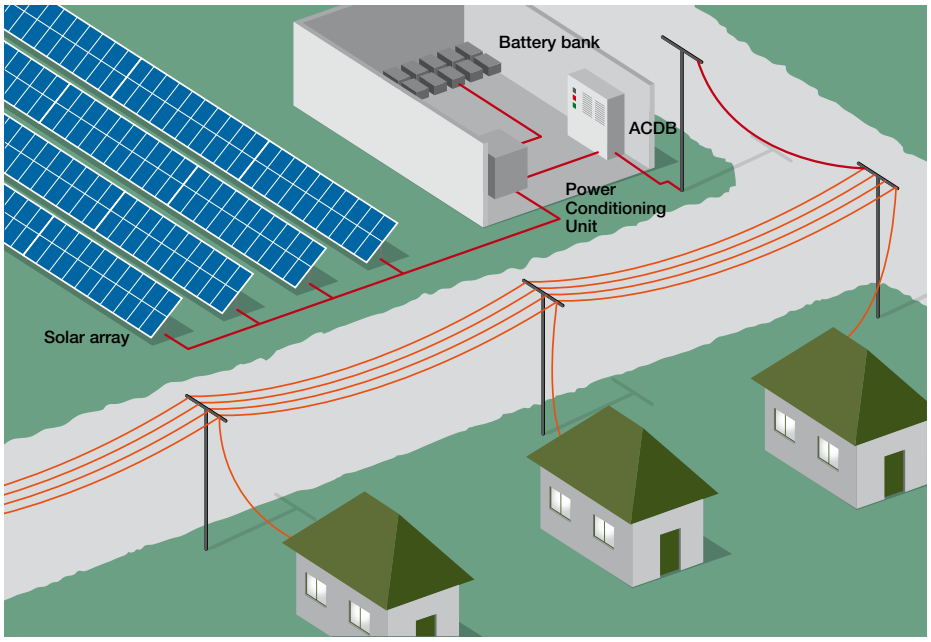
The requirements for power feed-in are clearly defined: The grid requires sinusoidal AC with stable voltage and frequency, and the harmonic component limits are regulated in guidelines and standards. Modern inverters meet these power quality requirements, yet in some cases limits may be exceeded. In this case additional monitoring relays may be required.

Step by step moving to Microgrids

Utilities penalizing for the injection of power into the grid are rare and generally only occur in extreme situations. However, incentive such as Feed In Tariffs, that drove the exponential growth of renewable over the last decade are forecast to decline or even disappear as renewable power reaches so called grid parity. Once this threshold is reached, building and private home owners will have much less interest in “selling-back” their power to the grid, this combine with the ongoing standardization of energy storage systems will drive consumers to become more and more independent, thus moving from a traditional grid system toward a so call independent microgrid.

Even in many developing countries where there is no-availability of stable power from the Grid, the requirement for stable power could be fulfilled by micro grids. There are many examples in the developing countries of such installations.

This trend is becoming popular in the private commercial installations where the cost of power from the utility during the peak hours can be very expensive and the micro grid helps in reducing the costs without compromising on the peak load requirements.



01

Building Automation connectivity within commercial operations

Editorial Staff

Smart strategy

Building automation represents a serious growth opportunity for panel builders. New technology makes upgrading switchgear a smart move.

Companies need smart ways to save energy and reduce operating costs. Building automation is the logical solution: connect everything into a powerful, central control system, collect operational data and identify the potential savings. The only problem is that for most users the actual load shedding is often too complex to deliver.

The answer lies in upgrades to the switchgear, which not only make them smarter, but also more competitive.

Most companies these days are committed to carefully controlling the power consumption of their buildings, and while environmental sustainability is a concern, mainly this is driven by the need to manage costs effectively. For this, automatic control of the loads, based on the absorbed power, is an optimum solution.

The target of such control systems is to modulate the demand for electric energy by avoiding a non-coordinated operation of the loads. On a hot summer's day, if all the air conditioners start to work at the same time, it causes consumption peaks and problems with energy supply.

To avoid exceeding the limits agreed with utility suppliers, facility managers may find themselves raising the initial limits; consequently increasing costs. In some cases the response is to install a large number of dedicated control devices. The more loads there are to be managed, the more complex the electrical assembly becomes. This can command a lofty initial investment when taking into account the complexity and the extra time required to design and to complete the application.

Electricity billing by the utilities is often comprised of a two-part tariff structure, whereby one part depends on the power demand (kVA or kW), while the other depends on the actual energy drawn (kWh) during the billing cycle. Some utilities also record and bill the user for reactive energy, as this also affects the load on the electrical lines. The utility bill includes charges for, among other things, maximum demand, active energy and reactive power drawn.

How the Ekip Power Controller supports building automation

1. Control of up to 15 loads and/or generators through a single SACE Emax 2 circuit breaker
2. Easy implementation since each load/generator is controlled by means of a circuit breaker, switch-disconnector, contactor or its own control circuit
3. Easy operation since just a few simple parameters must be set on the Ekip trip unit of SACE Emax 2
4. Compatibility with any type of load/generator thanks to the possibility of setting tailored working/not working times for each of them
5. Writing of programs for programmable logic controllers (PLCs) or computers (PCs) is not required since the software for the application is already implemented in Ekip trip units.
6. Management/control of the power absorption exceeding the defined limit for long periods of time result in the consequent reduction of the likelihood of malfunctions due to overloads and stress on the components of the electrical plant
7. Thanks to the function modes of the algorithm, Ekip Power Controller is less sensitive to brief absorption of high power in comparison with systems that use only the instantaneous power as a parameter.
8. Thanks to the feedback system on the measurements of consumed power, it is not necessary to know detailed data of each load (time-power curves, etc.).
9. No need to measure the power in real time for each controlled load necessary, since the measure of the total power absorbed by the plant is enough. Only the minimum number of loads is disconnected to stay within contractual power limits
10. Reconnection of loads is intelligently managed to prevent inrush current peaks

Energy companies can use tariff structures to influence the end-user's consumption, such as: time of use tariffs, penalties on exceeding allowed maximum demand, correct demand, night tariffs, and concessions. Since demand charges make up a considerable portion of the bill, there is a real need for integrated load management to provide effective control.

ABB is at the forefront of developments in this area. The company is introducing innovative ways to make it simple for panel builders to offer real energy savings, as well as a more intelligent, connected switchgear.

Integrated into the ABB SACE Emax 2, the world's first smart circuit breaker, is the Ekip Power Controller, an easy-to-use control system. The system is designed to limit the average power consumption in any defined time interval to a pre-determined maximum value. The result is an effective way of ensuring a building stays within its contractual limits.

ABB's patented algorithm helps the building manager to identify the non-priority loads that can be disconnected – and for how long. These loads are then reconnected as soon as the algorithm calculates that the average power demand identified by the utility contract is no longer being exceeded.

Thermal and refrigerating loads in industrial settings and HVAC loads in residential and commercial buildings are often the obvious candidates. Such loads can usually work in a certain temperature range and can tolerate some deviations from the optimum value. This makes it possible to reduce or increase the energy consumption whenever necessary, with limited impact on performance.

01 These are the facilities of ABB's Protection and Connection business in Bergamo, Italy. As a result of installing this technology, the building is able to save up to 400 kW of HVAC loads with a saving of approximately €11,000 per year.

Lighting can be similarly managed. By reducing the light flow of a group of lamps, for example, the minimum level of light defined by the designers can still be maintained. In some installations, the starting of motors connected to pumps such as swimming pool circulators can be delayed. The charging systems for electric vehicles can also be managed by modulating the power absorbed by the batteries over short periods.

How Ekip works

The algorithm of Ekip Power Controller consists of four steps, measuring, synchronizing, evaluating and managing the load.

First, Ekip measures the total power flow through the SACE Emax 2 circuit breaker, which implements the function. This value is then integrated to obtain the total energy. When each reference time interval has elapsed, the energy is set to zero.

To synchronize, the algorithm defines the time intervals in which average power is measured based on the clock inside the trip unit. A 15-minute period is typical. At regular intervals throughout each reference period, Ekip starts the evaluation module. It can also be synchronized using an external signal from a smart meter.

Ekip's algorithm then evaluates whether the demand is too high based on the energy measured and the time elapsed. If the average power limits are likely to be exceeded, it will decide to decrease the existing load configuration. The system then decides which loads should be the first to be disconnected, depending on the rules and priorities programmed in.

ABB installed Emax 2 circuit breakers with Ekip power controllers at its divisional headquarters in Bergamo, Italy. The primary function of the circuit breaker is to reduce the total power absorbed from the Grid. By facilitating communication and data transference between each of the plant's four MV/LV transformers, adjustments could be made based on the unit's specific needs at any given time, lowering costs and improving performance.

As a result of installing the technology, the building is able to save up to 400 kW of HVAC loads with a saving of approximately €11,000 per year.

And, because traditional meters and separate bolt-on energy management systems are no longer needed, panel builders save a lot of installation space, assembly time and copper and material costs. Depending on the switchgear, ABB calculates that fitting Emax 2 can yield space savings of 20-30% and can lower material costs by 20-25%.

Demand for more intelligent, connected switchgear presents a growing opportunity for panel builders – providing they can stay commercially competitive in the process. ABB believes the SACE Emax 2 will help panel builders to take that crucial first step.

Productivity gains

Many buildings these days are equipped with several sources of electrical energy: solar photovoltaics, cogeneration, diesel generators. SACE Emax 2 is able to protect the generation set as well as the distribution system from spikes in power demand.

For example, Emax 2 can offer protection against abnormal voltage and frequency conditions while also monitoring the power flow. For the manufacturer of the paralleling panel, this means no more external relays, current sensors, voltage sensors or even multimeters.

It also means an increase in the reliability of the entire installation. For Petroamazonas, Ecuador's state-owned oil company, maintaining continuous energy supply and process up-time are key success factors. ABB has supplied an integrated intelligent energy management solution using Emax 2 circuit breakers to the company.

The technology has been installed in four new facilities across Ecuador where diesel generators supply electricity for essential plant processes such as pumps and drills.

ABB's Emax 2 supports this by accurately protecting and supporting the balance between power consumption and power supply. As the only circuit breaker in the world with seven communication standards embedded, it can integrate into any automation or supervision system.

Emax 2 protects the power network, and its integrated communication modules also connect with Petroamazonas EP's local control systems, giving operators real-time access to energy consumption data. Through a remote diagnostic function it can interface with the plant's central intelligence to keep operations running smoothly by using preventive maintenance.

It is estimated that the addition of the integrated intelligent energy management solution will help Petroamazonas EP to gain up to an extra week of productivity annually, through the technology's capacity to prevent unexpected generator shutdowns.

Lightning and surge protection in building applications

Surge protection starts at the origin of the electrical system and finishes near the most sensitive equipment. The discharge energy is reduced in successive stages, first with the more robust SPDs (Class 1), then with finer protection (Class 2 devices) and finally near the sensitive equipment (class 3 devices). This protection co-ordination is represented with what is called the Lightning Zone concept also called LPZs, which divide up the structure on the basis of the effects of the lightning strike

Bertrand Berges: *Segment Marketing Manager - Building products*

A structure for protecting equipment and systems against the electromagnetic effects of lightning currents (LEMP, Lightning electromagnetic impulse), can be divided into LPZs (Lightning Protection Zones), meaning homogeneous electromagnetic environments, not necessarily delimited by walls, floors and ceilings, but rather ideal, with homogeneous protection measures represented by LPS, shielding and SPDs. The type of electric and electronic systems and their vulnerability to LEMP also contribute to the identification of the various zones. Electromagnetic conditions of different severity are associated with the protection zones, with a reduction in LEMP going downstream, in relation to the impulse withstand voltage level of the equipment's isolation.

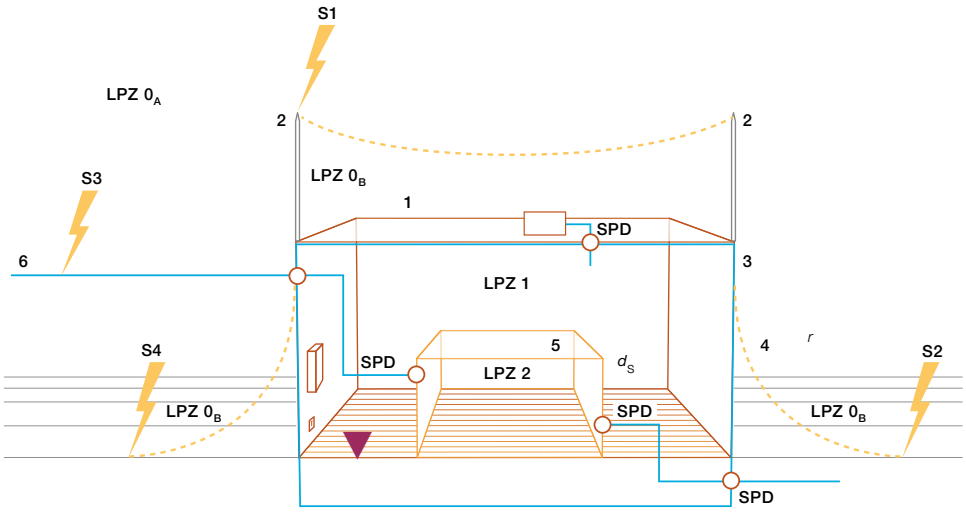
The zones are defined as follows in the IEC 62305-1 standard:

- LPZ 0A: open zone, not protected by external Lightning Protection System (LPS), in which the component elements are directly exposed to atmospheric discharges and must support the total current generated by them and are exposed to the complete electromagnetic field;
- LPZ 0B: zone contained within the external LPS, and for which protection against direct lightning strikes is ensured, but the danger is coming from total exposure to the electromagnetic field;
- LPZ 1: interior zone, in which objects are not exposed to direct lightning strikes and the induced currents are less than zone 0A. It is characterized by the presence of shielding and the installation of type 1 SPDs on the lines coming in;
- LPZ 2, LPZ n: zones with further shielding and SPDs (type 2 and 3), both at the limits of the different zones and protecting the terminal equipment, allowing a reduction of the induced current in relation to the requirements of the equipment to be protected.

Let's fix the ideas with a common building that could be a hotel for example. The first thing to do is run a risk analysis to know if a LPS is needed to protect the external part of the building against direct lightning strikes to insure mainly the protection of people. To do so software exists that avoid tedious calculations and gives in the end a level of protection for the given building to which is associated a minimum current level that external lightning protection needs to be able to capture lighting current can be symbolized as a ball, the smaller the ball the more difficult it is to captures. On the contrary it gives also a maximum value of current that SPD needs to be able to redirect to ground or to the electrical network.

Lightning current for each LPL based on 10/350 µs waveform

LPL	I	II	III	IV
Maximum current (kA)	200	150	100	100
Minimum current (kA)	3	5	10	16



1 Structure (shield of LPZ 1)
2 Air-termination system
3 Down-conductor system
4 Earth- termination system
5 Room (shield of LPZ 2)
6 Lines connected to the structure
S1 Flash to the structure
S2 Flash near to the structure
S3 Flash to a line connected to the structure
S4 Flash near to a line connected to the structure
r Rolling sphere radius
d_S Safety distance against too high magnetic field
LPZ 0_A Direct flash, full lightning current, full magnetic field
LPZ 0_B No direct flash, partial lightning or induced current, full magnetic field
LPZ 1 No direct flash, limited lightning or induced current, damped magnetic field
LPZ 2 No direct flash, induced currents, further damped magnetic field
Protected volumes inside LPZ 1 and LPZ 2 must respect safety distances d_S
Ground level
Lightning equipotential bonding by means of SPD

This Risk assessment is performed according to lightning protection Standard IEC 62305-2.

The international regulation IEC 62305, in force since April 2006, supplies all elements for evaluating the risk a building is subject to and for the selection of suitable protection measures against lightning for buildings, systems and people inside them and services connected to them. The assessment process starts with the analysis of the structure to be protected: type and dimensions of the building, its use, the number, length and type of services entering it, the characteristics of the surrounding environment and local lightning density.

The lightning current is the primary source of damage. The following sources are distinguished by the point of strike (see drawing 1):
S1: flashes to a structure,
S2: flashes near a structure,
S3: flashes to a line,
S4: flashes near a line.

A lightning flash may cause damage depending on the characteristics of the structure to be protected. Some of the most important characteristics are: type of construction, contents and application, type of service and protection measures provided.

For practical applications of this risk assessment, it is useful to distinguish between three basic types of damage, which can appear as a consequence of lightning. They are as follows:
D1: injury to living beings by electric shock,
D2: physical damage,
D3: failure of electrical and electronic systems.

The damage to a structure due to lightning may be limited to a part of the structure or may extend to the entire structure. It may also involve surrounding structures or the environment (e.g. chemical or radioactive emissions).

Each type of damage, alone or in combination with others, may produce a different consequential loss in the structure to be protected. The type of loss that may appear, depends on the characteristics of the structure itself and its content. The following types of loss shall be taken into account (see Table 1):
L1: loss of human life (including permanent injury);
L2: loss of service to the public;
L3: loss of cultural heritage;
L4: loss of economic value (structure, content, and loss of activity).

Damage and loss in a structure according to point of lightning strike (IEC/BS EN 62305-1 Table 2)

Point of strike	Source of damage	Type of damage	Type of loss
Structure	S1	D1	L1, L4**
		D2	L1, L2, L3, L4
		D3	L1*, L2, L4
Near a Structure	S2	D3	L1*, L2, L4
Lines connected to the structure	S3	D1	L1, L4**
		D2	L1, L2, L3, L4
		D3	L1*, L2, L4
Near a Line	S4	D3	L1*, L2, L4

* Only for structures with risk of explosion and for hospitals or other structures where failures of internal systems immediately endangers human life

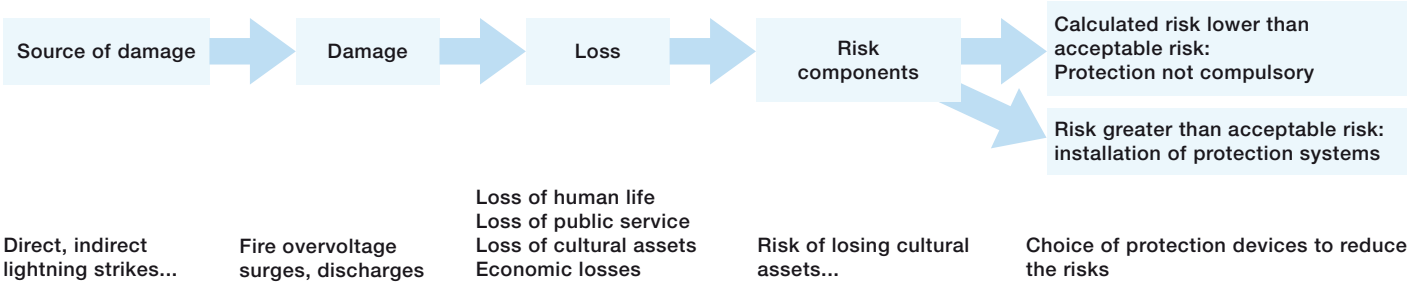
** Only for properties where animals may be lost

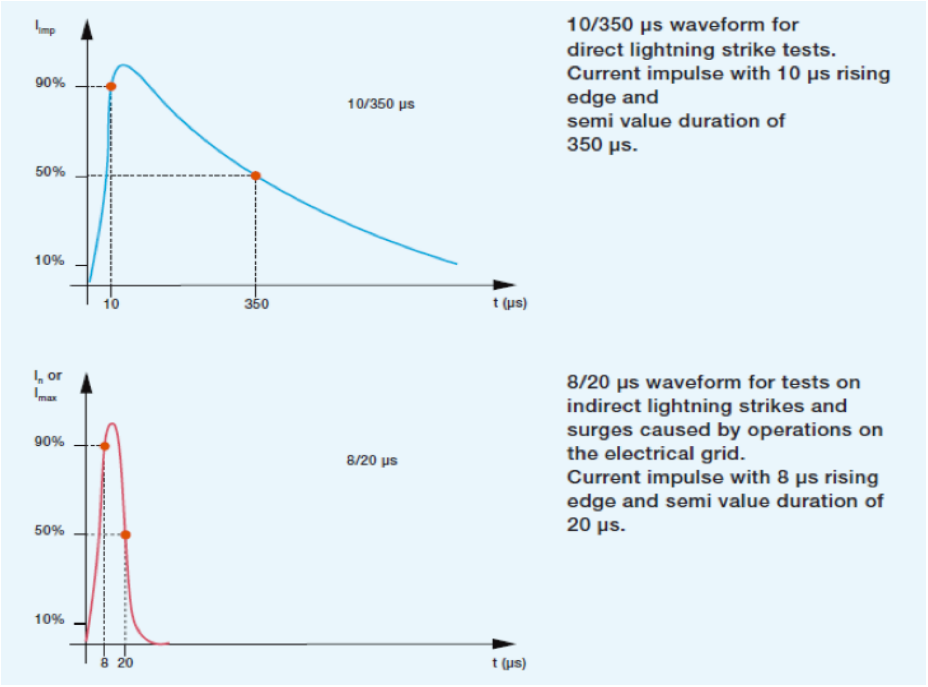
Bertrand Berges
Segment Marketing Manager
Building products

For each loss a risk R is calculated: R_1 is the risk of loss of human life; R_2 is the risk of losing essential public services; R_3 is the risk of losing cultural heritage; R_4 is the risk of economic loss. Each type of risk can be expressed on the basis of its different components relative to the cause of the damage (damage to persons by step and touch potentials; material damage due to fire, explosion etc.; damage to electrical systems by voltage surges) and the source of the damage (direct lightning strikes on buildings or external electricity lines, indirect lightning strikes near buildings or lines). For each of the three risks (R1, R2, R3), a maximum admissible value RT is defined: if the value is greater than that admissible, suitable measures must be taken to protect the building and reduce the risk (LPS, equipotential bonding, SPDs). For the fourth risk component (R4), protection is always optional – it is recommended if the cost/benefit analysis is favorable. Whenever the risk analysis requires the structure to be protected, the regulations also supply selection criteria for the appropriate SPDs to reduce the specific risk components below the acceptable risk values.

If the risk assessment requires the hotel to be protected with a LPS then it will mandatory to place a Type 1 SPD in the main distribution board as the probability that this MDB deals one day with a part of the lightning current coming from the LPS is quite high. Then this SPD has be designed in order to be able to evacuate to ground a direct impact (10/350 waveforms); this following the lightning protection zone concept and protecting the first point of entrance of the surge coming from LPZ0 to LPZ 1, from the outside of the structure to the first entrance point into this structure.

Now that the MDB is protected with a Type 1 SPD we have evacuated around 90% of the surge energy to ground however still the level of the overvoltage is too high to be accepted for category 1 equipment (equipment containing electronics can withstand only up to 1.5kV).





10/350 µs waveform for direct lightning strike tests. Current impulse with 10 µs rising edge and semi value duration of 350 µs.

8/20 µs waveform for tests on indirect lightning strikes and surges caused by operations on the electrical grid. Current impulse with 8 µs rising edge and semi value duration of 20 µs.

Therefore, in the SDB that is placed in each floor of this hotel (LPZ1 to LPZ2) we will place a Type 2 of 40KA Imax (tested with 8/20 wave forms) that will continue to evacuate what remains of surge energy and will lower again the overvoltage from 2.5kV (protection voltage of the previous Type 1) to an acceptable value for sensitive equipment (lower than 1.5KV).

Now important to note is that if the length exceeds 10 meters, the effectiveness of the protection decreases. This is the reason why we will also place in the DB of each room (LPZ2 to LPZ3) a last SPD (T2-T3 or T3) with a low Imax (20KA is enough) as we have already diverted to ground 98% of the surge energy but with a very good overvoltage protection (Up around 1kV) in order to give good protection to the end equipment.

Good surge protection is always done in steps, one SPD in each electrical board, decreasing the surge at each entry point to a new zone of the building; and to finish with a fine protection close to the end equipment. The closer the protection is to the equipment the better!

SPD are not only useful regarding protection from lightning surges, but also to protect from industrial surges. These we call industrial surges and these can also appear inside protected building. For example in a hotel high power consumption appliances like lift, air cooling systems, pumps can induce surges during switching.

The waveform (10/350 µs) simulates a direct lightning strike, with a sudden and intense increase of the current with a very high associated energy level. The lightning can, indeed, be considered the ideal current generator, injecting a 10/350 µs wave of current into the network with a very high peak value.

The waveform (8/20 µs) with reduced energy represents an indirect lightning strike, as well as the effects of electrical grid operations and parasitic interference.

The energy associated with this waveform depends on the area under the curve: Energy $\approx \int_0^T i^2 dt$. The energy associated with the 10/350 µs waveform is therefore significantly greater than that of the 8/20 µs one (approximately 10 times greater).

Conversion of the Toni site in Zürich

Dairy product factory 7 becomes a center for the arts and sciences

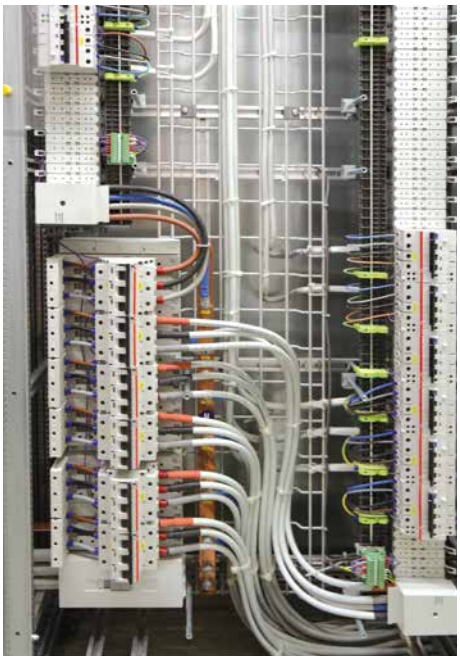
Malvin Lingwood: *Global Product Manager - DIN-Rail products*

The gigantic structure erected in the 1970s operated until1999 as an industrial dairy production plant. The Toni dairy plant used to process up to a million liters of milk a day into yoghurt, butter, cream, cheese, ice cream and powdered milk. Then, from 2009, the complex was completely rebuilt and today has a new identity as the Zurich University of the Arts (ZHdK) as well as for the Zurich University of applied sciences (ZHAW) with two departments: «Applied psychology» and «Social work». There is also a Museum, as well as about 100 apartments.

The total usable area is 87,000 square meters and the complex consists of a main building with roof garden, as well as a 75 meter high skyscraper. In total, there are approximately 5,000 students. The Zürich University of the Arts (ZHdK) boasts a wide curriculum of study and research platforms in the fields of design, film, fine arts, music, dance, theatre and dissemination of the arts, making it one of Europe's leading arts universities.

Working together with its partners, ABB created the electrical distribution systems throughout the building. The installation includes everything from the main distribution board with ABB SACE circuit breakers to the sub distributions boards, where S800 high-performance MCBs are combined with the SMISSLINE TP pluggable socket system. The immense size of the building indicates the scale of work involved.

allreal - http://www.allreal.ch/de/kaufmiete/anlageliegenschaften/toni-areal-zuerich/



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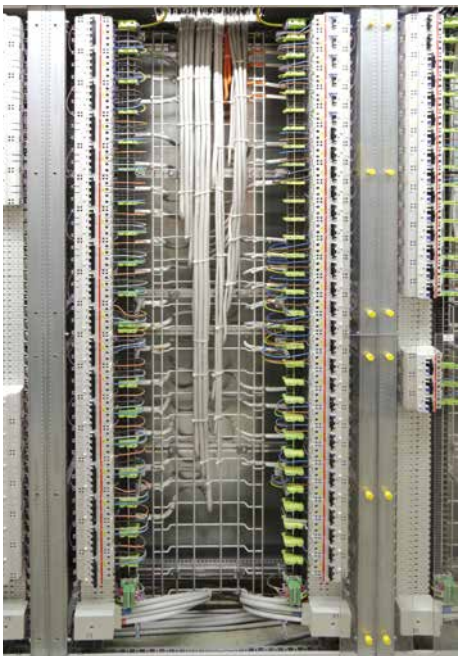
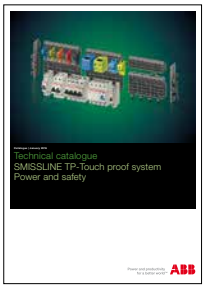


02

01 S800 as Incoming Backup protection for the SMISSLINE busbar system.
02 Vertical design: this saves space. The loads are connected from above.
03 All enclosures in the building are in the same vertical structure with ABB components.



For more information:
2CCC451059C0203

Why SMISSLINE TP?

The whole life cycle of electrical systems is highly complex regarding installation, operation and change of use and so required a system with a long-term future.

In terms of its life cycle, an electrical system must satisfy planning, construction and servicing needs, with the main focus on functional reliability, expandability and extension. Switchgear costs ultimately involve more than the costs incurred during installation and include everything throughout the life cycle of the system. ABB's total system package with everything optimally coordinated proved to be the best solution. ABB's sales department in Switzerland also provided advice regarding system design, back up and selectivity calculations. The electrical planners and switchgear constructors carrying out the work were already familiar with the advantages of the Smissline Systems from other projects.

Vertical construction

For the Toni Campus reconstruction project, all the low-voltage distribution boards with the flexible ABB Smissline pluggable socket system were made touch-proof. This has the advantage for day-to-day operations that the system can easily be extended by adding or replacing devices, meaning that changes can be made load-free to the system in the electrical operating rooms.

Because the transformer station is nearby, the short circuit current at the installation site is very high, which is why S800 high-performance MCBs were selected as the solution. This guarantees back up protection. As the S800 is very compact, these devices could be installed straight into the vertical configuration of the SMISSLINE TP fields. See the photo above for this configuration.

The vertical design of SMISSLINE TP produces a compact structural form, which is very advantageous for both new and converted installations. The output wiring is connected directly to the devices, which cuts out the need for separate input terminals. This again creates space-saving advantages with regards distribution.

03

Malvin Lingwood
Global Product Manager
DIN-Rail products

Advantages of plug-in technology: working under voltage

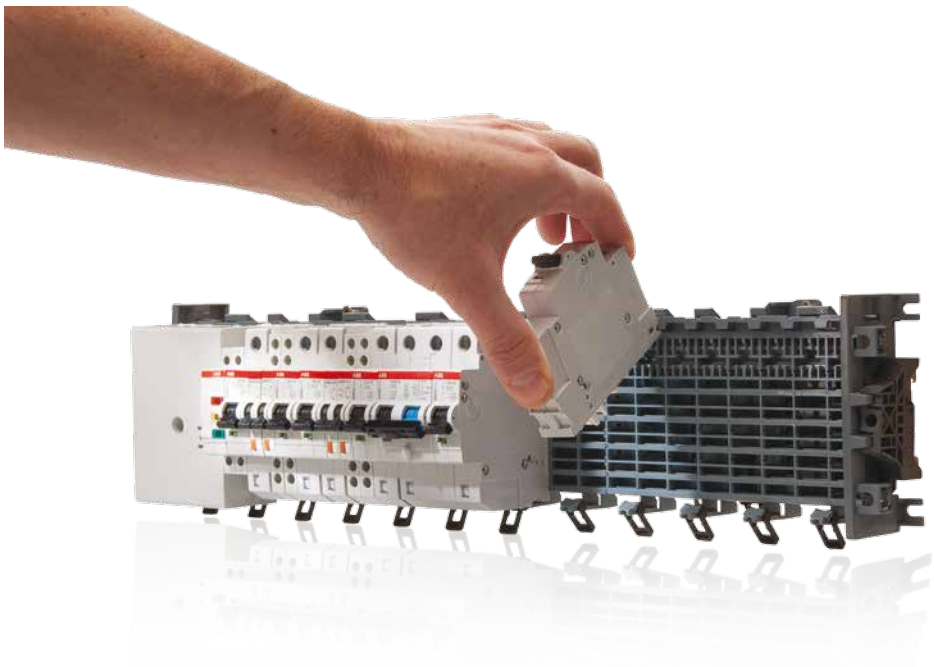
With the SMISSLINE TP pluggable socket system, it is a very simple matter to make changes on the spot to cabinet installations. The system is completely finger-safe and enables devices under voltage to be replaced load-free, ensuring that operation continues uninterrupted. This is a very major advantage, delivering cost savings throughout the system's life cycle.

Economies of time, safety, availability, flexibility

The systems can be constructed without any major planning for the individual devices. If necessary, devices don't need to be plugged in to the socket until they are on site. Single or multiple-pole devices can be integrated with or beside each other on the system - with or without accessories added on. This delivers a very high degree of flexibility, unequalled in any other system. All devices can be plugged in with a simple manual operation. Even a complete change of use of the whole installation can be effected rapidly later and with little effort.

Plug-in technology also reduces the amount of assembly and wiring work needed. There is no need for input and cross wiring and devices can be changed load-free while under voltage.

When we visited in summer 2015, the university was already a hive of activity and all the students and specialist teachers probably gave little or no thought whatsoever to all the technology buzzing away in the building behind the scenes.



Sunshine from within

Renovation as the new renewable

Emanuele Tosatti: *Segment Marketing Manager - Building products*

What if I told you that there were solar plant or a wind farm inside most of our buildings? Wind does not blow, sun does not shine but energy, plenty of electric energy, is there to be harvested. No surprise, this is just a way of looking at one of our biggest opportunities for the next decades: smart buildings renovation.

The topic features among the **highlights of Light and Building 2016 Frankfurt exhibition** too, as a part of Smart Technologies, and the business potential for all electricity professionals is huge in all developed economies, where better than growing the overall building stock the long term plans aim to refurbish them making them clean and efficient. Government and institutions focus on the challenge to reduce by more than 30% the buildings energy consumption by deep and smart renovation of its facilities and technological infrastructures. Let's then scale down to electricity distribution level to see some impact and opportunities to offer to our end users.

Considering the commercial building average amortization and the renovation rate estimates, we can say that an electric distribution board lasts about twenty years on average. This does not sound such a long time, does it? Well, in 1996, your car hardly had ABS or an airbag, your mobile phone had a 3 text line display, you had a nice collection of VHS videos at home, in your office the fax was blowing out 20 paper sheets per hour and, with your 56k modem, in a minute you could proudly visit your favorite electrical engineering company homepage:

Back to 2016, the components that were inside the 20 year old panel changed as much as ABB's website did so far, becoming up to 50% smaller.

Miniaturization

At ILS Electro Mechanical Supplies Ltd the installation of 50 SACE Emax 2 E1.2 up to 1600A, 60 E2.2 up to 2500A, and 20 E4.2 up to 4000A resulted in 20% saving in footprint for electrical infrastructure switchboards, providing an additional 15 sqm available for IT equipment, virtually leading to 1584 extra Terabytes of storage. Same as for Emax2, so many more ABB products have been shrunk in the last 20 years enabling smaller installations, such as E210 switches and indicator lights and DS200 RCBOs just to mention a few.

System pro *M* compact DS200 RCBO and E219 three LED in 1/2 module indicator light

For more information:
Highlights of Light and Building 2016 Frankfurt exhibition
http://goo.gl/4lBuF6

For more information:
ILS Electro Mechanical Supplies Ltd
http://goo.gl/rIE38N

ABB's website home page in 1996, at the dawn of the internet

Reengineering

Changing the way panel boards can be internally engineered is another great way to save space or use better that which is available. An example of this reengineering is **SMISSLINE solution**, which enables panel builder to save space thanks to vertical busbar wiring. Going smaller, even the displacement of an auxiliary contact from the side to the bottom of a circuit breaker can let us save modules on modules:

MCBs are also available with an integrated auxiliary contact (1 NO or 1 NC). Existing installations can be easily upgraded to include auxiliary switch functionality.

For more information:
SMISSLINE solution

Adaptability of SMISSLINE TP convinces ARBURG

Author: Florian Krackhecke

I learned a lot about plastics and molding when I recently spoke to ARBURG, a leading manufacturer of high quality machines for plastic processing.

Every day, millions of people use injection molded articles that depend on ARBURG's technology. During production, the company relies on flexible electrical distribution boards using ABB's touchproof pluggable system – SMISSLINE TP.

ARBURG is a German manufacturer of high quality machines used in plastic processing with headquarters in Loßburg, an idyllic town in the southwest corner of Germany. The company has 32 locations in 24 countries and trading partners in more than 50 countries. They have been dealing with injection molding technologies for over six decades. The success of the company is reflected in its continuous expansion of production and business management. I recently talked with Wolfgang Mast at ARBURG about the upcoming extension of the assembly hall and their energy distribution challenges.

Could you please explain why you used SMISSLINE TP at ARBURG?

New buildings and a change in usage of some parts of our buildings demand a high level of flexibility from us, as well as from our distribution boards. We relied on SMISSLINE by ABB for our building technologies since 1998. Two criteria have been crucial: the system remains adaptable throughout its entire life cycle and it allows us to make changes quickly and flexibly. This way, we can easily integrate new requirements. With our continuous development in mind, we were convinced.

How are you personally involved with using SMISSLINE TP and what are your tasks?

I'm the department manager for building services engineering at ARBURG. We face the challenge to meet the latest demands to expand the 146,000 m² office and production capacity here in Loßburg. We are planning to expand to 165,000 m² by building a new assembly hall.

What is the biggest benefit of SMISSLINE TP?

SMISSLINE offers us the flexibility of the energy distribution that ARBURG wants to have in its buildings and office environments as well as our supply units. Often, we need a residual current circuit breaker tomorrow, while today we still have an ordinary miniature circuit breaker (MCB) in place.

For me, one of the important benefits of using ABB's system, is the significant time saving. My electrician can start working on SMISSLINE TP immediately and does not have to clarify boundary conditions beforehand. They simply plug in the protection devices without having to worry about long, time consuming rewiring and reconnections. The mounting of the disconnected and load-free devices also ensures a high level of availability of the entire energy distribution as well as improved personal safety.

What excites you about SMISSLINE TP?

In our distribution cabinets, SMISSLINE TP is basically installed vertically to achieve better cable routing (cable entry from above and below). This allows us to wire directly to the MCBs without crossing other cables or having to bundle them.

In addition to having a better layout, we also save material, need less space and are able to implement extensions rapidly. The system is clearly structured. My electrician Markus Birk appreciates the simple wiring. With conventional systems, he has a neutral and a protective conductor bar to which he must reconnect all wires.

With SMISSLINE, the N and PE terminals are directly assigned to the devices, which makes everything easier with a clear structure.

What can you tell us about ARBURG that we don't already know?

Products that are manufactured using plastic injection molding are an indispensable part of our lives. Examples range from a toothbrush to a margarine container to lids of cosmetic containers all the way to the light switch. I always say: the products are part of our lives from morning until late at night. The value of these products often extends beyond the mere function. Nowadays these items include value-added features such as an attractive design and more individualization. Around the world, millions of people use every day items that could not be produced without our technology.

What do you like most about working with SMISSLINE TP?

We stock the distributions cabinets only with products that we need and space is reserved only for subsequent adjustments. With the old system, which had a comb rail, there was considerably more effort involved both in the planning phase and later in the project execution. This effort is no longer needed with SMISSLINE!

Efficiency and control

The power needed, when needed.

SACE Emax 2 air circuit-breakers up to 6300A have been designed to increase efficiency in all installations: from industrial and naval applications to traditional and renewable power generation installations, buildings, data centers and shopping centers. Reliable protection and systems managed with competence.

Power Controller

The exclusive Power Controller function available on the new SACE Emax 2 circuit-breakers monitors the power managed by the circuit-breaker, keeping it below the limit set by the user. As a result of this more effective use, the peak of power consumed can be limited allowing savings on electricity bills.

The Power Controller, patented by ABB, disconnects non-priority utilities, such as electric car charging stations, during the times when consumption limits need, and connects them again as soon as it is appropriate. When required, it automatically activates auxiliary power supplies such as generator sets. No monitoring system is required: it is sufficient to set the required load limit on Emax 2, which can control any circuit-breaker located downstream, even if it is not equipped with a measurement function. In installations that are already equipped with energy management systems, the load limit can also be modified remotely.

Ekip Touch

SACE Emax 2 circuit-breakers are equipped with a new generation of protection trip units that are easy to programme and read. The Ekip Touch trip units measure power and energy with precision and save the most recent alarms, events and measurements in order to prevent faults to the installation or trip effectively when necessary.

Network Analyzer

On request, the Network Analyzer function is also available, which controls the quality of absorbed power in real time and with extreme precision.

In addition, the innovative Ekip Touch and Hi Touch trip units in the G version include all the functions of generator protection switchgear, offering a safe control solution that is ready to use.
No external devices, wiring and inspections are required.

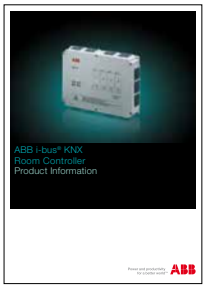
Embedding

Same as a car today features a GPS and Stereo, state of the art equipment today feature embedded functions. The Emax2, Air Circuit Breaker has embed measurement functions with Ekip touch, and M1175-F-L outlets combine fuse protection with an LED indicator all within the space of a traditional Schuko outlet.

It's now time to profit from the space savings harnessed thanks to a new generation of main and sub distribution technologies, which fits within the same space to increase the efficiency of a building, unleashing the power of the "solar plant behind". The power center can now feature solutions such as the Emax2 **Power Controller function**, enabling the building to use power when it's cleaner and save power when it is not.

Moving downstream to sub distribution, lighting control was not so often featured in a 1996 installation; today it can bring huge energy saving to a large commercial building, by learning the actual lighting needs of inhabitants and cutting any useless lighting perhaps by adapting the room lights to external conditions. This makes both work and leisure environments, even more comfortable. Twilight switches, timers, presence detectors, and dimmers will bring energy savings to every installation by simply using electricity better. The measurement of electricity consumption by means of EQ electricity meters for sub distribution and sub metering or ABB's Current Measurement System, which measures everything down to the last circuit, will also help save energy. We would all have to admit that monitoring the content of our wallet helps save money over time.

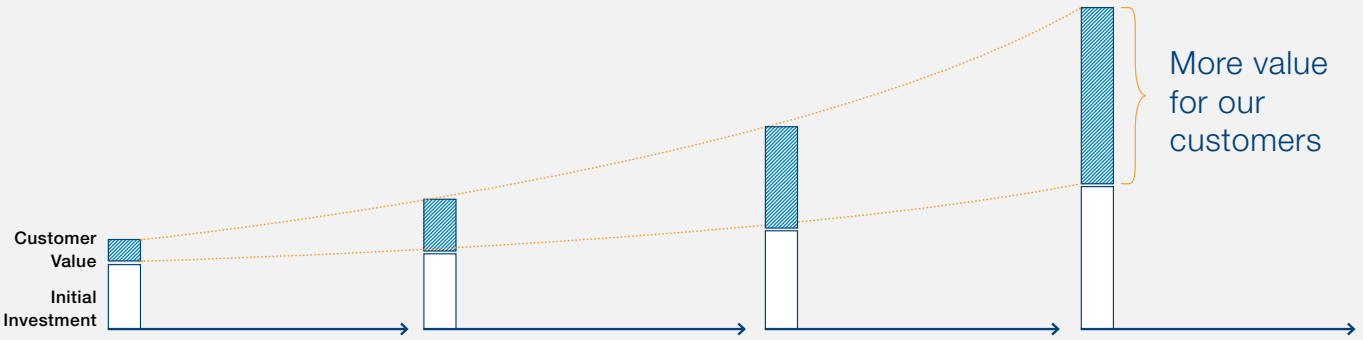
Further savings can be made through building automation and here the ABB i-bus® KNX Room Controller is great for refurbishments and renovations made possible with KNX. Compact and versatile, the Room Controller enables blinds, light, HVAC control to buildings refurbishments with minimum wiring change and size.



For more information please refer to the following brochure
Code: 2CDC514053D0201

Bringing value to the installation: the consumer unit example.

It's easy to grow the customer value of an installation, from basic up to premium, and the effect on the quality is much higher than the additional required investment. More information at: https://goo.gl/kzpCL9

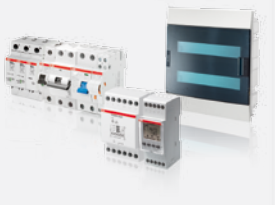


basic installation

Our basic installation includes mandatory protection devices: miniature circuit breakers, residual current circuit breakers, surge protection devices and switch disconnectors all mounted inside a consumer unit.

extended installation

In the extended installation we offer miniature circuit breakers for up-stream protection, selective residual current circuit breakers or residual current breakers with over-current protection, surge protection devices, bell transformers and time switches to be installed in a multiple row consumer unit.



advanced installation

In the advanced installation we offer the selective protection with residual current relays, sub-metering solutions, home automation based on ABB-free@home®, staircase lighting and auto-reclosing devices to grant continuity of service. All the devices are available in DIN rail version, suitable to be installed in sub distribution enclosures.

premium installation

In the premium installation we offer intelligent building solutions based on ABB i-bus® KNX along with innovative energy management solutions. All these devices can be easily installed on DIN rail and in our sub distribution enclosures.

So far with just few examples we shown many possibilities to let the sun shine inside an old building, making its energy consumption smaller and its environmental impact lower. We just have to answer a final question, and probably the most important one. Why? Why should a consultant, a panel builder, an installer, a system integrator, generally speaking an electricity professional tell an end user to refurbish her office or commercial building? Because we care; we care to bring as much value as we can to the job we do, in whichever way, with passion, competence and hard work. The value we bring will then be measured economically– a better installation profit -, socially – better feedback and reviews about my job – and environmentally – making the world a better place to be.

You know it, ABB knows it, and most relevant, the entire world knows it, and that's why most developed and developing economies are planning incentives to renovate the Countries building stock. Get ready for "the sunshine from within"!

Emanuele Tosatti
Segment Marketing Manager
Building products

A question of age

If you choose Type 2 surge arresters, beware of the lifetime!

Ronny Weber: *Global Product Manager - Surge Protection Devices*

Type 2 surge arresters often do not receive the attention they deserve in lightning protection. When the overvoltage protection devices reach the end of their service life and do not exercise their complete protective function any more, the consequences for the electrical systems can be severe. If you consider the maximum surge arrester lifespan, these effects could be avoided or made to occur less frequently.

Lightning can suddenly strike an electrical system or a low-voltage line. Often, the consequences of such an event are unclear. In industrial and residential electrical systems, lightning can cause high interference voltages. These surges are transferred through the public network (supply lines and electrical installations) and can reach sensitive devices that can be damaged or destroyed.

When installing a equipotential bonding within a lightning protection system, a great deal of effort is required to size the external lightning protection and grounding systems. Even the choice of a Type 1 surge arrester for the main distribution network is usually time-consuming, the technical parameters must be defined and different devices must be compared.

The downstream protection devices normally receive less attention. This is particularly the case for Type 2 surge arresters installed on the distribution side of the electrical system. As a general rule, standard devices are used, usually from the same manufacturer of the installed Type 1 surge arresters. But if we consider the characteristics and the technical specifications in more detail, we can notice that the Type 2 surge arresters need much more attention.

Standard parameters for the choice of Type 2 surge arresters

The standard HD 60364-5-534 (and deriving national standards) are decisive for the choice of Type 2 surge arresters. This standard defines several criteria for the selection of surge arresters. They include the protection level U_p, the operating voltage U_c, the resistance to temporary overvoltages (TOV), the nominal discharge current$_n$ and the impulse current I_n, as well as the short-circuit current I_{SCCR} and the expected current extinguishing capability.

Other important selection criteria are often the specific characteristics for installing a surge arrester. These include, but not limited to, the size - and in particular the installation width - the terminal contacts, the signaling contact and the maximum fuse.

The absence of a surge arrester can cause serious consequences

Scarcely considered is the planned lifespan of a surge arrester, while this factor should be carefully taken into account. What can happen if a surge protection device has reached the end of its working life? Ideally the device is disconnected from the network. Therefore, the electrical system does not have any surge protection anymore. As a result, damage may occur due to overvoltage. When a protection device with remote contact is disconnected from the network or protection against overvoltage is no longer guaranteed a message is sent to the central control system. For cost reasons, in many systems the devices are installed without a remote signaling feature. In such cases the absence of protection of the complete system is detected only by chance or only during subsequent maintenance of the system.

Instead, if the surge arrester is subjected to premature aging, the internal disconnection device is no longer able to isolate the device from the line. In such a case, the upstream fuse will trip. It may be a fuse assigned to the surge arrester only or a device that protects the entire electrical system.

If the assigned fuse trips, only the surge arrester is isolated, while the rest of the system continues to operate. In some circumstances, the fuse tripping is unnoticed, for example, when its operation is not monitored or when the surge arrester does not have telesignaling features. Therefore, the electrical system is no longer protected against voltage surges.

If no dedicated fuse for the surge arrester is installed, the main fuse of the electrical system acts primarily as the backup fuse for the surge arrester. This variant is often chosen to save space and costs in the switchboard. If the main fuse of the system trips, the entire system stops.

Direct and indirect damages

What happens if there is no overvoltage protection? If the system is no longer protected, both the installation and the terminal device can be damaged. These damages are not only affecting consumer units like, PCs, TVs, etc. in the private sector they also affect servers, switchboards or production equipment in the industrial sector. Even indirect damages caused by overvoltage can be severe. These can range from the loss of production and customer data, or the defrosting of cold stores to the loss of data and images. In fact, very often indirect costs can far exceed direct costs.

If a main fuse of the electrical system fails due to a surge arrester that has reached the end of its life the consequences are serious. In this case the entire electrical system is fails, which results in high repair and indirect costs. This is demonstrated by many examples in series production, such as in the automotive industry, in the chemical industry, in blast furnaces, etc.

The high costs of surge arrester failure, due to end-of-life and the use of an unsuitable fuse, far exceed the replacement of the tripped device. The cost of intervention by a technician or an electrician with a planned short shutdown of the electrical system to replace components, especially in the industrial sector are several orders of magnitude less than the costs of loss of production and replacement of the equipment the surge protection device usually safeguards.

Table: Average number of possible discharge processes according to the load at the point of installation (lab test)

	Level of shot current								
I max	80kA	65kA	40kA	30kA	20kA	10kA	5kA	2kA	1kA
80kA	1	3	15	20	25	220	530	4500	15000
40kA			1	5	20	40	200	1000	3000
20kA					1	20	150	1000	3000
	Number of strikes								

Aging of a Type 2 surge arrester

It is essential to take into account the "age" of a surge arrester. Its estimated lifecycle can not be determined in an absolute manner, for example in terms of hours of operation. For this purpose, the actual lifespan will be strongly affected by the number and values of surges at the point of installation. But it can be influenced by the choice of the discharge capacity. The discharge capacity describes the value of the current peaks that can be discharged during overvoltages. Two parameters, used to test the product, define the capacity of a Type 2 surge arrester: the nominal discharge I_n and the maximum leakage current I_{max}.

Nominal discharge capacity means a load that a surge arrester is able to discharge 15 times safely. A typical value is 20 kA (8/20). The indication 8/20 refers to impulse test of a Type 2 surge arrester. The first number defines the pulse rise time, that is, its slope. In a Type 2 surge arrester, in 8µs the pulse increases from 10% to 90% of the maximum current value. The second number identifies the half-life and thus the length of the pulse. For a Type 2 surge arrester, the current drops from the maximum value of 20µs to less than a half. Unlike Type 2 surge arresters, Type 1 devices are tested with the 10/350 pulse, which is significantly longer and therefore contains clearly more energy.

The maximum discharge current defines the maximum pulse current that a Type 2 surge arrester is able to discharge safely 1 time, without being damaged or isolated from the line. In this case, 40 kA (8/20) represents a typical value.

Based on these values, laboratory tests have shown that the number of safe discharge processes is considerably higher than at low loads. The table shows that it is impossible to specify the lifetime of a Type 2 surge arrester in hours of operation, as this in fact depends on the actual load at the installation point. If the load at that point decreases, the number of possible discharge processes increases exponentially. If, instead, the value of the surges is reduced for a surge arrester with a maximum discharge capacity of I_{max}= 40 kA for example, from 20 kA to 5 kA, the number of possible discharge processes exponentially increases from 20 up to 200.

Requirements based on the standards and the actual situation

Considering the minimum requirements for a Type 2 surge arrester according to HD 60364-5-534 standard, it was found that a nominal discharge current$_n$ of 5 kA (8/20) is enough for a system that complies with the standards. Based on the observation and the laboratory measurement results, it seems that in practice it can be helpful to use a surge arrester with a discharge capacity significantly higher.

What makes sense in reality?

Therefore, Type 2 surge arresters applied now as a standard, often have the combination of a maximum discharge capacity I_{max}= 40 kA and a rated capacity I_n= 20 kA. Surge arresters with a lower discharge capacity (for example I_{max}= 20 kA and $_n$= 5 kA) today are generally used only as a second layer of protection behind a first Type 2 surge arrester (e.g. in case of presence of longer cables), as well as a combined device with a Type 2 and Type 3 classification. These combined surge arresters can also be used as a fine protection after a first Type 2 device and are therefore particularly suitable for protection of sensitive electronic circuits.

Conclusion

In addition to the traditional parameters considered in the selection of Type 2 surge arresters, the perspective of the user of an electrical installation or the owner of a building, should also include the possible lifetime of a surge protective device (SPD). Here attention should be paid in particular to the discharge capacity, which has a considerable impact on the lifetime of the protective device.

Surge arresters with a discharge capacity lower than the standard combination of nominal discharge capacity I_n= 20 kA and maximum capacity I_{max}= 40 kA, can be found on the market for many reasons, both for use as fine protection or because the manufacturers want to reduce costs, and therefore they reduce the discharge capability of such devices. These devices are not recommended for use in primary and secondary networks, as they can significantly reduce the lifetime of the complete electrical system.

Ronny Weber
Global Product Manager
Surge Protection Devices

From Electrician to Marketer

The opening speech of a meeting: how do I start?

Federico Mai: *Marketing Communication Account - EP Division*

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

As it always happens in the context of the Comm unications, the first few minutes are the most important to give a general impression about the meeting: will it be interesting or not? It is within that short amount of time that each participant gets his/her own impression: will it be exciting or boring, useless or profitable? It's therefore essential to use in the best way those precious minutes to make things go easier later on.

Very often a meeting is started by the speech of a person within the Company or by a Top Manager, and it is frequently the quality of the initial message that is critical to the success of the entire meeting. Double talk or a boring issue can spoil the climate immediately. But if the speech defines the purposes, the arguments and the added value of the meeting, it brings an essential and irreplaceable contribution.

The cornerstones of a good opening speech are:

1. manage the attention
2. send a clear and "storable" message
3. provide guidance about the "mood" of the meeting

Manage the attention

The dynamics of capturing and maintaining the attention of meeting participants follows a clear sequence: grab their imagination immediately, maintain by building to a 'crescendo' and fix the message with the conclusions.

– **Catch the attention**
It seems trivial, but a common mistake is to start too early. If you start talking while participants are still chatting, the valuable opening sentences will be lost. Those who have caught the premise will not understand and will become distracted When the person to open the meeting has little experience, it is essential that someone else introduce him and wait for silence before giving a strong introduction. The first sentences of the speech are intended to obtain strong participation and involvement. If (and only If) it is in your nature, you can also start with a joke as suggested by many manuals, especially American manuals … Otherwise you could start with an unsettling quote. For example, if you want to talk about sustainability in a company, you might start like this: "Today I want to talk about my daughter (pause, look at the room). My daughter is very young (short stop) and like so many young people she is sensitive to issues that Companies in our sector have not taken very seriously in the past…". Or you could animate the room "physically" by involving your audience: "Hands up those who come from Paris or London today? … thanks for making this long journey" (applause).

– **Maintain the attention** ("in crescendo")
The whole speech (the content, the tone of voice, the impact of technical aids, etc …) must be built "in crescendo": arguments must be arranged from least to most important, from the predictable to those that lead to a change, up to the expected result. For example, before announcing an organizational change, you should first expose the problems, then you can launch a series of questions ("So we asked ourselves: how is it that…?"). Only when curiosity and attention are at a maximum can we present the solution.

Federico Mai
Marketing Communication Account
EP Division

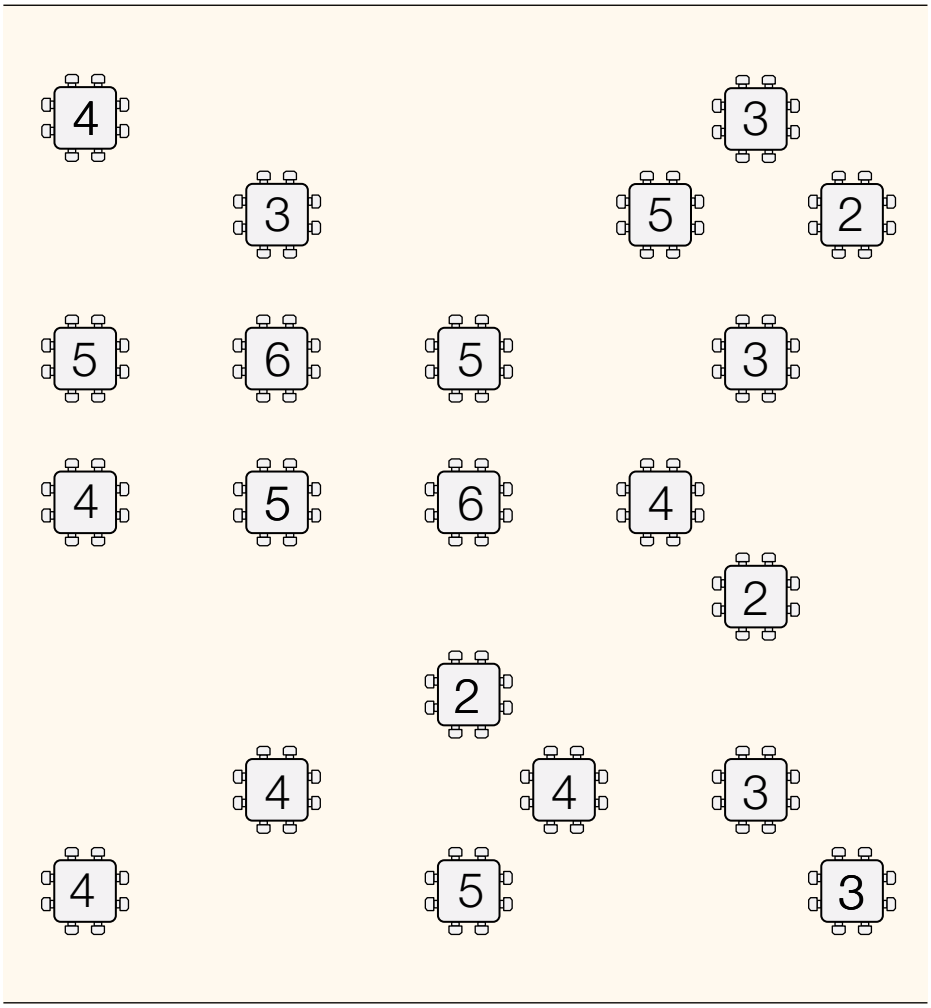
– **Fix the attention** (with conclusions)
The best way to fix attention is to put yourself in the shoes of those who are listening. For example, having proven the case of a new management system, one might conclude:
"I realize that for many of you, it will be difficult to give up the efficiency achieved with the current system, with all the tricks you've learned over the years to get the best out of it (pause and knowing smile), but having made the case for the new system and seen the support and enthusiasm you've shown in this meeting, I feel sure we can make a smooth transition, but of course any ideas you have to help shorten this process are very welcome."

Send a clear and "storable" message
There is the temptation to say everything and more, but you should be mindful that most of us can only understand and retain a limited amount of information. Choose one topic, discuss it briefly (no more than half an hour) and repeat the concept several times in a variety of different ways and repeat a 'tag line'.

Here is an effective tag line from a Manager: "Being a leader in the Company is a lifestyle choice. Not the Buena Vista Social Club". It is not only clear and concise, but is also evocative. Moreover, if repeated during the talk, it will definitely be discussed, quoted and stored.

Provide guidance about the "mood"
In Management, courses we are taught that "employees do not listen to what you say but look at what you do." Inside the organizations, the rules of behavior are most effective in the actions and reactions of Management. So, if the meeting must signify informality and fun, rather than commitment and reflection, then the clothing and attitudes of those who make the opening speech must be consistent with that theme. A tuxedo would not fit with a message such as: "Consider it a moment of informal reciprocal knowledge"!

Connect the boxes
Train your brain.



Task

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

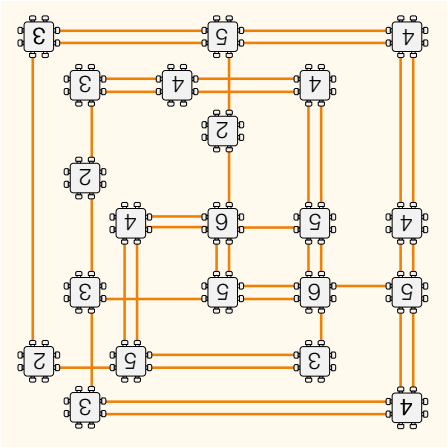
An electrician has already installed all the junction boxes on the wall and laid down the required connections, but then he left the job unfinished without explanation.

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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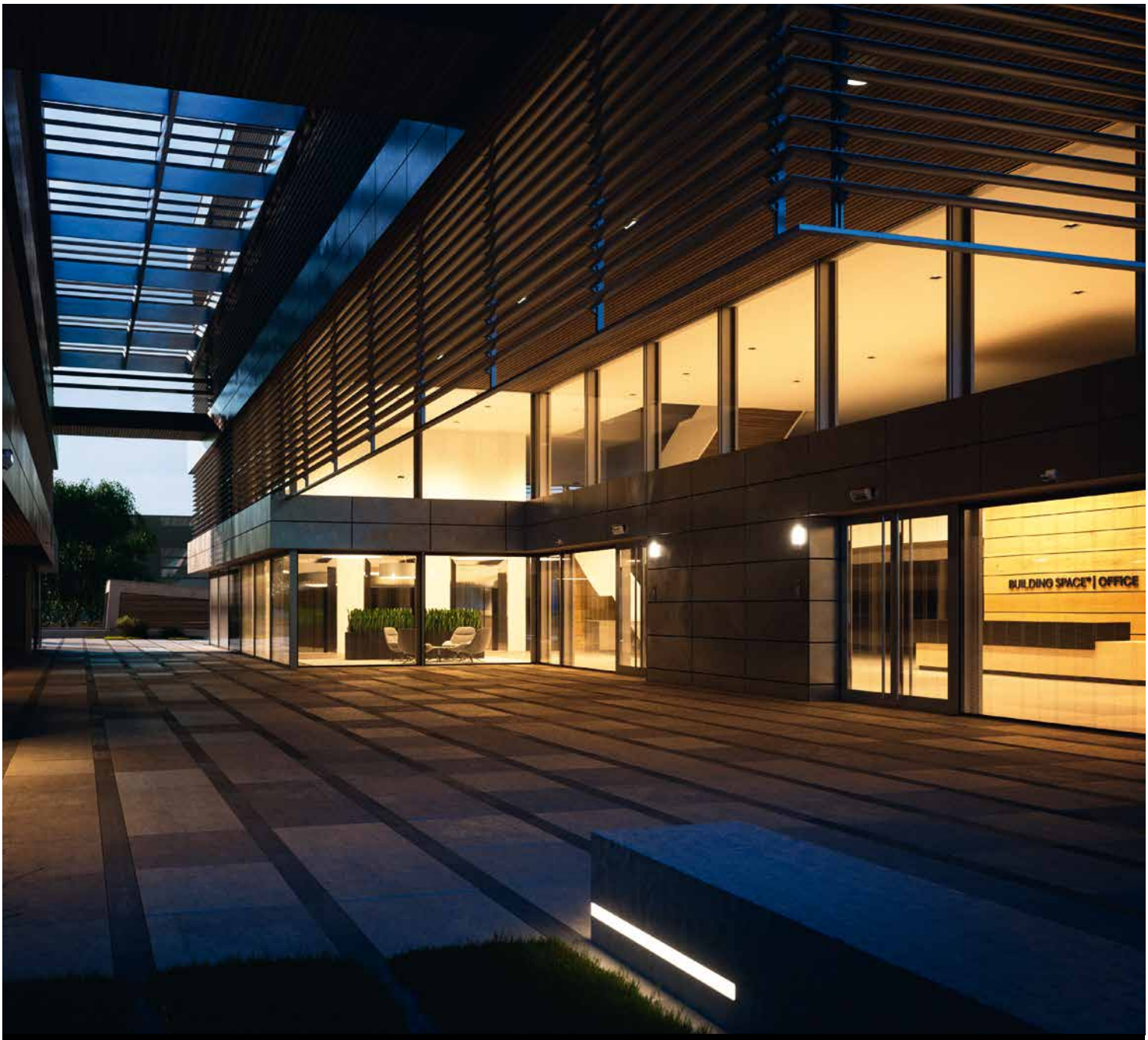

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