

## About us

$A B B$ is a leading global technology company that energizes the transformation of society and industry to achieve a more productive, sustainable future. By connecting software to its electrification, robotics, automation and motion portfolio, ABB pushes the boundaries of technology to drive performance to new levels. With a history of excellence stretching back more than 130 years, ABB's success is driven by about 110,000* talented employees in over 100 countries.

ABB has been present in India for over a century. ABB in India is a stock exchange listed company serving utility, industry, transport and infrastructure customers with power and automation technologies. The company has a deep manufacturing footprint in the country, developed over several decades with multiple world-class manufacturing locations, global feeder factories and development \& engineering centers.


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## Data Centers

The future data center will have an intelligent grid connection, buying and selling energy, discriminating between grid and renewable power sources and contributing to the stability of power supply for its neighbors.

Having a highly efficient data center is a very demanding task. Two of the main challenges are: building a highly efficient data center, and having the right degree of information coming from measurements to take the correct action.

Main benefits

Improve energy efficiency, saving energy, time and

Monitor energy loss and reduce it up to $5 \%$


Eliminate the risks of outages and guarantee service continuity 24/7.


Save up to $40 \%$ of the space needed for the equipment for electrical energy distribution.


Minimize the design time of the electrical distribution.

Our application packages were designed by domain experts to focus on your specific challenges.
+Intelligent distribution for electric power in Data Center
+Continuous power in Data Center


## Building Solutions

Our vison is a building space that is modular, efficient and flexible over time. Energy distribution and automation suiting well-being and productivity with transparency of costs and our mission is to offer an experience of excellence for different spaces, with ultimate technology components that are adaptable and able to support customer specific businesses.

## Segmentation


-
Residential
Single family

- Houses
- Private dwellings
- Single apartments

Multiple family

- Multi family dwelling
- Apartment's complex

|  |
| :---: |
| $\overline{\text { Commercial }}$ |
| Hospitality |

- Hotels, Resorts, Motels
- Dormitories, Lodgings, Rooming
- Cruiser ships

Office

- Low/Mid/High-rise
- Multi-purpose
- Laboratories
- Call centres
- Single/Time-share property


## Retail \& Mall

- Stores, Hypermarkets
- Retail chains, malls
- Restaurants, Food chains
- Showrooms

Leisure Facilities

- Casinos, Theme parks


Institutiona

## Healthcare

- Hospitals
- Nursing, Retirement homes
- Elderly care, Day care
- Multi-centres


## Educational

- Schools, Universities, Colleges
- Research facilities
- Archives, Libraries


## Public

- State/city buildings, Halls
- Post-offices
- Temples, Historic
- Police, Military, Prisons


Infrastructure
Transportation

- Airports, Ports, Stations
- Bus/Truck/Train
terminals
- Parking facilities
- Tunnels

Storage

- Warehouses
- Cold storage plants

Others Infrastructure

- Water/Sewage treatment


Industrial
Manufacturing

- Facility
- Manufacturing
- Transformation
- Packaging


## Others Industries

- Chemical Pharmaceutical
- Processing
- Telecom
- Power plants
- Agricultural


## Mid-sized office reference architecture



## Transportation rail \& infrastructure

When it comes to rail infrastructure electrification, the key focus areas are DC voltage, AC voltage and custom solutions. We provide complete solutions for a reliable network. Our innovative products are designed for heavy-duty industrial applications and are extensively tested to withstand the requirements of a transportation system, helping to ensure maximum reliability for our customers.


Keep your rolling stock vehicles always up and running and play your role in the energy transition, thanks to our Switching \& Protection solutions in compliance with rail standards.

Our Motor Starting and Protection solutions ensure that combinations of core power devices work in co-ordination with each other, while providing continuous operation and guaranteeing ease of installation. In addition, our solutions guarantee additional protection by providing control and monitoring functions for the whole system.

ABB offering (IEC)


## Food \& beverage

Food and beverage industry is highly demanding in terms of requirements for safety, productivity, efficiency and quality and Electrification Business has a complete set of solutions that are responding to this segment needs.


Depending on the nature of their business, F\&B industrial buildings include a mix of different processes and equipment with greatly varying power protection requirements. We have categorized the major applications as below.

- Power quality in Food \& Beverage
- Continuous power in Food \& Beverage Intelligent Distribution for Food \& Beverage
- Transfer switching for Food \& Beverage Motor Starting \& Protection in Livestock \& Poultry


## Solar

Solar is a leading sustainable energy source for utility-scale and distributed power generation and self-consumption to drive growth in mature and developing economies


ABB offers full range of solutions that meet the 1500 V DC requirements, allow monitoring and communication functions at any level of a PV plant and offer advanced energy storage solutions to ensure continuous operations in any kind of application.


## Low-voltage products:

1. Fuse disconnectors: E 90 PV; Fuses: E 9F PV
2. Current measurement system: CMS
3. Switch-disconnectors: OTDC
4. String combiners: $1000 \mathrm{~V} D / 1500 \mathrm{~V}$ DC
5. Surge Protection Devices: OVR PV
6. String Monitoring Controller
7. Recombiner
8. Moulded Case Circuit-Breakers: Tmax PV
9. Switchboards: ArTuK
10. Insulation monitoring devices: CM-IWx
11. Contactors: GF and GAF series
12. GFDI application: S804U-PVS5
13. Fuse disconnectors: E 90
14. Surge protection devices: OVR T1 / T1-T2 / T2 QS
15. Contactors: AF Series
16. Moulded Case Circuit-Breakers: Tmax XT,

Tmax T Air Circuit-Breakers: Emax 2
17. Temperature monitoring relay: CM-TCN. 012

## Battery Energy Storage System (BESS)

In a world becoming more digital and electric every day, we need Energy Storage Systems to help the world produce and consume energy more efficiently and sustainably.
Our Switching and Protection solutions help our customers to handle higher fault current events, manage direct currents, and protect battery storages against ground faults.


## BESS communication architecture for remote monitoring

Figure 22.
Wiring diagram for
BESS communication
and cloud monitoring

combiners

MV utility

## Wind

ABB supplies products, systems, solutions and services to the wind industry, starting from components needed inside the wind turbines to transmission, distribution and monitoring systems for the power generated by the plant


Wind energy is one of the fastest growing industries. Global wind capacity reached 486 GW in 2016 according to WWEA, having grown by 54 GW in that year and with an average growth of $14.5 \%$ since 2012. ABB is a leader in the wind industry, providing components to turbine manufacturers as well as everything needed to connect wind farms to the grid. ABB generators, electrical panels and low-voltage products are present inside more than 40,000 wind turbines worldwide. ABB has also delivered
tens of thousands of transformers and hundreds of wind farm substations. Furthermore, our customers can count on ABB Service solutions for an optimized wind economy. With our local presence, global footprint, fast delivery and responsiveness, our service offering includes efficiency improvement and production increase, while improving reliability and reducing Levelized Cost Of Energy (LCOE) over the entire lifetime of a turbine or a wind farm.

## ABB in wind industry

Low voltage product portfolio
$A B B$ is driven by a continuous search for innovation. That is why, many of our ideas have revolutionized the electrical industry.


Often recognized as a provider of single, high-quality products, the extent of ABB's solution offering is often forgotten. ABB pioneered the wind and solar industry and has worked closely with the largest Original Equipment Manufacturers (OEMs) for a long time. We are known for our individual products, but our solutions are what really stand apart.


## Application Finder

By simply selecting a market segment, the standard you need and the end-use you are looking for, you will get the full list of applications available and the related bill of materials and schematics, to build a complete application and speed up the project of your customer.

https://new.abb.com/low-voltage/low-voltage-products/applications

## Segment




# Get the Infinite Perspective ABB SACE Infinitus 

 Infinitus. This solid-state circuit breaker is 100X faster than traditional breakers, with near zero breaking time. But Infinitus goes way beyond asset protection - it opens up infinite possibilities for resilient DC distribution systems. Like ensuring maximum availability with faulty zone isolation. Or optimizing efficiency with 100x more endurance and the lowest power losses in category. The result? A seismic shift in how you think about electrical distribution. stories.abb.com/sace-infinitus
# ABB Ability ${ }^{\text {TM }}$ <br> Energy and Asset Manager <br> Understanding power and assets 


#### Abstract

ABB AbilityTM Energy and Asset Manager is a state－of－the－art cloud solution that integrates energy and asset management in a single intuitive dashboard． Providing full remote visibility of asset and electrical－system behavior，ABB Ability ${ }^{\top}$ M Energy and Asset Manager provides insights that help you minimize cost and risk and maximize performance and safety across your operations．Want to get started now？ Testing and purchasing Energy and Asset Manager is easy on the ABB Ability Marketplace ${ }^{\text {TM }}$ ．




Energy Manager
－Optimize energy bill
Avoid energy waste Cost allocation



Asset Manager
－Reduce total cost of ownership
－Maximize uptime
－Improve safety

## Energy and Asset Management made easy

The Energy and Asset Management modules can be purchased separately or together，depending on your needs．Monitoring can also be segmented down to individual pieces of equipment and／or sub－systems－such as an elevator，a single HVAC system，or a production line．


## ABB Ability ${ }^{\text {TM }}$ Energy Manager

Energy efficiency has become essential to running cost－efficient operations．ABB Ability ${ }^{\text {TM }}$ Energy Manager provides real－time understanding of your energy consumption and identifies areas of improvement．
And it＇s scalable，from a single site to a multi－facility system with hundreds of users．

## Monitor

Discover site performance，supervise the electrical system and allocate costs．

## Analyze

Schedule automatic data exports，improve the use of assets and take the right business decision．

Act
Set up alerts and notify to key personnel and remotely implement an effective efficiency strategy to achieve energy savings in a simple way．

## ABB Ability ${ }^{\text {TM }}$ Asset Manager



## Architecture

## Truly plug \& play

## Embedded solution with Ekip Com Hub

Emax 2, Ekip UP and TruONE equipped with the new Ekip Com Hub establishes the cloud connection for the whole switchboard.

External solution with
ABB Ability ${ }^{\text {TM }}$ Edge Industrial gateway
The ABB Ability ${ }^{\text {TM }}$ Edge Industrial gateway module can

ABB Ability ${ }^{\text {TM }}$ Asset Manager sets a new benchmark for simplicity and flexibility in asset-performance management. It gives you the power of seeing and optimizing your site equipment behavior anytime, anywhere via an intuitive graphic interface, resulting in greater reliability and availability and minimized unplanned maintenance.


Condition monitoring
ABB Ability ${ }^{\top M}$ Asset Manager provides granular visibility of your asset behavior in real time for both LV and MV environments

Predictive analytics
Detect potential faults through condition assessment, performance trends and pre-alarm notifications.

Maintenance planning
Root-cause analysis of asset condition enables predictive maintenance that significantly reduces unplanned downtime and operational costs.
be mounted on DIN-rail to collect data throughout the system. You can also connect sensors to measure environmental parameters (temperature, water, gas) via both analog and digital 1/0. ABB Ability ${ }^{\top \mathrm{M}}$ Edge Industrial gateway has enhanced connectivity functionalities, providing Wi-Fi or 3G/4G connectivity.


## ABB E-kit

## The new connectivity interpreter for the energy management



The new connectivity interpreter for the energy management E-kit gives the highest flexibility to integrate different product families, ABB or third party, in on-premise or cloud energy supervision platforms.

## Lite panel

One digital panel fits all


Lite Panel is the new switchboard HMI able to monitor and control until 28 electrical assets at the same time, directly connected in the on-premise communication network, showing their data as digital twins through predefined templates.

## Value proposition

## Safety

Monitor and control the electrical assets, also with fault detections and diagnostics data check, far from the switchboard power sections reduce the risk of serious incidents.

## Energy efficiency

Supervision of assets status, energy and power quality from a unique panel improves the data collection efficiency with less $70 \%$ of time spent nearby electrical rooms and enables analytics to plan saving actions.

## Easy to install

The plug \& play panel architecture saves more than 4 times the components and wiring compared to traditional market benchmarks.

## Optimum interface

Until 28 digital-twin devices are available from a single interface within the local secure network, so leveraging on the already present communication tag points.

# Ekip UP+ <br> The low voltage digital unit for next generation of plants 



## UP-date basic switchgear

Ekip UP+ updates switchboards with new monitoring, protection and power control solutions.

- Compatible with all switching devices, ABB or not.
- $100 \%$ applicable for every low-voltage scenario.


## UP-grade your facilities

Ekip UP+ is the unit that upgrades the electronics of old facilities to make them digital.

- $40 \%$ operational cost saving via the energy management system and predictive maintenance.
- Cost-effective solution compared with traditional retrofitting.


## For new installations

- A multi-functional digital unit allowing protection, metering, and asset management in one device.
- Save 20\% of operational costs on electrical distribution through power management functionalities.
- One single architecture and user experience throughout all ABB low-voltage air and molded-case circuit breakers.
- Perfect integration into all automation and energy management systems through a variety of available communication protocols.
- A cost-effective solution for entry-level logics, e.g., load shedding, thanks to its multiple IOs and programmable status.
- Advanced metering accuracy throughout the whole chain (main unit and its sensors).


## UP-load your electrical system

Ekip UP+ uploads your system data to the cloud-connected ABB Ability ${ }^{T M}$ platform.

- Enabling full microgrid control.
- In less than 10 minutes without any external gateway.


## Maximize UP-time

Ekip UP+ maximizes uptime for system integration as a plug and play unit with easy installation.

- $50 \%$ time saving when retrofitting, with reduced impact on switchboard design.
- Almost zero downtime during commissioning.
- No need for disassembly, just a clamp on a Rogowski coil.
- Easy configuration as a result of one ecosystem with ABB air and molded-case circuit breakers.
- Initial configuration at your fingertips.


## For upgrading existing installations

- Extend the lifetime of your existing lowvoltage circuit breakers with a cost-effective solution in which your investments are made scalable and flexible.
- Enjoy the latest state-of-the-art metering, protection and control functionalities.
- Benefit from a plug-and-play solution, offering easy and fast installation and commissioning to upgrade your plant's installed base to the next-generation technology.
- Connect your existing circuit breakers to the cloud and explore our ABB Ability EAM platform.


## ArTuK

Fully checked and certified (IEC 60439-1 and IEC 61439-1 and 2 Standard) by an external independent organisation (Acea Lovag, DEKRA, CPRI \& ERDA), the ArTu switchgear is a synonym of safety and quality. The certification is the fruit of severe tests carried out on the whole configuration, consisting of metalwork structures, circuit-breakers and busbar system.

The ArTu K series switchgear is ideal for primary distribution board, motor control center, power control center etc. upto 6300A with air and molded-case circuit-breakers and any internal segregations up to Form 4, and for floor-mounted distribution switchgear with molded-case and modular circuit-breakers. The switchgear has been tested for Internal Arc (as per IEC 61641) and Seismic (as per IEC 60068).


ArTu K Switchboards are safe and reliable

The ArTu switchgear is noted for the following features:

- Integrated range of modular metalwork structures up to 6300 A with common accessories.
- Possibility of fulfilling all application requirements in terms of installation (floorstanding, modular and corner versions) and degree of protection (IP31, IP41, IP 42, IP52, IP54 \& IP65).
- Maximum integration with modular apparatus and the molded-case and air circuit-breakers, so that additional drilling or adaptations are not required.
- Minimum switchgear assembly time, thanks to the simplicity of the kits, standardization of the small assembly items, self-supporting elements and the presence of clear reference points for assembly of the plates and panels -
Segregations in kits up to Form 4.

The use and installation of the kits according to the instructions provided means that assembly and cabling times can be reduced to a minimum, for example, thanks to the reference points for positioning the panels and plates, and that respect of the insulation distances and the rated characteristics of the circuit-breakers are guaranteed.

## Smart switchgear Let's go digital



Electrical distribution digitalization is aimed to answer rising demand for energy efficiency and continuity of service for electrical installation. The key aspect in realizing an intelligent distribution system is to have smart switchgears that can be easily monitored and managed from remote, in order to answer market demand for reliability and efficiency.


Flexibility
Simple to realize offering up to $66 \%$ less cables and up to $10 \%$ less connectivity components


Energy efficiency Sustainable, offering from $7 \%$ up to 20\% energy efficiency improvements

ABB intelligent distribution solutions are aimed to answer requirements from any segment and application.
Choose the smart switchgear design package that best fits your needs and helps you in designing, building, installing and operating the electrical installation.

[^0] maintenance cost


Future proof
Offering upgrade and update
solutions with zero downtime

# Electrical characteristics <br> ArTu distribution switchgear 

## Conformity with the IEC 61439-1-2 Standard

The ArTu switchboards have undergone the type tests foreseen by the new IEC 61439-1-2 Standard at the certified test laboratories. The results of these tests guarantee the performances of the ArTu switchboards and allow the assembler of the switchboard using ABB metal structures, ACBs, MCCBs, MCBs and other low voltage switchgear, not to carry out further type tests, respecting the selection criteria and the assembly instructions of the various components. These results, given below, can be referred to for drawing up the declaration of conformity of the electric switchboard.

## Over temperature

(Ref. par. 8.2.1. of the Standard)
The thermal dissipation values are indicated in detail catalogue, referring to all the dimensions of the ArTu switchboards and to the type of installation, deriving from the type tests carried out. The dissipated power data (in Watts) are according to the admissible over temperature inside the switchboard in the upper part, and must be compared with the sum of the powers dissipated by all the components installed inside the switchboard (taking appropriately into account the factor of contemporaneity).

| Technical characteristics | IEC 61439-1-2 |
| :--- | :--- |
| Compliance with Standards | according to IEC 60068-2-57 Standard |
| Test of vibration for structure ArTu K | Copper / Aluminium |
| Test of anti-seismic | up to 1000 V |
| Busbar | up to 1000 V |
| Rated service voltage Ue | $50-60 \mathrm{~Hz}$ |
| Rated insulation voltage Ui | $8 / 12 \mathrm{kV}$ * |
| Rated frequency | up to 6300 A |
| Rated impulse withstand voltage Uimp | $50 \mathrm{kA}, 65 \mathrm{kA}, 100 \mathrm{kA}$ |
| Rated current In | $105 \mathrm{kA}, 137 \mathrm{kA}, 220 \mathrm{kA}$ |
| Rated short-time short-circuit withstand current Icw | IP31/IP41 |
| Rated peak short-circuit current Ipk | IP42/IP52/IP54 |
| Degree of protection IP | IP65 |
| Without Glass door |  |
| With Glass door/without Glass door and ventilated side panels |  |
| With Glass door |  |

[^1]
## Mechanical characteristics <br> ArTu distribution switchgear

| Material |  |  |
| :--- | :--- | :--- |
| ArTu K structure | Galvanized steel sheet with 9 -fold structure |  |
| Panels | $1.5 / 2.0 \mathrm{~mm}$ thick steel sheet |  |
| Doors | $1.5 / 2.0 \mathrm{~mm}$ thick steel sheet $/ 4 \mathrm{~mm}$ thick tempered glass |  |
| Mounting plates | $2.0 / 2.5 \mathrm{~mm}$ thick hot galvanized steel sheet |  |
| IK Degree of resistance to impacts | IK 09 |  |
| With glass door | IK 10 |  |
| With blind door |  |  |
| Painting | Light Grey RAL 7035 |  |
| Standard colour | Powder coated |  |
| Painting standard | Indoors | $23^{\circ} \mathrm{C} / 83 \%-40^{\circ} \mathrm{C} / 93 \%$ |
| Ambient characteristics | Floor-mounted | $23^{\circ} \mathrm{C} / 98 \%-40^{\circ} \mathrm{C} / 98 \%$ |
| Type of installation | Constant | $-5^{\circ} \mathrm{C}+50^{\circ} \mathrm{C}$ |
| Installation conditions | Variable | $-25^{\circ} \mathrm{C}+55^{\circ} \mathrm{C}$ |
| Service climate ( $t^{\circ} /$ r.h. $\%$ ) | Operating |  |
| Ambient temperature limits | Storage |  |



# Arc flash protection and mitigation solutions <br> Passive, active and preventive 

Most short-circuit faults in LV and MV switchgears are accompanied by an electric arc. An arc fault always leads to considerable damage to equipment and personnel unless it is distinguished very fast. The fault should be disconnected as fast as possible and in less than 0.1 s to avoid serious damages and give involved person a fair chance to survive the accident without severe damages. This is a demand found in the electrical safety rules in all CE countries, ref. IEC364-4-42.


## LV distribution

Renewables and
LV loads
storage

LV sub-distribution switchgear

LV main-distribution switchgear
Motor control centers


## Active

- TVOC-2
- 
- UFES
- ArcLimiter
- Zone selective interlocking
- Dual settings
- RELT Module

Preventive

- ABB Ability

Energy and
Asset Manager

- ABB Ability CMES
- Ekip Signalling 3T
- Remote Racking Emax 2


$$
\begin{array}{lll}
\text { - ArTuK } & \text { - TVOC-2 } & \text { • ABB Ability Energy } \\
\text { - MNS } & \text { - REA } & \text { and Asset Manager } \\
& \text { - UFES } & \text { - ABB Ability CMES } \\
& \text { - ArcLimiter } & \text { - Ekip Signalling 3T } \\
& \text { - Zone selective } & \text { • Remote Racking } \\
& \text { interlocking } & \text { Emax } 2
\end{array}
$$

# Active arc flash mitigation solutions Improve safety, reduce damage 



|  | Arc Guard System TVOC-2 | Emax 2 and Tmax XT |
| :---: | :---: | :---: |
| Technology type | Optical-based internal arc detection and mitigation, which trips LV or MV circuit breaker | Zone-selective interlocking |
| Dedicated product or optional function | Dedicated product for arc flash mitigation | Optional function of Emax 2 and Tmax XT circuit breakers |
| Application | Low-voltage, medium-voltage | Low-voltage |
| Operating time | 1-2 ms | 40 ms with S protection <br> (ANSI 50TD, 51) |
| Total arc clearing time | With LV ABB circuit breaker: $45 \ldots 50 \mathrm{~ms}$ With MV ABB circuit breaker: 50 ... 100 ms | Depends on circuit breaker frame and fault current |
| Certifications | DNV, ABS, BV, TÜV (SIL 2) |  |
| Enables personnel safety during maintenance | Yes | Yes |
| Enables arc mitigation 24x7 | Yes | Yes |
| Benefits and features | Increased personnel safety. Significant reduction of overpressure, toxic gases. <br> - Outstanding reaction time < 1 ms (<2 ms with CSU2) <br> - All-in-one unit with up to 30 single point sensors in three separate zones for selectivity <br> - Suitable for MV and LV applications with light only detection or both light and current detection <br> - Open loop Rogowski coils simplify installation and retro fit <br> - Simple commissioning of TVOC-2 and CSU-2 through HMI, Modbus RTU or Ekip Connect <br> - Factory calibrated sensors - no need for on-site adjustment <br> - Modbus RTU and ABB Ability ${ }^{\text {™ }}$ Energy and Asset Manager connectivity | Increased personnel safety with hardwired or digital zone selectivity between circuit breakers. <br> Can be used for zone selectivity interlocking i.e. selective short circuit, ground fault, instantaneous and directional protections. <br> Digital zone selectivity can be provided with Ekip Link or Ekip Com IEC61850 to integrate the ABB circuit breakers in a substation automation system. |



| Alternative settings group (dual settings) | Energy-reducing maintenance switch with RELT module |
| :---: | :---: |
| Optional function of Emax 2 and Tmax XT circuit breakers | Optional function of Emax 2 and Tmax XT circuit breakers |
| Low-voltage | Low-voltage |
| 5-7 ms to change alternate settings | 2.5 ms |
| Depends on circuit breaker frame and fault current | Emax 2: $28 \ldots 42 \mathrm{~ms}$ at 60 Hz |
| Yes | Yes |
| No | No |
| Increased personnel safety. Add an extra level of protection with two user selectable sets of settings for circuit breakers. | Increased personnel safety. Dramatically reducing the impact of an arc flash event. |
| All protection settings can be changed between SET A and SET B to reduce trip protection thresholds and time delays. | The $2 l$ is a temporary protection that is faster than the normal instantaneous protections. |
| Can be easily activated by Ekip Connect. | Depending on the fault current, this function can provide a total clearing time as low as 1.5 cycles at 60 Hz . <br> - Cannot be deactivated remotely. |
| Different input can be set for the parameter change, e.g. selector switch, open door microswitch. | - Positive feedback provides a clear indication that the safety function is working properly. <br> - Easy-to-use wizard is automatically engaged during initial installation. <br> - Commissioning can be executed through the circuit breaker touch screen. |

## Click here

for more
information

# Preventive arc flash protection solutions Safer operations at a distance 




## Arc flash mitigation solutions <br> TVOC-2

TVOC-2, ABB's Arc Guard System ${ }^{\text {M }}$, builds on the well known TVOC design. Its functions and features improve an already great product, putting even more focus on reliability, flexibility and simplicity.

Arc Guard System ${ }^{\text {TM }}$ increases the protection of people and equipment, and minimizes unnecessary production stops. TVOC-2 is ABB's state-of-the-art solution for arc fault protection in all applications.

With over 40 years of experience, Arc Guard System ${ }^{\text {™ }}$ has become an industry standard in several key markets, helping to protect personnel and businesses around the world.

Typical applications include all low- and medium-voltage switchgear where a high level of protection is needed.


Arc Guard TVOC-2 and TVOC-2-E6 Extension module

## Reliability

- Certified according to functional safety (SIL-2) standard
- Over 40 years' experience in Arc Guard Systems ${ }^{\text {TM }}$
- Pre-calibrated optical detectors
- Testing the full length of the supervised detectors, the module confirms the entire system is ready and functioning
- Factory tested current sensors with Rogowski technology for both LV and MV applications


## Flexibility

- With IP54 high protection degree, HMI (Human Machine Interface) can be mounted on the panel door
- HMI-COM (HMI with communication module) adds ability to communicate with a remote station using Modbus RTU. Also the current sensing unit is able to communicate through Modbus RTU.
- Expandable with up to 30 standard detectors or 20 supervised detectors
- Configure the system to isolate separate breaker zones of the switchgear
- The Current Sensing Unit (CSU-2) is an accessory needed in those applications where strong light is expected on a regular basis.
Simplicity
- User-friendly start-up menu
- DIN-rail or wall-mounted
- Easy to expand as the switchgear functions are added

The diagram below shows how the exponential increase in energy over time affects different switchgear materials.


Total clearing time $=A B B$ Arc Guard System ${ }^{\text {TM }}+$ breaker

## ABB

## SACE Emax 2 <br> The all-in-one innovation



The world of electrical power distribution changes fast and major new trends such as renewables, energy storage and microgrids are now crowding onto the stage. These trends lead to new customer and application demands.

To meet these demands, $A B B$ has now unveiled the innovative Emax 2
all-in-one, the evolution of the Emax 2 into a multi-functional platform that is able to manage the next generation of electrical distribution systems such as microgrids.

Emax 2 all-in-one is the first circuit breaker that meets new grid requirements.

It enables a direct communication to the new energy management cloudcomputing platform ABB Ability™ Electrical Distribution Control System.

Smart plug and play architecture makes Emax 2 all-in-one easy-to-use. Leveraging also unmatched electrical performances, Emax 2 sets a new circuit breaker benchmark for the needs of today and tomorrow.

SACE Emax 2, the all-in-one solution to manage "low-voltage distribution systems".

## Efficiency and control

The power needed, when needed

## Efficiency

Achieving maximum efficiency of an electrical installation requires intelligent management of power supplies and energy use. For this reason, the new technologies used in the SACE Emax 2 circuit breakers allow the productivity and reliability of installations to be optimized, and at the same time, power consumption to be reduced while fully respecting the environment.

New advanced functionalities, together with protection trip units, communication and system devices contribute to make SACE Emax 2 the circuit breaker that maximizes efficiency in all low-voltage electrical installation.

## Control

SACE Emax 2 circuit breaker is the first single device ready to manage all the dynamics of a low-voltage electrical installation.

Managing loads in any condition is now possible thanks to Advanced Functionalities such as:

- Adaptive load shedding

Fast load shedding to guarantee continuity for critical loads during black-outs. Typical scenario is when LV distribution is disconnected from the grid (MV).

## - Predictive load shedding

Slow load shedding to avoid overloads, giving the possibility to modulate loads consumption.

- Power controller

Patented algorithm to reduce the peak of power consumed, allowing savings on electricity bills. Managing different power sources and connecting them to main grid is also crucial, so that service continuity is maximized.

- Embedded ATS functions.

An automatic transfer switch system used in all application where continuity is essential and where there are multi source supplies.

## - Synchro-reclosing

Synchronization and automatic reconnection of the Microgrid to the main grid when the power is back. Emax 2 is able to act as a controller of main grid condition, disconnecting a plant when necessary and also, to adapt protection to on-grid or off-grid conditions.

- Interface protection system and Interface device

Check of grid-connected operation that shall be immediately and automatically interrupted in case of outage of the distribution grid or when the voltage and frequency values of the grid itself are out of the range of values defined by the Distribution System Operator (DSO).

## - Adaptive protection

Network changes recognition and automatic set of thresholds to guarantee protection and co-ordination in on-grid and off-grid conditions.

## SACE Emax 2 automatic circuit breakers

| Common data |  |  |
| :--- | :--- | :--- |
| Rated service voltage Ue | $[\mathrm{V}]$ | 690 |
| Rated insulation voltage Ui | $[\mathrm{V}]$ | 1000 |
| Rated impulse withstand voltage Uimp | $[\mathrm{kV}]$ | 12 |
| Frequency | $[\mathrm{Hz}]$ | $50-60$ |
| Number of poles |  | $3-4$ |
| Version |  | Fixed - Withdrawable |
| Suitable for isolation according to | IEC 60947-2 |  |



| SACE Emax 2 |  |  | E1.2 |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| Performance levels |  |  | B | C | N |
| Rated uninterrupted current lu @ $40^{\circ} \mathrm{C}$ |  | [A] | 630 | 630 | 250 |
|  |  | [A] | 800 | 800 | 630 |
|  |  | [A] | 1000 | 1000 | 800 |
|  |  | [A] | 1250 | 1250 | 1000 |
|  |  | [A] | 1600 | 1600 | 1250 |
|  |  | [A] |  |  | 1600 |
|  |  | [A] |  |  |  |
| Neutral pole current-carrying capacity for 4-pole CBs |  | [\%\|u] | 100 | 100 | 100 |
| Rated ultimate short-circuit breaking capacity Icu | 400-415 V | [kA] | 42 | 50 | 66 |
|  | 440 V | [kA] | 42 | 50 | 66 |
|  | 500-525 V | [kA] | 42 | 42 | 50 |
|  | 690 V | [kA] | 42 | 42 | 50 |
| Rated service short-circuit breaking capacity Ics |  | [\%Icu] | 100 | 100 | $100{ }^{1)}$ |
| Rated short-time withstand current Icw | (1s) | [kA] | 42 | 42 | 50 |
|  | (3s) | [kA] | 24 | 24 | 30 |
| Rated short-circuit making capacity (peak value) Icm | 400-415 V | [kA] | 88 | 105 | 145 |
|  | 440 V | [kA] | 88 | 105 | 145 |
|  | 500-525 V | [kA] | 88 | 88 | 105 |
|  | 690 V | [kA] | 88 | 88 | 105 |
| Utilization category (according to IEC 60947-2) |  |  | B | B | B |
| Breaking ${ }^{4)}$ | Maximum breaking time for $1<1 \mathrm{cw}$ | [ms] | 40 | 40 | 40 |
|  | Maximum breaking time for I>Icw | [ms] | 25 | 25 | 25 |
| Dimensions | H-Fixed/Withdrawable | [mm] | 296/363.5 | 296/363.5 | 296/363.5 |
|  | D-Fixed/Withdrawable | [mm] | 183/271 | 183/271 | 183/271 |
|  | W - Fixed 3p/4p/4p FS | [mm] | 210/280 |  |  |
|  | W - Withdrawable 3p/4p/4p FS | [mm] | 278/348 |  |  |
| Weights (CB with trip unit and current sensor) | Fixed 3p/4p/4p FS | kg | 14/16 |  |  |
|  | Withdrawable 3p/4p/4p FS including fixed part | kg | 38/43 |  |  |

1) Ics : 50 kA for 400 V ... 440 V voltage; 2) Ics: 125 kA for 400 V ... 440 V voltage; 3 ) E4.2H $3200 \mathrm{~A}: 66 \mathrm{Icw}(3 \mathrm{~s})$; 4) Total clearing time is the sum of breaking time and trip time

| SACE Emax 2 |  | E1.2 |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| Mechanical life with regular ordinary maintenance prescribed by the manufacturer |  | [lu] | $\leq 1000$ | 1250 | 1600 |
|  |  | [No. cycles x 1000] | 20 | 20 | 20 |
|  | Frequency | [Oper./Hour] | 60 | 60 | 60 |
| Electrical life with regular ordinary maintenance prescribed by the manufacturer | 440 V | [No. cycles $\times 1000$ ] | 8 | 8 | 8 |
|  | 690 V | [No. cycles $\times 1000$ ] | 8 | 6,5 | 6,5 |
|  | Frequency | [Oper./Hour] | 30 | 30 | 30 |



| E2.2 |  |  |  |  | E4.2 |  |  |  |  | E6.2 |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| B | C | N | S | H | C | N | s | H | v | H | v | x |
| 1600 | 1600 | 800 | 250 | 800 | 3200 | 3200 | 3200 | 3200 | 2000 | 4000 | 4000 | 4000 |
| 2000 | 2000 | 1000 | 800 | 1000 | 4000 | 4000 | 4000 | 4000 | 2500 | 5000 | 5000 | 5000 |
|  | 2500 | 1250 | 1000 | 1250 |  |  |  |  | 3200 | 6300 | 6300 | 6300 |
|  |  | 1600 | 1250 | 1600 |  |  |  |  | 4000 |  |  |  |
|  |  | 2000 | 1600 | 2000 |  |  |  |  |  |  |  |  |
|  |  | 2500 | 2000 | 2500 |  |  |  |  |  |  |  |  |
|  |  |  | 2500 |  |  |  |  |  |  |  |  |  |
| 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 50-100 | 50-100 | 50-100 |
| 42 | 66 | 66 | 85 | 100 | 66 | 66 | 85 | 100 | 150 | 100 | 150 | 150 |
| 42 | 66 | 66 | 85 | 100 | 66 | 66 | 85 | 100 | 150 | 100 | 150 | 150 |
| 42 | 50 | 66 | 66 | 85 | 50 | 66 | 66 | 85 | 100 | 100 | 130 | 130 |
| 42 | 50 | 66 | 66 | 85 | 50 | 66 | 66 | 85 | 100 | 100 | 100 | 100 |
| 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | $100{ }^{\text {2) }}$ | 100 | 100 | 100 |
| 42 | 50 | 66 | 66 | 85 | 55 | 66 | 66 | 85 | 100 | 100 | 100 | 120 |
| 42 | 42 | 50 | 50 | 66 | 50 | 50 | 66 | $75^{3)}$ | 75 | 100 | 100 | 100 |
| 88 | 145 | 145 | 187 | 220 | 145 | 145 | 187 | 220 | 330 | 220 | 330 | 440 |
| 88 | 145 | 145 | 187 | 220 | 145 | 145 | 187 | 220 | 330 | 220 | 330 | 440 |
| 88 | 105 | 145 | 145 | 187 | 105 | 145 | 145 | 187 | 220 | 220 | 286 | 286 |
| 88 | 105 | 145 | 145 | 187 | 105 | 145 | 145 | 187 | 220 | 220 | 220 | 264 |
| B | B | B | B | B | B | B | B | B | B | B | B | B |
| 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 |
| 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 |
| 371/425 | 371/425 | 371/425 | 371/425 | 371/425 | 371/425 | 371/425 | 371/425 | 371/425 | 371/425 | 371/425 | 371/425 | 371/425 |
| 270/383 | 270/383 | 270/383 | 270/383 | 270/383 | 270/383 | 270/383 | 270/383 | 270/383 | 270/383 | 270/383 | 270/383 | 270/383 |
| 276/366 |  |  |  |  | 384/510 | 384/510 |  |  |  | 762/888/1014 |  |  |
| 317/407 |  |  |  |  | 425/551 | 425/551 |  |  |  | 803/929/1069 |  |  |
| 41/53 |  |  |  |  | 56/70 | 56/70 |  |  |  | 109/125/140 |  |  |
| 84/99 |  |  |  |  | 110/136 | 110/136 |  |  |  | 207/234/260 |  |  |


| E2.2 | E4.2 |  |  |  |  |  |  |  | E6.2 |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- |
| $<1600$ | 1600 | 2000 | 2500 | $<2500$ | 2500 | 3200 | 4000 | 4000 | 5000 |
| 25 | 25 | 25 | 20 | 20 | 20 | 20 | 15 | 12 | 12 |
| 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 |
| 15 | 12 | 10 | 8 | 10 | 8 | 7 | 5 | 4 | 12 |
| 15 | 10 | 8 | 7 | 10 | 8 | 7 | 4 | 4 | 60 |
| 30 | 30 | 30 | 30 | 20 | 20 | 20 | 20 | 2 | 10 |

## SACE Emax 2 switch disconnectors

Switch disconnectors, identified with the abbreviation "/MS", are devices that satisfy the isolating specifications provided by the IEC 60947-3 Standard. The switch disconnectors are derived from the corresponding automatic circuit breakers, and they have the same dimensions and accessory options.
This version differs from the automatic circuitbreakers only because of the absence of protection trip units.

The device, when in the open position, guarantees an isolating distance between the main contacts of the circuit breaker that is sufficient to ensure that the installation downstream is not live. Furthermore the switch disconnectors, if used with an external protection relay with maximum delay of 500 ms , enable a breaking capacity at a maximum rated operating voltage (Ue) equal to the value of rated short-time withstand current (Icw) for one second.

| Common data |  |  |
| :--- | :--- | :--- |
| Rated service voltage Ue | $[\mathrm{V}]$ | 690 |
| Rated insulation voltage Ui | $[\mathrm{V}]$ | 1000 |
| Rated impulse withstand voltage Uimp | $[\mathrm{kV}]$ | 12 |
| Frequency | $[\mathrm{Hz}]$ | $50-60$ |
| Number of poles |  | $3-4$ |
| Version |  | Fixed - Withdrawable |
| Suitable for isolation according to | IEC 60947-3 |  |



| SACE Emax 2 |  |  | E1.2 |  |
| :---: | :---: | :---: | :---: | :---: |
| Performance levels |  |  | B/MS | N/MS |
| Rated uninterrupted current lu @ $40^{\circ} \mathrm{C}$ |  | [A] | 630 | 250 |
|  |  | [A] | 800 | 630 |
|  |  | [A] | 1000 | 800 |
|  |  | [A] | 1250 | 1000 |
|  |  | [A] | 1600 | 1250 |
|  |  | [A] |  | 1600 |
| Neutral pole current-carrying capacity for 4-pole CBs |  | [\%/u] | 100 | 100 |
| Rated short-time withstand current Icw | (1s) | [kA] | 42 | 50 |
|  | (3s) | [kA] | 24 | 30 |
| Rated short-circuit making capacity (peak value) Icm | $400-415 \mathrm{~V}$ | [kA] | 88 | 105 |
|  | 440 V | [kA] | 88 | 105 |
|  | $500-525 \mathrm{~V}$ | [kA] | 88 | 105 |
|  | 690 V | [kA] | 88 | 105 |
| Utilization category (according to IEC 60947-3) |  |  | AC-23A | AC-23A |
| Dimensions | H-Fixed / Withdrawable | [mm] | 296/363.5 | 296 / 363.5 |
|  | D-Fixed / Withdrawable | [mm] | 183/271 | 183/271 |
|  | W-Fixed 3p/4p/4p FS | [mm] | 210/280 |  |
|  | W-Withdrawable 3p/4p/4p FS | [mm] | 278/348 |  |

1) $\mathrm{E} 4.2 \mathrm{H} / \mathrm{MS} 3200 \mathrm{~A}: 66 \mathrm{KA} \mathrm{Icw}$ (3s)

| SACE Emax 2 |  | E1.2 |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| Mechanical life with regular ordinary maintenance prescribed by the manufacturer |  | [lu] | <1000 | 1000 | 1600 |
|  |  | [No. cycles x 1000] | 20 | 20 | 20 |
|  | Frequency | [Oper./Hour] | 60 | 60 | 60 |
| Electrical life with regular ordinary maintenance prescribed by the manufacturer | 440 V | [No. cycles x 1000] | 8 | 8 | 8 |
|  | 690 V | [No. cycles x 1000] | 8 | 6.5 | 6.5 |
|  | Frequency | [Oper./Hour] | 30 | 30 | 30 |



## SACE Emax 2/E9, Emax 2/E10 circuit breakers up to 1000 V

## ABB SACE Emax 2/E9 circuit breakers can effectively and simply control all wind and solar applications - with the highest availability and continuity of service.

The world of renewable energy is evolving rapidly causing major changes in electrical power distribution trends. This causes an increased focus on:

- Power continuity for critical loads and the best performance, even at high altitudes
- Optimized, fast maintenance
- Minimized device footprint

These trends lead to new customer and application demands. To meet these demands, ABB has now unveiled the innovative Emax 2/E9 all-in-one, the evolution of the Emax 2 into a multifunctional platform that is able to manage the next

| Common data |  |  |
| :--- | :--- | :--- |
| Rated insulation voltage Ui | $[\mathrm{V}]$ | 1000 |
| Rated impulse withstand voltage Uimp | $[\mathrm{kV}]$ | 12 |
| Frequency | $[\mathrm{Hz}]$ | $50-60$ |
| Number of poles |  | $3-4$ |
| Version | Fixed - Withdrawable |  |
| Suitable for isolation according to | IEC 60947-2,3 |  |

generation of electrical plants such as microgrids. Emax 2/E9 all-in-one is the first smart circuit breaker that enables direct communication with the new energy management cloud-computing platform ABB Ability ${ }^{T M}$ Energy and Asset Manager. Smart and plug-and-play architecture makes Emax 2/E9 all-in-one easy to use. With the best performance up to 900 V of any device on the market, Emax 2/E9 is ready to control and protect all applications with voltages over 690 V .

Emax 2/E9 sets a new circuit-breaker benchmark for the electrical power distribution systems of today and tomorrow.


| SACE Emax 2/E9 |  |  | E1.2 | E2.2 |  |  | E4.2 |  | E6.2 |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Performance levels |  |  | N/E9 | S/E9 | H/E9 | H/E10 | S/E9 | H/E9 | H/E9 | X/E9 |
| Rated uninterrupted current lu @ $40^{\circ} \mathrm{C}$ |  | [A] | 1250 | 1250 | 1250 | 2500 | 3200 | 3200 | 5000 | 5000 |
|  |  | [A] |  | 2000 | 2000 |  | 4000 | 4000 | 6300 | 6300 |
|  |  | [A] |  | 2500 | 2500 |  |  |  |  |  |
| Neutral pole current-carrying capacity for 4-pole CBs |  | [\%\|u] | 100 | 100 | 100 |  | 100 | 100 | 50-100 | 50-100 |
| Rated service voltage Ue |  | [V] | 800 | 900 | 900 | 1000 | 900 | 900 | 900 | 900 |
| Rated ultimate short-circuit breaking capacity Icu | 800 V | [kA] | 35 | 50 | 65 |  | 65 | 90 | 90 | 100 |
|  | 900 V | [kA] |  | 50 | 65 |  | 65 | 75 | 75 | 90 |
|  | 1000V | [kA] |  |  |  | 50 |  |  |  |  |
| Rated service short-circuit breaking capacity Ics |  | [\%Icu] | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| Rated short-time withstand current Icw | (1s) 800 V | [kA] | 35 | 50 | 65 |  | 65 | 75 | 75 | 90 |
|  | (3s) 800 V | [kA] | 30 | 50 | 65 |  | 65 | $75^{(1)}$ | 75 | 90 |
|  | (1s) 900V | [kA] |  | 50 | 65 |  | 65 | 75 | 75 | 90 |
|  | (3s) 900V | [kA] |  | 50 | 65 |  | 65 | $75^{(1)}$ | 75 | 90 |
|  | (1s) 1000 V | [kA] |  |  |  | 50 |  |  |  |  |
|  | (3s) 1000 V | [kA] |  |  |  | 50 |  |  |  |  |
| Rated short-circuit making capacity (peak value) Icm | 800 V | [kA] | 73.5 | 105 | 143 |  | 143 | 200 | 200 | 220 |
|  | 900 V | [kA] |  | 105 | 143 |  | 143 | 165 | 165 | 198 |
|  | 1000V | [kA] |  |  |  | 105 |  |  |  |  |
| Utilization category (according to IEC 60947-2) |  |  | B | B | B | B | B | B | B | B |

[^2]
## SACE Emax 2/E9 MS Switch disconnectors up to 900V

Switch disconnectors at 900V are identified with the abbreviation "/E9 MS", and satisfy the isolating specifications according the IEC 60947-3 Standard.

The switch disconnectors are derived from the corresponding automatic circuit breakers, and they have the same dimensions and accessory options.

This version differs from the automatic circuit breakers because of the absence of protection trip units.

The device, when in the open position, guarantees an isolating distance between the main contacts of the circuit breaker that is sufficient to ensure that the installation downstream is not live.

Furthermore the switch disconnectors, if used with an external protection relay with maximum delay of 500 ms , enable a breaking capacity at a maximum rated operating voltage (Ue) equal to the value of rated short-time withstand current (Icw) for one second.

| Common data |  |  |
| :--- | :--- | :--- |
| Rated service voltage Ue | $[\mathrm{V}]$ | 900 |
| Rated insulation voltage Ui | $[\mathrm{V}]$ | 1000 |
| Rated impulse withstand voltage Uimp | $[\mathrm{kV}]$ | 12 |
| Frequency | $[\mathrm{Hz}]$ | $50-60$ |
| Number of poles |  | 3 |
| Version |  | Fixed-Withdrawable |
| Suitable for isolation according to | IEC 60947-3 |  |



| SACE Emax 2/E9 |  |  | E4.2 |  |
| :---: | :---: | :---: | :---: | :---: |
| Performance levels |  |  | H/E9 MS |  |
| Rated uninterrupted current lu @ $40^{\circ} \mathrm{C}$ |  | [A] | 2500 |  |
|  |  | [A] | 3200 |  |
|  |  | [A] | 4000 |  |
| Rated short-time withstand current Icw | (1s) | [kA] | 75 |  |
|  | (3s) | [kA] | $75^{(1)}$ |  |
| Rated short-circuit making capacity (peak value) Icm | 900 V | [kA] | 165 |  |
| Utilization category (according to IEC 60947-3) |  |  | AC-23A |  |
| Dimensions | H-Fixed/Withdrawable |  | 371/425 |  |
|  | W- Fixed/Withdrawable |  | 270/383 |  |
|  | D - Fixed/Withdrawable |  | 384/425 |  |
| 1) $666 \mathrm{kA} \mathrm{Icw} \mathrm{(3s)} \mathrm{up} \mathrm{to} 3200 \mathrm{~A}$ |  |  |  |  |
| SACE Emax 2/E9 |  |  | E4.2 |  |
|  | [lu] |  | $\leq 3200$ | 4000 |
| Mechanical life ${ }^{(1)}$ | [No. cycles $\times 1000$ ] |  | 20 | 15 |
|  | [Ope | ur] | 60 | 60 |
| Electrical life | [No. | x 1000] | 1 | 1 |
|  | [Ope |  | 10 | 10 |

[^3]
## SACE Emax 2 MS/DC-E Air switch disconnectors at 1500 V DC



## Global availability

Ensuring performances at 1500V DC under IEC and UL standards, SACE Emax 2 MS/DC-E range provide a unique solution for any projects around the world. Any version up to 3200A can also be ordered with IEC \& UL \& CCC approvals. This means that engineers, panel builders, inverter manufacturers and OEMs can find the right solution for any plant installed anywhere in the world.

## Energy efficiency

The SACE Emax 2 MS/DC-E range is here to support the energy efficiency trend in Energy Storage and Photovoltaic systems. Achieving 1500V DC helps to cut power losses and make our planet a better place.

The SACE Emax 2 MS/DC-E air switch-disconnectors further expand SACE's broad offering of low voltage devices providing a solution to all our customer's applications. Meeting both IEC and UL standards, this new range was designed with internationalization in mind. It offers to design engineers, panel builders and OEM manufacturers the chance to rely on a single provider and meet the specific requirements of a wide range of DC applications installed in any part of the world. A range that keeps pace with the times.
?

## Flexible installation

The SACE Emax 2 MS/DC-E range of air switchdisconnectors guarantee great flexibility for any installation. It is possible to insulate one polarity or both, and manage current flow in both directions. In addition, it is available in fixed and drawable version, and terminals can be setup vertically or horizontally.

IEC Range

The SACE Emax 2 MS/DC-E IEC range has been developed for installations up to 1500 V DC and 4000 A, with short-time withstand current up to 100 kA .

The SACE Emax 2 MS/DC-E is compliant with DC-PV2, the most demanding Utilization Category according to IEC 60947-3 Annex D, since it requires the ability to connect and disconnect PV circuits where significant overcurrents may occur and where current flow can be in either direction; these are common characteristics of centralized PV systems.

| Common data |  |  |
| :--- | :--- | :--- |
| Rated service voltage Ue | [V] | 1500 |
| Rated insulation voltage Ui | $[\mathrm{V}]$ | 1500 |
| Rated impulse withstand voltage Uimp | $[\mathrm{kV}]$ | 12 |
| Number of poles | 4 |  |
| Version | Fixed - <br> Withdrawable |  |
| Suitable for isolation according to | IEC 60947-3 |  |
| Utilization category | DC22A, DC-PV2 <br> (Annex D) |  |

Because of dedicated shorting busbar (jumper) kits, all four poles can be connected in series to isolate a single polarity source, or alternatively for a dual polarity source 2 poles can be configured in series for the positive supply and the other 2 poles in series for the negative supply.

SACE Emax 2 MS/DC-E can be fitted with a vast assortment of electrical and mechanical accessories already available for the standard SACE Emax 2 range. The IEC version has also achieved China CCC certification.

| SACE Emax2 MS/DC-E for IEC |  |  | E4.2 |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| Performance levels |  |  | S | H | V |
| Rated uninterrupted current lu @ $40^{\circ} \mathrm{C}$ |  | [A] | 1600 | 1600 | 1600 |
|  |  | [A] | 2000 | 2000 | 2000 |
|  |  | [A] | 2500 | 2500 | 2500 |
|  |  | [A] | 3200 | 3200 | 3200 |
|  |  | [A] | 4000 | 4000 | 4000 |
| Rated short-time withstand current Icw | (1s) | [kA] | 65 | 85 | 100 |
| Rated short-circuit making capacity (peak value) Icm | 1500 V | [kA] | 65 | 85 | 100 |
| Dimensions | H-Fixed | [mm] | 371 |  |  |
|  | D-Fixed |  | 270 |  |  |
|  | W-Fixed 4p |  | 510 |  |  |
|  | H-Draw out | [mm] | 425 |  |  |
|  | D-Draw out | [mm] | 393 |  |  |
|  | W-Draw out 4p | [mm] | 551 |  |  |

## Emax 2 trip units overview

SACE Emax 2 trip units offer a complete range of solutions for any installation requirements, for both distribution and generator protection. New features are now available with a renewed black look and feel.

Ekip Dip: The standard trip unit


Ekip Touch: The smart trip unit


Ekip Hi-Touch: The ultimate trip unit


Ekip G: The generator trip unit


Ekip Dip LI
Ekip Dip LSIG

- Overcurrent protection for distribution systems
- Phase and neutral current protections
- LED permanent trip cause signalization
- Thermal memory as standard feature
- Neutral setting up to 200\%
- Trip history with real-time and date stamping using USB port


## Ekip Touch LI Ekip Touch LSIG

- Advanced set of protections and measurements, always upgradable and customizable
- Embedded Bluetooth low energy technology
- Intuitive touchscreen interface
- High measurement accuracy of electrical parameters


## Ekip Hi-Touch LSIG

- Complete set of advanced protections and measurements
- Dual settings of protection
- Network analyzer function
- Suitable for microgrid applications

Ekip G Touch LSIG
Ekip G Hi-Touch LSIG

- Designed for installations with generators such as genset, co-generation and marine applications
- Dedicated set of generator protections


## New digital experience Solutions

Three solutions are available to fully exploit the potential of the Ekip architecture：Embedded ATS， adaptive load shedding and power controller．


## Embedded ATS

This function enables the activation of auxiliary generation sources（e．g．generators）and transfers the feed of the loads from the distribution network to such auxiliary sources， thus ensuring a secure transfer to maintain service continuity and reliability of the system． How to order：via ABB Ability Marketplace ${ }^{T \mathrm{M}}$ ． The hardware accessories must be ordered via traditional ordering channels．


## Adaptive load shedding

Thanks to this solution，the circuit－breaker enables islanding transition to avoid blackouts． It actively controls the power consumption based on the priorities set by the user． How to order：via ABB Ability Marketplace ${ }^{T M}$ or traditional ordering channels．The hardware accessories must be ordered via traditional ordering channels．

## $W M$

## Power controller

This function is the ideal solution for load management and represents an optimum compromise between reliability，simplicity and cost－effectiveness．Based on a patented calculation algorithm，Ekip Power Controller allows a list of loads to be controlled from remote according to the priorities defined by the user． How to order：via ABB Ability Marketplace ${ }^{T M}$ or traditional ordering channels．The hardware accessories must be ordered via traditional ordering channels．

When a solution is purchased via ABB Ability Marketplace ${ }^{\text {TM }}$ ，it must be activated through Ekip Connect 3 installed on a PC using Ekip T\＆P to scan the trip unit．

These solutions require the installation of hardware components that have to be ordered through the traditional ordering channels． For further information，please refer to the specific documentation available on ABB Library （www．abb．com／abblibrary／DownloadCenter／）．

## Packages

|  |  |  | $\square_{0}$ | 5 | " | $\mathfrak{S}^{c}$ |  |  | $\square \square \square$ | $4^{+}$ | ¢ ${ }_{\text {¢ }}$ |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | Standard Protection | Standard Measures | Measuring Package | Voltage Protections | Frequency Protections | Power Protections | Adaptive Protections | Data <br> Logger | Network Analyzer | Advanced Voltage Protections | ROCOF Protections |
| Ekip Touch | $\bullet$ | $\bullet$ | $\uparrow$ | $\uparrow$ | $\uparrow$ | $\uparrow$ | $\uparrow$ | $\uparrow$ | $\uparrow$ | $\uparrow$ | $\uparrow$ |
| Ekip G Touch | $\bullet$ | $\bullet$ | $\bullet$ | 个 | 个 | 个 | 个 | $\bullet$ | $\uparrow$ | $\uparrow$ | $\uparrow$ |
| Ekip Hi－Touch | $\bullet$ | $\bullet$ | $\bullet$ | $\bullet$ | $\bullet$ | $\uparrow$ | $\bullet$ | $\bullet$ | $\bullet$ | 个 | $\uparrow$ |
| Ekip G Hi－Touch | $\bullet$ | $\bullet$ | $\bullet$ | $\bullet$ | $\bullet$ | $\bullet$ | $\bullet$ | $\bullet$ | $\bullet$ | $\bullet$ | $\bullet$ |

－Available by default
$\uparrow$ upgradable
个 Some elements of the package are already provided by default．It is possible to upgrade the trip unit to achieve the complete package．

## SACE Tmax XT <br> The right choice: a complete circuit-breaker range for any solution





# Added value each step of the way There is more than just a circuit-breaker in the SACE Tmax XT range 

A new generation of molded case circuit-breakers delivering great added value.

There is a lot more to the range of SACE Tmax XT than what meets the eye, and the benefits for your business are noticeable. To start with, the whole selection and ordering process has been overhauled to make it far easier to get your hands on the parts you need, speeding things up by about 30\%. Installation has been simplified to increase user-friendliness, frames have been streamlined to save space, and improved connectivity - such as Bluetooth and

Ekip mobile - will save you considerable time. Another additional benefit is the reliable cloud connectivity and overall increase in information available, meaning diagnostics and maintenance are vastly improved, resulting in less downtime. Finally, thanks to the smart power controller concept, overall energy consumption can be reduced by up to $20 \%$.


# Choosing the right circuit-breaker has never been so easy 

You consider what you need. We'll show you what is possible.

The world of circuit-breakers is a complex one, yet choosing the right device for your individual needs has never been simpler thanks to SACE Tmax XT range. Maybe you are looking for a basic protection device for a standard distribution plant. Or perhaps you need something more complex, such as a device that integrates
protection, automation, measuring and communication into a cloud-based supervision system. Whatever you are looking for, with a wealth of customization possibilities and a range of possible solutions depending on the breaking part and trip unit you choose, the power of circuit-breaking is firmly in your hands.


Basic functionality

-

- Standard performance
- Icu 70kA at $415 / 480 \mathrm{~V}$ AC


Heavy-duty


- Extreme breaking capacity
- 200kA at 415 V AC
- 100kA at 690V AC

$\square$

Universally compatible



## Basic functionality

Whether you are a hotel owner or planning a production line, where you need to consider the overall power voltage over a period of time, the whole SACE Tmax XT range offers all the circuit breaking power you need to keep your business running long into the future.


## Thermal-magnetic, Ekip Dip - manual operation

This either consists of the standard thermal-magnetic trip unit intended for basic protection or the Ekip Dip trip unit, the first level of electronic trip unit that can provide increased accuracy, a wider regulation range, delayed s hort-circuit protection and individual trip information.


## Heavy duty

When it comes to heavy duty usage - whether it is ships, chemical parks, mining, or heavy duty machinery - the SACE Tmax XT2, XT4, XT5 and XT7 frames are designed to work well beyond the normal constraints when you will be pushing the limits of your installation to the maximum.

## $C \uparrow$

Ekip Touch/Hi-Touch - cloud functionality
Once you are working with the XT2, XT4 XT5 or XT7 frames, all activity can be remotely monitored via the cloud thanks to the Ekip Touch/Hi-Touch trip units which send all data to the ABB Ability ${ }^{T M}$ EDCS and can be monitored through smartphone or tablet whenever and wherever you like.

Possible combinations within the range

|  |  | $1$ |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Tmax XT1 | Tmax XT2 | Tmax XT3 | Tmax XT4 | Tmax XT5 | Tmax XT6 | Tmax XT7 |
| $\bigcirc \cdot 0$ | Basic functionality (Icu@415V<70 kA) | - | - | - | - | - | - | - |
|  | Heavy duty (Icu@415V>70 kA) |  | - |  | - | $\bullet$ |  | - |
| - | Thermal-magnetic trip units | - | - | - | - | - | - |  |
| $\bigcirc 0$ | Ekip Dip (standard electronic) |  | - |  | $\bullet$ | - | - | - |
|  | Ekip Touch/Hi-Touch (smart electronic) |  | - |  | - | - |  | - |

## Accessories



## Various accessories are also available:

1. Breaking unit
2. Trip units
3. Front
4. Polish plate
5. Terminal covers
6. Auxiliary contacts
7. Key lock
8. Service releases
9. Communication module
10. Conversion kit for plug-in/ withdrawable versions
11. Guide of fixed part in the withdrawable version
12. Fixed part - FP
13. Front for lever operating mechanism - FLD
14. Stored energy motor operator - MOE
15. Direct rotary handle - RHD
16. Transmitted rotary handle - RHE
17. Conversion kit RHE > RHS
18. Cable rack
19. Phase separators
20. Rear orientated terminals - R
21. Front extended spread terminals - ES
22. Front terminals for copper-aluminium - FC CuAI
23. Front extended terminals - EF
24. Residual current release

## SACE Tmax XT automatic circuit-breakers for alternating current (AC) distribution

|  |  |  |  |
| :--- | :--- | :--- | :--- |

$\begin{array}{lll}\text { (1) } X T 1 \text { plug-in In max }=125 \mathrm{~A} & \text { (2) } \operatorname{In}<32 \mathrm{~A} I c u=25 \mathrm{kA} / \mathrm{Ics}=20 \mathrm{kA} \text {, with magnetic trip unit only and } \mathrm{In} \leq 52 \mathrm{~A} / \mathrm{Icu}=\mathrm{Ics}=5 \mathrm{kA}\end{array}$
(3) $\mathrm{Ics}=100 \%$ Icu up to 250 A with EF, ES, Rear and external FC CuAI (2x...) terminal. When any other terminals are used and load >200A Icu=25\%

| XT2 | XT3 | XT4 |
| :---: | :---: | :---: |
| 160 | 250 | $160 / 250$ |
| 3,4 | 3,4 | 3,4 |
| 690 | 690 | 690 |
| 1000 | 800 | 1000 |
| 8 | 8 | 8 |


| Fixed, Withdrawable, Plug-in |  |  |  |  | Fixed, Plug-in |  | Fixed, Withdrawable, Plug-in |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| $\leq 480$ |  |  |  |  | $690$ |  | N | S | $\leq 600$ |  | v | X |
| N | S | H | L | v | N | S |  |  | H | L |  |  |
| 65 | 85 | 100 | 150 | 200 | 50 | 85 | 65 | 85 | 100 | 150 | 200 | 200 |
| 36 | 50 | 70 | 120 | 150 | 36 | 50 | 36 | 50 | 70 | 120 | 150 | 200 |
| 36 | 50 | 70 | 120 | 150 | 36 | 50 | 36 | 50 | 70 | 120 | 150 | 200 |
| 36 | 50 | 65 | 100 | 150 | 25 | 40 | 36 | 50 | 65 | 100 | 150 | 200 |
| 30 | 36 | 50 | 60 | 70 | 20 | 30 | 30 | 36 | 50 | 60 | 85 | 100 |
| 20 | 25 | 30 | 36 | 50 | 13 | 20 | 20 | 25 | 45 | 50 | 70 | 100 |
| 10 | 12 | 15 | 18 | 20 | 5 | 6 | 10 | 12 | 15 | 20 | $50^{(2)}$ | 100 |
| 100\% | 100\% | 100\% | 100\% | 100\% | 75\% | 50\% | 100\% | 100\% | 100\% | 100\% | 100\% | 100\% |
| 100\% | 100\% | 100\% | 100\% | 100\% | 75\% | 50\% (27) | 100\% | 100\% | 100\% | 100\% | 100\% | 100\% |
| 100\% | 100\% | 100\% | 100\% | 100\% | 75\% | 50\% (27) | 100\% | 100\% | 100\% | 100\% | 100\% | 100\% |
| 100\% | 100\% | 100\% | 100\% | 100\% | 75\% | 50\% | 100\% | 100\% | 100\% | 100\% | 100\% | 100\% |
| 100\% | 100\% | 100\% | 100\% | 100\% | 75\% | 50\% | 100\% | 100\% | 100\% | 100\% | 100\% | 100\% |
| 100\% | 100\% | 100\% | 100\% | 100\% | 75\% | 50\% | 100\% | 100\% | 100\% | 100\% | 100\% | 100\% |
| 100\% | 100\% | 100\% | 75\% (15) | 75\% | 50\% (3) | 50\% | 100\% | 100\% | 100\% | 100\% | $100 \%{ }^{(3)}$ | 100\% ${ }^{(3)}$ |
| 143 | 187 | 220 | 330 | 440 | 110 | 187 | 143 | 187 | 220 | 330 | 440 | 440 |
| 75.6 | 110 | 154 | 264 | 330 | 75.6 | 110 | 75.6 | 110 | 154 | 264 | 330 | 440 |
| 75.6 | 110 | 154 | 264 | 330 | 75.6 | 110 | 75.6 | 110 | 154 | 264 | 330 | 440 |
| 75.6 | 110 | 143 | 220 | 330 | 52.5 | 84 | 75.6 | 110 | 143 | 220 | 330 | 440 |
| 63 | 75.6 | 110 | 132 | 154 | 40 | 63 | 63 | 75.6 | 110 | 132 | 187 | 220 |
| 40 | 52.5 | 63 | 75.6 | 110 | 26 | 40 | 40 | 52.5 | 94.5 | 110 | 154 | 220 |
| 17 | 24 | 30 | 36 | 40 | 7.5 | 9 | 17 | 24 | 30 | 40 | 110 | 220 |
| 65 | 85 | 100 | 150 | 200 | 50 | 85 | 65 | 85 | 100 | 150 | 200 | 200 |
| 30 | 36 | 65 | 100 | 150 | 25 | 35 | 30 | 36 | 65 | 100 | 150 | 100 |
| A |  |  |  |  | A |  | A |  |  |  |  |  |


| IEC 60947-2 | IEC 60947-2 | IEC 60947-2 |  |
| :---: | :---: | :---: | :---: |
| $\boldsymbol{\nu}$ | $\boldsymbol{\nu}$ | $\boldsymbol{\nu}$ |  |
| DIN EN 50022 | DIN EN 50022 | DIN EN 50022 |  |
| 25,000 | 25,000 | 25,000 |  |
| 240 | 240 | 240 | 10,000 |
| 8,000 | 8,000 | 8,000 |  |
| 120 | 120 |  | 120 |

## SACE Tmax XT automatic circuit-breakers for alternating current (AC) distribution

|  |  |  |  |
| :--- | :--- | :--- | :--- | :--- |
|  |  |  |  |

[^4]
(5) Plug-in/Withdrawable: $\max \ln 40^{\circ} \mathrm{C}=600 \mathrm{~A}$ (6) 1000 A only for fixed execution with EF . ES. R and FCCuAl terminals. EF terminals are supplied as standard if no other terminals are ordered

## SACE Tmax XT automatic circuit-breakers for direct current (DC) distribution

|  |  |  |
| :--- | :--- | :--- |



## SACE Tmax XT automatic circuit-breakers for direct current (DC) distribution

|  |  |  |
| :--- | :--- | :--- |


|  |  |
| :--- | :--- |
|  |  |
|  |  |

## SACE Tmax XT switch-disconnectors

Switch-disconnectors are devices created from the corresponding circuit-breakers and feature the same overall dimensions, versions, and can be fitted with the same accessories.

## Applications

These devices are mainly used as:

- general disconnection devices in sub-switchboards;
- switching and insulation devices for lines, bus bars or groups of apparatus;
- bus ties.

In the open position, the disconnector guarantees a sufficient insulation distance (between the contacts) to ensure safety and to prevent an electrical arc from striking.

## Utilization category

Tmax XT disconnectors comply with utilization categories defined by IEC 60947-3 Standard.

Characteristics


Electrical life AC22 / AC23 (AC) 440 V In
Mechanical life
(1) 1000A only for fixed execution with EF, ES, R and FCCuAl terminals. EF terminals are supplied as standard if no other terminals are ordered

Coordination

| Supply side |  |  | XT1 160 |  |  |  |  |  | XT2 160 |  |  | XT3 250 |  |  |  | XT4 250 |  |  | XT5 400 |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | Icu @ 415V AC |  | B | C | N | S | H | N | S | H | L | v | B | S | N | S | H | L | v | N | S | H | L | v |
|  |  |  | 18 | 25 | 36 | 50 | 70 | 36 | 50 | 70 | 120 | 150 | 36 | 50 | 36 | 50 | 70 | 120 | 150 | 36 | 50 | 70 | 120 | 200 |
| $\begin{aligned} & 0 \\ & \frac{0}{n} \\ & \text { ס} \\ & 0 \\ & \hline \end{aligned}$ | XT1D | 160 | 18 | 25 | 36 | 50 | 70 | 36 | 50 | 70 | 70 | 70 | - | - | - | - | - | - | - | - | - | - | - | - |
|  | XT3D | 250 | - | - | - | - | - | - | - | - | - | - | 36 | 50 | 36 | 50 | 50 | 50 | 50 | - | - | - | - | - |
|  | XT4D | 250 | - | - | - | - | - | - | - | - | - | - | 36 | 50 | 36 | 50 | 70 | 120 | 150 | - | - | - | - | - |
|  | XT5D | 400 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 36 | 50 | 70 | 120 | 200 |
|  | XT5D | 630 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
|  | XT6D | 630 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
|  | XT6D | 800 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
|  | XT6D | 1000 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
|  | XT7D | 1000 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
|  | XT7D | 1250 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
|  | XT7D | 1600 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

## Protection

Each switch-disconnector must be protected on the supply side by a coordinated device which safeguards it against short-circuits.
The section "Coordination" in the table below shows the correspondence between each switch-disconnector and the relevant cir-cuit-breaker.

## Making capacity

The making capacity Icm is highly important since a switch-disconnector must be able to withstand the dynamic, thermal and current stresses which can occur during closing operations without being destroyed, right up to short-circuit closing conditions.

| XT5D |  | XT6D | XT7D | XT7D M |
| :---: | :---: | :---: | :---: | :---: |
| 400 | 630 | 630-800-1000 | 1000-1250-1600 | 1000-1250-1600 |
| 3, 4 | 3,4 | 3, 4 | 3,4 | 3, 4 |
| Fixed, Plug-in, Withdrawable |  | Fixed, Withdrawable ${ }^{(1)}$ | Fixed, Withdrawable | Fixed, Withdrawable |
| 690 | 690 | 690 | 690 | 690 |
| 750 | 750 | 750 | 750 | 750 |
| 1000 | 1000 | 1000 | 1000 | 1000 |
| 8 | 8 | 8 | 8 | 8 |
| 7,65 | 12,3 | 30 | 40 | 40 |
| 440 | 440 | 220 | 252 | 252 |
| 5 | 7,6 | 10 | 20 | 20 |
| 400 | 630 | 630-800-1000 | 1000-1250-1600 | 1000-1250-1600 |
| 400 | 630 | 630-800 | 1000-1250-1600 | 1000-1250-1600 |
| 400 | 630 | 630-800-1000 | 1000-1250-1600 | 1000-1250-1600 |
| 400 | 630 | 630-800 | 1000-1250-1600 | 1000-1250-1600 |
| $4002 p$ in series | $6302 p$ in series | 630-800-1000-2p in series | 1000-1250-1600-2p in series | 1000-1250-1600-2p in series |
| 4002 p in series | $6302 p$ in series | 630-800-2p in series | 1000-1250-1600-2p in series | 1000-1250-1600-2p in series |
| 4002 p in series | $6302 p$ in series | 630-800-1000-2p in series | 1000-1250-1600-3p in series | 1000-1250-1600-3p in series |
| $4002 p$ in series | $6302 p$ in series | 630-800-2p in series | 1000-1250-3p in series | 1000-1250-3p in series |
| $4003 p$ in series | $6303 p$ in series | 630-800-1000-3p in serie | 1000-1250-1600-4 p in series | 1000-1250-1600-4 p in series |
| $4003 p$ in series | $6303 p$ in series | 630-800-3p in serie | 1000-1250-4 p in series | 1000-1250-4 p in series |
| 5,000 | 3,000 | 3,500 | 2,500 | 2,500 |
| 20,000 | 20,000 | 20,000 | 10,000 | 20,000 |


| XT5 630 |  |  |  |  | XT6 800 |  |  | XT6 1000 |  |  | XT7 1000 |  |  | XT7 1250 |  |  | XT7 1600 |  |  | XT7 M 1000 |  |  | XT7 M 1250 |  |  | XT7 M 1600 |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| N | S | H | L | v | N | S | H | N | S | H | S | H | L | S | H | L | S | H | L | S | H | L | S | H | L | S | H | L |
| 36 | 50 | 70 | 120 | 200 | 36 | 50 | 70 | 36 | 50 | 70 | 50 | 70 | 120 | 50 | 70 | 120 | 50 | 70 | 120 | 50 | 70 | 120 | 50 | 70 | 120 | 50 | 70 | 120 |
| - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 36 | 50 | 70 | 120 | 200 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 36 | 50 | 70 | - | - | - | - | - | - | - | - | - | - |  | - | - | - | - | - | - | - | - |  | - | - | - | - | - | - |
| - | - | - | - | - | 36 | 50 | 70 | - | - | - | - | - |  | - | - | - | - | - | - | - | - |  | - | - | - | - | - | - |
| - | - | - | - | - | - | - | - | 36 | 50 | 70 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| - | - | - | - | - | - | - | - | - | - | - | 50 | 70 | 120 | - | - | - | - | - | - | 50 | 70 | 120 | - | - | - | - | - | - |
| - | - | - | - | - | - | - | - | - | - | - | - | - | - | 50 | 70 | 120 | - | - | - | - | - | - | 50 | 70 | 120 | - | - | - |
| - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 50 | 70 | 120 | - | - | - | - | - | - | 50 | 70 | 120 |

## Tmax XT trip unit offering

The Tmax XT trip units represent the ideal solution for any application up to 1600A.

The Tmax XT molded case circuit-breaker family complies with numerous installation requirements. Circuit-breakers are available with trip units dedicated to three different application groups. The table below shows the trip units for each circuit-breaker frame and the related rated interrupted current ranges.

|  |  |  |  |
| :---: | :---: | :---: | :---: |
| Rated uninterrupted current ranges [A] | XT1 | XT2 | XT3 |
| Power Distribution Protection |  |  |  |
| Thermal-magnetic |  |  |  |
| TMD | $16 . .160^{(1)}$ | 1,6...32 | 63... 250 |
| TMA |  | 40... 160 |  |
| Ekip Dip |  |  |  |
| Ekip Dip LS/I |  | 10... 160 |  |
| Ekip Dip LIG |  | 10... 160 |  |
| Ekip Dip LSI |  | 10... 160 |  |
| Ekip Dip LSIG |  | 10... 160 |  |
| Ekip Touch |  |  |  |
| Ekip Touch LSI |  | 40... 160 |  |
| Ekip Touch LSIG |  | 40...160 |  |
| Ekip Touch Measuring LSI |  | 40... 160 |  |
| Ekip Touch Measuring LSIG |  | 40...160 |  |
| Ekip Hi-Touch LSI |  | 40... 160 |  |
| Ekip Hi-Touch LSIG |  | 40... 160 |  |
| Motor Protection |  |  |  |
| Magnetic |  |  |  |
| MF/MA |  | 1...160 | 100... 200 |
| Ekip Dip |  |  |  |
| Ekip M Dip I |  | 10... 160 |  |
| Ekip M Dip LIU |  | 25... 160 |  |
| Ekip Touch |  |  |  |
| Ekip M Touch LRIU |  | 40... 100 |  |
| Generator Protection |  |  |  |
| Thermal-magnetic |  |  |  |
| TMG |  | 16... 160 | 63... 250 |
| Ekip Dip |  |  |  |
| Ekip G Dip LS/I |  | 25... 160 |  |
| Ekip Touch |  |  |  |
| Ekip G Touch LSIG |  |  |  |
| Ekip G Hi-Touch LSIG |  |  |  |

[^5]Maximum flexibility is guaranteed for customers: on the XT5, XT7 and XT7 M, with Ekip Touch trip units, the interchangeable rating plug enables the rated current to be changed according to system requirements.


| 16... 32 |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| 40... 250 | 320... 630 | 630... 800 |  |  |
| 40... 250 | 250... 630 | 630... 1000 | 630.. 1600 | 630... 1600 |
| 40... 250 | 250... 630 | 630... 1000 | 630.. 1600 | 630.. 1600 |
| 40... 250 | 250... 630 | 630... 1000 | 630.. 1600 | 630.. 1600 |
| 40... 250 | 250... 630 | 630... 1000 | 630... 1600 | 630... 1600 |
| 100... 250 | 250...630 |  | 630... 1600 | 630... 1600 |
| 100... 250 | 250... 630 |  | 630... 1600 | 630... 1600 |
| 100... 250 | 250... 630 |  | 630... 1600 | 630... 1600 |
| 100... 250 | 250... 630 |  | 630... 1600 | 630... 1600 |
| 100... 250 | 250...630 |  | 630... 1600 | 630... 1600 |
| 100... 250 | 250... 630 |  | 630... 1600 | 630... 1600 |


| 10... 200 | 320... 500 |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| 40... 250 | 250...630 | 630... 1000 | 630... 1600 | 630... 1600 |
| 40... 160 | 250... 500 | 630... 800 |  |  |
| 100... 200 | 250... 500 |  | 630... 1600 | 630... 1600 |
| 320... 630 |  |  |  |  |
| $40 . . .250$ | 250...630 | 630... 1000 | 630... 1600 | 630... 1600 |
|  | 250... 630 |  | 630... 1600 | 630... 1600 |
|  | 250...630 |  | 630... 1600 | 630... 1600 |

## SACE Tmax PV <br> Molded case switch disconnectors

The Tmax PV line of IEC switch-disconnectors has generation's history of offering complete adaptability, versatility and freedom for any type of application.

Under IEC 60947-3, Tmax PV offers switchdisconnectors to meet standard 1100 V DC applications. In addition, it offers the versatility of extended capacities to 1500 V DC for the increasingly demanding solar applications of today's market.

Tmax automatic circuit-breakers according to IEC up to 1000 V DC are available as a special version of the standard Tmax line.

| Common data |  |  |
| :--- | :--- | :--- |
| Operating temperature | $\left[{ }^{\circ} \mathrm{C}\right]$ | $-25^{\circ} \mathrm{C} \ldots+70^{\circ} \mathrm{C}$ |
| Storage temperature | $\left[{ }^{\circ} \mathrm{C}\right]$ | $-40^{\circ} \mathrm{C} \ldots+70^{\circ} \mathrm{C}$ |
| Numbers of poles |  | 4 |
| Version | fixed |  |

Molded case circuit-breakers up to 1500 V DC in compliance with IEC 60947-2
Whenever a consistent short-circuit current can be found, 1000 V and 1500V DC automatic circuitbreakers are available in the Tmax T and Tmax PV range.

|  |  |  | For use at 1000VDC |  | For use at 1000VDC with jumpers for connection of poles |  |  | For use at 1500VDC |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Tmax 74 | Tmax 75 | Tmax 76 | Tmax 74 | Tmax T 5 | Tmax 76 | T4N/PV-E |
| Rated uninterrupted current | [A] | 250 | 400/630 | 630/800 | $80 . .250$ | 400/630 | 630/800 | 100.. 250 |
| Poles |  | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| Rated service voltage, Ue | [VDC] | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1500 |
| Rated impulse withstand voltage, Uimp | [kV] | 8 | 8 | 8 | 8 | 8 | 8 | 8 |
| Rated insulation voltage, Ui | [V] | 1150 | 1150 | 1150 | 1150 | 1150 | 1150 | 1500 |
| Rated ultimate short-circuit breaking capacity, Icu |  |  |  |  |  |  |  |  |
| Icu @ 1000 V (DC) 2 poles +2 poles in series ${ }^{(1)}$ | [kA] | - | - | - | 20 | 20 | 20 |  |
| Icu @ 1000V (DC) 4 poles in series ${ }^{(1)}$ | [kA] | $40^{(2)}$ | $40^{(2)}$ | $50^{(2)}$ | - | - | - |  |
| Icu @ 1500V (DC) ${ }^{(1)}$ | [kA] | - | - | - | - | - | - | $\begin{aligned} & 25(\tau=1 \mathrm{~ms})^{(6)} \\ & 10(\tau=5 \mathrm{~ms})^{(7)} \end{aligned}$ |
| Rated service short-circuit breaking capacity in DC, Ics |  |  |  |  |  |  |  |  |
| Ics @ 1000V (DC) 2 poles +2 poles in series ${ }^{(1)}$ | $[\mathrm{kA}]$ | - | - | - | 10 | 10 | 10 |  |
| Ics @ 1000 V (DC) 4 poles in series ${ }^{(1)}$ | [kA] | $20^{(2)}$ | $10^{(2)}$ | $12,5^{(2)}$ | - | - | - |  |
| Ics @ $1500 \mathrm{~V}(\mathrm{DC})^{(1)}$ | [kA] | - | - | - | - | - | - | $20(\tau=1 \mathrm{~ms})^{(6)}$ |
|  |  |  |  |  |  |  |  | $7.5(\tau=5 \mathrm{~ms})^{(7)}$ |
| Category of use (IEC 60947-2) |  | A | B ( 400 A$)^{(3)}$ | $B^{(4)}$ | A | B ( 400 A ) | B | A |
|  |  |  | A (630 A) |  |  | A (630 A) |  |  |
| Behaviour on isolation |  | - | - | - | - | - | - | - |
| Reference Standards |  | IEC 60947-2 | IEC 60947-2 | IEC 60947-2 | IEC 60947-2 | IEC 60947-2 | IEC 60947-2 | IEC 60947-2 |
| Thermomagnetic releases TMD |  | - | - | - | - | - | - | - |
| TMA |  | - | - | - | - | - | - | - |
| TMF |  | - | - | - | - | - | - | $\bullet$ |
| Terminals |  | FCCu | FCCu | F-FC CuAl-R | F | F | F | FCCu-FC CuAl |
| Connection with jumpers |  | - | - | - | - ${ }^{\text {8 }}$ | - ${ }^{\text {8) }}$ | - ${ }^{8}$ ) | - ${ }^{88}$ |
| Version |  | F | F | F(5) | F | F | F | F |
| Mechanical life | [No. operations] | 20000 | 20000 | 20000 | 7500 | 7500 | 7500 | 7500 |
| Electrical life | [No. operations] | $1000{ }^{(9)}$ | $1000{ }^{(9)}$ | $1000{ }^{(9)}$ | $1000{ }^{(9)}$ | $1000{ }^{(9)}$ | $1000{ }^{(9)}$ | $1000{ }^{(9)}$ |
| Dimensions 4 poles | W [mm/in] | 140/5.52 | 184/7.24 | 280/11,02 | 140/5.52 | 184/7.24 | 280/11,02 | 140/5.52 |
|  | D [mm/in] | 103.5/4.07 | 103.5/4.07 | 103.5/4.07 | 103.5/4.07 | 103.5/4.07 | 103.5/4.07 | 103.5/4.07 |
|  | H [mm/in] | 205/8.07 | 205/8.07 | 268/10.55 | 205/8.07 | 205/8.07 | 268/10.55 | 205/8.07 |
| Weight <br> (with standard terminals) Fixed | [kg/lbs] | 3.05/6.72 | 4.15/9.15 | 12/26.46 | 3.05/6.72 | 4.15/9.15 | 12/26.46 | 3.05/6.72 |

(1) See the wiring diagrams on page 9/2
(2) Power supply only from above
(3) $\mathrm{Icw}=5 \mathrm{kA}$
(4) Icw $=7,6 \mathrm{kA}(630 \mathrm{~A})-10 \mathrm{kA}(800 \mathrm{~A})$
(5) For Tmax T6 in withdrawable version please ask ABB SACE
(6) According to IEC 60947-2 Edition 5.0 Annex P
(7) According to IEC 60947-2 Edition 4.2 and GB 14048.2
(8) Selection of one of the jumper connection options is mandatory. Jumpers KITs to be ordered separately (not supplied with CB).
(9) Opening with SOR or UVR

## Ranges

## Molded case switch-disconnectors up to 1100V DC in compliance with IEC 60947-3

| Tmax PV switch-disconnectors in compliance with the IEC60947-3 |  | T4D/PV | T5D/PV | T6D/PV | T7D/PV ${ }^{(1)}$ |
| :---: | :---: | :---: | :---: | :---: | :---: |
| Rated service current in category DC22 B, le | (A) | 250 | 500 | 800 | 1250-1600 |
| Number of poles | (No.) | 4 | 4 | 4 | 4 |
| Rated service voltage, Ue |  | 1100 V DC | 1100 V DC | 1100 V DC | 1100 V DC |
| Rated impulse withstand voltage, Uimp | (kV) | 8 | 8 | 8 | 8 |
| Rated insulation voltage, Ui | (V) | 1150 V DC | 1150 V DC | 1150 V DC | 1150 V DC |
| Test voltage at industrial frequency for 1 minute | (V) | 3500 | 3500 | 3500 | 3500 |
| Rated short-circuit making capacity, switch-disconnector only, Icm | (kA) | 3 | 6 | 9.6 | 19.2 |
| Rated short-time withstand current for 1 s , Icw | (kA) | 3 | 6 | 9.6 | 19.2 |
| Versions |  | F | F | F | F |
| Standard terminals |  | F | F | F | F |
| Mechanical life | (No. Operations) | 7500 | 7500 | 7500 | 20000 |
| Electrical life (operations @ 1100V DC) | (No. Operations) | $500{ }^{(2)}$ | $500{ }^{(2)}$ | $500^{(2)}$ | $500^{(2)}$ |
| Basic dimensions | W (mm/in) | 140/5.52 | 186/7.33 | 280/11.02 | 280/11.02 |
|  | D (mm/in) | 103.5/4.07 | 103.5/4.07 | 103.5/4.07 | 154/6.06 (manual) <br> 178/7.01 (motorized) |
|  | $\mathrm{H}(\mathrm{mm} / \mathrm{in})$ | 205/8.07 | 205/8.07 | 268/10.55 | 268/10.55 |
| Weight (with standard terminals only) | (kg/lbs) | 3.05/6.72 | 4.15/9.15 | 12/26.46 | 12.5/27.56 (manual) <br> 14/30.86 (motorized) |

(1) installation in vertical position only;
(2) openings with SOR or UVR

Molded case switch-disconnectors up to 1500V DC in compliance with IEC 60947-3
Electrical charachteristics

| Tmax PV switch-disconnectors in compliance with the IEC60947-3 |  | T4D/PV-E | T5D/PV-E | T7D/PV-E ${ }^{(1)}$ |
| :---: | :---: | :---: | :---: | :---: |
| Rated service current in category DC22 A, le | (A) | 250 | 500 | 1250-1600 |
| Number of poles | (No.) | 4 | 4 | 4 |
| Rated service voltage, Ue |  | 1500 V DC | 1500 V DC | 1500 V DC |
| Rated impulse withstand voltage, Uimp | (kV) | 8 | 8 | 8 |
| Rated insulation voltage, Ui | (V) | 1500 V DC | 1500 V DC | 1500 V DC |
| Rated short-circuit making capacity, switch-disconnector only, Icm | (kA) | 3 | 6 | 19.2 |
| Rated short-time withstand current for 1 s , Icw | (kA) | 3 | 6 | 19.2 |
| Versions |  | F | F | F |
| Standard terminals |  | F | F | F |
| Mechanical life | (No. Operations) | 7500 | 7500 | 20000 |
| Electrical life (operations @ 1500V DC) | (No. Operations) | $1000{ }^{(2)}$ | $1000{ }^{(2)}$ | $500{ }^{(2)}$ |
| Basic dimensions | W (mm/in) | 140/5.52 | 186/7.33 | 280/11.02 |
|  | D (mm/in) | 103.5/4.07 | 103.5/4.07 | 178/7.01 |
|  | H (mm/in) | 205/8,07 | 205/8.07 | 268/10.55 |
| Weight (with standard terminals only) | (kg/lbs) | 3.05/6.72 | 3,15/9.15 | 14/30.86 |

(1) installation in vertical position only. Motorized version;
(2) openings with SOR or UVR

## Ranges

## Circuit breakers up to 800V AC - IEC

|  |  |  | T4V-HA | T5V-HA | T5X-HA |
| :---: | :---: | :---: | :---: | :---: | :---: |
| Rated service current |  | [A] | 80-250 | 320-630 | 320-400 |
| Poles |  |  | 3/4 | 3/4 | 3/4 |
| Standard |  |  | IEC 60947-2/GB14048.2 | IEC 60947-2/GB14048.2 | IEC 60947-2/GB14048.2 |
| Rated service voltage |  | [VAC] | 800 | 800 | 800 |
| Rated impuls withstand voltage |  | [VAC] | 8 | 8 | 8 |
| Rated insulation voltage |  | [VAC] | 1000 | 1000 | 1000 |
| Rated breaking capacity, Icu |  | [kA] | 25 | 32 | 35 |
| Rated service breaking capacity, Ics |  | [kA] | 12 | 16 | 18 |
| Isolation behaviour |  | [kA] | Yes | Yes | Yes |
| Category of use |  | [kA] | A | A | A |
| Product certification |  |  | IEC-CCC | IEC-CCC | IEC-CCC |
| Thermomagnetic releases |  |  | TMA | TMA (Up to 500A) |  |
| Electronic trip units |  |  | PR222DS-LSIG (250A) | PR221 (630A) | PR222DS-LSIG |
| Version |  |  | F | F | F |
| Class of pollution |  |  | III | III | III |
| Terminals |  |  | F-FcCuAl - FcCu | F-FcCuAl - FcCu | F-FcCuAl-FcCu |
| Mechanical life |  | [No.operations] | 20000 | 20000 | 20000 |
| Electrical life |  | [No.operations] | 2000 | 1000 | 1000 |
| Dimensions |  | W [mm/in] | 140/5.52 | 186/7.33 | 186/7.33 |
|  |  | D [mm/in] | 103.5/4.07 | 103.5/4.07 | 103.5/4.07 |
|  |  | H [mm/in] | 205/8,07 | 205/8,07 | 205/8,07 |
| Weight (with standard terminals) | Fixed | [kg/lbs] | 3.05/6.72 | 3,15/9.15 | 3,15/9.15 |

Circuit breakers up to 1150V AC - IEC

|  |  | T4V ${ }^{(1)}$ | T55 ${ }^{(1)}$ |
| :---: | :---: | :---: | :---: |
| Rated service current | [A] | 250 | 400-630 |
| Poles |  | 3/4 | 3/4 |
| Standard |  | IEC 60947-2 | IEC 60947-2 |
| Rated service voltage | [VAC] | 1150 | 1150 |
| Test voltage at power frequency for 1 min . | [VAC] | 3500 | 3500 |
| Rated impulse withstand voltage | [VAC] | 8 | 8 |
| Rated insulation voltage | [VAC] | 1150 | 1150 |
| Rated breaking capacity, Icu | [kA] | 12 | 12 |
| Rated service breaking capacity, Ics | [kA] | 12 | 10 |
| Isolation behaviour | [kA] | Yes | Yes |
| Category of use | [kA] | A | $\begin{gathered} \text { 400A: B }{ }^{(2)} \\ 630 \mathrm{~A}: \mathrm{A} \end{gathered}$ |
| Product certification |  | IEC | IEC |
| Thermomagnetic releases |  | TMD <br> TMA | TMA |
| Electronic trip units |  | $\begin{aligned} & \text { PR221DS } \\ & \text { PR222DS/P } \\ & \text { PR222DS/PD } \end{aligned}$ | $\begin{gathered} \text { PR221DS } \\ \text { PR222DS/P } \\ \text { PR222DS/PD } \end{gathered}$ |
| Version |  | F | F |
| Class of pollution |  | III | III |
| Terminals |  | FCCu-F* ${ }^{\text {EF* }}$ | FCCu-F* - EF* |
| Mechanical life | [No.operations] | 20000 | 20000 |
| Electrical life | [No.operations] | 1000 | 1000 |
| Dimensions | 3P W [mm/in] | 105/4.13 | 140/1.57 |
|  | 4P W [mm/in] | 140/1.57 | 184/7.24 |
|  | D [mm/in] | 103.5/4.07 | 103.5/4.07 |
|  | H [mm/in] | 205/8.07 | 205/8.07 |
| Weight (with standard terminals) Fixed | 3P [kg/lbs] | 2.35/5.18 | 3.25/7.17 |
|  | 4P [kg/lbs] | 3.05/6.72 | 4.15/9.15 |

(1) Power supply only from the top
(2) Icw 5 kA

* Ordering extracodes


## Switch disconnectors up to 1150V AC - IEC

|  |  | T4D |
| :---: | :---: | :---: |
| Rated service current | [A] | 250 |
| Poles |  | 3 |
| Standard |  | IEC 60947-3 |
| Product certification |  | IEC |
| Rated service voltage | [VDC] | 1150 |
| Rated insulation voltage | [VDC] | 1150 |
| Short-circuit current withstand | [kA] | 3,6 |
| Version |  | F |
| Standard terminals |  | F |
| "Terminals provided with Jumper kit (see ordering codes for details)" |  | - |
| Mechanical life | [No.operations] | 2000 |
| Electrical life | [No.operations] | 1000 |
| Dimensions | W [mm/in] | 105/4.13 |
|  | D [mm/in] | 103.5/4.07 |
|  | H [mm/in] | 205/8.07 |
| Weight (with standard terminals) | Fixed 3P [kg/lbs] | 2.35/5.18 |

Circuit breakers up to 1000 V AC - IEC

|  |  | T4L | T4V ${ }^{(1)}$ | T5L | T5V ${ }^{(1)}$ | T6L ${ }^{(1)}$ |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Rated service current | [A] | 250 |  | 400-630 |  | 630-800 |
| Poles |  | 3/4 |  | 3/4 |  | 3/4 |
| Standard |  | IEC 60947-2 |  | IEC 60947-2 |  | IEC 60947-2 |
| Rated service voltage | [VAC] | 1000 |  | 1000 |  | 1000 |
| Test voltage at power frequency for 1 min . | [VAC] | 3500 |  | 3500 |  | 3500 |
| Rated impulse withstand voltage | [VAC] | 8 |  | 8 |  | 8 |
| Rated insulation voltage | [VAC] | 1000 |  | 1000 |  | 1000 |
| Rated breaking capacity, Icu | [kA] | 12 | 20 | 12 | 20 | 12 |
| Rated service breaking capacity, Ics | [kA] | 12 | 12 | 10 | 12 | 6 |
| Isolation behaviour | [kA] | Yes |  | Yes |  | Yes |
| Category of use | [kA] | A |  | $\begin{gathered} \text { 400A: } \mathrm{B}^{(2)} \\ 630 \mathrm{~A}: \mathrm{A} \end{gathered}$ |  | $B^{(3)}$ |
| Product certification |  | IEC | IEC - CCC | IEC | IEC-CCC | IEC - CCC |
| Thermomagnetic releases |  |  | $\begin{aligned} & \text { TMD } \\ & \text { TMA } \end{aligned}$ | - | TMA | TMA |
| Electronic trip units |  | $\begin{gathered} \text { PR221DS } \\ \text { PR222DS/P } \\ \text { PR222DS/PD } \end{gathered}$ | $\begin{aligned} & \text { PR221DS } \\ & \text { PR222DS/P } \\ & \text { PR222DS/PD } \end{aligned}$ | PR221DS PR222DS/P PR222DS/PD | $\begin{aligned} & \text { PR221DS } \\ & \text { PR222DS/P } \\ & \text { PR222DS/PD } \end{aligned}$ | $\begin{gathered} \text { PR221DS } \\ \text { PR222DS/P } \\ \text { PR222DS/PD } \end{gathered}$ |
| Electronic trip units for motor protection |  | Ekip M-LRIU | - | Ekip M-LRIU | - | - |
| Version |  | F, P, W | F | F, P, W ${ }^{(4)}$ | F | $F^{(5)}$ |
| Class of pollution |  | III |  | III |  | III |
| Terminals |  | FCCu-F*-EF* |  | FCCu-F*-EF* |  | $\begin{gathered} \mathrm{F}-\mathrm{FC} \text { CuAl** }-\mathrm{R} \\ -E F^{*}-E S^{*} \end{gathered}$ |
| Mechanical life | [No. operations] | 20000 |  | 20000 |  | 20000 |
| Electrical life | [No. operations] | 1000 |  | 1000 |  | 1000 |
| Dimensions | 3 P W [mm/in] | 105/4.13 |  | 140/1.57 |  | 210/8.27 |
|  | 4P W [mm/in] | 140/1.57 |  | 184/7.24 |  | 280/11.02 |
|  | D [mm/in] | 103.5/4.07 |  | 103.5/4.07 |  | 103.5/4.07 |
|  | H [mm/in] | 205/8.07 |  | 205/8.07 |  | 268/10.55 |
| Weight (with standard terminals) Fixed | 3 P [kg/lbs] | 2.35/5.18 |  | 3.25/7.17 |  | 9.5/20.94 |
|  | 4 P [kg/lbs] | 3.05/6.72 |  | 4.15/9.15 |  | 12.0/26.46 |
| Plug-in | 3 P [kg/lbs] | 3.60/7.94 |  | 5.15/11.35 |  |  |
|  | 4 P [kg/lbs] | 4.65/10.25 |  | 6.65/14.66 |  | - |
| Withdrawable | 3 P [kg/lbs] | 3.85/8.49 |  | 5.40/11.91 |  |  |
|  | 4 P [kg/lbs] | 4.90/10.80 |  | 6.90/15.21 |  | - |

[^6]
## Formula Air

## Simplicity and safety, up to 50kA

Formula Air is an ideal solution for main installation requirements, from distribution switchboards to onboard compartments. This comprehensive range offers the most suitable solution for each specific set of requirements. Easy to use Formula Air products are also easy to order. The ACBs are available in 3 sizes up to 4000A with performance level up to 50kA which are equipped with new Ek 1 and Ek 2 trip units.


| Current capacity |  |  |
| :--- | :---: | :--- |
| F4 | $2500-4000$ |  |
| F2 | $1600-2000$ |  |
| FA | $630-1600$ |  |

Ek 1. Enables rapid and accurate setting of the protections with the use of dip switches. This is the most appropriate solution for common applications.

Ek 2. Enables simple and intuitive navigation thanks to the graphical user interface of the LCD screen.

## Formula Air

## Simplicity and safety, up to 50kA

| Common data |  |  |
| :--- | :--- | :--- |
| Rated service voltage Ue | $[\mathrm{V}]$ | 440 |
| Rated insulation voltage Ui | $[\mathrm{V}]$ | 1000 |
| Rated impulse withstand voltage Uimp | $[\mathrm{kV}]$ | 12 |
| Frequency | $[\mathrm{Hz}]$ | $50-60$ |
| Number of poles | $3-4$ |  |
| Version | Fixed - Withdrawable |  |
| Operating temperature | $-25^{\circ} \mathrm{C} \ldots+70^{\circ} \mathrm{C}$ |  |
| Storage temperature | $-40^{\circ} \mathrm{C} \ldots+70^{\circ} \mathrm{C}$ |  |



| Formula Air automatic circuit-breakers |  |  | FA1 |  | FA2 | FA4 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Performance levels |  |  | B | C | C | C |
| Max rated uninterrupted current at $40^{\circ} \mathrm{C}$ - lu |  | [A] | 630 | 630 | 1600 | 2500 |
|  |  | [A] | 800 | 800 | 2000 | 3200 |
|  |  | [A] | 1000 | 1000 |  | 4000 |
|  |  | [A] | 1250 | 1250 |  |  |
|  |  | [A] | 1600 | 1600 |  |  |
| Neutral pole current-carrying capacity for 4 poles breakers |  | [\%lu] | 100 | 100 | 100 | 100 |
| Rated ultimate breaking capacity under short circuit - Icu | @400-415V | [kA] | 42 | 50 | 50 | 50 |
|  | @440V | [kA] | 42 | 50 | 50 | 50 |
| Rated service breaking capacity under short-circuit - Ics |  | [\%Icu] | 100 | 100 | 100 | 100 |
| Rated short time withstand current - Icw | (1s) @440V | [kA] | 42 | 50 | 50 | 50 |
|  | (3s) | [kA] | 24 | 24 | 25 | 25 |
| Rated making capacity under short-circuit (peak value) - Icm | 440 V | [kA] | 88 | 105 | 105 | 105 |
| Utilization category (according to IEC 60947-2) |  |  | B | B | B | B |
| Operating times |  | [ms] | 40 | 40 | 40 | 40 |
| Dimensions | H - Fixed/Withdrawable | [mm] |  | 296/363.5 | 371/425 | 371/425 |
|  | D - Fixed/Withdrawable | [mm] |  | 183/271 | 270/383 | 270/383 |
|  | W-Fixed 3p/4p | [mm] |  | 210/280 | 276/317 | 384/510 |
|  | W - Withdrawable 3p/4p | [mm] |  | 278/348 | 317/407 | 425/551 |
| Weights (CB with trip unit and current sensor) | Fixed 3p/4p |  |  | 14/16 | 41/53 | 56/70 |
|  | Withdrawable 3p/4p (fixe |  |  | 38/43 | 54/99 | 110/136 |


| Formula Air Switch-disconnector |  |  |  | FA1 | FA2 |  | FA |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Performance levels |  |  |  | N/MS | C/M |  |  |  |
| Max rated uninterrupted current at $40^{\circ} \mathrm{C}$ - Iu |  |  | [A] | 630 | 160 |  |  |  |
|  |  |  | [A] | 800 | 200 |  |  |  |
|  |  |  | [A] | 1000 |  |  |  |  |
|  |  |  | [A] | 1250 |  |  |  |  |
|  |  |  | [A] | 1600 |  |  |  |  |
| Neutral pole current-carrying capacity for 4 poles breakers |  |  | [\%lu] | 100 | 100 |  | 10 |  |
| Rated making capacity under short-circuit 440 V (peak value) - Icm |  |  | [kA] | 105 | 105 |  | 10 |  |
| Rated short time withstand current - Icw $(1 \mathrm{~s}) @ 440 \mathrm{~V}$ <br> $(3 \mathrm{~s})$  |  |  | [kA] | 50 | 50 |  | 50 |  |
|  |  |  | [kA] | 30 | 25 |  | 25 |  |
|  |  |  |  | AC23 | AC2 |  |  |  |
| Formula AIR |  | FA1 |  |  | FA2 | FA4 | FA4 |  |
| Mechanical life with regular ordinary maintenance | [lu] | $\leq 1000$ | 1250 | 1600 | $\leq 2000$ | 2500 | 3200 | 4000 |
|  | [No. cycles x 1000] | 15 | 15 | 15 | 15 | 15 | 15 | 15 |
| Frequency | [Oper./Hour] | 60 | 60 | 60 | 60 | 60 | 60 | 60 |
| Electrical life with regular 440 V <br> ordinary maintenance  | [No. cycles $\times 1000$ ] | 6 | 6 | 6 | 6 | 5 | 5 | 4 |
| Frequency | [Cycles/Hour] | 30 | 30 | 30 | 30 | 20 | 20 | 20 |

## Formula Air

## Trip unit protection functions

| ABB Code | ANSI Code | Function | Threshold |
| :---: | :---: | :---: | :---: |
| L | 49 | Overload protection | $\begin{aligned} & 11=0.4-0.42-0.45-0.47-0.5-0.52-0.55-0.57-0.6-0.62-0.65-0.67-0.7- \\ & 0.72-0.75-0.77-0.8-0.82-0.85-0.87-0.9-0.92-0.95-0.97-1 \times \ln \end{aligned}$ |
|  |  | Thermal memory |  |
|  |  | Tolerance | tripping between 1.05 and $1.2 \times \mathrm{I} 1$ |
| S | 50TD | Short-circuit selective protection | $\mathrm{I} 2=0.6-0.8-1-1.5-2-2.5-3-3.5-4-5-6-7-8-9-10 \times \mathrm{ln}$ |
|  |  | Tolerance | $\begin{aligned} & \pm 7 \% \text { If } \leq 6 \times \ln \\ & \pm 10 \% \text { If }>6 \times \text { In } \end{aligned}$ |
|  | 51 | Short-circuit selective protection | $\mathrm{I} 2=0.6-0.8-1-1.5-2-2.5-3-3.5-4-5-6-7-8-9-10 \times \mathrm{ln}$ |
|  |  | Thermal memory |  |
|  |  | Tolerance | $\begin{aligned} & \pm 7 \% \text { If } \leq 6 \times \text { In } \\ & \pm 10 \% \text { If }>6 \times \text { In } \end{aligned}$ |
| 1 | 50 | Short-circuit instantaneous protection | $13=1.5-2-3-4-5-6-7-8-9-10-11-12-13-14-15 \times \mathrm{ln}$ |
|  |  | Tolerance | $\pm 10 \%$ |
| G | 50N TD | Earth fault protection | $14=0.1-0.2-0.3-0.4-0.6-0.8-1 \times \mathrm{ln}$ |
|  |  | Tolerance | $\pm 7 \%$ |
|  | 51 N | Earth fault protection | $14=0.1-0.2-0.3-0.4-0.6-0.8-1 \times \mathrm{ln}$ |
|  |  | Tolerance | $\pm 7 \%$ |
| ABB Code | ANSI Code | Function | Threshold |
| L | 49 | Overload Protection | $\mathrm{I}=0.4 \ldots 1 \times \mathrm{ln}$ in steps of $0.001 \times \mathrm{ln}$ |
|  |  | Thermal Memory |  |
|  |  | Tolerance | tripping between 1.05 and $1.2 \times 11$ |
| S | 50TD | Time-delayed overcurrent protection | $12=0.6 \ldots 10 \times \mathrm{ln}$ in steps of $0.1 \times \mathrm{ln}$ |
|  |  | Start up | Activation: $0.6 \ldots 10 \times \mathrm{ln}$ in steps of $0.1 \times \mathrm{ln}$ |
|  |  | Tolerance | $\begin{aligned} & \pm 7 \% \mathrm{I} \leq 6 \times \ln \\ & \pm 10 \% \mathrm{I}>6 \times \ln \end{aligned}$ |
|  | 51 | Time-delayed overcurrent protection | $12=0.6 \ldots 10 \times \mathrm{ln}$ in steps of $0.1 \times \mathrm{ln}$ |
|  |  | Thermal Memory |  |
|  |  | Tolerance | $\begin{aligned} & \pm 7 \% \mathrm{l} \leq 6 \times \ln \\ & \pm 10 \% \mathrm{l}>6 \times \mathrm{ln} \\ & \hline \end{aligned}$ |
| 1 | 50 | Istantaneous overcurrent protection | I3= 1.5... $15 \times \mathrm{ln}$ in steps of $0.1 \times \mathrm{ln}$ |
|  |  | Start up | Activation: $1.5 \ldots 15 \times \mathrm{ln}$ in steps of $0.1 \times \mathrm{ln}$ |
|  |  | Tolerance | $\pm 10 \%$ |
| MCR |  | Closing on short-circuit protection | $13=1.5 \ldots 15 \times \mathrm{ln}$ in steps of $0.1 \times \mathrm{ln}$ |
|  |  | Tolerance | $\pm 10 \%$ |
| G | 50N/50N TD | Earth fault protection | $14^{(1)}=$ Inst, $0.1 \ldots 1 \times \mathrm{In}$ in steps of $0.001 \times \mathrm{ln}$ |
|  |  | Start up | Activation: 0.2... $1 \times \mathrm{ln}$ in steps of $0.2 \times \mathrm{ln}$ |
|  |  | Tolerance | $\pm 7 \%$ |
|  | 51 N | Earth fault protection | $14^{(1)}=0.1 \ldots 1 \times \mathrm{ln}$ in steps of $0.01 \times \mathrm{ln}$ |
|  |  | Tolerance | $\pm 7 \%$ |
| IU | 46 | Current unbalance protection | $16=2 . .90 \%$ In unbalance in steps of 1\% In |
|  |  | Tolerance | $\pm 10 \%$ |


| ABB Code | Trip threshold | Trip time |
| :--- | :--- | :--- |
| L | Trip between 1.05 and $1.2 \times 11$ | $\pm 20 \%$ |
| S | $\pm 10 \%$ | $\pm 20 \%$ |
| G | $\pm 15 \%$ | $\leq 60 \mathrm{~ms}$ |
| G | $\pm 15 \%$ | $\pm 20 \%$ |
| Other protection | $\pm 15 \%$ | $\pm 20 \%$ |
|  |  |  |

[^7]| Trip time | Excludability | Pre Alarm | Trip curve | Ek 1 |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| with I $=3 \mathrm{I} 1$, t1 $=3-12-24-36-48-72-108-144 \mathrm{~s}$ | No | $\begin{aligned} & 50 \ldots 90 \text { I1 } \\ & \text { Step 1\% } \end{aligned}$ | $\mathrm{t}=\mathrm{k} / \mathrm{I}^{2}$ | $\bullet$ | $\frac{12}{6}$ |
|  | Yes |  |  | $\bullet$ | . |
| $\begin{aligned} & \pm 10 \% \text { If } \leq 6 \times \text { In } \\ & \pm 20 \% \text { If }>6 \times \text { In } \end{aligned}$ |  |  |  |  |  |
| $\mathrm{t} 2=0.1-0.2-0.3-0.4-0.5-0.6-0.7-0.8 \mathrm{~s}$ | Yes | No | $\mathrm{t}=\mathrm{k}$ | - |  |
| The best between: $\pm 10 \%$ or $\pm 40 \mathrm{~ms}$ |  |  |  |  |  |
| with $\mathrm{I}=10 \mathrm{ln}, \mathrm{t2}=0.1-0.2-0.3-0.4-0.5-0.6-0.7-0.8 \mathrm{~s}$ | Yes | No | $\mathrm{t}=\mathrm{k} / \mathrm{I}^{2}$ | $\bullet$ |  |
|  | Yes | No |  |  |  |
| $\begin{aligned} & \pm 15 \% \text { If } \leq 6 \times \text { In } \\ & \pm 20 \% \text { If }>6 \times \text { In } \\ & \hline \end{aligned}$ |  |  |  |  |  |
| Instantaneous | Yes | No | $\mathrm{t}=\mathrm{k}$ | $\bullet$ |  |
| $\leq 30 \mathrm{~ms}$ |  |  |  |  |  |
| $\mathrm{t} 4=0.1-0.2-0.4-0.8 \mathrm{~s}$ | Yes | $\begin{aligned} & \text { 50...90\% } 14 \\ & \text { Step 1\% } \\ & \hline \end{aligned}$ | $\mathrm{t}=\mathrm{k}$ | $\bullet$ |  |
| The best between: $\pm 10 \%$ or $\pm 40 \mathrm{~ms}$ |  |  |  |  |  |
| t4 = 0.1-0.2-0.4-0.8s | Yes | $\begin{aligned} & \text { 50...90\% I4 } \\ & \text { Step 1\% } \end{aligned}$ | $\mathrm{t}=\mathrm{k} / \mathrm{I}^{2}$ | $\bullet$ |  |
| $\pm 15 \%$ |  |  |  |  |  |
| Tripping time | Excludability | Pre-alarm | Trip curve | Ek 2 | $\pm$ |
| with $\mathrm{I}=3 \mathrm{I} 1, \mathrm{t} 1=3 \ldots 144 \mathrm{~s}$ in steps of 1 s | no | 50...90\% I1 | $\mathrm{t}=\mathrm{k} / \mathrm{l}^{2}$ | $\bullet$ | セ 2 |
|  | yes |  |  | $\bullet$ | $\bar{x} \geq i$ |
| $\begin{aligned} & \pm 10 \% \mathrm{l} \leq 6 \times \mathrm{ln} \\ & \pm 20 \% \mathrm{l}>6 \times \mathrm{ln} \end{aligned}$ |  |  |  |  |  |
| t2 $=0.05 \ldots . .0 .8 \mathrm{~s}$ in steps of 0.01s | yes | no | $\mathrm{t}=\mathrm{k}$ | $\bullet$ |  |
| Range: 0.1...30s in steps of 0.01s | yes |  |  | $\bullet$ |  |
| The best between: $\pm 10 \%$ or $\pm 40 \mathrm{~ms}$ |  |  |  |  |  |
| with $\mathrm{I}=10 \mathrm{ln}, \mathrm{t} 2=0.05 \ldots .0 .8 \mathrm{~s}$ in steps of 0.01s | yes | no | $\mathrm{t}=\mathrm{k} / \mathrm{I}^{2}$ | $\bullet$ |  |
|  | yes |  |  | $\bullet$ |  |
| $\begin{aligned} & \pm 15 \% \mathrm{l} \leq 6 \times \ln \\ & \pm 20 \% \mathrm{l}>6 \times \ln \\ & \hline \end{aligned}$ |  |  |  |  |  |
| Instantaneous | yes | no | $\mathrm{t}=\mathrm{k}$ | $\bullet$ |  |
| Range: 0.1...30s in steps of 0.01s | yes |  |  | $\bullet$ |  |
| $\leq 30 \mathrm{~ms}$ |  |  |  |  |  |
| With I>13 instantaneous <br> Monitor time range: $40 . .500 \mathrm{~ms}$ in steps of 0.01 s | yes | no | $\mathrm{t}=\mathrm{k}$ | $\bullet$ |  |
| $\leq 30 \mathrm{~ms}$ |  |  |  |  |  |
| with $1>14$, <br> $\mathrm{t} 4=0.1 \ldots .1 \mathrm{~s}$ in steps of 0.05 s | yes | $\begin{aligned} & 50 . . .90 \% 14 \\ & \text { Step 1\% } \\ & \hline \end{aligned}$ | $\mathrm{t}=\mathrm{k}$ | $\bullet$ |  |
| range: $0.1 \ldots 30 \mathrm{~s}$ in steps of 0.01s | yes |  |  | $\bullet$ |  |
| The best between: <br> $\pm 10 \%$ or $\pm 40 \mathrm{~ms}$ or 50 ms with $\mathrm{t} 4=$ Istantaneous |  |  |  |  |  |
| with $\mathrm{I}=4 \mathrm{In}$, $\mathrm{t} 4=0.1 \ldots .1 \mathrm{~s}$ in steps of 0.05 s | yes | $\begin{aligned} & \text { 50...90\% } 14 \\ & \text { Step 1\% } \\ & \hline \end{aligned}$ | $\mathrm{t}=\mathrm{k} / \mathrm{l}^{2}$ | $\bullet$ |  |
| $\pm 15 \%$ |  |  |  |  |  |
| t6 $=0.5 \ldots 60 \mathrm{~s}$ in steps of 0.5s | yes | no | $\mathrm{t}=\mathrm{k}$ | $\bullet$ |  |
| $\begin{aligned} & \text { The best between: } \\ & \pm 10 \% \text { or } \pm 40 \mathrm{~ms} \text { (for } \mathrm{t}<5 \mathrm{~s} \text { ) } \\ & \pm 100 \mathrm{~ms} \text { (for } \mathrm{t} \geq 5 \mathrm{~s} \text { ) } \end{aligned}$ |  |  |  |  |  |

## Formula Air

## Protection Trip unit



| Parameters | EK 1 - LI | EK1- LSIG | EK2-LSIG |
| :---: | :---: | :---: | :---: |
| Neutral protection | - | - | $\bullet$ |
| Switchable thermal memory | - | $\bullet$ | - |
| Graphical display with current metering |  |  | - |
| Closing on short-circuit (MCR) |  |  | $\bullet$ |
| Start-up function |  |  | $\bullet$ |
| Instantaneous earth fault (G-ANSI 50N) |  |  | $\bullet$ |
| Current unbalance protection |  |  | $\bullet$ |
| Watchdog function | $\bullet$ | - | - |
| Contact wear Indication |  |  | - |
| Display of No. of operations |  |  | $\bullet$ |
| Display of last maintaince date |  |  | $\bullet$ |
| Zone Selectivity for S \& G protections |  |  | $\bullet$ |
| Display of 20 trip history \& 100 events |  |  | $\bullet$ |
| Test function | - | $\bullet$ | - |
| Download breaker maintenance data from ACB | - | $\bullet$ | - |



## SACE Formula DSP Performance made simple

SACE FORMULA DSP is part of the ABB FORMULA range, a complete product range for standard applications dedicated to residential, commercial and industrial environments. A perfect synthesis of quality at your fingertips, easy to select, install and use.



## Easy to install

Click-in fixing for accessories to guarantee time saving and fast installations

## Wide applications

Capability to cover standard applications dedicated to residential, commercial and industrial environments

## Standardization

Same fixing points and dimensions of SACE Tmax XT series guarantee standardization of the solutions with the whole ABB molded-case circuit-breakers range

## Quality

ABB long experience in molded-case
circuit-breakers design is a guarantee of quality


Simplified selection
Availability of a short list of codes enables simplified product selection and easy ordering

## Safety and Reliability

Compliance with the main safety standards and directives


## Exactly what you need

Performances are tailor-made to cover exactly what you need

## Sustainability

Compliance with the international regulations of Product Materials and Environmental Health and Safety

## SACE Formula DSP

## Technical characteristics

Size


(1) Not suitable for IT distribution Systems $>440 \mathrm{~V}$ AC

## -

Power distribution protection


## SACE Formula DSA <br> Simplicity and quality in a single product

01 SACE FORMULA DSA A1 02 SACE FORMULA DSA A2 03 SACE FORMULA DSA A3

The SACE FORMULA DSA circuit-breakers from 15A to 630A consist of the interruption part together with the trip unit and they can be installed:

- directly on the back plate of the cubicles;
- on a DIN rail (A1 and A2);
- back door (A1, A2 and A3, 2-3 4 poles).

They are characterised by:

- fixed version;
- polarity: 1 pole (A1), 2 poles (A1 and A2), 3 poles (A1, A2 and A3), 4 poles (A1, A2 and A3);
- maximum breaking capacity of 36 kA for A 1 and A2 and of 50kA for A3 at 415V AC;
- fixed thermomagnetic trip unit (TMF) for protection of networks in alternating and direct current (A1, A2, A3);
- ELT LI electronic trip unit with fixed thresholds for the protection of networks in alternating current (A3);
- only two depths: $60 \mathrm{~mm}(\mathrm{~A} 1, \mathrm{~A} 2)$ and 103.5 mm (A3);
- standard front terminals;
- the possibility of use at $50^{\circ} \mathrm{C}$ without derating up to 250A (except for A1 125A);
${ }_{01}$
2 poles3 poles4 poles

03


## SACE Formula DSA <br> Simplicity and quality in a single product

Quality is the rapid installation system. With FORMULA Link, the simplicity of the SACE FORMULA family shows up in all its strength. The connection between the supply side circuit-breaker and FORMULA Link is made using special incoming connections kit, whereas the connection between the load side circuit-breakers and FORMULA Link is made using the outgoing connection kits.

Installation and putting into service are simple and rapid.

Three different frames of FORMULA Link are available:

- 250A FORMULA Link;
- 400A FORMULA Link;
- 630/800A FORMULA Link.

All the versions of the moulded-case circuit-breakers can be installed in the FORMULA Link: SACE FORMULA DSA A1 and A2 in the single-pole, two-pole and three-pole versions, and SACE FORMULA DSA A3 in the three-pole version.

Sace Formula DSA. Small space, great quality.


## SACE Formula DSA

Simplicity and quality in a single product

(1) 5 kA ; (2) 9 kA ; (3) 2.5 kA ; (4) Special version; (5) In=15A, 16A; Icu=30kA; (6) 5kA

## Switches

ABB has a wide portfolio of low voltage switches. They are suitable for diverse applications, in motor control centers, in switch boards and as main switches in various equipment and machines. From single to 8 poles and combination switches for change-over, automatic transfer, bypass, reversing, etc.

## Switch disconnectors 16-4000 A

The switch disconnector is largely used as the main switch in low voltage switchgears for distribution of power, starting and stopping motors and isolating loads during maintenance.

The range from 16 to 125 Amps are either base plate or door mounted by snap-on or screw fitting front operated 3, 4, 6 and 8-pole are available as standard.

From 160 to 4000 Amps, the switch disconnectors, also called load break switches, are designed as pole modules and they are available as 1, 2, 3 and 4-pole versions, front or side operated.

## Switch disconnectors OTDC and OTDCP 10-1000 A

The OTDC range of switch-disconnectors is specially designed for DC applications. Thanks to a compact design, efficiency and reliability, OTDC switches bring photovoltaic installations to the next level.

## Switch disconnector fuses 16-1250 A

The switch disconnector fuse is used as the main switch in low voltage switchgears in industry for distributing power and protecting motors, cables and other devices against short-circuits and over loads.

The switch disconnector fuses are available for all types of fuse links, DIN, BS, NFC, UL, CSA.

The range includes single pole to four pole versions, front-or side-operated. The pole module design enables location of the operating mechanism in any position together with the direction of the terminals giving flexibility to installation in different types of cubicle designs.

## Change-over and transfer switches 16-3200 A

ABB's change-over and transfer switches are designed to transfer loads from one power source to another in a wide variety of applications.

The range includes switches from 16 to 3200 Amperes, which can be operated manually, remotely by using a motor or automatically.

ABB's change-over and transfer switches are tested according to IEC 60947-6-1 and IEC 60947-3 standards. The switches have ratings in AC31 and AC33 utilization categories, up to 415 V . In motorized switches, the motor operators have a wide voltage operation range.

## Enclosed switches 16-1600 A

The ABB enclosed switches are suitable for power distribution in factories and buildings, as local motor isolators and as main switches. Each incoming supply shall be provided with a hand operated main switch-disconnector according to the Machine Directive EN 60204 and isolate reliably the electrical equipment from the supply.

ABB enclosed switches are designed and tested to meet these requirements and complies with IEC 60 947-3.

The enclosed switches are easy to install and safe to use in industrial, public and residential environments. The indication of the handle is always reliable and lockable in the OFF-position with a standard padlock. ABB's long experience in switch disconnects guarantees a long and safe use.

## Auto Transfer Switches 40-3000 A

Technologies for external environment-complete range 40-4000 A. ABB offers a wide selection of automatic transfer switches (ATS). They have the features and functionality that make them suitable for diverse applications.


## HRC Fuse links - DIN \& BS

## Features

- Total safety for your cables and motors
- Wide and dense current ratings for optimal dimensioning of other circuit components.
- Low let through energy
- Energy saving through low power losses.
- High breaking capacity
- Superior current limiting capability
- Emission free operation
- Reliable protection and safe operation


## Standards

- IEC 60269


## Technical Data

The fuse links are tested to the following short circuit ratings:

|  | IEC Fuse |  |
| ---: | ---: | ---: |
|  | $000 \ldots 3$ | 4 |
| Breaking capacity, AC (DIN) 500 V | $80 \mathrm{kA} /$ | 120 kA |
|  | 120 kA |  |
| 690 V | 80 kA | 160 kA |
|  | F1....C3 |  |
| Breaking capacity, AC (BS) 415 V | 80 kA |  |

## Applications

- General Installation
- Industrial Applications

DIN-size
$\mathrm{I}_{\mathrm{n}}$ [A]


00
6... 160


1
$32 . . .250$


2
100... 400


3
$315 . . .800$

BS-Type HRC fuse links, 2A... 800 A, 415 V, 80 kA


## Technical data

Switch fuses OESA32... 160

| Technical data according to IEC 60947-3 |  | Switch size |
| :---: | :---: | :---: |
| Rated insulation voltage and rated operational voltage AC-20 and DC-20 | Pollution degree 3 |  |
| Dielectric strength Rated impulse withstand voltage |  | 50 Hz 1 min |
| Rated thermal current in ambient $35^{\circ} \mathrm{C}$ and temporarily in $40^{\circ} \mathrm{C}$ / max. fuse power dissipation ....with minimum cable cross section | in open air in enclosure | Cu |
| Derating at $60^{\circ} \mathrm{C}$ | in open air in enclosure |  |
| Rated operational current AC-21A |  | $\begin{array}{r} \leq 500 \mathrm{~V} \\ 690 \mathrm{~V} \end{array}$ |
| Rated operational current AC-22A |  | $\begin{array}{r} \leq 500 \mathrm{~V} \\ 690 \mathrm{~V} \end{array}$ |
| Rated operational current AC-23A |  | $\begin{array}{r} \leq 500 \mathrm{~V} \\ 690 \mathrm{~V} \end{array}$ |
| Rated operational current / pole in series DC-21A, DC-22A and DC - 23A |  | $\begin{array}{r} \leq 220 \mathrm{~V} \\ 440 \mathrm{~V} \end{array}$ |
|  |  | $\begin{aligned} & 230 \mathrm{~V} \\ & 400 \mathrm{~V} \end{aligned}$ |
| Rated operational power AC-23 ${ }^{1)}$ |  | 415 V 500 V 690 V |
| Rated breaking capacity AC-23A |  | $\leq 500 \mathrm{~V}$ |
| Rated conditional short circuit current Ip (r.m.s) and corresponding max allowed cut-off current Ic |  | $80 \mathrm{kA}, 415 \mathrm{~V}$ |
| The cut-off current Ic refers to values listed by fuse manufacturers (single phase test acc.to IEC60269) |  | 100kA, 500V <br> $50 \mathrm{kA}, 415 \mathrm{~V}$ |
| Rated short-time withstand current, 1s | r.m.s-value |  |
| Rated capacitor power when no initial charge of the capacitor | The capacitor ratings of the switch fuses are limited by the fuse links | $\begin{aligned} & 400 \mathrm{~V} \\ & 415 \mathrm{~V} \end{aligned}$ |


| Power loss/pole | with rated current, without fuse |
| :--- | :--- |
| Mechanical endurance | Divided by two for operation <br> cycles |


| Fuse types, IEC 60269-2 | Sec I, DIN 43620 |
| :--- | :--- |
| Weight without accessories | Sec II, BS 88 |
| Terminal bolt size (included) | Metric thread diameter $\times$ length <br> Counter torque reqd. |
| Terminal tightening torque fuses |  |
| Fuse-links bolts tightening torque <br> Operating torque | Typical for 3-pole switch fuses |

[^8]| A | OESA_32 | OESA_63 | OESA_100 | OESA_125 | OESA_160 |
| :---: | :---: | :---: | :---: | :---: | :---: |
|  | v | 750 | 750 | 750 | 750 |
| kV | 8 | 8 | 8 | 8 | 8 |
| kV | 12 | 12 | 12 | 12 | 12 |
| A/W | 32/3.3 | 63/5.8 | 100/7.4 | 125/10.6 | 160/10.7 |
| A/W | 32/3.3 | 63/5.8 | 100/7.4 | 125/10.6 | 160/10.7 |
| mm2 | 6 | 16 | 50 | 50 | 50 |
| \% | 20/20 | 20/20 | 20/20 | 20/20 | 20/20 |
| A | 32 | 63 | 100 | 125 | 160 |
| A | - | $63^{2}$ | $100^{2)}$ | 125 ${ }^{2)}$ | $160^{2)}$ |
| A | 32 | 63 | 100 | 125 | 160 |
| A | - | $63^{2}$ | 1002) | 1252 | 135 ${ }^{2}$ |
| A | 32 | 63 | 100 | 100 | 100 |
| A | - | $40^{2}$ | $50^{2)}$ | 50 ${ }^{\text {2) }}$ | $50^{2)}$ |
| A | 32/3 | 63/3 | 100/3 | 125/3 | 160/3 |
| A | 32/4 | 63/4 | 100/4 | 125/4 ${ }^{2}$ | 160/4 ${ }^{\text {2 }}$ |
| kW | 7.5 | 15 | 30 | 30 | 30 |
| kW | 11 | 30 | 55 | 55 | 55 |
| kW | 15 | 30 | 55 | 55 | 55 |
| kW | 15 | 30 | 70 | 70 | 70 |
| kW | - | 30 | 45 | 45 | 45 |
| A | 256 | 504 | 800 | 800 | 2000 |
| kA | 10 | 12 | 23 | 23 | 23 |
| kA | 6 | 9 | 17 | 17 | 17 |
| kA | 6 | 8 | 14 | 14 | 14 |
| kVAr | 15 | 30 | 50 | 50 | 57 |
| kVAr | 16 | 32 | 55 | 55 | 62 |
| kVAr | - | 50 | 90 | 90 | 100 |
| w | 0.7 | 4 | 5 | 5 | 9 |
| Oper | 20,000 | 20,000 | 20,000 | 20,000 | 20,000 |
|  | 00/000 | 00/000 | 00 | 00 | 00 |
|  | A2 | A3 | A4 | A4 | B2 |
| kg | 1.6/1.9 | 1.6/1.9 | 1.8/2.3 | 1.8/2.3 | 1.8/2.3 |
|  |  |  |  |  | M8x25 |
| mm |  |  | M8x25 | M $8 \times 25$ |  |
| Nm | 5 | 5 | 15... 22 | 15... 22 | 15... 22 |
| Nm | 3.5 | 3.5 | 10 | 10 | 10 |
| Nm | 3 | 3 | 5 | 5 | 5 |

## Technical data

Switch fuses OS/OSM200... 1250

| Technical data according to IEC 609 |  | Switch size | A | $\begin{aligned} & \text { OS_ } \\ & 200- \end{aligned}$ |
| :---: | :---: | :---: | :---: | :---: |
| Rated insulation voltage and rated operational voltage AC-20 and DC-20 | Pollution degree 3 |  | V | 1000 |
| Dielectric strength <br> Rated impulse withstand voltage |  | 50 Hz 1 min . | kV | 10 12 |
| Rated thermal current in |  |  |  |  |
| ambient $35^{\circ} \mathrm{C}$ and temporarily in $40^{\circ} \mathrm{C} /$ | In open air |  | A/W | 200/17 |
| max. fuse power dissipation | In enclosure |  | A/w | 200/15 |
| ...with minimum cable cross section |  | Cu | $\mathrm{mm}^{2}$ | 95 |
| Rated thermal current of detachable neutral | In open air / Cu cable or bar cross section | In "N3" types | A/mm ${ }^{\text {2 }}$ | 290/120 |
| Derating, mounting on | In open air or ventilated enclosure |  | \% | 0 |
| wall horizontal fuses | Totally enclosed |  | \% | 5 |
| Derating, mounting on ceiling |  |  | \% | 10 |
| Derating at $60^{\circ} \mathrm{C}$ | In open air / in enclosure |  | \% | 20/20 |
| Rated operational current AC-21A |  | $\leq 500 \mathrm{~V}$ | A | 200 |
|  |  | 690 V | A | 200 |
| Rated operational current AC-22A |  | $\leq 415 \mathrm{~V}$ | A | 200 |
|  |  | 500 V | A | 200 |
|  |  | 690 V | A | 200 |
| Rated operational current AC-23A |  | $\leq 415 \mathrm{~V}$ | A | 200 |
|  |  | 500 V | A | 200 |
|  |  | 690 V | A | 200 |
| Rated operational current / |  | $\leq 220 \mathrm{~V}$ | A | 200/1 |
| poles in series DC-21A, DC-22A and DC-23A |  | 440 V | A | 200/2 |
|  |  | 660 V | A | 200/3 |
|  |  | 750 V | A | 180/4 |
|  |  | 880 V | A | 180/4 |
| Rated operational power AC-231) |  | 230 V | kW | 60 |
|  |  | 400 V | kW | 110 |
|  |  | 415 V | kW | 110 |
|  |  | 500 V | kW | 132 |
|  |  | 690 V | kW | 200 |
| Rated breaking capacity AC-23 |  | $\leq 690$ V | A | 1600 |
| Rated conditional short- | at prospective SC-current | $80 \mathrm{kA}, 415 \mathrm{~V}$ | kA | 35 |
| circuit current Ip (r.m.s.) | Max. OFA_ fuse size gG/aM |  | A | 250/200 |
| and corresponding max. allowed cut-off current îc | at prospective SC-current | $100 \mathrm{kA}, 500 \mathrm{~V}$ | kA | 37.5 |
|  | Max. OFA_ fuse size gG/aM |  | A | 250/200 |
|  | at prospective SC-current | $80 \mathrm{kA}, 690 \mathrm{~V}$ | kA | 25 |
|  | Max. OFA_ fuse size gG/aM |  | A | 160/ |
| The cut-off current îc refers to values listed by fuse | at prospective SC-current | $50 \mathrm{kA}, 415 \mathrm{~V}$ | kA | 28 |
|  | Max. BS fuse size gG/gM |  | A | 200/200M315 |
| manufacturers (single phase | at prospective SC-current | $80 \mathrm{kA}, 690 \mathrm{~V}$ | kA | 28 |
| test acc. to IEC60269) | Max. BS fuse size gG/gM |  | A | 200/200M250 |
| Rated short-time withstand current, 1s. | r.m.s. -value |  | kA | 8 |
|  | Max. distance from switch frame to nearest busbar/cable support | mm | 150 | 150 |
| Rated capacitor power when no initial charge of the capacitor | The capacitor ratings of the switch-fuses are limited by the fuse links | 400 V | kVAr | 90 |
|  |  | 415 V | kVAr | 100 |
|  |  | 500 V | kVAr | 120 |
|  |  | 690 V | kVAr | 160 |
| Power loss / pole | With rated current, without fuse |  | W | 8 |
| Mechanical endurance | Divide by two for operation cycles |  | Oper. | 20000 |
| Fuse types, IEC 60269-2 | Sec. I, DIN 43620 |  |  | 0 |
|  | Sec. IA, NFC 0-3 Ref.A, 4a Ref.B |  |  | 1 |
|  | Sec. II, BS 88 |  |  | B1-B2 |
|  | Size / distance of fuse-link bolts |  | mm | M6/111 |
| Weight without accessories | 3-pole switch fuses |  | kg | 2.6 |
| Terminal bolt size (included) | Metric thread diameter x length |  | mm | M8X25 |
| Terminal tightening torque | Counter torque required |  | Nm | 15-22 |
| Fuse-links bolts tightening torque |  |  | Nm | 4 |
| Operating torque | Typical for 3-pole switch fuses |  | Nm | 7 |

${ }^{1)}$ Some fuselinks limit these figures further, starting cur-
rent characteristics must be considered separately
${ }^{2}$ ) Utilization category B
${ }^{3}$ ) Ambient temperature $60^{\circ} \mathrm{C}$ : derating 20\%. Mounting on "ceiling": derating $10 \%$. Mounting on wall, horizontal fuses: derating $8 \%$.
${ }^{4}$ ) Utilization category B
${ }^{5)}$ Some fuse links limit these figures further. Starting cur-
rent characteristics must be considered separately.
${ }^{6}$ ) OESA Mini, use 4 -pole switches with $2+2$ parallel contacts in series.
${ }^{7}$ ) Maximum fuse body diameter $<55 \mathrm{~mm}$


## Technical data

Switch-disconnectors OT16...OT160G

| Technical data according to IEC 60947-3 |  |  |  | Size [A] /Switch type |
| :---: | :---: | :---: | :---: | :---: |
|  |  |  |  | 16/OT16F |
| Rated insulation voltage and rated operational voltage | Pollution degree 3 |  | V | 750 |
| AC20/DC20 |  |  |  |  |
| Dielectric strength |  | 50 Hz 1 min . | kV | 6 |
| Rated impulse withstand voltage |  |  | kV | 8 |
| Rated thermal current and rated operational current | Ambient $40^{\circ} \mathrm{C}^{2)}$ | In open air | A | 25 |
| AC20/DC20 |  |  |  |  |
|  | Ambient $40^{\circ} \mathrm{C}^{2)}$ | In enclosure | A | 25 |
|  | Ambient $60^{\circ} \mathrm{C}$ | In enclosure | A | 20 |
| ..with minimum conductor cross section |  | Cu | mm2 | 4 |
| Rated operational current, AC-21A |  | up to 415 V | A | 16 |
|  |  | $440 . . .690 \mathrm{~V}$ | A | 16 |
| Rated operational current, AC-22A |  | up to 415 V | A | 16 |
|  |  | 440...500 V | A | 16 |
|  |  | 690 V | A | 16 |
| Rated operational current, AC-23A |  | up to 415 V | A | 16 |
|  |  | 440 V | A | 16 |
|  |  | 500 V | A | 16 |
|  |  | 690 V | A | 10 |
| Rated operational current / poles in series, DC-21A |  | 24... $48 \mathrm{~V}^{19}$ | A | 16/1 |
|  |  | 110 V | A | 16/2 |
|  |  | 220 V | A | 16/3 |
|  |  | 440 V | A | 16/4 |
|  |  | 500 V | A | 16/4 |
|  |  | 750 V | A | 16/8 |
| Rated operational current / poles in series, DC-22A |  | 24...48 V ${ }^{19}$ | A | 16/1 |
|  |  | 110 V | A | 16/2 |
|  |  | 220 V | A | 16/3 |
|  |  | 440 V | A | 10/4 |
|  |  | 750 V | A | 16/8 |
| Rated operational current / poles in series, DC-23A |  | 24...48 ${ }^{11}$ | A | 16/1 |
|  |  | 110 V | A | 16/2 |
|  |  | 220 V | A | 16/4 |
|  |  | 440 V | A | 10/4 |
|  |  | 750 V | A | 16/8 |
| Rated operational power, AC-23A (These values are given for |  | 220... 240 V | kW | 3 |
| guidance and may vary acc. to the motor manufacturer) |  | $400 . .415 \mathrm{~V}$ | kW | 7.5 |
|  |  | 440 V | kW | 7.5 |
|  |  | 500 V | kW | 7.5 |
|  |  | 690 V | kW | 7.5 |
| Rated breaking capacity, AC-23A |  | up to 415 V | A | 128 |
|  |  | 440 V | A | 128 |
|  |  | 500 V | A | 128 |
|  |  | 690 V | A | 80 |
| Rated breaking capacity/poles in series, DC-23A |  | 24...48 V | A | 64/1 |
|  |  | 220 V | A | 64/3 |
|  |  | 110 V | A | 64/2 |
|  |  | 440 V | A | 40/4 |
|  |  | 750 V | A | 64/8 |
| Rated conditional short-circuit current Ip (r.m.s.) and corresponding | Ip (r.m.s.) | 50 kA | kA | 6.5 |
| max. allowed cut-off current îc. The cut-off current îc refers to values | Max. OFA_fuse size gG/aM | $\leq 415$ V | A | 40/32 |
| listed by fuse manufacturers (single phase test acc. toIEC60269) | Ip(r.m.s.) | 100 kA | kA |  |
|  |  |  |  |  |
|  | Max. OFA_fuse size gG/aM | $\leq 500 \mathrm{~V}$ | A |  |
|  | Ip (r.m.s.) | 10 kA | kA |  |
|  | Max. OFA_fuse size gG/aM | $\leq 690 \mathrm{~V}$ | A |  |
|  | Ip(r.m.s.) | 50 kA | kA | 4 |
|  | Max. OFA_fuse size gG/aM | $\leq 690$ V | A | 25/16 |
| Rated short-time withstand current | r.m.s. -value Icw | $690 \mathrm{~V}, 0.25 \mathrm{~s}$ | kA |  |
|  | r.m.s.-value Icw | $690 \mathrm{~V}, 1 \mathrm{~s}$ | kA | 0.5 |
| Rated short circuit making capacity | Peak value Icm | $690 \mathrm{~V} / 500 \mathrm{~V}$ | kA | 0.705 |
| Rated capacitor power (The capacitor ratings are limited by the fuse link.) |  | $400 . . .415 \mathrm{~V}$ | kVAr | 6.5 |
| Power loss / pole | At rated operational current |  | W | 0.3 |
| Mechanical endurance | Divide by two for operation cycles |  | Oper. | 20000 |
| Weight without accessories | 3 -pole |  | kg | 0.11 |
|  | 4 -pole |  | kg | 0.15 |
| Cable size | Cu-wire size suitable for terminal clamps |  | mm2 | 0.75... 10 |
|  |  |  | AWG | 18-8 |
| Terminal tightening torque | Counter torque required |  | Nm | 0.8 |
| Operating torque | 3-pole switch-disconnector |  | Nm | 1 |

[^9]| 25/ OT25F | 40 / OT40F | 63 / OT63F | 80/ OT80F | 100 / OT100F | 125 / OT125F | 160 / OT160G |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 750 | 750 | 750 | 750 | 750 | 750 | 1000 |
| 6 | 6 | 6 | 6 | 6 | 6 | 10 |
| 8 | 8 | 8 | 8 | 8 | 8 | 12 |
| 32 | 40 | 63 | 80 | 115 | 125 | 160 |
| 32 | 40 | 63 | 80 | 115 | 125 | 160 |
| 25 | 32 | 50 | 63 | 80 | 100 |  |
| 6 | 10 | 16 | 25 | 35 | 50 | 70 |
| 25 | 40 | 63 | 80 | 100 | 125 | 160 |
| 25 | 40 | 63 | 80 | 100 | 125 | 160 |
| 25 | 40 | 63 | 80 | 100 | 125 | 160 |
| 25 | 40 | 63 | 80 | 100 | 125 |  |
| 25 | 40 | 63 | 80 | 100 | 125 |  |
| 20 | 23 | 63 | 75 | 80 | 90 | 160 |
| 20 | 23 | 63 | 65 | 65 | 78 | 160 |
| 20 | 23 | 45 | 58 | 60 | 70 | 160 |
| 11 | 12 | 20 | 20 | 40 | 50 | 160 |
| 25/1 | 32/1 | 63/1 | 80/1 | 100/1 | 125/1 |  |
| 25/2 | 32/2 | 63/2 | 80/2 | 100/2 | 125/2 |  |
| 25/3 | 32/3 | 63/4 | 80/4 | 100/4 | 125/4 |  |
| 16/4 | 16/4 | 16/4 | 16/4 |  |  |  |
| 16/4 | 16/4 | 16/4 | 16/4 |  |  |  |
| 25/8 | 32/8 |  |  |  |  |  |
| 25/1 | 32/1 | 63/1 | 80/1 | 100/1 | 125/1 |  |
| 25/2 | 32/2 | 63/2 | 80/2 | 100/2 | 125/2 |  |
| 25/3 | 32/4 | 45/4 | 45/4 | 63/4 | 80/4 |  |
| 10/4 | 10/4 | 10/4 | 10/4 |  |  |  |
| 25/8 | 25/8 |  |  |  |  |  |
| 25/1 | 32/1 | 63/1 | 80/1 | 100/1 | 125/1 |  |
| 25/2 | 32/2 | 63/2 | 80/2 | 100/2 | 125/2 |  |
| 25/4 | 32/4 | 45/4 | 45/4 | 63/4 | 63/4 |  |
| 10/4 | 10/4 | 10/4 | 10/4 |  |  |  |
| 16/8 | 16/8 |  |  |  |  |  |
| 4 | 5.5 | 11 | 22 | 22 | 22 | 45 |
| 9 | 11 | 22 | 37 | 37 | 45 | 75 |
| 9 | 11 | 22 | 37 | 37 | 45 | 90 |
| 9 | 11 | 22 | 37 | 37 | 45 | 132 |
| 9 | 11 | 15 | 18.5 | 37 | 45 |  |
| 160 | 184 | 360 | 640 | 640 | 720 | 1280 |
| 160 | 184 | 360 | 448 | 520 | 624 | 1280 |
| 160 | 184 | 360 | 464 | 480 | 560 | 1280 |
| 88 | 96 | 160 | 160 | 320 | 40 | 1280 |
| 100/1 | 128/1 | 180/1 | 252/1 | 400/1 | 500/1 |  |
| 100/4 | 128/4 | 180/4 | 180/4 | 252/4 | 252/4 |  |
| 100/2 | 128/2 | 180/2 | 252/2 | 400/2 | 500/2 |  |
| 40/4 | 40/4 | 40/4 | 40/4 |  |  |  |
| 64/8 | 64/8 |  |  |  |  |  |
| 6.5 | 6.5 | 13 | 13 | 16.5 | 16.5 | 30 |
| 40/32 | 40/32 | 100/80 | 100/80 | 125/125 | 125/125 | 200/200 |
|  |  | 17 | 17 |  |  |  |
|  |  | 100/80 | 100/80 |  |  |  |
|  |  |  |  | 8.2 | 8.2 |  |
|  |  |  |  | 125/100 | 125/100 |  |
| 4 | 4 | 11 | 11 | 10 | 10 | 24 |
| 25/16 | 25/16 | 80/63 | 80/63 | 63/63 | 63/63 | 200/200 |
|  |  |  |  |  |  |  |
| 0.5 | 0.5 | 1 | 1.5 | 2.5 | 2.5 | 7 |
| 0.705 | 0.705 | 1.4 | 2.1 | 3.6 | 3.6 | 12 |
| 10 | 15 | 25 | 30 | 40 | 50 | 65 |
| 0.6 | 1.6 | 2.8 | 4.5 | 4.0 | 6.3 | 6.5 |
| 20000 | 20000 | 20000 | 20000 | 20000 | 20000 | 20000 |
| 0.11 | 0.11 | 0.27 | 0.27 | 0.36 | 0.36 | 1.1 |
| 0.15 | 0.15 | 0.35 | 0.35 | 0.50 | 0.50 | 1.3 |
| 0.75... 10 | 0.75...10 | 1.5... 35 | 1.5... 35 | 10... 70 | 10... 70 | 10... 70 |
| 18-8 | 18-8 | 14-4 | 14-4 | 8-00 | 8-00 | 8-1/0 |
| 0.8 | 0.8 | 2 | 2 | 6 | 6 | 6 |
| 1 | 1 | 1.2 | 1.2 | 2 | 2 | 4 |

## Technical data

Switch-disconnectors OT160... 800

| Technical data according to IEC 60947-3 |  |  |  |  | OT200E | OT250E | OT315E | OT400E | Switch type |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  | OT160EV |  |  |  |  |  | OT630E | OT800E |
| Rated insulation voltage and rated operational voltage AC-20, DC-20 | Pollution degree 3 |  | V | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 |
| Dielectric strength |  | 50 Hz 1 min . | kV | 10 | 10 | 10 | 10 | 10 | 10 | 10 |
| Rated impulse withstand voltage |  |  | kV | 12 | 12 | 12 | 12 | 12 | 12 | 12 |
| Rated thermal current and rated operational current AC-20, DC-20 | In open air |  | A | 200 | 200 | 250 | 315 | 400 | 630 | 800 |
| in ambient $40{ }^{\circ} \mathrm{C}^{4}$ | In enclosure |  | A | 160 | 200 | 250 | 315 | 400 | 630 | 800 |
| ...with minimum cable cross section |  | Cu | $\mathrm{mm}^{2}$ | 70 | 95 | 120 | 185 | 240 | 2x185 | 2x240 |
| Rated operational current, AC-21A |  | $\leq 500 \mathrm{~V}$ | A | 200 | 200 | 250 | 315 | 400 | 630 | 800 |
|  |  | 690 V | A | 160 | 200 | 250 | 315 | 400 | 630 | 800 |
|  |  | 1000 V | A | 160 | 200 | 250 | 315 | 400 | 630 | 800 |
| Rated operational current, AC-22A |  | $\leq 500 \mathrm{~V}$ | A | 200 | 200 | 250 | 315 | 400 | 630 | 800 |
|  |  | 690 V | A | 160 | 200 | 250 | 315 | 400 | 630 | 800 |
|  |  | 1000 V | A | 160 | 200 | 250 | 315 | 400 | 630 | 800 |
| Rated operational current, AC-23A |  | $\leq 500 \mathrm{~V}$ | A | 160 | 200 | 250 | 315 | 400 | 630 | 800 |
|  |  | 690 V | A | 160 | 200 | 250 | 315 | 400 | 630 | 800 |
|  |  | 1000 V | A | 135 | 135 | 135 | 200 | 200 | 400 | 400 |
| Rated operational current / poles in series, DC-21A ${ }^{1)}$ |  | 24...110 V | A | 160/2 | 200/2 | 250/2 | 315/1 ${ }^{2}$ | 400/1 ${ }^{2)}$ | 630/1 | 800/1 |
|  |  | 220 V | A | 160/2 | 200/2 | 250/2 | $315 / 2^{2}$ | 400/22) | 630/1 | 800/1 |
|  |  | 440 V | A | 160/3 | 200/3 | 250/3 | 315/3 | 360/3 | 630/2 | 800/2 |
|  |  | 660 V | A | 160/4 | 200/4 | 230/4 ${ }^{\text {) }}$ | 315/4 | 360/4 | 630/4 ${ }^{2}$ | 650/4 ${ }^{2}$ |
| Rated operational current / |  | 800 V | A | 160/5 | 200/5 | 250/5 | 315/5 | 400/5 | 600/5 | 600/5 |
| poles in series, DC-21B |  | 1000 V | A | 160/6 | 200/6 | 250/6 | 315/6 | 400/6 | 600/6 | 600/6 |
| Rated operational power, AC-233) |  | 230 V | kW | 48 | 60 | 75 | 100 | 132 | 200 | 250 |
|  |  | 400 V | kW | 80 | 110 | 140 | 160 | 220 | 355 | 450 |
|  |  | 415 V | kW | 88 | 110 | 145 | 180 | 230 | 355 | 450 |
|  |  | 500 V | kW | 112 | 132 | 170 | 220 | 280 | 400 | 560 |
|  |  | 690 V | kW | 144 | 200 | 250 | 315 | 400 | 630 | 800 |
| Rated breaking capacity in category AC-23 |  | $\leq 500 \mathrm{~V}$ | A | 1280 | 1600 | 2000 | 2520 | 3200 | 5040 | 6400 |
|  |  | 690 V | A | 1280 | 1600 | 2000 | 2520 | 3200 | 5040 | 6400 |
|  | Icc (r.m.s.) | $100 \mathrm{kA}, 500 \mathrm{~V}$ | kA | 40.5 | 40.5 | 40.5 | 61.5 | 61.5 | 90 | 90 |

Rated conditional short-circuit current Icc (r.m.s.) and corresponding max. allowed cut-off current îc. The cut-off current îc. refers to values listed by fuse
manufacturers (single phase test acc. to IEC60269)

| Max. OFA_ <br> fuse size | $\mathrm{gG} / \mathrm{aM}$ | A | $315 / 315$ | $315 / 315$ | $315 / 315$ | $500 / 450$ | $500 / 450$ | $800 / 1000$ | $800 / 1000$ |
| :--- | ---: | ---: | ---: | ---: | ---: | ---: | ---: | ---: | ---: |
| Icc (r.m.s.) | $80 \mathrm{kA}, 690 \mathrm{~V}$ | kA | 40.5 | 40.5 | 40.5 | 59 | 59 | 83.5 | 83.5 |


| Rated short-time withstand current | r.m.s. value Icw | $\leq 1000$ V 0,15s | kA | 15 | 15 | 15 | 31 | 31 | 38 | 38 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | $\leq 1000 \mathrm{~V} 0,25 \mathrm{~s}$ | kA | 15 | 15 | 15 | 24 | 24 | 36 | 36 |
|  |  | $\leq 1000$ V 1 s | kA | 8 | 8 | 8 | 15 | 15 | 20 | 20 |
| Rated short-circuit making capacity | Peak value Icm | $\leq 1000 \mathrm{~V}$ | kA | 30 | 30 | 30 | 65 | 65 | 80 | 80 |
| Rated capacitor power when no initial charge on the capacitor | The capacitor ratings are limited by the fuse links | 415 V | kVAr | 80 | 100 | 115 | 145 | 180 | 250 | 310 |
|  |  | 500 V | kVAr | 96 | 120 | 135 | 175 | 215 | 300 | 375 |
|  |  | 690 V | kVAr | 128 | 160 | 190 | 250 | 325 | 450 | 550 |
| Power loss / pole | With rated current |  | w | 3.2 | 4 | 6.5 | 6.5 | 10 | 25 | 40 |
| Mechanical endurance | Divide by two for oper. cycles |  | Oper. | 20000 | 20000 | 20000 | 16000 | 16000 | 10000 | 10000 |
| Weight without accessories | 3-pole switch |  | kg | 1.2 | 1.2 | 1.2 | 2.2 | 2.2 | 5.2 | 5.2 |
| Terminal bolt size | Metric thread diameter x length |  | mm | M8x25 | M8x25 | M8x25 | M10x30 | M10x30 | M12x40 | M12x40 |
| Terminal tightening torque | Counter torque required |  | Nm | 15-22 | 15-22 | 15-22 | 30-44 | 30-44 | 50-75 | 50-75 |
| Operating torque | 3-pole switch disconnector |  | Nm | 7 | 7 | 7 | 16 | 16 | 27 | 27 |

1) Further ratings on request.
2) Category B.
3) These values are given for guidance and may vary acc. to the motor manufacturer.
4) Acc. to IEC 60947-1, § 6.1.1.

## Technical data

Switch-disconnectors OT1000... 4000

Technical data according to IEC 60947-3
Switch type


|  |  | 500-690V | A | 1000 | 1250 | 1600 | $2000{ }^{2(3)}$ | $2500^{2 / 3)}$ |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Rated operational current, AC-23A |  | up to 500 V | A | 1000 | 1250 | 1250 |  |  |  |  |
|  |  | 690 V | A | 1000 | 1250 | 1250 |  |  |  |  |
| Rated operational power, AC-23A (These values are given for guidance and may vary acc. to the motor manufacturer) |  | $400 . .415 \mathrm{~V}$ | kW | 560 | 710 | 710 |  |  |  |  |
|  |  | 440 V | kW | 630 | 800 | 800 |  |  |  |  |
|  |  | 500 V | kW | 710 | 900 | 900 |  |  |  |  |
|  |  | 690 V | kW | 1000 | 1200 | 1200 |  |  |  |  |
| Rated breaking capacity, AC-23A |  | up to 500 V | A | 10000 | 10000 | 10000 |  |  |  |  |
|  |  | 690 V | A | 10000 | 10000 | 10000 |  |  |  |  |
| Rated conditional short-circuit current $\mathrm{I}_{\mathrm{cc}}$ (r.m.s.) and corresponding max. allowed cut-off current $\hat{i}_{c}$. The cut-off current $\hat{i}_{c}$ refers to values listed by fuse manufacturers (single phase test acc. to IEC60269). | $\mathrm{I}_{\text {cc }}$ (r.m.s.) | 80 kA | kA | 100 | 100 | 100 |  |  |  |  |
|  | Max. OFA_fuse size gG/aM | $\leq 415 \mathrm{~V}$ | A | $\begin{aligned} & 1250 / \\ & 1250 \end{aligned}$ | $\begin{aligned} & 1250 / \\ & 1250 \end{aligned}$ | $\begin{aligned} & 1250 / \\ & 1250 \end{aligned}$ | $\begin{aligned} & 1250 / \\ & 1250 \end{aligned}$ |  |  |  |
|  | $\mathrm{I}_{\text {cc }}$ (r.m.s.) | 100 kA | kA | 106 | 106 | 106 |  |  |  |  |
|  | Max. OFA_fuse size gG/aM | $\leq 500 \mathrm{~V}$ | A | $\begin{aligned} & 1250 / \\ & 1250 \end{aligned}$ | $\begin{aligned} & 1250 / \\ & 1250 \end{aligned}$ | $\begin{aligned} & 1250 / \\ & 1250 \end{aligned}$ | $\begin{aligned} & 1250 / \\ & 1250 \end{aligned}$ |  |  |  |
| Rated short-time withstand current | r.m.s. -value $\mathrm{I}_{\mathrm{cw}}$ | $690 \mathrm{~V}, 0.25 \mathrm{~s}$ | kA | 50 | 50 | 50 | 80 | 80 | 80 | 80, 100 ${ }^{5}$ |
|  |  | $690 \mathrm{~V}, 1 \mathrm{~s}$ | kA | 50 | 50 | 50 | 55 | 55 | 80 | 80 |
| Rated short circuit making capacity | Peak value ${ }_{\text {cm }}$ | 690 V | kA | $110^{4)}$ | $110^{4)}$ | $110^{4)}$ | 176 | 176 | 176 | 176, 220 ${ }^{5}$ |
|  | Max. distance from switch frame to nearest busbar/ cable support |  | mm | 150 | 150 | 150 | 150 | 150 | 150 | 150 |
| Rated capacitor power when no initial charge on the capacitor | The capacitor ratings are limited by the fuse links | 415 V | kVAr | 460 | 575 | 575 |  |  |  |  |
|  |  | 500 V | kVAr | 550 | 690 | 690 |  |  |  |  |
|  |  | 690 V | kVAr | 750 | 950 | 950 |  |  |  |  |
| Power loss/pole | At rated operational current |  | w | 19 | 29 | 48 | 55 | 85 | 95 | 130 |
| Mechanical endurance | Divide by two for operation cycles |  | Oper. | 6000 | 6000 | 6000 | 6000 | 6000 | 5000 | 5000 |
| Weight without accessories | 3 -pole |  | kg | 14.1 | 14.1 | 15.2 | 22 | 22 | 24.7 | 28.9 |
|  | 4-pole |  | kg | 18 | 18 | 19.5 | 28 | 28 | 32.1 | 37.7 |
| Terminal bolt size | Metric thread diameter x length |  | mm | M12x50 | M12x50 | M12x60 | M12x60 | M12x60 | M12x60 | M12x60 |
| Terminal tightening torque | Counter torque required |  | Nm | 50... 75 | 50... 75 | 50... 75 | 50... 75 | 50...75 | 50... 75 | 50... 75 |
| Operating torque | 3-pole switchdisconnector |  | Nm | 65 | 65 | 65 | 65 | 65 | 65 | 65 |

[^10]
## Technical data

Motorized switch-disconnectors, IEC



[^11]
## Technical data

Motorized switch-disconnectors, IEC

|  |  |  |  |  |  |  |  |  |  | witch type |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Technical data according to IEC 60947-3 |  |  | OTM160EV |  | OTM200E | OTM250E | OTM315E | OTM400E | OTM630E | OTM800E |
| Rated insulation voltage and rated operational voltage AC-20, DC-20 | Pollution degree 3 |  | V | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 |
| Dielectric strength |  | $\begin{aligned} & 50 \mathrm{~Hz} \\ & 1 \mathrm{~min} . \end{aligned}$ | kV | 10 | 10 | 10 | 10 | 10 | 10 | 10 |
| Rated impulse withstand voltage |  |  | kV | 12 | 12 | 12 | 12 | 12 | 12 | 12 |
| Rated thermal current and rated operational current $\mathrm{AC}-20$, DC-20 | In open air |  | A | 200 | 200 | 250 | 315 | 400 | 630 | 800 |
| in ambient $40^{\circ} \mathrm{C}^{4)}$ | In enclosure |  | A | 160 | 200 | 250 | 315 | 400 | 630 | 800 |
| ...with minimum cable cross section |  | Cu | $\mathrm{mm}^{2}$ | 70 | 95 | 120 | 185 | 240 | 2x185 | $2 \times 240$ |
| Rated operational current, AC-21A |  | $\leq 500$ V | A | 200 | 200 | 250 | 315 | 400 | 630 | 800 |
|  |  | 690 V | A | 160 | 200 | 250 | 315 | 400 | 630 | 800 |
|  |  | 1000 V | A | 160 | 200 | 250 | 315 | 400 | 630 | 800 |
| Rated operational current, AC-22A |  | $\leq 500$ V | A | 200 | 200 | 250 | 315 | 400 | 630 | 800 |
|  |  | 690 V | A | 160 | 200 | 250 | 315 | 400 | 630 | 800 |
|  |  | 1000 V | A | 160 | 200 | 250 | 315 | 400 | 630 | 800 |
| Rated operational current, AC-23A |  | $\leq 500 \mathrm{~V}$ | A | 160 | 200 | 250 | 315 | 400 | 630 | 800 |
|  |  | 690 V | A | 160 | 200 | 250 | 315 | 400 | 630 | 800 |
|  |  | 1000 V | A | 135 | 135 | 135 | 200 | 200 | 400 | 400 |
| Rated operational current / poles in series, DC-21A ${ }^{1)}$ |  | 24...110 V | A | 160/2 | 200/2 | 250/2 | $315 / 1^{2)}$ | 400/1 ${ }^{\text {2 }}$ | 630/1 | 800/1 |
|  |  | 220 V | A | 160/2 | 200/2 | 250/2 | $315 / 2^{2)}$ | 400/22) | 630/1 | 800/1 |
|  |  | 440 V | A | 160/3 | 200/3 | 250/3 | 315/3 | 360/3 | 630/2 | 800/2 |
|  |  | 660 V | A | 160/4 | 200/4 | 230/4 ${ }^{\text {2 }}$ | 315/4 | 360/4 | 630/4 ${ }^{2}$ | 650/42 |
| Rated operational current / poles in series, DC-21B |  | 800 V | A | 160/5 | 200/5 | 250/5 | 315/5 | 400/5 | 600/5 | 600/5 |
|  |  | 1000 V | A | 160/6 | 200/6 | 250/6 | 315/6 | 400/6 | 600/6 | 600/6 |
| Rated operational power, AC-23 |  | 230 V | kW | 48 | 60 | 75 | 100 | 132 | 200 | 250 |
|  |  | 400 V | kW | 80 | 110 | 140 | 160 | 220 | 355 | 450 |
| (These values are given for guidance and may vary acc. to the motor manufacturer) |  | 415 V | kW | 88 | 110 | 145 | 180 | 230 | 355 | 450 |
|  |  | 500 V | kW | 112 | 132 | 170 | 220 | 280 | 400 | 560 |
|  |  | 690 V | kW | 144 | 200 | 250 | 315 | 400 | 630 | 800 |
| Rated breaking capacity in category AC-23 |  | $\leq 500$ V | A | 1280 | 1600 | 2000 | 2520 | 3200 | 5040 | 6400 |
|  |  | 690 V | A | 1280 | 1600 | 2000 | 2520 | 3200 | 5040 | 6400 |
| Rated conditional short-circuit current $\mathrm{Icc}_{\text {c }}$ <br> (r.m.s.) and corresponding max. <br> allowed <br> cut-off current $\hat{i}_{c}$. The cut-off current $\hat{i}_{c}$. <br> refers to values listed by fuse manufacturers (single phase test acc. to IEC60269) | $\mathrm{I}_{\text {cc }}$ (r.m.s.) | $\begin{array}{r} 100 \mathrm{kA}, \\ 500 \mathrm{~V} \\ \hline \end{array}$ | kA | 40.5 | 40.5 | 40.5 | 61.5 | 61.5 | 90 | 90 |
|  | Max. OFA_fuse size | gG/aM | A | 315/315 | 315/315 | 315/315 | 500/450 | 500/450 | $\begin{array}{r} 800 / 1 \\ 000 \\ \hline \end{array}$ | $\begin{array}{r} 800 / 1 \\ 000 \\ \hline \end{array}$ |
|  | $\mathrm{I}_{\mathrm{cc}}$ (r.m.s.) | $\begin{array}{r} 80 \mathrm{kA}, 690 \\ \mathrm{~V} \end{array}$ | kA | 40.5 | 40.5 | 40.5 | 59 | 59 | 83.5 | 83.5 |
|  | $\begin{aligned} & \text { Max. OFA_fuse } \\ & \text { size } \end{aligned}$ | gG/aM | A | 355/315 | 355/315 | 355/315 | 500/500 | 500/500 | $\begin{array}{r} 800 / 1 \\ 000 \end{array}$ | $\begin{array}{r} 800 / 1 \\ 000 \end{array}$ |
| Rated short-time withstand current | r.m.s. value $\mathrm{I}_{\mathrm{cw}}$ | $\begin{array}{r} \leq 1000 \mathrm{~V} \\ 0,15 \mathrm{~s} \end{array}$ | kA | 15 | 15 | 15 | 31 | 31 | 38 | 38 |
|  |  | $\begin{array}{r} \leq 1000 \mathrm{~V} \\ 0,25 \mathrm{~s} \\ \hline \end{array}$ | kA | 15 | 15 | 15 | 24 | 24 | 36 | 36 |
|  |  | $\leq 1000 \mathrm{~V} 1 \mathrm{~s}$ | kA | 8 | 8 | 8 | 15 | 15 | 20 | 20 |
| Rated short-circuit making capacity | Peak value $\mathrm{I}_{\text {cm }}$ | $\leq 1000 \mathrm{~V}$ | kA | 30 | 30 | 30 | 65 | 65 | 80 | 80 |
| Rated capacitor power when no initial charge on the capacitor | The capacitor ratings are limited by the fuse links | 415 V | kVAr | 80 | 100 | 115 | 145 | 180 | 250 | 310 |
|  |  | 500 V | kVAr | 96 | 120 | 135 | 175 | 215 | 300 | 375 |
|  |  | 690 V | kVAr | 128 | 160 | 190 | 250 | 325 | 450 | 550 |
| Power loss / pole | With rated current |  | W | 3.2 | 4 | 6.5 | 6.5 | 10 | 25 | 40 |
| Mechanical endurance | Divide by two for oper. cycles |  | Oper. | 20000 | 20000 | 20000 | 16000 | 16000 | 10000 | 10000 |
| Weight without accessories | 3-pole switch |  | kg | 1.2 | 1.2 | 1.2 | 2.2 | 2.2 | 5.2 | 5.2 |
| Terminal bolt size | Metric thread diameter x length |  | mm | M8x25 | M8x25 | M8x25 | M10x30 | M10x30 | M12x40 | M12x40 |
| Terminal tightening torque | Counter torque required |  | Nm | 15-22 | 15-22 | 15-22 | 30-44 | 30-44 | 50-75 | 50-75 |
| Operating torque | 3-pole switch disconnector |  | Nm | 7 | 7 | 7 | 16 | 16 | 27 | 27 |

[^12]${ }^{2)}$ Category B.

## Technical data

Motorized switch-disconnectors, IEC


| Switch type |  |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Technical data according to IEC 60947-3 |  |  | OTM1000E |  | OTM1250E | OTM1600E OTM2000E |  | OTM2500E OTM3200E |  | OTM4000E |
| Rated insulation voltage and rated operational voltage AC20/DC20 | Pollution degree 3 |  | V | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 |
| Dielectric strength |  | 50 Hz 1 min . | kV | 10 | 10 | 10 | 10 | 10 | 10 | 10 |
| Rated impulse withstand voltage |  |  | kV | 12 | 12 | 12 | 12 | 12 | 8 | 8 |
| Rated thermal current and rated operational current AC20/ | Ambient $40^{\circ} \mathrm{C}^{1)}$ | In open air | A | 1000 | 1250 | 1600 | 2000 | 2500 | 3200 | $\begin{gathered} 3800^{2)}, \\ 4000^{5} \end{gathered}$ |
| DC20 | Ambient $40^{\circ} \mathrm{C}^{1)}$ | In enclosure | A | 1000 | 1250 | 1600 |  |  |  |  |
| ..with minimum conductor cross section | Cu |  | $\mathrm{mm}^{2}$ | 2x300 | 2x400 | 2x500 | $3 \times 500$ | 4×500 | $4 \times 1000$ | $5 \times 1000$ |
| Rated operational current, AC-21A |  | up to 690 V | A | 1000 | 1250 | 1600 | $2000{ }^{2)}$ | $2500{ }^{2}$ |  |  |
|  |  | 1000 V | A | 1000 | 1250 | 1600 |  |  |  |  |
| Rated operational current, AC-22A |  | up to 415 V | A | 1000 | 1250 | 1600 | $2000{ }^{2 \prime}$ | $2500{ }^{2}$ | $3200{ }^{2}$ | $\begin{gathered} 3800^{2)}, \\ 4000^{5} \end{gathered}$ |
|  |  | 500-690 V | A | 1000 | 1250 | 1600 | $2000^{233}$ | $2500^{213)}$ |  |  |
| Rated operational current, AC-23A |  | up to 500 V | A | 1000 | 1250 | 1250 |  |  |  |  |
|  |  | 690 V | A | 1000 | 1250 | 1250 |  |  |  |  |
| Rated operational power, AC-23A |  | $400 . .415 \mathrm{~V}$ | kW | 560 | 710 | 710 |  |  |  |  |
| (These values are given for guidance |  | 440 V | kW | 630 | 800 | 800 |  |  |  |  |
|  |  | 500 V | kW | 710 | 900 | 900 |  |  |  |  |
| may vary acc. to the motor manufacturer) |  | 690 V | kW | 1000 | 1200 | 1200 |  |  |  |  |
| Rated breaking capacity, AC-23A |  | up to 500 V | A | 10000 | 10000 | 10000 |  |  |  |  |
|  |  | 690 V | A | 10000 | 10000 | 10000 |  |  |  |  |
| Rated conditional short-circuit | $\mathrm{I}_{\text {cc }}$ (r.m.s.) | 80 kA | kA | 100 | 100 | 100 |  |  |  |  |
| current ${ }_{\text {cc }}$ <br> (r.m.s.) and corresponding max. <br> allowed | Max. OFA_ <br> fuse size <br> gG/aM | $\leq 415 \mathrm{~V}$ | A | $\begin{array}{r} 1250 / \\ 1250 \end{array}$ | $\begin{array}{r} 1250 / \\ 1250 \end{array}$ | $\begin{array}{r} 1250 / \\ 1250 \end{array}$ |  |  |  |  |
| cut-off current $\hat{1}_{c}$. The cut-off current $\hat{1}_{c}$ | $\mathrm{I}_{\text {cc }}$ (r.m.s.) | 100 kA | kA | 106 | 106 | 106 |  |  |  |  |
| manufacturers (single phase test acc. to IEC60269). | Max. OFA <br> fuse size <br> gG/aM | $\leq 500 \mathrm{~V}$ | A | $\begin{array}{r} 1250 / \\ 1250 \end{array}$ | $\begin{array}{r} 1250 / \\ 1250 \end{array}$ | $\begin{array}{r} 1250 / \\ 1250 \end{array}$ |  |  |  |  |
| Rated short-time withstand current | r.m.s. -value $\mathrm{I}_{\mathrm{cw}}$ | $690 \mathrm{~V}, 0.25 \mathrm{~s}$ | kA | 50 | 50 | 50 | 80 | 80 | 60 | 60 |
|  |  | $690 \mathrm{~V}, 1 \mathrm{~s}$ | kA | 50 | 50 | 50 | 55 | 55 |  |  |
| Rated short circuit making capacity | Peak value $\mathrm{I}_{\text {cm }}$ | 690 V | kA | 1104) | 1104) | $110^{4)}$ | 176 | 176 | 176 | 176 |
|  | Max. distance |  | mm | 150 | 150 | 150 | 150 | 150 | 150 | 150 | from

switch frame to
nearest busbar/
cable support


[^13]${ }^{2}$ ) IEC 947-3, utilization category B, infrequent operation.
${ }^{3)}$ Phase barriers or terminal shrouds must be used on both sides of the switch at voltages $\geq 500 \mathrm{~V}$.
${ }^{4}$ ) The value is 92 kA for 4 -pole switch-disconnectors.
${ }^{5}$ ) OTM4000E_W8_

## Technical data

Motor operators OTM40... 4000

| Data for motor operator of switch-diconnectors, OTM according to IEC 60947 |  |  |  |  |  |  |  | Switch type |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  |  | OTM40... 125 | OTM160... 250 | OTM315...400 | OTM600... 800 | OTM1000... 4000 |
| Rated operational voltage $U_{\text {e }}$ | Pollution degree 3 |  | $\begin{array}{r} \hline \mathrm{VAC/} \\ \mathrm{DC} \end{array}$ | 110... 240 |  |  |  |  |
|  | $50 / 60 \mathrm{~Hz}$ |  | V AC |  | 220... 240 | 220... 240 | 220... 240 | 220... 240 |
| Operating voltage range |  |  |  | 0.85...1.1 $\times$ U | 0.85...1.1 x U | 0.85...1.1 x U | 0.85...1.1 x U | 0.85...1.1 $\times$ U |
| Operating time ${ }^{1)}$ | $90^{\circ} 1-0,0-1$ | $\begin{array}{r} 110 \ldots 240 \mathrm{~V} \\ \mathrm{AC} / \mathrm{DC} \end{array}$ | s | 0.5..1.0 |  |  |  |  |
|  |  | 24 V DC | s | 0.6...1.3 |  |  |  |  |
|  |  | 220-240 VAC | s |  | 0.5...1.0 | 0.5...1.0 | 0.5...1.5 | 1.0...2.0 |
| Nominal current $\mathrm{In}^{1 \text { 1 }}$ |  | 220-240 VAC | A |  | 0,3 | 0,5 | 0,9 | 1,4 |
| Current inrush ${ }^{1 \text { 1 }}$ |  | 220-240 VAC | A |  | 1,5 | 2,5 | 4 | 10 |
| Overload fuse | Type / In / Capacity | 220-240 VAC | mA |  | T / 315 / H | T/500 / H | T/1000 / H | T/2000 / H |
|  | Size |  | mm |  | $5 \times 20$ | $5 \times 20$ | $5 \times 20$ | $5 \times 20$ |
| Operating rate | Max. <br> continuous |  | cycles / min | 1 | 1 | 1 | 1 | 0,5 |
|  | Max. shorttime $\leq 10$ cycles |  | cycles / min | 10 | 10 | 10 | 10 | 5 |
| Overvoltage category |  |  |  | III | III | III | III | III |
| Rated impulse withstand voltage $U_{i m p}$ |  |  | kV | 4 | 4 | 4 | 4 | 4 |
| Dielectric strength |  | 50 Hz 1 min . | kV | 1,5 | 1,5 | 1,5 | 1,5 | 1,5 |
| Impulse command |  | Min. impulse |  |  |  |  |  |  |
|  |  | duration | ms | 100 | 100 | 100 | 100 | 100 |
| Terminals |  |  |  |  |  |  |  |  |
| Voltage supply wiring for Ue |  |  |  | PE-N-L | PE-N-L | PE-N-L | PE-N-L | PE-N-L |
| Cross section |  | solid/ <br> stranded | $\mathrm{mm}^{2}$ | 1.5...2.5 | 1.5...2.5 | 1.5...2.5 | 1.5...2.5 | 1.5...2.5 |
| Short-circuit protection device |  | max.MCB/ fuse size | A | 16 | 16 | 16 | 16 | 16 |
| Control terminal for the push -buttons |  |  |  | C-I-O | C-1-O | C-I-O | C-I-O | C-I-O |
| Push-button control |  |  |  |  | no SELV | no SELV | no SELV | no SELV |
| Cross section |  | solid/ stranded | $\mathrm{mm}^{2}$ | 1.5-2.5 | 1.5-2.5 | 1.5...2.5 | 1.5...2.5 | 1.5...2.5 |
| Maximum cable length |  |  | m | 100 | 100 | 100 | 100 | 100 |
| Terminal for state information |  | solid/ <br> stranded | $\mathrm{mm}^{2}$ | 1,5 |  |  |  |  |
| State information of locking |  |  |  |  | no SELV | no SELV | no SELV | no SELV |
| Common, voltage supply |  | 11 |  | $\begin{aligned} & 3 \mathrm{~A} / \mathrm{AC}- \\ & 1 / 250 \mathrm{~V} \end{aligned}$ |  |  |  |  |
| Handle attached or motor operator locked |  | 14 |  | $\begin{aligned} & \text { 3A/AC- } \\ & 1 / 250 \mathrm{~V} \end{aligned}$ |  |  |  |  |
|  |  | $\begin{array}{r} 11-12-14 \\ (\mathrm{C} / \mathrm{O}) \\ \hline \end{array}$ | cos=1 |  | 5A/250V | 5A/250V | 5A/250V | 5A/250V |
| Locking motor operator |  | 23-24 (NO) | $\cos =1$ |  | 5A/250V | 5A/250V | 5A/250V | 5A/250V |
| Short-circuit protection device |  | MCB type and size | A | C/2A | C/2A | C/2A | C/2A | C/2A |
| Protection degree (front panel) |  |  |  | IP20 | IP20 | IP20 | IP20 | IP20 |
| Operating temperature |  |  | ${ }^{\circ} \mathrm{C}$ | $-25 . .+55$ | -25...+55 | -25...+55 | $-25 . .+55$ | -25...+55 |
| Transportation and storage temperature |  |  | ${ }^{\circ} \mathrm{C}$ | $-40 . . .+70$ | -40...+70 | -40...+70 | $-40 . .+70$ | -40...+70 |
| Max. altitude |  |  | m | 2000 | 2000 | 2000 | 2000 | 2000 |

[^14]Technical data for OTDC16...1600, IEC

Technical data according to IEC 60947 for switch-disconnectors OTDC16... 250


| Switch size |  |  | OTDC16F OTDC25F OTDC32F |  |  | OTDC16U <br> $1250^{\text {1) }}$ | $\qquad$ <br> $1250^{1)}$ | $\frac{\text { OTDC32U }}{1250^{11}}$ |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Rated insulation voltage Ui | Pollution degree 2 | V | $1250{ }^{\text {1) }}$ | $1250{ }^{1)}$ | $1250{ }^{\text {1) }}$ |  |  |  |
|  | Pollution degree 3 | V | $1000{ }^{\text {1) }}$ | $1000{ }^{1)}$ | $1000{ }^{\text {1) }}$ | $1000{ }^{\text {1) }}$ | $1000{ }^{1)}$ | $1000{ }^{\text {1) }}$ |
| Rated impulse withstand voltage |  | kV | 8 | 8 | 8 | 8 | 8 | 8 |
| Rated thermal current Ith | In open air, normal conditions 2) | A | 25 | 32 | 45 | 40 | 50 | 63 |
|  | In enclosure $40^{\circ} \mathrm{C}$ | A | 25 | 32 | 45 | 32 | 40 | 50 |
|  | In enclosure $60^{\circ} \mathrm{C}$ | A | 25 | 32 | 32 | 25 | 32 | 40 |
| ...with minimum cable or bar cross section | Cu | $\mathrm{mm}^{2}$ | 4 | 6 | 10 | 4 | 6 | 10 |
| Rated operational current / poles in series DC-21B | 500 One circuit | V |  |  |  |  |  |  |
|  | 660 One circuit | V | 16/2 | 25/2 | 32/2 | 16/2 | 25/2 |  |
|  | Two circuits | v |  | 25/2 | 32/2 | 16/2 | 25/2 | 32/2 |
|  | 1000 One circuit | v | 10/2 | 16/2 | 20/2 | $10 / 2^{3)}$ | $16 / 2{ }^{3)}$ |  |
|  |  | v | 16/3 | 25/3 | 32/3 |  |  |  |
|  | Two circuits | v | 10/2 | 16/2 | 20/2 | 10/2 ${ }^{3)}$ | $16 / 2^{3)}$ | 20/2 ${ }^{3)}$ |
|  | Three circuits | V |  |  |  | $10 / 2^{3)}$ |  |  |
|  | 1500 One circuit | v |  |  |  |  |  |  |
| Rated short-time withstand current, $1000 \mathrm{~V}, 1 \mathrm{~s}$ | R.M.S. -value Icw | kA | 0,4 | 0,6 | 0,8 | 1,0 | 1,0 | 1,0 |
| Rated conditional short-circuit current Ip (r.m.s.) | $\begin{aligned} & \text { Ip (r.m.s.), } \\ & 1000 \mathrm{~V} \end{aligned}$ | kA |  |  |  | 10 | 10 | 10 |
|  | Max fuse size, gPV | A |  |  |  | 80 | 80 | 80 |
| Power loss / pole | At rated current | w | 0,15 | 0,3 | 0,5 | 0,1 | 0,2 | 0,35 |
| Terminal cable size | Cu | $\mathrm{mm}^{2}$ | 2.5...16 | 2.5... 16 | 2.5... 16 | 2.5...16 | 2.5...16 | 2.5...16 |
| Terminal bolt size | Metric thread diameter $\times$ length | mm |  |  |  |  |  |  |
| Terminal tightening torque | Counter torque required | Nm |  |  |  |  |  |  |

${ }^{1)}$ When used with external handle. For use with direct mounted handle, see installation instruction.
${ }^{\text {2) }}$ Normal conditions defined in IEC 60947-1-6.1
${ }^{3)} U$ and UT types only. (Not applicable for US nor UST.)

## Technical data

OTDC S2.0-Series IEC


OTDC100...250_G_

Technical data according to IEC 60947 for switch-disconnectors OTDC100G_...250G_

| Switch size |  |  | A | OTDC100G_ | OTDC160G_ | OTDC200G_ | OTDC250G_ |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Rated insulation voltage $\mathrm{U}_{\mathrm{i}}$ | Pollution degree 2 |  | V | 1500 | 1500 | 1500 | 1500 |
| Rated impulse withstand voltage |  |  | kV | 12 | 12 | 12 | 12 |
| Rated thermal current $\mathrm{I}_{\text {th }}{ }^{\text {1) }}$ | In open air, normal conditions ${ }^{2)}$ |  | A | 100 | 160 | 200 | 250 |
|  | In enclosure $40^{\circ} \mathrm{C}$ |  | A | 100 | 160 | 200 | 250 |
|  | In enclosure $50^{\circ} \mathrm{C}$ |  | A | 100 | 160 | 200 | 250 |
|  | In enclosure $60^{\circ} \mathrm{C}$ |  | A | 100 | 160 | 200 | 219 |
|  | In enclosure $70^{\circ} \mathrm{C}$ |  | A | 100 | 146 | 169 | 185 |
|  | In enclosure $80^{\circ} \mathrm{C}$ |  | A | 88 | 115 | 133 | 146 |
| $\ldots$...with cable or bar cross section | Cu |  | $\mathrm{mm}^{2}$ | 35 | 70 | 95 | 120 |
| Rated operational <br> current le ${ }^{3)}$, <br> poles in series DC-21B <br>  DC-PV1 | 1000V | $2 \mathrm{P}(1 \mathrm{P}+$, 1P-) | A | 100 | 160 | 200 | 250 |
|  |  | 4P (2P+, 2P-) | A | 100 | 160 | 200 | 250 |
|  | 1500V | $2 \mathrm{P}(1 \mathrm{P}+, 1 \mathrm{P}-)$ | A | 100 | 160 | 200 | 250 |
|  |  | 4P (2P+, 2P-) | A | 100 | 160 | 200 | 250 |
|  | 1000V | 2P (1P+, 1P-) | A | 100 | 160 | 200 | 200 |
|  |  | 4P (2P+, 2P-) | A | 100 | 160 | 200 | 200 |
|  | 1500V | $2 \mathrm{P}(1 \mathrm{P}+, 1 \mathrm{P}-)$ | A | 100 | 160 | 200 | 200 |
|  |  | 4P (2P+, 2P-) | A | 100 | 160 | 200 | 200 |
| DC-PV2 | 1000V | $2 \mathrm{P}(1 \mathrm{P}+, 1 \mathrm{P}-)$ | A | 100 | 160 | 200 | 200 |
|  |  | $4 \mathrm{P}(2 \mathrm{P}+, 2 \mathrm{P}-)$ | A | 100 | 160 | 200 | 200 |
|  | 1500V | $2 \mathrm{P}(1 \mathrm{P}+, 1 \mathrm{P}-)$ | A | 100 | 100 | 100 | 100 |
|  |  | $4 \mathrm{P}(2 \mathrm{P}+, 2 \mathrm{P}-)$ | A | 100 | 100 | 100 | 100 |
| Rated short-time withstand current, 1500V, 0,1 | R.M.S. -value $\mathrm{I}_{\mathrm{cw}}$ |  | kA | 10 | 10 | 10 | 10 |
| Rated short circuit making capacity, 1500V | Peak value $\mathrm{I}_{\mathrm{cm}}$ |  | kA | 10 | 10 | 10 | 10 |
| Power loss / pole | At rated current |  | W | 1,0...1,3 | 3,1...3,5 | 5,0...5,5 | 7,7...8,4 |
| Terminal bolt size | Metric thread diameter x length |  | mm | M8x25 | M8x 25 | M8x25 | M8x25 |
| Terminal tightening torque | Counter torque required |  | Nm | 15... 22 | 15... 22 | 15... 22 | 15... 22 |
| Mechanical Endurance | Cycles |  | - | 10.000 |  |  |  |
| Operating altitude without derating |  |  | m | $\leq 2000$ |  |  |  |
| Operating torque | 2P/4P |  | Nm | 6... 9 | 6... 9 | 6... 9 | 6... 9 |

[^15]
## Technical data

OTDC S2.0-Series for higher short-circuit currents IEC


[^16]
## Technical data

OTDC M-Series IEC

-דTDC315...800F_11


OTDC800...1000F_22

Technical data according to IEC 60947 for switch-disconnectors OTDC315F...1000F

${ }^{1)}$ For more detailed derating please consult us. Installation condition may influence on the derating by increasing the possible rated current. The given deratings are references based on specific test setup.
${ }^{2)}$ Normal conditions defined in IEC 60947-1, section 6.1.
${ }^{3}$ ) 4 -pole-types with 2-poles in parallel _ 22 models, OTDCKIT800FS11 is included to the package - installation mandatory.

## Technical data

OTDC M-Series for higher short-circuit currents IEC


Technical data according to IEC 60947 for switch-disconnectors OTDC315F_...1000F_-ESS

| Switch size |  |  |  | $\begin{aligned} & \text { OTDC } \\ & \text { 315F_- } \\ & \text { ESS } \end{aligned}$ | OTDC 400F_ESS | OTDC 500F_- <br> ESS | OTDC <br> 630F_- <br> ESS | $\begin{aligned} & \text { OTDC } \\ & \text { 800F_22- } \\ & \text { ESS } \\ & \hline \end{aligned}$ | $\begin{aligned} & \text { OTDC } \\ & \text { 1000F_22- } \\ & \text { ESS } \\ & \hline \end{aligned}$ |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Rated insulation voltage $U_{i}$ |  | Pollution degree 3 | V | 1500 | 1500 | 1500 | 1500 | 1500 | 1500 |
| Rated impulse withstand voltage |  |  | kV | 12 | 12 | 12 | 12 | 12 | 12 |
| Rated thermal current Ith ${ }^{1)}$ |  | In open air, normal conditions ${ }^{2)}$ | A | 315 | 400 | 500 | 630 | 800 | 1000 |
|  |  | In enclosure $40^{\circ} \mathrm{C}$ | A | 315 | 400 | 500 | 630 | 800 | 1000 |
|  |  | In enclosure $50^{\circ} \mathrm{C}$ | A | 315 | 400 | 475 | 567 | 800 | 1000 |
|  |  | In enclosure $60^{\circ} \mathrm{C}$ | A | 293 | 352 | 415 | 498 | 664 | 830 |
|  |  | In enclosure $80^{\circ} \mathrm{C}$ | A | 195 | 232 | 275 | 328 | 440 | 550 |
| $\ldots$...with cable or bar cross section |  | Cu | $\mathrm{mm}^{2}$ | 185 | 240 | 2×150 | 2×185 | 2x240 | $4 \times 150$ |
| Rated operational current $I_{e}$ Poles in series | -21B 1000V | 1 circuit $\quad 2 \mathrm{P}(1 \mathrm{P}+, 1 \mathrm{P}-)$ | A | 315 | 400 | 500 | 630 | $800{ }^{\text {3) }}$ | $1000{ }^{3)}$ |
|  | 1500V |  | A | 315 | 400 | 500 | 630 | $800{ }^{3)}$ | $1000{ }^{3)}$ |
|  | DC-PV1 1000V |  | A | 315 | 400 | 500 | 500 | $800{ }^{3)}$ | $1000{ }^{3)}$ |
|  | DC-PV1 1500V |  | A | 315 | 400 | 500 | 500 | $800{ }^{3)}$ | $1000{ }^{3)}$ |
|  | 1000V |  | A | 315 | 400 | 500 | 500/630 ${ }^{3}$ | $800^{3)}$ | - |
|  | DC-PV2 1500V |  | A | 315 | 400 | 500 | 500/630 ${ }^{3}$ | $800^{3)}$ | - |
|  | DC-22B 1000V |  | A | 315 | 400 | 400 | 400 | - | - |
|  | DC-22B 1500V |  | A | 315 | 400 | 400 | 400 | - | - |
| Rated short-time withstand current $\mathrm{I}_{\mathrm{cw}}, 1500 \mathrm{~V}$ |  | 1 | kA | 10 | 10 | 10 | 10 | 10 | 10 |
|  |  | R.M.S. -value $I_{c w} \quad 0,1$ | kA | 20 | 20 | 20 | 20 | 63 | 63 |
| Rated short circuit making capacity $\mathrm{I}_{\mathrm{cm}}, 1500 \mathrm{~V}$ |  | Peak value, $\mathrm{I}_{\text {cm }}$ | kA | 20 | 20 | 20 | 20 | 63 | 63 |
| Rated conditional short-circuit current $I_{q}, 1500 \mathrm{~V}$ Required protection |  | R.M.S. - value ${ }_{q}$ | kA | 30 | 30 | 30 | 30 | - | - |
|  |  | Max. ETI fuse size gPV, L/R=3 ms | A | $500{ }^{4)}$ | $500{ }^{4)}$ | $500{ }^{4)}$ | $500{ }^{4)}$ | - | - |
| Rated conditional short-circuit current $\mathrm{I}_{\mathrm{q}}, 1500 \mathrm{~V}^{5)}$ |  | R.M.S. - value $\mathrm{I}^{\prime}$, $\mathrm{L} / \mathrm{R}=5 \mathrm{~ms}$ | kA | 70 | 70 | 70 | 70 | - | - |
|  |  | Allowed let through peak | kA | 29 | 29 | 29 | 29 | - | - |
|  |  | Allowed let through energy $1^{1} \mathrm{t}$ | MA ${ }^{2} \mathrm{~S}$ | 2,3 | 2,3 | 2,3 | 2,3 | - | - |
| Rated conditional short-circuit current $\mathrm{I}_{\mathrm{q}}, 1500 \mathrm{~V}^{5)}$ |  | R.M.S. - value $\mathrm{I}_{\mathrm{\prime}}, \mathrm{~L} / \mathrm{R}=0.5 \mathrm{~ms}$ | kA | 100 | 100 | 100 | 100 | 100 | 100 |
|  |  | Allowed let through peak | kA | 53 | 53 | 53 | 53 | 70 | 70 |
|  |  | Allowed let through energy $1^{2} \mathrm{t}$ | MA ${ }^{2} \mathrm{~S}$ | 1,1 | 1,1 | 1,1 | 1,1 | 2,4 | 2,4 |
| Power loss/pole |  | At maximum rated current | W | 7-8 | 12-13 | 18-20 | 30-32 | 22-24 | 37-40 |
| Terminal bolt size |  | Metric thread diameter $x$ length mm |  | M10x30 | M10x30 | M12x40 | M12x40 | M12x40 | M12x40 |
| Terminal tightening torque |  | Counter torque required | Nm | 30-44 | 30-44 | 50-75 | 50-75 | 50-75 | 50-75 |
| Mechanical Endurance |  | Cycles | - | 10000 |  |  |  |  |  |
| Operating altitude without derating |  |  | m | $\leq 2000$ |  |  |  |  |  |
| Operating torque |  | 2 P |  | 11... 19 | 11... 19 | 11... 19 | 11... 19 |  |  |
|  |  | 4P | Nm | 18... 30 | 18... 30 | 18... 30 | 18... 30 | 18... 30 | 18... 30 |
|  |  | 6P |  | 18... 35 | 18... 35 | 18... 35 |  |  |  |

${ }^{1)}$ For more detailed derating please consult us. Installation condition may have an influence on the derating by increasing the possible rated current. The given deratings are references based on specific test setup.
${ }^{2)}$ Normal conditions defined in IEC 60947-1, section 6.1.
${ }^{3)}$ 4-pole-types with 2-poles in parallel _ 22 models, OTDCKIT800FS11 is included in the package and installation is mandatory
${ }^{4)}$ Fuse manufacturer, size and type: ETI, 500A, Cat.no 004110 followed by 718,723 or 728 . More details from the fuse manufacturer catalog.
${ }^{5)}$ Any fuse, which does not exceed stated values, can be used.

## Manual change-over switches

The growing importance of a secure power supply

ABB offers a wide variety of manual change-over switches, from 16 to 3200 Amperes in range. Manual change-over switches are available with three different transition types; Open, fast or closed.



Single terminal per pole construction A single terminal per pole across the entire range also eliminates the need to use additional fixing sets to do connections and creating savings in terms of energy consumption and space occupied.


## Modular and flexible

The modular and flexible construction, which can even include an adjustable periscopic haft, allows for different arrangements of the poles and handle, providing you with the opportunity to create unique space saving solutions for your customers.


UL/CSA certified performance
To complement our wide range of manual change-over switches, we also offer open transition manual changeover switches designed according to UL/CSA certification standards in a power range from 30 to 800 Amperes.

## Manual change-over switches

Technical data for OT16...125_C

## Manual change-over switches

|  |  |  |  |  |  |  |  |  | Switch size |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Data according to IEC 60947-3 |  |  |  | OT16_ | OT25_ | OT40_ | OT63_ | OT80_ | OT100_ | OT125 |
| Rated insulation voltage and rated operational voltage AC20/DC20 |  | Pollution degree 3 | V | 750 | 750 | 750 | 750 | 750 | 750 | 750 |
| Dielectric strength |  | 50 Hz 1 min . | kV | 6 | 6 | 6 | 6 | 6 | 6 | 6 |
| Rated impulse withstand voltage |  |  | kV | 8 | 8 | 8 | 8 | 8 | 8 | 8 |
| Rated thermal current and rated operational current AC20/DC20 | / ambient $40^{\circ} \mathrm{C}$ | In open air | A | 25 | 32 | 40 | 63 | 80 | 115 | 125 |
|  | / ambient $40^{\circ} \mathrm{C}$ | In enclosure | A | 25 | 32 | 40 | 63 | 80 | 115 | 125 |
|  | / ambient $60^{\circ} \mathrm{C}$ | In enclosure | A | 20 | 25 | 32 | 50 | 63 | 80 | 100 |
| ..with minimum conductor cross section |  | Cu | $\mathrm{mm}^{2}$ | 4 | 6 | 10 | 16 | 25 | 35 | 50 |
| Rated operational current, AC-21A |  | up to 500 V | A | 16 | 25 | 40 | 63 | 80 | 100 | 125 |
|  |  | 690 V | A | 16 | 25 | 40 | 63 | 80 | 100 | 125 |
| Rated operational current, AC-22A |  | up to 500 V | A | 16 | 25 | 40 | 63 | 80 | 100 | 125 |
|  |  | 690 V | A | 16 | 25 | 40 | 63 | 80 | 100 | 125 |
| Rated operational current, AC-23A |  | up to 415 V | A | 16 | 20 | 23 | 45 | 75 | 80 | 90 |
|  |  | 440 V | A | 16 | 20 | 23 | 45 | 65 | 65 | 78 |
|  |  | 500 V | A | 16 | 20 | 23 | 45 | 58 | 60 | 70 |
|  |  | 690 V | A | 10 | 11 | 12 | 20 | 20 | 40 | 50 |
| Rated operational current / poles in series, DC-21A |  | up to $48 \mathrm{~V}^{1}$ | A | 16/1 | 25/1 | 32/1 | 63/1 | 80/1 | 100/1 | 125/1 |
|  |  | 110 V | A | 16/2 | 25/2 | 32/2 | 63/2 | 80/2 | 100/2 | 125/2 |
|  |  | 220 V | A | 16/3 | 25/3 | 32/3 | 63/4 | 63/4 | 100/4 | 100/4 |
|  |  | 440 V | A | 16/4 | 16/4 | 16/4 | 16/4 | 16/4 |  |  |
|  |  | 500 V | A | 16/4 | 16/4 | 16/4 | 16/4 | 16/4 |  |  |
| Rated operational current / poles in series, DC-22A |  | up to $48 \mathrm{~V}^{1}$ | A | 16/1 | 25/1 | 32/1 | 63/1 | 80/1 | 100/1 | 125/1 |
|  |  | 110 V | A | 16/2 | 25/2 | 32/2 | 63/2 | 80/2 | 100/2 | 125/2 |
|  |  | 220 V | A | 16/3 | 25/3 | 32/4 | 45/4 | 45/4 | 63/4 | 80/4 |
|  |  | 440 V | A | 10/4 | 10/4 | 10/4 | 10/4 | 10/4 |  |  |
| Rated operational current / poles in series, DC-23A |  | up to $48 \mathrm{~V}^{1}$ | A | 16/1 | 25/1 | 32/1 | 63/1 | 80/1 | 100/1 | 125/1 |
|  |  | 110 V | A | 16/2 | 25/2 | 32/2 | 63/2 | 80/2 | 100/2 | 125/2 |
|  |  | 220 V | A | 16/4 | 25/4 | 32/4 | 45/4 | 45/4 | 63/4 | 63/4 |
|  |  | 440 V | A | 10/4 | 10/4 | 10/4 | 10/4 | 10/4 |  |  |
| Rated operational power, $A C-23 A^{2)}$ The kW-ratings are accurate for 3-phase 1500 R.P.M. standard asychronous motors |  | 230 V | kW | 3 | 4 | 5,5 | 11 | 22 | 22 | 22 |
|  |  | 400 V | kW | 7.5 | 9 | 11 | 22 | 37 | 37 | 45 |
|  |  | 415 V | kW | 7.5 | 9 | 11 | 22 | 37 | 37 | 45 |
|  |  | 500 V | kW | 7.5 | 9 | 11 | 22 | 37 | 37 | 45 |
|  |  | 690 V | kW | 7.5 | 9 | 11 | 15 | 18.5 | 37 | 45 |
| Rated breaking capacity in category AC-23 |  | up to 415 V | A | 128 | 160 | 184 | 360 | 640 | 640 | 720 |
|  |  | 500 V | A | 128 | 160 | 184 | 360 | 464 | 480 | 560 |
|  |  | 690 V | A | 80 | 88 | 96 | 160 | 160 | 320 | 400 |
| Rated conditional short-circuit current $I_{p}$ (r.m.s.) and corresponding max. allowed cut-off current $\hat{i}_{c}$ (peak) value. The cut-off current $\hat{i}_{c}$ refers to values listed by fuse manufacturers (single phase test acc. to IEC60269). | Ip (r.m.s.) $50 \mathrm{kA}, 415 \mathrm{~V}$ | îc (peak) | kA | 6.5 | 6.5 | 6.5 | 13 | 13 | 16.5 | 16.5 |
|  | Max. OFA_fuse size | gG/aM | A/A | 40/32 | 40/32 | 40/32 | 100/80 | 100/80 | 125/125 | 125/125 |
|  | Ip (r.m.s.) $100 \mathrm{kA}, 500 \mathrm{~V}$ | îc (peak) | kA |  |  |  | 17 | 17 |  |  |
|  | Max. OFA_fuse size | gG/aM | A |  |  |  | 100/80 100/80 |  |  |  |
| Rated short-time withstand current | Icw (r.m.s.) | 690 V 1s | kA | 0.5 | 0.5 | 0.5 |  |  | 2.5 | 2.5 |
| Rated short-time making capacity ${ }^{3}$ | Icm (peak) | 690 V | kA | 0.7 | 0.7 | 0.7 | 1.4 | 2.1 | 3.6 | 3.6 |
| Power loss / pole | With rated current |  | W | 0.3 | 0.6 | 1.6 | 2.8 | 4.5 | 4.0 | 6.3 |
| Mechanical endurance | Number of oper. cycles4) |  | Cycles | 10000 | 10000 | 10000 | 10000 | 10000 | 10000 | 10000 |
| Cable size | Cu-wire size suitable for terminal clamps |  | mm2 | 0.75-10 | 0.75-10 | 0.75-10 | 1.5-35 | 1.5-35 | 10-70 | 10-70 |
|  |  |  | AWG | 18-8 | 18-8 | 18-8 | 14-4 | 14-4 | 8-00 | 8-00 |
| Terminal tightening torque | Counter torque required |  | Nm | 0.8 | 0.8 | 0.8 | 2 | 2 | 6 | 6 |
| Operating torque | Typical for 3-pole switches |  | Nm | 1 | 1 | 1 | 1.2 | 1.2 | 2 | 2 |
| Weight without accessories | 3 -pole switch |  | kg | 0.25 | 0.25 | 0.25 | 0.64 | 0.64 | 0.90 | 0.90 |
|  | 4-pole switch |  | kg | 0.31 | 0.31 | 0.31 | 0.70 | 0.70 | 1.18 | 1.18 |
| Data according to UL508 (Listed) |  |  |  |  |  |  |  |  |  |  |
| Current |  |  | A | 16 | 25 | 40 | 60 | 80 |  |  |
| Horsepower, 3-phase |  | 200 V | HP | 3 | 7.5 | 10 | 15 | 20 |  |  |
|  |  | 208 V | HP | 3 | 7.5 | 10 | 15 | 20 |  |  |
|  |  | 240 V | HP | 5 | 7.5 | 10 | 15 | 20 |  |  |
|  |  | 480 V | HP | 10 | 15 | 20 | 30 | 40 |  |  |
|  |  | 600 V | HP | 10 | 20 | 25 | 30 | 40 |  |  |

[^17]Manual change-over switches
Technical data for OT160...800_C

Manual change-over switches


| Data according to IEC 60947-3 |  |  |  |  | OT_200_ |  |  |  |  | witch size |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | OT_160_ |  |  |  | OT_250_ | OT_315_ | OT_400_ | OT_630_ OT_800_ |  |
| Rated insulation voltage and rated operational voltage AC20/DC20 |  | Pollution degree 3 | v | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 |
| Dielectric strength |  | 50 Hz 1 min . | kV | 10 | 10 | 10 | 10 | 10 | 10 | 10 |
| Rated impulse withstand voltage |  |  | kV | 12 | 12 | 12 | 12 | 12 | 12 | 12 |
| Rated thermal current and rated operational current AC20/DC20 | / ambient $40^{\circ} \mathrm{C}$ | In open air | A | 160 | 200 | 250 | 315 | 400 | 630 | 800 |
|  | / ambient $40^{\circ} \mathrm{C}$ | $\begin{array}{r} \text { In } \\ \text { enclosure } \end{array}$ | A | 160 | 200 | 250 | 315 | 400 | 630 | 800 |
| ..with minimum conductor cross section |  | Cu | $\mathrm{mm}^{2}$ | 70 | 95 | 120 | 185 | 240 | 2x185 | $2 \times 240$ |
| Rated operational current, AC-21A |  | up to 500 V | A | 160 | 200 | 250 | 315 | 400 | 630 | 800 |
|  |  | 690 V | A | 160 | 200 | 250 | 315 | 400 | 630 | 800 |
| Rated operational current, AC-22A |  | up to 500 V | A | 160 | 200 | 250 | 315 | 400 | 630 | 800 |
|  |  | 690 V | A | 160 | 200 | 250 | 315 | 400 | 630 | 800 |
| Rated operational current, AC-23A |  | up to 415 V | A | 160 | 200 | 250 | 315 | 400 | 630 | 800 |
|  |  | 440 V | A | 160 | 200 | 250 | 315 | 400 | 630 | 800 |
|  |  | 500 V | A | 160 | 200 | 250 | 315 | 400 | 630 | 800 |
|  |  | 690 V | A | 160 | 200 | 250 | 315 | 400 | 630 | 800 |
| Rated operational current / poles in series, DC-21A ${ }^{6}$ ) |  | $\leq 110 \mathrm{~V}$ | A | 160/2 | 200/2 | 250/2 | $315 / 1^{1)}$ | 400/1 ${ }^{11}$ | 630/1 | 800/1 |
|  |  | 220 V | A | 160/2 | 200/2 | 250/2 | $315 / 2^{1)}$ | 400/21) | 630/1 | 800/1 |
|  |  | 440 V | A | 160/3 | 200/3 | 230/3 | 315/3 | 360/3 | 630/2 | 720/2 |
|  |  | 660 V | A | 160/4 | 200/4 | 200/4 | 315/4 | 315/4 | 630/4 ${ }^{11}$ | 630/4) |
| Rated operational power, AC-23A ${ }^{2}$ |  | 230 V | kW | 45 | 60 | 75 | 100 | 132 | 200 | 250 |
| The kW-ratings are accurate for 3-phase 1500 R.P.M. standard asychronous motors |  | 400 V | kW | 90 | 110 | 140 | 160 | 220 | 355 | 450 |
|  |  | 415 V | kW | 90 | 110 | 145 | 180 | 230 | 355 | 450 |
|  |  | 500 V | kW | 110 | 132 | 170 | 220 | 280 | 400 | 560 |
|  |  | 690 V | kW | 160 | 200 | 250 | 315 | 400 | 630 | 800 |
| Rated breaking capacity in category AC-23 |  | up to 415 V | A | 1280 | 1600 | 2000 | 2520 | 3200 | 5040 | 6400 |
|  |  | 500 V | A | 1280 | 1600 | 2000 | 2520 | 3200 | 5040 | 6400 |
|  |  | 690 V | A | 1280 | 1600 | 2000 | 2520 | 3200 | 5040 | 6400 |
| Rated conditional short-circuit current Ip (r.m.s.) and cut-off current îc (peak) value. The cut-off current îc refers to values listed by fuse manufacturers (single phase test acc. to IEC60269). | Ip (r.m.s.) $80 \mathrm{kA}, 415 \mathrm{~V}$ | îc (peak) | kA | 40.5 | 40.5 | 40.5 | 59 | 59 | 83.5 | 83.5 |
|  | Max. OFA_fuse size | gG/aM | A/A | 355/315 | 355/315 | 355/315 | 500/500 | 500/500 | $\begin{array}{r} 800 / 1 \\ 000 \end{array}$ | $\begin{array}{r} 800 / 1 \\ 000 \end{array}$ |
|  | Ip (r.m.s.) $100 \mathrm{kA}, 500 \mathrm{~V}$ | îc (peak) | kA | 40.5 | 40.5 | 40.5 | 61.5 | 61.5 | 90 | 90 |
|  | Max. OFA_fuse size | gG/aM | A | 315/315 | 315/315 | 315/315 | 500/450 | 500/450 | 800/800 | 800/800 |
|  | Ip (r.m.s.) $80 \mathrm{kA}, 690 \mathrm{~V}$ | îc (peak) | kA | 40.5 | 40.5 | 40.5 | 59 | 59 | 83.5 | 83.5 |
|  | Max. OFA_fuse size | gG/aM | A | 355/315 | 355/315 | 355/315 | 500/500 | 500/500 | 800/1000 | 800/1000 |
| Rated short-time withstand current | Icw (r.m.s.) | 690 V 0.15 s | kA | 15 | 15 | 15 | 31 | 31 | 38 | 38 |
|  |  | 690 V 0.25 s | kA | 15 | 15 | 15 | 24 | 24 | 36 | 36 |
|  |  | 690 V 1s | kA | 8 | 8 | 8 | 15 | 15 | 20 | 20 |
| Rated short-time making capacity ${ }^{31}$ | Icm (peak) ${ }^{4}$ | 690 V | kA | 30 | 30 | 30 | 65 | 65 | 80 | 80 |
| Power loss / pole | With rated current |  | W | 2.4 | 4 | 6.5 | 6.5 | 10 | 25 | 40 |
| Mechanical endurance | Number of oper. cycles ${ }^{\text {5 }}$ |  | Cycles | 8000 | 8000 | 8000 | 8000 | 8000 | 5000 | 5000 |
| Terminal bolt size | Metric thread diameter x length |  | mm | M8x25 | M8x25 | M8x25 | M10x30 | M10x30 | M12x40 | M12×40 |
| Terminal tightening torque | Counter torque required |  | Nm | 15-22 | 15-22 | 15-22 | 30-44 | 30-44 | 50-75 | 50-75 |
| Operating torque | 3 -pole change-over switches |  | Nm | 7 | 7 | 7 | 16 | 16 | 27 | 27 |
| Weight without accessories | Manual change-over | 3-poles | kg | 2.5 | 2.5 | 2.5 | 4.7 | 4.7 | 12.8 | 12.8 |
|  | sw | 4 -poles | kg | 3.2 | 3.2 | 3.2 | 5.8 | 5.8 | 15.6 | 15.6 |
| Data according to IEC 60947-6-1 |  |  |  |  |  |  |  |  |  |  |
| Class of equipment |  |  |  | PC | PC | PC | PC | PC | PC | PC |
| Rated short-time withstand current | Icw (r.m.s.) | 690 V 0.1 s | kA | 15 | 15 | 15 | 25 | 25 | 38 | 38 |
| Rated operational current, AC-31B |  | up to 415 V | A | 160 | 200 | 250 | 315 | 400 | 630 | 800 |
| Rated operational current, AC-33B |  | up to 415 V | A | 160 | 200 | 250 | 315 | 400 | 630 | 800 |

1) Utilization category $B$
2) These values are given for guidance and may vary acc. to the motor manufacture
${ }^{3)}$ Short circuit duration $>50 \mathrm{~ms}$, without fuse protection
${ }^{4)}$ Max. distance from switch frame to nearest busbar / cable support 150 mm
${ }^{5)}$ Operating cycle: O-I-O-II-O
${ }^{6)}$ Further 1000 V ratings on request

## Manual change-over switches

Technical data for OT1000...3200_C


Manual change-over switches

| Data according to IEC 60947-3 |  |  |  | OT_1000_ | OT_1250_ | OT_1600_ | OT_2000_ | Switch size, OT_ |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  |  |  |  |  |  | OT_2500_ | OT_3200_ |
| Rated insulation voltage and rated operational voltage AC20/ DC20 |  | Pollution degree 3 | V | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 |
| Dielectric strength |  | 50 Hz 1 min . | kV | 10 | 10 | 10 | 10 | 10 | 10 |
| Rated impulse withstand voltage |  |  | kV | 12 | 12 | 12 | 12 | 12 | 12 |
| Rated thermal current and rated operational current AC20/ DC20 | / ambient $40^{\circ} \mathrm{C}$ | In open air | A | 1000 | 1250 | 1600 | 2000 | 2500 | 3200 |
|  | / ambient $40^{\circ} \mathrm{C}$ | In enclosure | A |  |  |  |  |  |  |
| ..with minimum conductor cross section |  | Cu | mm ${ }^{2}$ | 2x300 | 2x400 | 2x500 | $3 \times 500$ | 4x500 | 4×1000 |
| Rated operational current, AC-21A |  | up to 500 V | A | 1000 | 1250 | 1600 | $2000{ }^{5}$ | $2500^{5)}$ | $3200{ }^{51}$ |
|  |  | 690 V | A | 1000 | 1250 | 1600 |  |  |  |
| Rated operational current, AC-22A |  | up to 500 V | A | 1000 | 1250 | 1600 |  |  |  |
|  |  | 690 V | A | 1000 | 1250 | 1600 |  |  |  |
| Rated operational current, AC-23A |  | up to 415 V | A | 1000 | 1250 | 1250 |  |  |  |
|  |  | 440 V | A | 1000 | 1250 | 1250 |  |  |  |
|  |  | 500 V | A | 1000 | 1250 | 1250 |  |  |  |
|  |  | 690 V | A | 1000 | 1250 | 1250 |  |  |  |
| Rated operational power, AC-23A ${ }^{\text {1 }}$ |  | 230 V | kW | 315 | 400 | 400 |  |  |  |
| The kW-ratings are accurate for 3-phase 1500 R.P.M. standard asychronous motors |  | 400 V | kW | 560 | 710 | 710 |  |  |  |
|  |  | 415 V | kW | 560 | 710 | 710 |  |  |  |
|  |  | 500 V | kW | 710 | 900 | 900 |  |  |  |
|  |  | 690 V | kW | 1000 | 1200 | 1200 |  |  |  |
| Rated breaking capacity in category AC-23 |  | up to 415 V | A | 10000 | 10000 | 10000 |  |  |  |
|  |  | 500 V | A | 10000 | 10000 | 10000 |  |  |  |
|  |  | 690 V | A | 10000 | 10000 | 10000 |  |  |  |
| Rated conditional short-circuit current <br> Ip (r.m.s.) and cut-off current îc (peak) value. The cut-off current îc refers to values listed by fuse manufacturers (single phase test acc. to IEC60269). | Ip (r.m.s.) $80 \mathrm{kA}, 415 \mathrm{~V}$ | îc (peak) | kA | 100 | 100 | 100 |  |  |  |
|  | Max. OFA_fuse size | gG/aM | A/A | $1250 / 1$ | $1250 / 1$ | $1250 / 1$ |  |  |  |
|  |  |  |  | 250 | 250 | 250 |  |  |  |
|  | Ip (r.m.s.) $100 \mathrm{kA}, 500 \mathrm{~V}$ | îc (peak) | kA | 106 | 106 | 106 |  |  |  |
|  | Max. OFA_fuse size | gG/aM | A | $1250 / 1$ | $1250 / 1$ | $1250 / 1$ |  |  |  |
|  |  |  |  | 250 | 250 | 250 |  |  |  |
| Rated short-time withstand current | Icw (r.m.s.) | 690 V 0.15 s | kA | 50 | 50 | 50 | 50 | 50 |  |
|  |  | 690 V 0.25 s | kA | 50 | 50 | 50 | 50 | 50 |  |
|  |  | 690 V 1s | kA | 50 | 50 | 50 | 55 | 55 | 65 |
| Rated short-time making capacity ${ }^{2}$ | Icm (peak) ${ }^{3}$ | 690 V | kA | 92 | 92 | 92 | 110 | 110 | 143 |
| Power loss / pole | With rated current |  | W | 19 | 29 | 48 | 55 | 85 | 95 |
| Mechanical endurance | Number of oper. cycles ${ }^{4)}$ |  | Cycles | 3000 | 3000 | 3000 | 2000 | 2000 | 2000 |
| Terminal bolt size | Metric thread diameter x length |  | mm | M12x60 | M12x60 | M12x60 | M12x60 | M12x60 | M12×100 |
| Terminal tightening torque | Counter torque required |  | Nm | 50-75 | 50-75 | 50-75 | 50-75 | 50-75 | 50-75 |
| Operating torque | 3-pole change-over switches |  | Nm | 78 | 78 | 78 | 78 | 78 | 80 |
| Weight without accessories | Manual change-over | 3-poles | kg | 32.3 | 32.3 | 34.8 | 48 | 48 | 57 |
|  | switches | 4-poles | kg | 40.2 | 40.2 | 43.3 | 60 | 60 | 72 |
| Data according to IEC 60947-6-1 |  |  |  |  |  |  |  |  |  |
| Class of equipment |  |  |  | PC | PC | PC | PC | PC |  |
| Rated short-time withstand current | Icw (r.m.s.) | 690 V 0.1 s | kA | 50 | 50 | 50 | 50 | 50 |  |
| Rated operational current, AC-31B |  | up to 415 V | A | 1000 | 1250 | 1600 | 2000 | 2000 |  |
| Rated operational current, AC-33B |  | up to 415 V | A | 1000 | 1000 | 1000 |  |  |  |

${ }^{1)}$ These values are given for guidance and may vary acc. to the motor manufacturer
${ }^{\text {2) }}$ Short circuit duration $>50 \mathrm{~ms}$, without fuse protection
${ }^{3)}$ Max. distance from switch frame to nearest busbar / cable support 150 mm
${ }^{4)}$ Operating cycle: O-I-O-II-O
${ }^{5)}$ Category AC-21B, up to 415 V 1000 V ratings on request

# Motorized change-over switches <br> Uninterrupted power supply with motorized functionality 

ABB offers a wide variety of open transition motorized change-over switches from 40 to 3200 Amperes in range. All of our visually redesigned motorized change-over switches now come equipped with a new cover with clear operating instructions and enhanced motor operator performance.



High performance level
Ensuring a high performance level for you is of the utmost importance to us. In change-over applications where the loaded switch may need to be operated remotely, adequate durability has been ensured by testing against the IEC 60947-6-1 standard in the specification of endurance requirements.

## Reduced installation time

ABB motorized change-over switches are fast and easy to install. The voltage sensing connectors have been designed to save time, as there is no need to drill holes into the busbars (see page 78 for relevant accessories). Also, the control and power cables are screw mounted, providing a safe and secure connection that stays tight even during transportation.


## Safe and reliable

Our switches come equipped with a comprehensive range of inbuilt safety features such as mechanical interlock, which ensures the isolation of the two asynchronous power supplies. This eliminates risk of shortcircuiting between them. The motorized change-over switches are also equipped with a handle for manual operation in case of emergency.


## Space-saving design

ABB provides compact and cost-effective components for any and all installations. On average, our motorized change-over switches are $20 \%$ smaller than other similar products on the market.

## Motorized change-over switches

Technical data for OTM40...125_C

Motorized change-over switches

| Data according to IEC 60947-3 |  |  |  |  |  |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- |
|  |  |  |  |  |  |

[^18]
## Motorized change-over switches

Technical data for OTM160...800_C


## Motorized change-over switches

| Data according to IEC 60947-3 |  |  |  |  | Switch size |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  |  | OT_160_ | OT_200_ | OT_250_ | OT_315_ | OT_400_ | OT_630_ | OT_800_ |
| Rated insulation voltage and rated operational voltage AC20/ DC20 ${ }^{1)}$ |  | Pollution degree 32) | V | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 |
| Dielectric strength |  | 50 Hz 1 min . |  | 10 | 10 | 10 | 10 | 10 | 10 | 10 |
| Rated impulse withstand voltage3) |  |  | kV | 12 | 12 | 12 | 12 | 12 | 12 | 12 |
| Rated thermal current and rated / ambient $40^{\circ} \mathrm{C}$ operational current AC20/DC20 / ambient $40^{\circ} \mathrm{C}$ |  | In open air | A | 160 | 200 | 250 | 315 | 400 | 630 | 800 |
|  |  | In enclosure | A | 160 | 200 | 250 | 315 | 400 | 630 | 800 |
| ..with minimum conductor cross section |  | Cu | $\mathrm{mm}^{2}$ | 70 | 95 | 120 | 185 | 240 | $2 \times 185$ | $2 \times 240$ |
| Rated operational current, AC-21A |  | up to 500 V | A | 160 | 200 | 250 | 315 | 400 | 630 | 800 |
|  |  | 690 V | A | 160 | 200 | 250 | 315 | 400 | 630 | 800 |
| Rated operational current, AC-22A |  | up to 500 V | A | 160 | 200 | 250 | 315 | 400 | 630 | 800 |
|  |  | 690 V | A | 160 | 200 | 250 | 315 | 400 | 630 | 800 |
| Rated operational current, AC-23A |  | up to 415 V | A | 160 | 200 | 250 | 315 | 400 | 630 | 800 |
|  |  | 440 V | A | 160 | 200 | 250 | 315 | 400 | 630 | 800 |
|  |  | 500 V | A | 160 | 200 | 250 | 315 | 400 | 630 | 800 |
|  |  | 690 V | A | 160 | 200 | 250 | 315 | 400 | 630 | 800 |
| Rated operational current / poles in series, DC-21A6) |  | $\leq 110 \mathrm{~V}$ | A | 160/2 | 200/2 | 250/2 | $315 / 1^{1)}$ | 400/1 ${ }^{1 /}$ | 630/1 | 800/1 |
|  |  | 220 V | A | 160/2 | 200/2 | 250/2 | $315 / 2^{1)}$ | 400/2 ${ }^{11}$ | 630/1 | 800/1 |
|  |  | 440 V | A | 160/3 | 200/3 | 230/3 | 315/3 | 360/3 | 630/2 | 720/2 |
|  |  | 660 V | A | 160/4 | 200/4 | 200/4 | 315/4 | 315/4 | 630/4 ${ }^{1 /}$ | 630/41) |
| Rated operational power, AC- 23A2) |  | 230 V | kW | 45 | 60 | 75 | 100 | 132 | 200 | 250 |
| The kW-ratings are accurate for 3-phase 1500 R.P.M. standard asychronous motors |  | 400 V | kW | 90 | 110 | 140 | 160 | 220 | 355 | 450 |
|  |  | 415 V | kW | 90 | 110 | 145 | 180 | 230 | 355 | 450 |
|  |  | 500 V | kW | 110 | 132 | 170 | 220 | 280 | 400 | 560 |
|  |  | 690 V | kW | 160 | 200 | 250 | 315 | 400 | 630 | 800 |
| Rated breaking capacity in category AC-23 |  | up to 415 V | A | 1280 | 1600 | 2000 | 2520 | 3200 | 5040 | 6400 |
|  |  | 500 V | A | 1280 | 1600 | 2000 | 2520 | 3200 | 5040 | 6400 |
|  |  | 690 V | A | 1280 | 1600 | 2000 | 2520 | 3200 | 5040 | 6400 |
| Rated conditional short-circuit current Ip (r.m.s.) and cut-off current îc (peak) value. The cutoff current îc refers to values listed by fuse manufacturers (single phase test acc. to IEC60269). | Ip (r.m.s.) $80 \mathrm{kA}, 415 \mathrm{~V}$ | îc (peak) | kA | 40.5 | 40.5 | 40.5 | 59 | 59 | 83.5 | 83.5 |
|  | Max. OFA_fuse size | gG/aM | A/A | 355/315 | 355/315 | 355/315 | 500/500 | 500/500 | 800/1 000 | $\begin{array}{r} 800 / 1 \\ 000 \\ \hline \end{array}$ |
|  | Ip (r.m.s.) $100 \mathrm{kA}, 500 \mathrm{~V}$ | îc (peak) | kA | 40.5 | 40.5 | 40.5 | 61.5 | 61.5 | 90 | 90 |
|  | Max. OFA_fuse size | gG/aM | A | 315/315 | 315/315 | 315/315 | 500/450 | 500/450 | 800/800 | 800/800 |
|  | Ip (r.m.s.) $80 \mathrm{kA}, 690 \mathrm{~V}$ | îc (peak) | kA | 40.5 | 40.5 | 40.5 | 59 | 59 | 83.5 | 83.5 |
|  | Max. OFA_fuse size | gG/aM | A | 355/315 | 355/315 | 355/315 | 500/500 | 500/500 | 800/1 000 | 800/1000 |
| Rated short-time withstand current | Icw (r.m.s.) | 690 V 0.15 s | kA | 15 | 15 | 15 | 31 | 31 | 38 | 38 |
|  |  | 690 V 0.25 s | kA | 15 | 15 | 15 | 24 | 24 | 36 | 36 |
|  |  | 690 V 1s | kA | 8 | 8 | 8 | 15 | 15 | 20 | 20 |
| Rated short-time making capacity3) | Icm (peak)4) | 690 V | kA | 30 | 30 | 30 | 65 | 65 | 80 | 80 |
| Power loss / pole | With rated current |  | W | 2.4 | 4 | 6.5 | 6.5 | 10 | 25 | 40 |
| Mechanical endurance | Number of oper. cycles ${ }^{5}$ |  | Cycles | 8000 | 8000 | 8000 | 8000 | 8000 | 5000 | 5000 |
| Terminal bolt size | Metric thread diameter $x$ length |  | mm | M8x25 | M8x25 | M8x25 | M10x30 | M10x30 | M12x40 | M12x40 |
| Terminal tightening torque | Counter torque required |  | Nm | 15-22 | 15-22 | 15-22 | 30-44 | 30-44 | 50-75 | 50-75 |
| Operating torque | 3 -pole change-over switches |  | Nm | 7 | 7 | 7 | 16 | 16 | 27 | 27 |
| Weight without accessories | 3-pole switch |  | kg | 5.7 | 5.7 | 5.7 | 10.2 | 10.2 | 17.5 | 17.5 |
|  | 4-pole switch |  | kg | 6.4 | 6.4 | 6.4 | 11.4 | 11.4 | 20.4 | 20.4 |
| Data according to IEC 60947-6-1 |  |  |  |  |  |  |  |  |  |  |
| Class of equipment |  |  |  | PC | PC | PC | PC | PC | PC | PC |
| Rated short-time withstand current | Icw (r.m.s.) | 690 V 0.1s | kA | 15 | 15 | 15 | 25 | 25 | 38 | 38 |
| Rated operational current, AC-31B |  | up to 415 V | A | 160 | 200 | 250 | 315 | 400 | 650 | 720 |
| Rated operational current, AC-33B |  | up to 415 V | A | 160 | 200 | 250 | 315 | 400 | 650 | 650 |

${ }^{1)}$ Utilization category $B$
${ }^{2)}$ These values are given for guidance and may vary acc. to the motor manufacturer
${ }^{3}$ ) Short circuit duration $>50 \mathrm{~ms}$, without fuse protection
4) Max. distance from switch frame to nearest busbar / cable support 150 mm
${ }^{5)}$ Operating cycle: O-I-O-II-O
${ }^{6}$ ) Further ratings on request

## Motorized change-over switches

Technical data for OTM1000...3200_C

Motorized change-over switches


[^19]
## Motorized change-over switches

Motor operator performance data for OTM40...125_C

Motor operator

| Data according to IEC 60947 |  |  |  |
| :--- | ---: | ---: | ---: | ---: |
|  |  |  |  |
| Rated operational voltage U e |  |  |  |

${ }^{1)}$ Under nominal conditions

## Motorized change-over switches

Motor operator performance data for OTM160...3200_C

Motor operator


[^20]
## Manual and motorized bypass switches

Technical data for OT and OTM160...800_Y


## Manual and motorized bypass switches

| Data according to IEC 60947-3 |  |  |  | OTM160_ OTM200_ |  | OTM250_ | OTM315_ | Switch size, OTM_ |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  |  |  |  | OTM400_ |  | OTM630_ | OTM800_ |
| Rated insulation voltage and rated operational voltage AC20/DC20 |  | Pollution degree 3 | V | 1000 | 1000 |  | 1000 | 1000 | 1000 | 1000 | 1000 |
| Dielectric strength |  | 50 Hz 1 min . | kV | 10 | 10 | 10 | 10 | 10 | 10 | 10 |
| Rated impulse withstand voltage |  |  | kV | 12 | 12 | 12 | 12 | 12 | 12 | 12 |
| Rated thermal current and rated operational current AC20/DC20 | / ambient $40^{\circ} \mathrm{C}$ | In open air | A | 160 | 200 | 250 | 315 | 400 | 630 | 800 |
|  | / ambient $40^{\circ} \mathrm{C}$ | In enclosure | A | 160 | 200 | 250 | 315 | 400 | 630 | 800 |
| ..with minimum conductor cross section |  | Cu | $\mathrm{mm}^{2}$ | 70 | 95 | 120 | 185 | 240 | 2x185 | $2 \times 240$ |
| Rated operational current, AC-21A |  | up to 500 V | A | 160 | 200 | 250 | 315 | 400 | 630 | 800 |
|  |  | 690 V | A | 160 | 200 | 250 | 315 | 400 | 630 | 800 |
| Rated operational current, AC-22A |  | up to 500 V | A | 160 | 200 | 250 | 315 | 400 | 630 | 800 |
|  |  | 690 V | A | 160 | 200 | 250 | 315 | 400 | 630 | 800 |
| Rated operational current, AC-23A |  | up to 415 V | A | 160 | 200 | 250 | 315 | 400 | 630 | 800 |
|  |  | 440 V | A | 160 | 200 | 250 | 315 | 400 | 630 | 800 |
|  |  | 500 V | A | 160 | 200 | 250 | 315 | 400 | 630 | 800 |
|  |  | 690 V | A | 160 | 200 | 250 | 315 | 400 | 630 | 800 |
| Rated operational current / poles in series, DC-21A1) |  | $\leq 110 \mathrm{~V}$ | A | 160/2 | 200/2 | 250/2 | $315 / 1^{4)}$ | 400/14) | 630/1 | 800/1 |
|  |  | 220 V | A | 160/2 | 200/2 | 250/2 | $315 / 2^{4)}$ | 400/24) | 630/1 | 800/1 |
|  |  | 440 V | A | 160/3 | 200/3 | 230/3 | 315/3 | 360/3 | 630/2 | 720/2 |
|  |  | 660 V | A | 160/4 | 200/4 | 200/4 | 315/4 | 315/4 | 630/4 ${ }^{4}$ | 630/44) |
| Rated operational power, AC-23A ${ }^{\text {2) }}$ |  | 230 V | kW | 45 | 60 | 75 | 100 | 132 | 200 | 250 |
| The kW-ratings are accurate for 3-phase 1500 R.P.M. standard asychronous motors |  | 400 V | kW | 90 | 110 | 140 | 160 | 220 | 355 | 450 |
|  |  | 415 V | kW | 90 | 110 | 145 | 180 | 230 | 355 | 450 |
|  |  | 500 V | kW | 110 | 132 | 170 | 220 | 280 | 400 | 560 |
|  |  | 690 V | kW | 160 | 200 | 250 | 315 | 400 | 630 | 800 |
| Rated breaking capacity in category AC-23 |  | up to 415 V | A | 1280 | 1600 | 2000 | 2520 | 3200 | 5040 | 6400 |
|  |  | 500 V | A | 1280 | 1600 | 2000 | 2520 | 3200 | 5040 | 6400 |
|  |  | 690 V | A | 1280 | 1600 | 2000 | 2520 | 3200 | 5040 | 6400 |
| Rated conditional short-circuit current <br> Ip (r.m.s.) and cut-off current îc (peak) value. The cut-off current îc refers to values listed by fuse manufacturers (single phase test acc. to IEC60269). | Ip (r.m.s.) $80 \mathrm{kA}, 415 \mathrm{~V}$ | îc (peak) | kA | 40.5 | 40.5 | 40.5 | 59 | 59 | 83.5 | 83.5 |
|  | Max. OFA_fuse size | gG/aM | A/A | 355/315 | 355/315 | 355/315 | 500/500 | 500/500 | $\begin{array}{r} 800 / 1 \\ 000 \end{array}$ | 800/1000 |
|  | Ip (r.m.s.) $100 \mathrm{kA}, 500 \mathrm{~V}$ | îc (peak) | kA | 40.5 | 40.5 | 40.5 | 61.5 | 61.5 | 90 | 90 |
|  | Max. OFA_fuse size | gG/aM | A | 315/315 | 315/315 | 315/315 | 500/450 | 500/450 | 800/800 | 800/800 |
|  | Ip (r.m.s.) $80 \mathrm{kA}, 690 \mathrm{~V}$ | îc (peak) | kA | 40.5 | 40.5 | 40.5 | 59 | 59 | 83.5 | 83.5 |
|  | Max. OFA_fuse size | gG/aM | A | 355/315 | 355/315 | 355/315 | 500/500 | 500/500 | $\begin{array}{r} 800 / 1 \\ 000 \end{array}$ | 800/1000 |
| Rated short-time withstand current | Icw (r.m.s.) | 690 V 0.15s | kA | 15 | 15 | 15 | 31 | 31 | 38 | 38 |
|  |  | 690 V 0.25s | kA | 15 | 15 | 15 | 24 | 24 | 36 | 36 |
|  |  | 690 V 1s | kA | 8 | 8 | 8 | 15 | 15 | 20 | 20 |
| Rated short-time making capacity ${ }^{3)}$ | Icm (peak) ${ }^{\text {4) }}$ | 690 V | kA | 30 | 30 | 30 | 65 | 65 | 80 | 80 |
| Power loss / pole | With rated current |  | W | 2.4 | 4 | 6.5 | 6.5 | 10 | 25 | 40 |
| Mechanical endurance | Number of oper. cycles ${ }^{5)}$ |  | Cycles | 8000 | 8000 | 8000 | 8000 | 8000 | 5000 | 5000 |
| Terminal bolt size | Metric thread diameter x length |  | mm | M8x25 | M8x25 | M8x25 | M10x30 | M10x30 | M12x40 | M12x40 |
| Terminal tightening torque | Counter torque required |  | Nm | 15-22 | 15-22 | 15-22 | 30-44 | 30-44 | 50-75 | 50-75 |
| Operating torque | Typical for 3-pole bypass switches |  | Nm | 14 | 14 | 14 | 32 | 32 | 54 | 54 |
| Weight without accessories | Manual bypass switches | 3-pole switch | kg | 4.3 | 4.3 | 4.3 | 8.2 | 8.2 | 19.9 | 19.9 |
|  |  | 4-pole switch | kg | 5.8 | 5.8 | 5.8 | 11.0 | 11.0 | 26.6 | 26.6 |

[^21]4) Max. distance from switch frame to nearest busbar / cable support 150 mm
5) Operating cycle: O-I-O-II-O

## Manual and motorized bypass switches

## Technical data for motor operators

Motorized bypass switches, Motor operator

${ }^{1)}$ Under nominal conditions

## Functionality in brief

The amplified diagram illustrate the basic functionality and application of these switch products.


## ABB Compact ATS <br> Compact without compromise

The Compact ATS by ABB is just that - it's a compact, economical and innovative all-in-one device that delivers all the safety and performance you would expect from an automatic transfer switch... and more. 100\% ease and efficiency in a $40 \%$ more compact package. You can now get the high ABB quality you know and trust, at a competitive price.


## Technical data

## Compact automatic transfer switches

## Automatic transfer switches functionality

| OTM_C_D products overview | OTM_C20D_ OTM_C21D_ |
| :---: | :---: |
| Features | x |
| Rated operational voltage Ue | 154 V AC-480 V AC +/-20\% + N |
| Rated frequency | $50 / 60 \mathrm{~Hz}+/-10 \%$ |
| Voltage sensing precision | 5\% |
| Frequency sensing precision | 1\% |
| Rated impulse withstand voltage, Uimp | 6 kV |
| Overvoltage category | III |
| Pollution degree | 2 |
| Protection rating for the front panel | IP20 |
| Operating temperature | $-20 \ldots+60^{\circ} \mathrm{C}$ |
| Transportation and storage temperature | $-25 . .+80^{\circ} \mathrm{C}$ |
| Altitude | Max. 2000 m |
| Humidity With condensation | 5 \%... 98 \% |
| Humidity Without condensation | $5 \% . . .90 \%$ |


| Operation Types |  |  |
| :---: | :---: | :---: |
| Manual operation with handle | x | x |
| Local operation with front panel keypad |  | x |
| Automatic transfer switching equipment (ATSE) | x | x |
| Applications |  |  |
| Transfer between two transformers | x | x |
| Transfer between a transformers and a generator |  | x |
| Operation modes |  |  |
| Automatic transfer and back-switching operation | $x$ | x |
| Automatic transfer and manual back-switching operation | x | x |
| Source failure detections |  |  |
| No voltage | x | x |
| Undervoltage | Fixed 0.7Ue | 0.7-0.95 Ue |
| Overvoltage | Fixed 1.3Ue | 1.05-1.3 Ue |
| Phase missing | x | $x$ |
| Voltage unbalance |  | x |
| Invalid frequency |  | x |
| Configuration |  |  |
| By DIP switches | x | x |
| By rotary switches |  | x |
| Two power status display | x | x |
| Two switches status display | x | x |
| Auto status display | x | x |
| Alarm display | x | x |

## Technical data

## Compact automatic transfer switches

Automatic transfer switches functionality

| OTM_C_D products overview | OTM_C20D_ | OTM_C21D_ |
| :---: | :---: | :---: |
| Time delays |  |  |
| Delay on transfer ${ }^{3}$ |  | 0-30s |
| Back-switching delay |  | 0-900s |
| Generator stop delay |  | 30s,400s |
| Signals input and output |  |  |
| Emergency Off with 24VDC signal input | x | x |
| Test signal input |  | x |
| Switch position signal | With auxiliary contacts | Without auxiliary contact |
| Alarm output signal |  | x |

${ }^{3)}$ Overvoltage and undervoltage conditions

## Compact ATS

Easy use and installation


03 Base mounting with screws

## Technical data

Compact automatic transfer switches OTM40...125_

Compact automatic transfer switches

| Data according to IEC 60947-3 |  |  |  | Switch size |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  |  | OTM40_ | OTM63_ | OTM125_ |
| Rated insulation voltage and rated operational voltage AC20/DC20 |  | Pollution degree 3 | V | 800 | 800 | 800 |
| Dielectric strength |  | 50 Hz 1 min . | kV | 6 | 6 | 6 |
| Rated impulse withstand voltage |  |  | kV | 8 | 8 | 8 |
| Rated thermal current and rated operational current AC20/DC20 | / ambient $40^{\circ} \mathrm{C}$ | In open air | A | 40 | 63 | 125 |
|  | / ambient $40^{\circ} \mathrm{C}$ | In enclosure | A | 40 | 63 | 125 |
|  | / ambient $60^{\circ} \mathrm{C}$ | In enclosure | A | 32 | 50 | 100 |
| ..with minimum conductor cross section |  | Cu | $\mathrm{mm}^{2}$ | 10 | 16 | 50 |
| Rated operational current, AC-21A |  | up to 500 V | A | 40 | 63 | 125 |
|  |  | 690 V | A | 40 | 63 | 125 |
| Rated operational current, AC-22A |  | up to 500 V | A | 40 | 63 | 125 |
|  |  | 690 V | A | 40 | 63 | 125 |
| Rated operational current, AC-23A |  | up to 415 V | A | 40 | 63 | 90 |
|  |  | 500 V | A | 40 | 60 | 70 |
|  |  | 690 V | A | 40 | 40 | 50 |
| Rated operational current / poles in series, DC-21A |  | up to 48 V | A | 40/1 | 63/1 | 125/1 |
|  |  | 110 V | A | 40/2 | 63/2 | 125/2 |
|  |  | 220 V | A | 40/4 | 63/4 | 100/4 |
| Rated operational current / poles in series, DC-22A |  | up to 48 V | A | 40/1 | 63/1 | 125/1 |
|  |  | 110 V | A | 40/2 | 63/2 | 125/2 |
|  |  | 220 V | A | 40/4 | 63/4 | 80/4 |
| Rated operational current / poles in series, DC-23A |  | up to 48 V | A | 40/1 | 63/1 | 125/1 |
|  |  | 110 V | A | 40/2 | 63/2 | 125/2 |
|  |  | 220 V | A | 40/4 | 63/4 | 63/4 |
| Rated operational power, AC-23A ${ }^{1)}$ <br> The kW-ratings are accurate for 3-phase 1500 R.P.M. standard asynchronous motors |  | 230 V | kW | 7.5 | 15 | 22 |
|  |  | 400 V | kW | 18.5 | 30 | 45 |
|  |  | 415 V | kW | 18.5 | 30 | 45 |
|  |  | 500 V | kW | 22 | 37 | 45 |
|  |  | 690 V | kW | 37 | 37 | 45 |
| Rated breaking capacity in category AC-23 |  | up to 415 V | A | 320 | 504 | 720 |
|  |  | 500 V | A | 320 | 480 | 560 |
|  |  | 690 V | A | 320 | 320 | 400 |
| Rated conditional short-circuit current Ip (r.m.s.) and corresponding max. allowed cut-off current îc (peak) value. | Ip (r.m.s.) $50 \mathrm{kA}, 415 \mathrm{~V}$ | îc (peak) | kA | 16.5 | 16.5 | 16.5 |
|  | Max. OFA_fuse size | gG/aM | A/A | 125/125 | 125/125 | 125/125 |
|  | 1 p (r.m.s.) $18 \mathrm{kA}, 690 \mathrm{~V}$ | îc (peak) | kA | 11 | 11 | 11 |
| The cut-off current îc refers to values listed by fuse manufacturers (single phase test acc. to IEC60269). | Max. OFA_fuse size | gG | A | 125 | 125 | 125 |
|  | 1 lp (r.m.s.) $50 \mathrm{kA}, 690 \mathrm{~V}$ | îc (peak) | kA | 10 | 10 | 10 |
|  | Max. OFA_fuse size | gG/aM | A/A | 63/63 | 63/63 | 63/63 |
| Rated short-time withstand current | Icw (r.m.s.) | 690 V 1s | kA | 2.5 | 2.5 | 2.5 |
| Rated short-time making capacity2) | Icm (peak) | 690 V | kA | 3.6 | 3.6 | 3.6 |
| Power loss / pole | With rated current |  | W | 1.6 | 2.8 | 6.3 |
| Mechanical endurance | Number of oper. cycles ${ }^{3)}$ |  | Cycles | 10000 | 10000 | 10000 |
| Cable size | Cu-wire size suitable for terminal clamps |  | $\mathrm{mm}^{2}$ | 2.5-25/2x2.5-16 | 10-70 | 10-70 |
|  |  |  | AWG | 14-4/2x14-6 | 8-00 | 8-00 |
| Terminal tightening torque | Counter torque required |  | Nm | 6 | 6 | 6 |
| Operating torque | Typical for 3-pole switches |  | Nm | 5 | 5 | 5 |
| Weight without accessories | 3-pole switch |  | kg | 1.75 | 1.75 | 1.75 |
|  | 4-pole switch |  | kg | 2.00 | 2.00 | 2.00 |

## Introducing TruONE ${ }^{\oplus}$ ATS from ABB

A critical breakthrough for critical power

## The all-new TruONE ${ }^{\oplus}$ is the world's first true purposebuilt automatic transfer switch, engineered to incorporate switch and controller in one seamless unit.

Performance tested beyond standard requirements, TruONE ${ }^{\oplus}$ stands ready to ensure the steady delivery of critical power at all times. Its self-contained design reduces the number of wires and connections, which speeds installation and minimizes the potential for connection failures to ensure best-in-class reliability. Its predictive maintenance and modular components reduce downtime and service costs. And its advanced connectivity is ready for the future. In addition, unlike typical ATS solutions, TruONE ${ }^{\oplus}$ allows emergency manual operation under load for immediate power restoration in the event of an equipment malfunction.


## Technical data-IEC

TruONE ATS OX200...1600E, open style

General performance

|  |  | Switch size |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Data according to IEC 60947-6-1 (Class PC equipment) |  | $0 \times 200$ | OX250 | OX315 | OX400 | OX500 |
| Rated insulation voltage, Ui (power circuit) | V |  |  | 1000 |  |  |
| Rated insulation voltage, Ui (electronics) | V |  |  | 500 |  |  |
| Rated frequency, f | Hz |  |  | 50-60 |  |  |
| Rated impulse withstand voltage, Uimp (power circuit) | kV |  | 8 |  | 12 |  |
| Rated impulse withstand voltage, Uimp (electronics) | kV |  |  | 6 |  |  |
| Conventional free air thermal current, Ith /ambient $40^{\circ} \mathrm{C}$ | A | 200 | 250 | 315 | 400 | 500 |
| Conventional enclosed thermal current, Ithe /ambient $40^{\circ} \mathrm{C}$ | A | 200 | 250 | 315 | 400 | 500 |
| Minimum enclosure size or equivalent volume $\mathrm{W} \times \mathrm{H} \times \mathrm{D}$ | mm |  |  | $600 \times 800 \times$ |  |  |
| Contact transfer time I-II, II-I Load interrupting time | ms |  |  | <50 |  |  |
| Operating transfer time I-II, II-I | ms |  |  | <500 |  |  |
| ATS current draw during transfer / time duration | $\mathrm{A} / \mathrm{ms}$ |  |  | <110 |  | 40/<130 |
| Mechanical endurance No. of operating cycles ${ }^{3}$ |  | 6012 | 6012 | 4012 | 4012 | 3012 |
| Power loss / pole | W | 5.8 | 9.7 | 12.1 | 20.3 | 17.2 |
| Overvoltage category |  |  |  |  |  |  |
| Pollution degree (control circuit) | PD 3 | up to 415 | D 2 up to 5 |  |  |  |
| Environment category |  |  |  |  |  |  |
| Minimum conductor cross section Cu | $\mathrm{mm}^{2}$ | 95 | 120 | 185 | 240 | 2x150 |
| Terminal bolt size Metric thread diameter x length | mm | M8×25 | M8 $\times 25$ | M10 $\times 30$ | M10 $\times 30$ | M12 $\times 40$ |
| Terminal tightening torque Counter torque required | Nm | 15... 22 | 15... 22 | 30... 44 | 30... 44 | 50... 75 |
| 2-pole switch | kg | 12.4 | 12.4 | 13.3 | 13.3 | 16.9 |
| Weight without accessories 3-pole switch | kg | 14 | 14 | 15.4 | 15.4 | 19.1 |
| 4-pole switch | kg | 15.6 | 15.6 | 17.5 | 17.5 | 21.4 |

utable for applications
2 pole construction - Operating performance and short-circuit capability

|  |  |  |  | Switch size |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Data according to IEC 60947-6-1 (Class PC equipment) |  |  |  | $0 \times 200$ | 0X250 | OX315 | OX400 | $0 \times 500$ |
| Rated operational voltage, U |  |  | Vac |  |  | 200-2 |  |  |
| Operating voltage range, $U$ |  |  | Vac | 160-288 |  |  |  |  |
| Rated operational current, AC-31B |  | up to 240 V | A | 200 | 250 | 315 | 400 | 500 |
| Rated operational current, AC-33B |  | up to 240 V | A | 200 | 250 | 315 | 400 | $500{ }^{1)}$ |
| Rated breaking capacity in category AC-33 |  | up to 240 V | A | 2000 | 2500 | 3150 | 4000 | $5000^{1)}$ |
| Rated conditional short-circuit current Iq (r.m.s.) and corresponding protective devices (fuse or circuit breaker) | 1 l (r.m.s.) $100 \mathrm{kA}, 240 \mathrm{~V}$ | $\hat{i}_{c}(\text { peak })^{5}$ | kA | 39 | 39 | 56 | 56 | 90 |
|  | Max. OFA_fuse size | gG/aM | A/A | 315 | 315 | 500 | 500 | 1000 |
|  | 1 l (r.m.s.) $50 \mathrm{kA}, 240 \mathrm{~V}$ |  |  |  |  |  |  |  |
|  | ABB circuit breaker type |  |  | T5L630 | T5L630 | T5L630 | T5L630 | T6L1000 |
| Rated short-time withstand current | Icw (r.m.s.) | 240 V 0.1 s | kA | 12 | 12 | 18 | 18 | 18 |
|  | Icw (r.m.s.) | 240 V 0.3 s | kA | 12 | 12 | 18 | 18 | 18 |
|  | Icw (r.m.s.) | 240 V 0.5 s | kA |  |  |  |  | 18 |
| Rated short-time making capacity ${ }^{\text {2 }}$ | Icm peak | 240 V | kA | 24 | 24 | 36 | 36 | 36 |

3 and 4 pole construction - Operating performance and short-circuit capability

|  |  |  |  | Switch size |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Data according to IEC 60947-6-1 (Class PC equipment) |  |  |  | $0 \times 200$ | $0 \times 250$ | OX315 | OX400 | $0 \times 500$ |
| Rated operational voltage, U |  |  | Vac |  |  | 200-415 |  |  |
| Operating voltage range, U |  |  | Vac | 160-576 |  |  |  |  |
| Rated operational current, AC-31B |  | up to 415 V | A | 200 | 250 | 315 | 400 | 500 |
| Rated operational current, AC-32B |  | up to 415 V | A | 200 | 250 | 315 | 400 | 500 |
| Rated operational current, AC-33B |  | up to 415 V | A | 200 | 250 | 315 | 400 | 500 |
| Rated breaking capacity in category AC-33 |  | up to 415 V | A | 2000 | 2500 | 3150 | 4000 | 5000 |
| Rated operational current, AC-33iA ${ }^{6}$ |  | up to 415 V | A | 125 | 125 | 250 | 250 | 500 |
| Rated conditional short-circuit current Iq (r.m.s.) and corresponding protective devices (fuse or circuit breaker) | Iq (r.m.s.) $100 \mathrm{kA}, 500 \mathrm{~V}$ | $\hat{i}_{c}\left(\right.$ peak ${ }^{5}$ ) | kA | 49 | 49 | 69 | 69 | 90 |
|  | Max. OFA_fuse size | gG/aM | A/A | 400 / 400 | 400 / 400 | 630 / 630 | 630 / 630 | 1000/1000 |
|  | Iq (r.m.s.) $50 \mathrm{kA}, 500 \mathrm{~V}$ |  |  |  |  |  |  |  |
|  | ABB circuit breaker type |  |  | T5L630 | T5L630 | T6L630 | T6L630 | T6L1000 |
|  | Iq (r.m.s.) $85 \mathrm{kA}, 500 \mathrm{~V}$ |  |  |  |  |  |  |  |
|  | ABB circuit breaker type |  |  |  |  |  |  |  |
| Rated short-time withstand current | Icw (r.m.s.) | 415 V 0.1 s | kA | 18 | 18 | 25 | 25 | 42 |
|  | Icw (r.m.s.) | 415 V 0.3 s | kA | 18 | 18 | 25 | 25 | 30 |
|  | Icw (r.m.s.) | 415 V 0.5 s | kA |  |  |  |  | 30 |
| Rated short-time making capacity ${ }^{\text {2 }}$ | Icm peak | 415 V | kA | 36 | 36 | 52.5 | 52.5 | 89 |

[^22]
## Technical data-IEC

TruONE ATS OX200...1600E, open style

## General performance



2 pole construction - Operating performance and short-circuit capability

| Data according to IEC 60947-6-1 (Class PC equipment) |  |  |  | Switch size |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  |  | 0x630 | Ox800 |
| Rated operational voltage, U |  |  | Vac | 200-240 |  |
| Operating voltage range, $U$ |  |  | Vac | 160-288 |  |
| Rated operational current, AC-31B |  | up to 240 V | A | 630 | 800 |
| Rated operational current, AC-33B |  | up to 240 V | A | $630^{17}$ | $800^{17}$ |
| Rated breaking capacity in category AC-33 |  | up to 240 V | A | $6300^{1)}$ | $8000^{1)}$ |
| Rated conditional short-circuit current Iq (r.m.s.) and corresponding protective devices (fuse or circuit breaker) | 19 (r.m.s.) $100 \mathrm{kA}, 240 \mathrm{~V}$ | $\hat{c}_{\text {c }}(\mathrm{peak})^{5}$ | kA | 90 | 90 |
|  | Max. OFA_fuse size | gG/aM | A/A | 1000 | 1000 |
|  | Iq (r.m.s.) $50 \mathrm{kA}, 240 \mathrm{~V}$ |  |  |  |  |
|  | ABB circuit breaker type |  |  | T6L1000 | T6L1000 |
| Rated short-time withstand current | Icw (r.m.s.) | 240 V 0.15 | kA | 18 | 18 |
|  | Icw (r.m.s.) | 240 V 0.3 s | kA | 18 | 18 |
|  | Icw (r.m.s.) | 240 V 0.5 s | kA | 18 | 18 |
| Rated short-time making capacity ${ }^{2}$ | Icm peak | 240 V | kA | 36 | 36 |

3 and 4 pole construction - Operating performance and short-circuit capability

|  |  |  |  | Switch size |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Data according to IEC 60947-6-1 (Class PC equipment) |  |  |  | 0x630 | Ox800 | Ox1000 | OX1250 | OX1600 |
| Rated operational voltage, U |  |  | Vac |  |  | 200-415 |  |  |
| Operating voltage range, $U$ |  |  | Vac | 160-576 |  |  |  |  |
| Rated operational current, AC-31B |  | up to 415 V | A | 630 | 800 | 1000 | 1250 | 1600 |
| Rated operational current, AC-32B |  | up to 415 V | A | 630 | 800/720 ${ }^{\text {7 }}$ | 1000 | 1250 | 1500/1250 ${ }^{7}$ |
| Rated operational current, AC-33B |  | up to 415 V | A | 630 | 800/7207) | 1000 | 1250 | 1250 |
| Rated breaking capacity in category AC-33 |  | up to 415 V | A | 6300 | 8000/7200 ${ }^{\text {7 }}$ | 10000 | 12500 | 12500 |
| Rated operational current, AC-33iA ${ }^{\text {6 }}$ |  | up to 415 V | A | 630 | 630 | 1000 | 1250 | 1250 |
| Rated conditional short-circuit current Iq (r.m.s.) and corresponding protective devices (fuse or circuit breaker) | 19 (r.m.s.) $100 \mathrm{kA}, 500 \mathrm{~V}$ | $\hat{\mathrm{i}}_{\mathrm{c}}\left(\right.$ (peak) ${ }^{5}$ | kA | 90 | 90 | 95 | 95 | 95 |
|  | Max. OFA_fuse size | $\mathrm{gG} / \mathrm{aM}$ | A/A | 1000 / 1000 | 1000/1000 | 1600/1250 | 1600 / 1250 | 1600/1250 |
|  | Iq (r.m.s.) $50 \mathrm{kA}, 500 \mathrm{~V}$ |  |  |  |  |  |  |  |
|  | ABB circuit breaker type |  |  | T6L1000 | T6L1000 |  |  |  |
|  | 1 l (r.m.s.) $85 \mathrm{kA}, 500 \mathrm{~V}$ |  |  |  |  |  |  |  |
|  | ABB circuit breaker type |  |  |  |  | T7L1600 | T7L1600 | T7L1600 |
| Rated short-time withstand current | Icw (r.m.s.) | 415 V 0.1 s | kA | 42 | 42 | 65 | 65 | 65 |
|  | Icw (r.m.s.) | 415 V 0.3 s | kA | 30 | 30 | 50 | 50 | 50 |
|  | Icw (r.m.s.) | 415 V 0.5 s | kA | 30 | 30 | 50 | 50 | 50 |
| Rated short-time making capacity ${ }^{\text {2 }}$ | Icm peak | 415 V | kA | 89 | 89 | 105 | 105 | 105 |

[^23]
## Technical data - IEC

TruONE ATS OX200...1250E, enclosed style

Enclosed automatic transfer switches

|  |  |  | Switch size |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Data according to IEC 60947-6-1 (Class PC equipment) |  |  | OX200 | OX250 | OX315 | OX400 |
| Rated operational voltage, U |  | Vac | 200-415 |  |  |  |
| Operating voltage range, $U$ |  | Vac | 160-576 |  |  |  |
| Rated insulation voltage, Ui (power circuit) |  | V | 1000 |  |  |  |
| Rated insulation voltage, Ui (electronics) |  | V | 500 |  |  |  |
| Rated frequency, f |  | Hz | 50-60 |  |  |  |
| Rated impulse withstand voltage, Uimp (power circuit) |  | kV | 8 |  |  | 12 |
| Rated impulse withstand voltage, Uimp (electronics) |  | kV | 6 |  |  |  |
| Conventional free air thermal current, Ith / ambient $40^{\circ} \mathrm{C}$ |  | A | 200 | 250 | 315 | 400 |
| Conventional enclosed thermal current, Ithe / ambient $40^{\circ} \mathrm{C}$ |  | A | 200 | 250 | 315 | 400 |
| Enclosure size W $\quad$ ¢HxD |  | mm | $610 \times 810 \times 300$ |  |  |  |
| Rated operational current, AC-31B | up to 415 V | A | 200 | 250 | 315 | 400 |
| Rated operational current, AC-32B | up to 415 V | A | 200 | 250 | 315 | 400 |
| Rated operational current, AC-33B | up to 415 V | A | 200 | 250 | 315 | 400 |
| Rated breaking capacity in category AC-33 | up to 415 V | A | 2000 | 2500 | 3150 | 4000 |
| Rated conditional short-circuit Iq (r.m.s.) $100 \mathrm{kA}, 500 \mathrm{~V}$ | îc (peak) ${ }^{4}$ | kA | 49 | 49 | 69 | 69 |
| current Iq (r.m.s.) and corresponding Max. OFA_fuse size | gG/aM | A/A | 400 / 400 | 400 / 400 | 630 / 315 | 630 / 630 |
| protective devices (fuse or circuit breaker) Iq (r.m.s.) $50 \mathrm{kA}, 500 \mathrm{~V}$ |  |  |  |  |  |  |
| ABB circuit breaker type |  |  | T5L630 | T5L630 | T6L630 | T6L630 |
| Rated short-time withstand current | 415 V 0.1 s | kA | 18 | 18 | 25 | 25 |
|  | 415 V 0.3s | kA | 18 | 18 | 25 | 25 |
|  | 415 V 0.5 s | kA |  |  |  |  |
| Rated short-time making capacity ${ }^{11}$ I $\quad$ Icm peak | 415 V | kA | 36 | 36 | 52,5 | 52,5 |
| Contact transfer time I-II, II-I OFF time / load interrupting time |  | ms | <50 |  |  |  |
| Operating transfer time I-II, II-I |  | ms | <500 |  |  |  |
| ATS current draw during transfer / time duration |  | A/ms | $37 /<110$ |  |  |  |
| Mechanical endurance No. of operating cycles ${ }^{2)}$ |  |  | 6012 | 6012 | 4012 | 4012 |
| Overvoltage category |  |  | III |  |  |  |
| Pollution degree |  |  | PD 3 up to $415 \mathrm{~V} / \mathrm{PD} 2$ up to 500 V |  |  |  |
| Minimum conductor cross section | Cu | $\mathrm{mm}^{2}$ | 95 | 120 | 185 | 240 |
| Terminal bolt size Metric thread diameter x length |  | mm | M8 $\times 25$ | M8 $\times 25$ | M10 $\times 30$ | M10 $\times 30$ |
| Terminal tightening torque Counter torque required |  | Nm | 15...22 | 15... 22 | 30... 44 | 30... 44 |
| Weight without accessories | 3 -pole switch kg |  | 52 | 52 | 59 | 59 |
|  | 4-pole switch kg |  | 52 | 52 | 59 | 59 |

Suitable for applications
Transformer - Transformer, Transformer - Generator ${ }^{3}$ )
${ }^{1)}$ Short-circuit duration $>50 \mathrm{~ms}$, without fuse protection
${ }^{2}$ ) Operating cycle: O-I-O-II-O
${ }^{3)}$ Please contact ABB for applications with smaller than 20 kVA gensets
${ }^{4)}$ Cut-off current îc (peak) value. The cut-off current îc refers to values listed by fuse manufacturers (single phase test acc. to IEC60269).

## Technical data-IEC

TruONE ATS OX200...1250E, enclosed style

Enclosed automatic transfer switches

|  |  |  |  | Switch size |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Data according to IEC 60947-6-1 (Class PC equipment) |  |  |  | $0 \times 630$ | OX800 | OX1000 | OX1250 |
| Rated operational voltage, U |  |  | Vac | 200-415 |  |  |  |
| Operating voltage range, U |  |  | Vac | 160-576 |  |  |  |
| Rated insulation voltage, Ui (power circuit) |  |  | V | 1000 |  |  |  |
| Rated insulation voltage, Ui (electronics) |  |  | V | 500 |  |  |  |
| Rated frequency, f |  |  | Hz | 50-60 |  |  |  |
| Rated impulse withstand voltage, Uimp (pow | er circuit) |  | kV | 12 |  |  |  |
| Rated impulse withstand voltage, Uimp (electronics) |  |  | kV | 6 |  |  |  |
| Conventional free air thermal current, Ith | / ambient $40^{\circ} \mathrm{C}$ |  | A | 630 | 800 | 1000 | 1250 |
| Conventional enclosed thermal current, Ithe | / ambient $40^{\circ} \mathrm{C}$ |  | A | 630 | 700 | 1000 | 1150 |
| Enclosure size | W $\times \mathrm{H} \times \mathrm{D}$ |  | mm | $610 \times 810 \times 300$ |  | $810 \times 1010 \times 300$ |  |
| Rated operational current, AC-31B |  | up to 415 V | A | 630 | 700 | 1000 | 1150 |
| Rated operational current, AC-32B |  | up to 415 V | A | 630 | 700 | 1000 | 1150 |
| Rated operational current, AC-33B |  | up to 415 V | A | 630 | 700 | 1000 | 1150 |
| Rated breaking capacity in category AC-33 |  | up to 415 V | A | 6300 | 7000 | 10000 | 11500 |
| Rated conditional short-circuit | Iq (r.m.s.) $100 \mathrm{kA}, 500 \mathrm{~V}$ | îc (peak) ${ }^{4}$ | kA | 90 | 90 | 95 | 95 |
| current Iq (r.m.s.) and corresponding | Max. OFA_fuse size | gG/aM | A/A | 1000 / 1000 | 1000 / 1000 | 1600 / 1250 | 1600 / 1250 |
| protective devices (fuse or circuit breaker) Iq (r.m.s.) $50 \mathrm{kA}, 500 \mathrm{~V}$ |  |  |  |  |  |  |  |
|  | ABB circuit breaker type |  |  | T6L1000 | T6L1000 | T7L1600 | T7L1600 |
| Rated short-time withstand current | Icw (r.m.s.) | 415 V 0.1 s | kA | 30 | 30 | 50 | 50 |
|  | Icw (r.m.s.) | 415 V 0.3 s | kA | 30 | 30 | 50 | 50 |
|  | Icw (r.m.s.) | 415 V 0.5s | kA | 30 | 30 | 50 | 50 |
| Rated short-time making capacity ${ }^{10}$ | Icm peak | 415 V | kA | 63 | 63 | 105 | 105 |
| Contact transfer time I-II, III-I | OFF time / load interrupting time |  | ms | <50 |  |  |  |
| Operating transfer time I-II, II-I |  |  | ms | <500 |  |  |  |
| ATS current draw during transfer / time duration |  |  | A / ms | 40 / <130 |  |  |  |
| Mechanical endurance | No. of operating cycles ${ }^{2}$ ) |  |  | 3012 | 3012 | 3012 | 3012 |
| Overvoltage category |  |  |  | III |  |  |  |
| Pollution degree |  |  |  | PD 3 up to $415 \mathrm{~V} / \mathrm{PD} 2$ up to 500 V |  |  |  |
| Minimum conductor cross section |  | Cu | $\mathrm{mm}^{2}$ | $2 \times 185$ | $2 \times 240$ | $3 \times 185$ | $3 \times 240$ |
| Terminal bolt size | Metric thread diameter x length |  | mm | M12 $\times 40$ | M12 $\times 40$ | M12 $\times 40$ | M12 $\times 40$ |
| Terminal tightening torque | Counter torque required |  | Nm | 50... 75 | 50... 75 | 50... 75 | 50... 75 |
| Weight without accessories |  | 3-pole switch | kg | 80 | 80 | 109 | 109 |
|  |  | 4-pole switch | kg | 80 | 80 | 115 | 115 |

Suitable for applications
Transformer - Transformer, Transformer - Generator ${ }^{3}$ )
${ }^{11}$ Short circuit duration $>50 \mathrm{~ms}$, without fuse protection
${ }^{\text {2) }}$ Operating cycle: O-I-O-II-O
${ }^{3)}$ Please contact ABB for applications with smaller than 20kVA gensets
${ }^{4}$ ) Cut-off current îc (peak) value. The cut-off current îc refers to values listed by fuse manufacturers (single phase test acc. to IEC60269).

## TruONE ${ }^{\ominus}$ feature comparison

Main features in the table below.
Consult ABB for more information.


Feature comparison

|  | Level 2 controls | Level 3 controls | Level 4 controls |
| :--- | ---: | ---: | ---: |
| Ampere sizes available | IEC: $200-1600 \mathrm{~A}$ | IEC: 200-1600 A | IEC: 200-1600 A |
|  | UL: 30-1200 A | UL: 30-1200 A | UL: 30-1200 A |
| Rated voltage | $200-480 \mathrm{Vac}$ | $200-480 \mathrm{VaC}$ |  |
| Rated frequency | $50 / 60 \mathrm{~Hz}$ | $50 / 60 \mathrm{~Hz}$ |  |
| Phase system | Single and Three | $50 / 60 \mathrm{~Hz}$ | Single and Three |
| Number of poles | 2,3 and 4 | Single and Three | 3 and 4 |


| Neutral configuration |  |  |  |
| :--- | :--- | :--- | :--- |
| Switched | Yes | Yes |  |
| Overlapping | No | Yes |  |
|  |  |  |  |
| Product type |  | Yes |  |
| Open transition (I-II) | Yes | Yes |  |
| Delayed transition (I-O-II) |  | Yes |  |

Voltage and frequency settings

| Pick up Voltage Source 1 | Fixed 2\% above drop out | $81-99 \%, 101-119 \%$ | $81-99 \%, 101-119 \%$ |
| :--- | ---: | ---: | ---: | ---: |
| Drop out Voltage Source 1 | $+/-5,10,15,20 \%$ | $80-98 \%, 102-120 \%$ | $80-98 \%, 102-120 \%$ |
| Pick up Voltage Source 2 | Fixed 2\% above drop out | $81-99 \%, 101-119 \%$ | $81-99 \%, 101-119 \%$ |
| Drop out Voltage Source 2 | $+/-5,10,15,20 \%$ | $80-98 \%, 102-120 \%$ | $80-98 \%, 102-120 \%$ |
| Pick up Frequency Source 1 | Fixed 1\% above drop out | $80.5-99.5 \%, 100.5-119.5 \%$ | $80.5-99.5 \%, 100.5-119.5 \%$ |
| Drop out Frequency Source 1 | $+/-5,10 \%$ | $80-99 \%, 101-120 \%$ | $80-99 \%, 101-120 \%$ |
| Pick up Frequency Source 2 | Fixed 1\% above drop out | $80.5-99.5 \%, 100.5-119,5 \%$ | $80.5-99.5 \%, 100.5-119.5 \%$ |
| Drop out Frequency Source 2 | $+/-5,10 \%$ | $80-99 \%, 101-120 \%$ | $80-99 \%, 101-120 \%$ |

## Time delay settings

| Override momentary Source 1 Outage, sec | $0,1,2,3,4,5,10,15,20,25,30$ | 0-60 | 0-60 |
| :---: | :---: | :---: | :---: |
| Transfer from Source 1 to Source 2, sec | Fixed 2 seconds | 0-3600 | 0-3600 |
| Override momentary Source 2 Outage, sec | Fixed 1,5 seconds | 0-60 | 0-60 |
| Transfer from Source 2 to Source 1, min | $0,1,2,3,4,5,10,15,20,25,30$ | 0-120 | 0-120 |
| Generator stop delay, min | 30 secs or 4 mins | 0-60 | 0-60 |
| Center-OFF delay, sec | 0 or 4 | 0-300 | 0-300 |
| Pre-transfer delay S1 to S2, sec | No | 0-60 | 0-60 |
| Post-transfer delay S1 to S2, sec | No | 0-60 | 0-60 |
| Pre-transfer delay S2 to S1, sec | No | 0-60 | 0-60 |
| Post-transfer delay S2 to S1, sec | No | 0-60 | 0-60 |
| Load shed delay, sec | No | 0-60 | 0-60 |

## Source failure detections

| No voltage |  |  |  |
| :--- | :--- | :--- | :--- |
| Undervoltage | Yes | Yes |  |
| Overvoltage | Yes | Yes |  |
| Phase missing | Yes | Yes |  |
| Voltage unbalance | Yes | Yes |  |
| Invalid frequency | Yes | Yes | Yes |
| Incorrect phase sequence | Yes | Yes | Yes |
|  | Yes | Yes | Yes |

## TruONE ${ }^{\circledR}$ feature comparison



## Feature comparison

|  | Level 2 controls | Level 3 controls | Level 4 controls |
| :---: | :---: | :---: | :---: |
| Features |  |  |  |
| Controls | DIP + keys | LCD + keys | Touch + keys |
| LED indications for ATS, S1 and S2 status | Yes | Yes | Yes |
| Open transition - Standard digital inputs/outputs | $0 / 1$ | $1 / 1$ | $2 / 1$ |
| Delayed transition - Standard digital inputs/outputs | $1 / 1$ | $2 / 1$ | $3 / 1$ |
| Programmable digital inputs/outputs | No | Yes | Yes |
| Auto config (voltage, frequency, phase system) | Yes | Yes | Yes |
| Source priority | Source 1, No priority | Source 1/2, No priority | Source 1/2, No priority |
| Manual re-transfer | Yes | Yes | Yes |
| In-phase monitor (synchro check) | Yes | Yes | Yes |
| Genset exercising: on-load, off-load | Yes | Yes | Yes |
| In-built power meter module | No | No | Yes |
| Load shedding | No | Yes | Yes |
| Real time clock | No | Yes | Yes |
| Event log | No | Yes | Yes |
| Predictive maintenance | No | No | Yes |
| Voltage and current harmonics measuring | No | No | Yes |

## Field-mount accessories

| Auxiliary contacts for position indication | Yes | Yes | Yes |
| :--- | :--- | :--- | :--- |
| Digital input/output modules | No | Yes | Yes |
| $12-24$ Vdc aux supply module for controller | No | Yes | Yes |
| Communication modules | No | Yes | Yes |
|  |  |  |  |

## Connectivity

| Modbus RTU (RS-485) | No | Yes |  |
| :--- | :--- | :--- | :--- |
| Modbus/TCP | No | Yes |  |
| Profibus DP | No | Yes |  |
| ProfiNet | No | Yes |  |
| DeviceNet | No | Yes |  |
| Ethernet IP | No | Yes |  |
| IEC 61850 | No | Yes |  |
| Monitoring via ABB Ability ${ }^{\text {TM }: \text { EDCS }}$ | No | Yes |  |

## For applications

| Mains - Mains | Yes | Yes |
| :--- | :--- | :--- |
| Mains - Generator (minimum size 40kVA) | Yes | Yes |

## Zenith ATS

ZTS T-series Automatic Transfer Switches 30-3000 A

Zenith ZTS T-series technical data 1600-3000 A

|  |  | Zenith switch size (A) |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| Data according to UL1008 |  | 1600 | 2000 | 2600 | 3000 |
| Rated operational voltage | Vac |  |  | -480 |  |
| Operating voltage range | Vac |  |  | - 576 |  |
| Rated frequency | Hz |  |  | -60 |  |
| Emergency systems - Motor loads or total system | A | 1600 | 2000 | 2600 | 3000 |
| Optional standby systems - Motor loads or total system | A | 1600 | 2000 | 2600 | 3000 |
| Contact transfer time I-II, II-I Load interrupting time | ms |  |  |  |  |
| Operating transfer time I-II, II-I | ms |  |  |  |  |
| ATS current draw during transfer / time duration | A/ms |  |  |  |  |
| Suitable for applications |  |  | mer - Tr | r, Tran | Generator |

## ZTG T-series :

General purpose ATS for commercial, industrial, and infrastructure applications.

30-1200 A, 200-480 Vac, 1 and 3 phase, open (standard) or delayed transition, with Type 1, 3R, 4, 4 X , and 12 enclosures.
1600-3000 A, 200-480 Vac, 3 phase, open (standard) or delayed transition, with Type 1, 3R, 4, 4X, and 12 enclosures.


## ZTS T-series :

Advanced ATS for mission critical applications such as data centers, critical infrastructure or industry, finance, and healthcare.

30-1200 A, 200-480 Vac, 1 and 3 phase, open (standard) or delayed transition, with Type 1, 3R, 4, 4 X , and 12 enclosures
1600-3000 A, 200-480 Vac, 3 phase, open (standard), delayed, or closed transition, with Type 1, 3R, $4,4 \mathrm{X}$, and 12 enclosures
400-1200A, 200-480 Vac, 1 and 3 phase, closed transition, with Type $1,3 \mathrm{R}, 4,4 \mathrm{X}$, and 12 enclosures.

## ZBTS T-series :

Bypass/isolation ATS for mission critical applications requiring maintenance bypass such as hospitals and other key infrastructure.

100-1200 A, 200-480 Vac, 1 and 3 phase, open (standard) or delayed transition, with Type 1, 3R, 4, 4 X , and 12 enclosures
1600-3000 A, 200-480 Vac, 3 phase, open (standard), delayed, and closed transition, with Type 1, $3 R, 4,4 X$, and 12 enclosures.

## Technical data

EasyLine - XLP



|  | 3-pole |  | XLP000 |  |  |  | XLPOO |  |  | $\begin{array}{r} \text { XLP1 } \\ \hline 690 \end{array}$ | XLP2 |  |  | $\begin{array}{r} \text { XLP3 } \\ \hline 690 \\ \hline \end{array}$ |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | Rated operational voltage $U_{e} A C$ | (V) | 400 | 500 | 690 | 400 | 500 | 690 | 500 |  | 500 | 690 | 500 |  |
|  | Rated operational current $\mathrm{I}_{\mathrm{e}} \mathrm{AC}$ | (A) | 80 | 100 | 50 | 125 | 160 | 125 | 250 | 200 | 400 | 315 | 630 | 500 |
|  | Thermal current with fuse link $\mathrm{Ith}^{\text {}}$ | (A) |  |  | 100 |  |  | 160 |  | 250 |  | 400 |  | 630 |
|  | Rated insulation voltage $U_{i}$ | (V) |  |  | 690 |  |  | 1000 |  | 1000 |  | 1000 |  | 1000 |
|  | Rated impulse withstand voltage $\mathrm{U}_{\mathrm{imp}}$ | (kV) |  |  | 6 |  |  | 8 |  | 8 |  | 8 |  | 8 |
|  | Rated conditional short circuit current | (kArms) |  |  | 50 |  |  | 50 |  | 50 |  | 50 |  | 50 |
|  | Rated making and breaking capacity |  | AC23B | AC22B | AC21B | AC23B | AC22B | AC21B | AC23B | AC22B | AC22B | AC21B | AC22B | AC21B |
|  | Rated frequency | (Hz) |  |  | 50-60 |  |  | 50-60 |  | 50-60 |  | 50-60 |  | 50-60 |
|  | Power loss at $I_{\text {th }}$ without fuse link/per phase | (W) |  |  | 1,4W |  |  | 3,5W |  | 7,5W |  | 13W |  | 24W |
|  | Max allowed poweloss in the Fuse per phase | (W) |  |  | 7,5W |  |  | 12W |  | 23W |  | 30W |  | 48W |
|  | Electrical durability |  |  |  | 300 |  |  | 200 |  | 200 |  | 200 |  | 200 |
|  | Mechanical durability |  |  |  | 1700 |  |  | 1400 |  | 1400 |  | 800 |  | 800 |
|  | Degree of protection from the | Open |  |  | IP20 |  |  | IP20 |  | IP20 |  | IP20 |  | IP20 |
|  | front acc. to IEC60529 | Closed |  |  | IP30 |  |  | IP30 |  | IP30 |  | IP30 |  | IP30 |


|  | 4-pole |  | XLPOO | XLP1 | XLP2 | XLP3 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | Rated operational voltage Ue AC |  | 500 | 500 | 500 | 500 |
|  | Rated operational current le |  | 160 | 250 | 400 | 630 |
|  | Thermal current with fuse-link Ith |  | 160 | 250 | 400 | 630 |
|  | Utilization category |  | AC22B | AC22B | AC22B | AC22B |
|  | Rated insulation voltage $\mathrm{U}_{\mathrm{i}}$ | (V) | 1000 | 1000 | 1000 | 1000 |
|  | Rated impulse withstand voltage $U_{\text {imp }}$ | (kV) | 8 | 8 | 8 | 8 |
|  | Rated conditional short circuit current | (kArms) | 50 | 50 | 50 | 50 |
|  | Rated frequency | (Hz) | 50-60 | 50-60 | 50-60 | 50-60 |
|  | Power loss (Itn) without fuselink, per phase | (W) |  |  |  |  |
|  | Electrical durability |  | 200 | 200 | 200 | 200 |
|  | Mechanical durability |  | 1400 | 1400 | 800 | 800 |
|  | Degree of protection from | Open | IP20 | IP20 | IP20 | IP20 |
|  | the front according to IEC60529 | Closed | IP30 | IP30 | IP30 | IP30 |

## Technical data

InLine II - Designed for the future

## ABB is proud to introduce the latest technology of Fuse Switch

Disconnectors to ensure the best stability and highest safety in the power distribution network. The new generation InLine II also offers the highest level of personal safety during operation and service.

01 ON -
Closed position
02 OFF -
Open position
-
03 Replacement of fuses position

## Advantages

High level of personal safety by: Safe and reliable operation ON/OFF
Safe and simple replacement of the NH fuse links Universal terminal bolts offering standing bolt or fixed nut for high flexibility of cable connections Variants with integrated V-clamps Available in two alternative heights (ZLBM/ ZHBM), L-version (ZLBM) will save space in Cable

$\overline{01}$

$\overline{0}$

Distribution Cabinets by offering reduced depth Easy installation of current transformers in the H-version (ZHBM)
Variants with non corrosive steel materials (stainless steel)
Designed for intelligent communication to support a high level of stability in the power distribution network

$\overline{03}$

| ZLBM/ZHBM Fuse Switch Disconnector |  | ZLBM/ZHBM 00 | ZLBM/ZHBM 1 | ZLBM/ZHBM 2 | ZLBM/ZHBM 3 |
| :---: | :---: | :---: | :---: | :---: | :---: |
| Rated operational voltage Ue | (V) | 400/500/690 | 400/500/690 | 400/500/690 | 400/500/690 |
| Rated operational current le | (A) | 160/160/125 | 250 | 400 | 630 |
| Rated insulation voltage Ui | (V) | 1000 | 1000 | 1000 | 1000 |
| Rated impulse withstand voltage Uimp | (kV) | 8 | 8 | 8 | 8 |
| Fuse protected short circuit withstand current | (kArms) | 100 | 100 | 100 | 100 |
| Fuse protected short circuit making | (kArms) | 100 | 100 | 100 | 100 |
| Rated making and breaking capacity |  | $\begin{array}{r} \mathrm{AC} 23 \mathrm{~B} / \mathrm{AC} 22 \mathrm{~B} / \\ \mathrm{AC} 21 \mathrm{~B} \end{array}$ | AC23B/AC22B/ <br> AC21B | AC23B/AC22B/ AC21B | $\begin{array}{r} \mathrm{AC} 23 \mathrm{~B} / \mathrm{AC} 22 \mathrm{~B} / \mathrm{AC} \end{array}$ |
| Rated frequency | (Hz) | 50 | 50 | 50 | 50 |
|  | Open | IP20 | IP20 | IP20 | IP20 |
| Degree of protection from the front | Closed | IP30 | IP30 | IP30 | IP30 |

[^24]
## Electronic Fuse Monitoring

Real time monitoring and easy serviceability

The Electronic Fuse Monitor (EFM) gives a remote alarm at any fault conditions if a fuse is blown and allows faults to be located quickly.

- The EFM unit is self-supplied, which means no additional power supply is required.
- The EFM functionality is available up to 800 V AC.
- The fuse status is also visible on the product, with red and green LEDs.



| Fuse status |  |  | Relay contacts |  | Relay contacts |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 1. ON position | Green LED | Red LED | NO contact 11,12 |  | NC contact 13,12 |  |
|  |  |  | Open | Closed | Open | Closed |
| Fuses OK | * | $\bullet$ | X |  |  | X |
| Fuses BLOWN | $\bullet$ | * |  | x | x |  |
| 2. OFF position |  |  |  |  |  |  |
| Fuses OK | $\bullet$ | $\bullet$ | X |  |  | X |
| Fuses BLOWN | $\bullet$ | $\bullet$ | X |  |  | X |

## Technical features

## Control Fuse Base - BS type

## Features:

- ABB fuse bases consisting of fuse carrier available in two ratings (20 \& 32A) for accommodating BS type F1 size HRC (High Rupturing Capacity) fuselinks.
- Fuse bases conform fully to IEC 269/BS88.
- The VS fuse bases are with OFFN range of fuse links, having low powerloss provide protection for wide range of electrical equipments.


## Construction :

- Fuse holders are made of high grade flame retardant, nonhygroscopic, phenolic moulding to IS 1300, BS 771 with a hard gloss surface, black finish.
- They are simple in construction with minimum number of components.
- Carrier contacts and base contacts are mounted using locating ridges formed on the mouldings, assuring perfect alignment.
- Type NS fuse-carriers have a single piece phosphor bronze clip, while type SM fusecarriers have a single piece pressed brass spin rivetted contact.
- The base is also made of a single piece extruded brass tinned contact having adequate size of cable hole to accommodate aluminium cable.


## DIN Fuse Base

Technical Details

- Conforms to IEC 60269 / DIN 43620
- Range 6 to 630A (Size 00,1,2,3)
- Rated Voltage : 500V
- Breaking Capacity : 80 kA
- Rated Frequency: $50-60 \mathrm{~Hz}$



## Wide range of enclosed switches <br> From 16 to 1600 Amperes, 690 V

Enclosed switches are designed and used as main switches for applications, which need to be isolated from the network. The range includes front operated and side operated switch disconnectors, switch fuses and change-over switches enclosed in plastic, steel sheet or stainless steel sheet and aluminum enclosures. They are rated for utilization categories including disconnecting as well as making and breaking the load. In addition the switch fuses equipped with fuse links protects the application and the cables from overload currents and short circuits.

## Plastic enclosures

The plastic enclosures are most suitable for locations with high chemical and moisture requirements. In addition they are light and easy to install and handle.

## Steel sheet enclosures

The steel sheet enclosures are hot dip galvanized and the surface is polyester powder painted. The enclosures are durable and robust for various environments.

## Stainless steel sheet enclosures

The stainless steel sheet enclosures are made of

AISI 304 stainless steel. They are used particularly in the food and beverage industry and in locations where high hygienie is required. The smooth surface does not require any painting and is easy to clean.

## Aluminum alloy enclosures

- Aluminum enclosures have very good impact strength and protection against UV light. They are suitable both for indoor and outdoor use in medium to heavy-duty applications.
- Safety for personnel - reliable position indication
- Padlocking in the OFF-position with one, three or six (with the shackle L6) padlocks against unintentional start-up. The handle cannot be padlocked in the OFF-position if one of the contacts is not in the OFF position.
- The cover cannot be removed if the handle is padlocked.
- Door interlock in the ON-position.
- Arc proof, short circuit durability function: Expander washers in aluminium enclosures with le > 160 A and door locking release in large metal sheet enclosures type MSC.
- Door interlock defeatable with rectangular and pistol type handles.



## Safety switches and enclosed switchdisconnectors

## Overview

Side operated, type BW_, LBAS_, KSF_, KSE_

- Degree of protection: IP65, IEC 60529
- Degree of protection without cover: IP20
- Enclosure in PBT (Thermoplastic polyester) plastic, high impact strength and chemical resistant
- Flame class UL94 5VA, Glow wire $850^{\circ}$ (IEC 60695-2-12)
- Resistance against UV-radiation: F 1, UL 746C
- Standard IEC 60947-3 for Switch-disconnectors
- European Standard EN60204 Safety of machinery
- Cable outlets M sized threaded knock-outs
- 2-, 3-, 4- and 6-pole versions
- Light grey/dark grey enclosure with grey handle
- Yellow enclosure have red handle
- Handle indication I-O/ON-OFF
- Suitable for 3-, 4- and 5-wire systems


1 Metric threaded knockouts, IP54 cable glands sealing plugs included | 2 Knockout in the back of the box | 3 Space for auxiliary contacts, (N.O./N.C.) | 4 Handle, axis and switch insert is one system factory assembled. Switch insert UL94 Vo and glow wire $960^{\circ}$ (IEC 60965-2-12) | 5 Knockout for ventilation / Water drain holes | 6 Cable strip length $\mid 7$ Isolated neutral terminal with separate in/out connection | 8 Handle padlockable in "O" position as standard.Knockout for padlock in "।" position. Shackle for 6 padlocks \| 9 PE-terminal

## Front operated, type OTP

- Degree of protection: IP65, IEC 60529
- Degree of protection without cover: IP20, IEC 60529
- Self-extinguishing plastic: UL94 VO
- Resistance against UV-radiation: F 1, UL 746C
- Standard IEC 60947-3 for Switch-disconnectors
- European Standard EN60204 Safety of machinery
- Cable outlets M or Pg sized threaded knock-outs
- Also blank gland plates available
- 3-, 4- and 6-pole versions
- Black or red-yellow handle
- Handle indication I-O/ON-OFF
- Suitable for 4- and 5-wire systems


1 Knock-out openings for M threads on the top and bottom, separate threaded knock-out opening for control wires in enclosure sizes Width 130 mm and larger | 2 Terminals for 5-wire system: three phases + N + PE terminals | 3 Pull stoppers for two cables in 16 A enclosed switches | 4 Provision for sealing of the lid | 5 Enclosure mounting screws isolated from the inside housing | 6 Knock-out opening on the base for incoming cables 17 Space for auxiliary contacts, (N.O./N.C.) (to be ordered separately)

## Introduction <br> Kabeldon IP-system

Kabeldon IP-system consists of a unique, screenprotected busbar system which is combined with a broad range of switching devices and connectors.

Features of the Kabeldon IP-system are its simplicity and reliability. These are the most important factors when you want to achieve low operating costs and high delivery reliability in a distribution system.

## Features - busbar system

- Busbars of continuously extruded aluminium sections, insulated with a layer of polyamid.
- The busbar has a screen-protected contact slot. This ensures safety regardless of where on the busbar the switching device is placed.
- Busbars are available with rated currents from 400 to 2500 A.
- IP2X: No entry of standard test finger to live parts.



## Features - switching devices

- Can be arranged in any order, regardless of rated current.
- Switching devices 100-1600 A.
- All parts have a high degree of protection and are safe.
- Switching devices are mounted on and connected to the busbar system in the same operation.
- Switching devices can be connected when the system is live.
- Always voltage-free ("dead") when changing fuses.
- The width of Switching devices, connectors and busbars combine to form a modular system. Each module is 12.5 mm . The modular system makes planning easier.
- The compact design of the switching devices makes them suitable for use in many different types of distribution boards.
- All switching devices have a utilization category so that they can be used in cable distribution cabinets, substations and other low voltage distribution boards.


Cable distribution cabinets with switching devices and busbar systems.

## Reference pictures Application areas



Cable distribution boards at Hedens bandy rink, Gothenburg, Sweden.


Cable distribution board, Sweden.


Kabeldon switching devices in a CSS, Latvia.


Distribution board in powder coated enclosure mounted on the wall in a switchgear room at a bakery, in Gothenburg, Sweden.


Kabeldon switching devices SLDL, Sweden, especially designed for CSS.


Examples of using Kabeldon products on the wall in low voltage switchgear, Sweden.

## ABB's comprehensive range of LV control products

The range of ABB control products ranks amongst the most extensive on the market with a full range of innovative solutions for control \& protection, motor starting, intelligent motor management, measurement and monitoring and connection applications.

The business unit is comprised of 3 main product families:

- Control \& protection
- Electronic relays
- Safety devices


## Our products

Our products are already among the most extensive in the market and we are constantly adding new products in order to meet ever changing customer needs.

Quality and reliability are built into every device to ensure total performance satisfaction, even in the most demanding applications.

We offer a very modern and competitive range of contactors, starters, manual motorstarters, a wide range of electronic relays and overload relays, together with an extended program of pilot devices.


## Our offering

- Contactors
- Manual motor starters
- Thermal overload relays
- Electronic overload relays
- Intelligent motor management systems - Universal motor controllers
- Electronic products and relays
- Timers
- Measuring and monitoring relays
- Power supplies
- Interface relays \& optocouplers
- Jokab safety systems
- Pilot devices
- Limit switches
- Softstarters



## AF technology Main benefits



## Reliable in all networks

The electronic system within the AF contactor continuously monitors the current and voltage apply to the coil. The contactor is safely operated in an always optimized condition and is hum-free.


## Wide control voltage range

With conventional contactor technology, different contactors are needed for different network voltages. Thanks to the wide operating range of the AF contactor, it can operate just as well in Europe as in Asia or North America. The core coil of the AF contactor range covers 100-250 V AC / DC, $50 / 60 \mathrm{~Hz}$.


## Reduced coil consumption

AF coil and energy consumption is reduced up to $80 \%$. This allows a reduction of the temperature rise, the size of control transformers and size of cabinets.


## Built-in surge suppression

With conventional contactor technology, it is recommended to use an external surge suppressor, an accessory that could cost as much as half of the contactor. With the AF technology, the surges are handled by the contactor and never reach the control circuit. One less product and one less complication to worry about.

# Select AF contactor dedicated to your control circuit application 




#### Abstract

Direct coil control

Contactor coils are operated directly with an auxiliary contact or PLC-output or indirectly through an interface relay. For direct coil control, the switching capacity of coil operating device (auxiliary contact, solid state PLC-output, ...) must be verified versus the coil consumption at closing and at holding.


AF09...AF2850-4 to 400kW - AC / DC operated

-
AF09Z...AF38Z designed for PLC - 4 to 18.5 kW - 24 V DC operated

| Voltage range | Coil code | - Allow direct control by $24 \mathrm{~V} \mathrm{DC} \geq 250 \mathrm{~mA}$ |
| :--- | :--- | :--- |
| 24 VDC | PLC-output |  |
|  |  | - Pull-in consumption 6 W 250 mA |
|  | - Holding consumption 1.7 W |  |
|  | - N.O. contact opening time 29 ms and closing |  |
|  | time 53 ms |  |
|  |  | With built-in surge protection |

AF09Z...AF38Z for specific applications - 4 to 18.5 kW - AC / DC operated

- Coil 20 covers 12 ... 20 V DC applications

| Voltage range | Coil code |  |
| :--- | :--- | :--- |
| $12 \ldots 60 \mathrm{~V}$ | $D C$ | 20 |
| $24 \ldots 60 \mathrm{~V}$ | $A C / D C$ | 21 |
| $48 \ldots 130 \mathrm{~V}$ | $A C / D C$ | 22 |
| $100 \ldots 250 \mathrm{~V}$ | $A C / D C$ | 23 |

- Coil allow direct control by 24 V DC $\geq$ 500 mA PLC-output
- Coil 21,22 and 23 can withstand short voltage sags ans dips with reference to SEMI F47 conditions of use
- With built-in surge protection


## Select your AF coil interface for PLC For contactors up to 2850 A AC-1 / general use

Coil interfaces are offered to operate all contactor sizes up to AF2850 with very low PLC output signals. They allow a galvanic isolation between the PLC circuit and the contactor coil circuit.


## Interface relay

For control with 24 V DC $\geq 20 \mathrm{~mA}$ PLC output. RA4 interface relay can be used for rated control circuit voltages Uc 24 ... $250 \mathrm{~V} 50 / 60 \mathrm{~Hz}$ with the standard AF contactors up to $45 \mathrm{~kW}-400 \mathrm{~V} / 60 \mathrm{hp}-480 \mathrm{~V}$ and with NF contactor relays.

## Built-in PLC interface

For control with 24 V DC $\geq 10 \mathrm{~mA}$ PLC output. The built-in PLC interface operates the 100 ... 250 V AC / DC or 250 ... 500 V AC / DC AF contactor coil. Available for AF contactors from $55 \mathrm{~kW}-400 \mathrm{~V} / 75 \mathrm{hp}$ up to 560 kW 400 V /900 hp 480 V and up to 2850 A AC-1 / General use. Dedicated coil code from AF116 up to AF370 and standard feature from AF400 up to AF2850.

Control circuit with interface relay


## Control inputs with PLC plug



## Protection and control To keep things running you need control



Manual motor starters and circuit breakers for transformer protection

- Fuseless motor protection up to 80 A
- Designed to perfectly combine with ABB contactors
- Harmonized accessory range


Contactors and contactor relays

- 3-pole and 4-pole AC / DC electronic control coil from 9 up to 2850 A AC-1, 500 kW AC-3
- GAF contactors for solar application
- UA...UA..RA for capacitor switching
- AFS contactors for safety applications


Mini contactors and mini contactor relays

- Up to 20 A AC-1 / 5.5 kW AC-3 400 V
- Flattest mini contactors on the market
- 3 different connecting terminals available
- Wide accessories assortment


Contactors and contactor relays designed for OEMs

- Compact and powerful - up to 7.5 kW AC-3
- Designed for OEMs
- Specially suitable for motor control application


Overload relays

- Up to 200 A (thermal) and 1250 A (electronic)
- Direct mounting to AF contactors

- Monitoring of the winding temperature of motors which have PTC temperature sensors installed
- Evaluation of various motor conditions such as overheating, overload and insufficient cooling
- ATEX approval available for the use in hazardous areas

- Forward and reverse running, motor protection, emergency stop
- Space saving up to $90 \%$ with only 22.5 mm width
- Up to $75 \%$ reduced time in wiring and installation: less error-prone wiring


Self-resetting current
limiting module

- Increases the short-circuit breaking capacity of downstream devices
- Ideal solution for group protection

- Provision of detailed operational, diagnostic and service data continuously
- Effective data source for modern predictive maintenance systems in any plant
- Seamless integration into ABB Ability ${ }^{T M}$ System 800xA platform

- For machine or wall mounting motor starter
- Up to 7.5 kW
- Robust IP66 and type 4X enclosure


Customer made motor starting solution guide

- Co-ordination type 1 and 2 for
- Direct-on-line starting
- Reversing starters
- Start-delta starters
- Full range of connecting kits


## General overview motor protection and control

3-pole contactors

## B mini contactors


(1) 1000 V IEC ratings available for AF80, AF96 and AF146 ... AF2650 contactors.
(2) $\theta \leq 55^{\circ} \mathrm{C}$ for mini contactors and AF400 ... AF2650 contactors.

| Main accessories |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Auxiliary contact blocks | Front mounting | CAF6 | $\begin{aligned} & \text { CA4-10 ( } 1 \times \mathrm{N} .0 .) \\ & \text { CA4-01 ( } 1 \times \mathrm{N} . \mathrm{C} .) \end{aligned}$ |  |  |  |
|  | Side mounting | CA6 | CAL4-11 (1 $\times$ N.O. $+1 \times$ N.C.) |  |  |  |
| Timers | Electronic |  | TEF4-ON TEF4-OFF |  |  |  |
| Interlocking units (3) | Mechanical |  | vM4 |  | VM96-4 |  |
|  | Mechanical / Electrical |  | VEM4 |  |  |  |
| Connection sets | For reversing contactors | BSM6-30 | BER16-4 | BER38-4 | BER65-4 |  |
| Surge suppressors | Varistor (AC/DC) | RV-BC6 | Built-in surge protection |  |  |  |
|  | RC type (AC) |  |  |  |  |  |
|  | Transil diode (DC) | RD7 |  |  |  |  |

(3) See available reversing contactors VB6, VB7 and VAS09 ... VAS16.

## Overload relays



## Manual motor starters



[^25]

|  | CAL19-11 (1 $\times$ N.O. $+1 \times$ N.C. $)$ |  |  | CAL18-11 (1 $\times$ N.O. $+1 \times$ N.C. $)$ |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | VM19 (for same size contactors) |  |  | VM750H VM750V |  | VM1650H |
| BER96-4 | BER140-4 | BER205-4 | BER370-4 | BEM460-30 | BEM750-30 |  |


| TF96 | TF140DU |  | TA200DU |  |  |  |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- |
| $(40 \ldots 96 \mathrm{~A})$ | $(66 \ldots 142 \mathrm{~A})$ |  | $(66 \ldots 200 \mathrm{~A})$ |  |  |  |
|  | $\theta \leq 55^{\circ} \mathrm{C}$ |  | $\theta \leq 55^{\circ} \mathrm{C}$ |  |  |  |
| EF96 | EF146 | EF205 | EF370 $(115 \ldots 380 \mathrm{~A})$ | EF460 | EF750 | EF1250DU |
| $(20 \ldots 100 \mathrm{~A})$ | $(54 \ldots 150 \mathrm{~A})$ | $(63 \ldots 210 \mathrm{~A})$ |  | $(150 \ldots 500 \mathrm{~A})$ | $(250 \ldots 800 \mathrm{~A})$ | $(350 \ldots 1250 \mathrm{~A})$ |
| DB96 |  | DB200 |  |  |  |  |
| DB96 |  |  |  |  |  |  |

## 3-pole contactors, for motor control and power switching



| IEC (1) | AC-3 Rated operational power | $\theta \leq 55^{\circ} \mathrm{C}, 415 \mathrm{~V}$ | kW | 4 | 5.5 | 7.5 | 11 | 15 | 18.5 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| UL/CSA | 3-phase motor rating | 480 V | hp | 5 | 7.5 | 10 | 20 | 25 | 30 |
| AC Contr | supply | $\stackrel{\sim}{\sim}$ | Type | A9 | A12 | A16 | A26 | A30 | A40 |
| IEC | AC-3 Rated operational current | $\theta \leq 55^{\circ} \mathrm{C}, 415 \mathrm{~V}$ | A | 9 | 12 | 17 | 26 | 32 | 37 |
|  | AC-1 Rated operational current | $\theta \leq 40^{\circ} \mathrm{C}, 690 \mathrm{~V}$ | A | 25 | 27 | 30 | 45 | 55 | 60 |
| UL/CSA | General use rating | 600 V | A | 21 | 25 | 30 | 40 | 50 | 60 |

(1) 1000 V IEC ratings available for A50 ... A185 contactors.

| Main accessories |  |  |
| :---: | :---: | :---: |
| Auxiliary contact blocks | Front mounting | $\begin{aligned} & \text { CA5-10 ( } 1 \times \mathrm{N} . \mathrm{O} .) \\ & \text { CA5-01 ( } 1 \times \mathrm{N} . \mathrm{C} .) \end{aligned}$ |
|  | Side mounting | CAL5-11 ( $1 \times$ N.O. $+1 \times$ N.C.) |
| Timers | Electronic | TEF5-ON |
|  |  | TEF5-OFF |
|  |  | TE5S (for star-delta starters - direct timing - separate mounting) |
| Interlocking units | Mechanical | VM5-1 |
|  | Mechanical / Electrical | VE5-1 |
| Surge suppressors | Varistor (AC/DC) | RV5 (24...440 V) |
|  | RC Type (AC) | RC5-1 (24...440 V) |

Overload relays


Thermal
relays
TA25DU-M (0.10... 32 A)

| Electronic relay | Trip class 10E, 20E, 30E | E16DU-(0.32...18.9 A) | E45DU-(9...45 A) |
| :--- | :--- | :--- | :--- |
|  | Mounting kit | DB16E | DB45E |

## Manual motor starters

Thermal / magnetic protection Class 10

MS116 (0.10... 32 A)
Ics up to 50 kA for class 10 A
MS132 (0.10... 32 A)
Ics up to 100 kA
MS165 (10...32A)
Ics up to 100 kA

## Magnetic only types

MO132 (0.16... 32 A)
Ics up to 100 kA

MO165 (16-32A)
Ics up to 100 kA


| 22 | 30 | 37 | 45 | 55 | 75 | 90 | 110 | 132 | 160 | 200 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 40 | 60 | 60 | 60 | 75 | 100 | 125 | 150 | 200 | 250 | 300 |
| A50 | A63 | A75 | A95 | A110 | A145 | A185 | AF205 | AF265 | AF305 | AF370 |
| 50 | 65 | 75 | 96 | 110 | 145 | 185 | 205 | 265 | 305 | 370 |
| 100 | 115 | 125 | 145 | 160 | 250 | 275 | 350 | 400 | 500 | 600 |
| 80 | 90 | 105 | 125 | 150 | 230 | 250 | 300 | 350 | 400 | 520 |


|  | VM300H <br> VM300V | VM19 |
| :--- | :--- | :--- |
| VE5-2 |  |  |
| RC5-2 $(24 \ldots 440 \mathrm{~V})$ |  |  |

TA75DU-M (18...80 A)
TA80DU-M (29... 80 A) TA200DU-M (66... 200 A)
TA110DU-M (66... 110 A)

| E80DU- $(27 \ldots 80 \mathrm{~A})$ | E140DU $(50 \ldots 140 \mathrm{~A})$ | EF205DU (63...210 A) |
| :--- | :--- | :--- |
| DB80E | DB140E |  |

## Short-circuit protection devices

Tmax Circuit breaker and accessories

## MS165 (42...65A)

Ics up to 50 kA

[^26]

## 3-pole contactors, for motor control and power switching



AX09


AX40

|  |  |  |  |  |  | Size 1 |  |  | Size 2 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| IEC (1) | AC-3 Rated operational power | $\varnothing \leq 55^{\circ} \mathrm{C}, 415 \mathrm{~V}$ | kW | 4 | 5.5 | 7.5 | 11 | 15 | 18.5 |
| AC Con | upply |  | Type | AX09 | AX12 | AX18 | AX25 | AX32 | AX40 |
| IEC | AC-3 Rated operational current | $\varnothing \leq 55^{\circ} \mathrm{C}, 415 \mathrm{~V}$ | A | 09 | 12 | 18 | 25 | 32 | 40 |
|  | AC-1 Rated operational current | $\varnothing \leq 40^{\circ} \mathrm{C}, 690 \mathrm{~V}$ | A | 22 | 25 | 27 | 32 | 55 | 60 |

[^27]
## Main accessories

| Auxiliary contact blocks | Front mounting |  |
| :--- | :--- | :--- |
|  | Side mounting |  |
|  | Electronic |  |
| Surge suppressors | Mechanical | Vechanical / Electrical |
| Overload relays | Varistor (AC / DC) | VE5-1 |
| Thermal relays | RC type (AC) | RC5-1 (24...440 V) |

Manual motor starters

| Thermal / magnetic protection Class 10 | $\begin{array}{r} \text { MS116 (0.10... } 32 \mathrm{~A} \text { ) } \\ \text { Ics up to } 50 \text { kA for class } 10 \mathrm{~A} \end{array}$ |  |
| :---: | :---: | :---: |
|  | MS132 (0.10... 32 A) Ics up to 100 kA |  |
|  |  | MS165 (10...32A) Ics up to 100 kA |
| Magnetic only types | MO132 (0.16... 32 A) <br> Ics up to 100 kA |  |
|  |  | MO165 (16...32A) Ics up to 100 kA |




## 3-pole contactors, for motor control and power switching




VM19 (For same size contactor)
VM750H VM750V
VM1650H

BER140-14

> BER205-14 BER370-4

BEM460-30 BEM750-30

TF140DU(66... 143 A )
TA200DU(66...200 A)

EF146 (54... 150 A )
EF205(63...210 A)

EF370(115... 380 A) EF2460(150...500 A) EF750(250... 300 A)
EF1250DU
(375...1250 A)

## Short-circuit protection devices

MCCB and switch-fuses


## -

4-pole contactors


| IEC | AC-rated operational Current | $\theta \leq 40^{\circ} \mathrm{C}, 690 \mathrm{~V}$ | A |
| :---: | :---: | :---: | :---: |
| UL/CSA | General use rating | 600 V | A |
| AC/DC C | Control supply | $\stackrel{1}{\mid}$ | Type |
| AC Contr | rol supply | $\stackrel{1}{4}$ | Type |
| DC Contr | trol supply | 官 | Type |
| IEC | AC-1 Rated operational Current | $\theta \leq 40^{\circ} \mathrm{C}$ | A |
|  | 690 V | $\theta \leq 60^{\circ} \mathrm{C}(1)$ | A |
|  |  | $\theta \leq 70^{\circ} \mathrm{C}$ | A |
|  | With conductor cross sectional area |  | $\mathrm{mm}^{2}$ |
|  | Rated operational voltage Ue m |  | V |


| 25 | 30 | 45 | 55 | 70 | 100 | 125 |
| ---: | ---: | ---: | ---: | ---: | ---: | ---: |
| 25 | 30 | 45 | 55 | 60 | 80 | 105 |
| AF09 | AF16 | AF26 | AF38 | AF40 | AF52 | AF80 |
| AF09 | AF16 | AF26 | AF38 | AF40 | AF52 | AF80 |
| AF09 | AF16 | AF26 | AF38 | AF40 | AF52 | AF80 |
| 25 | 30 | 45 | 55 | 70 | 100 | 125 |
| 25 | 30 | 40 | 45 | 60 | 80 | 105 |
| 22 | 26 | 32 | 37 | 50 | 70 | 90 |
| 4 | 6 | 10 | 16 | 35 | 35 | 50 |
| 690 | 690 | 690 | 690 | 690 | 690 | 690 |

$\theta \leq 55^{\circ} \mathrm{C}$ for EK550, EK 1000 contactors
-
Main accessories

| Auxiliary contact blocks | Front mounting | CA4-10(1 X N.O.), CA4-01(1 X N.C.) |  |
| :---: | :---: | :---: | :---: |
|  | Side mounting | CAL4-11(1 X N.O. + 1 X N.C.) |  |
| Timers | Electronic | TEF4-ON |  |
|  |  | TEF4-OFF |  |
| Interlock units | Mechanical | VM4 | VM96-4 |
|  | Mechanical/ Electronic | VEM4 |  |
| Surge suppressor | Varistor + RC (AC / DC) | Built -in surge protction |  |




|  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 160 | 200 | 275 | 350 | 400 | 500 | 525 | 800 | 1000 |
| 160 | 175 | 230 | 250 | 300 | 350 | 420 | 540 |  |
| AF116 | AF140 | AF190 | AF205 | AF265 | AF305 | AF370 | - |  |
| AF116 | AF140 | AF190 | AF205 | AF265 | AF305 | AF370 | EK550 | EK1000 |
| AF116 | AF140 | AF190 | AF205 | AF265 | AF305 | AF370 | EK550 | EK1000 |
| 160 | 200 | 275 | 350 | 400 | 500 | 525 | 800 | 1000 |
| 145 | 175 | 250 | 300 | 350 | 400 | 425 | 650 | 800 |
| 130 | 160 | 200 | 240 | 290 | 325 | 350 | 575 | 720 |
| 70 | 95 | 150 | 240 | 240 | 300 | $2 \times 185$ | $2 \times 240$ | $2 \times 300$ |
| 690 | 690 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 |

## Installation contactor

## Introduction

ABB offers a complete range of equipment for controlling, remote switching and protecting electrical installations in buildings as hotels, hospitals, shopping centers,office centers and domestic applications.

ESB and EN installation contactors are designed to match the Modular DIN rail components for common use in dedicated panels providing high safety and finger protection.

## The range

The ESB range includes 6 ratings from 16 A to 100 A with 2 to 4-pole version. The EN contactor range offers 3 types from 20 A to 40 A with an additional manual switch in front.

## Flexible use for many application

- Resistive loads such as electric heaters, water heaters, etc.
- Motors, pumps
- Lamp switching and controls (Building installtion)


## Features and benefits

- AC/ DC coil connection
- High comfort due to hum-free operation
- High protection against overvoltages and current peaks
- Compact and optimized design, DIN rain mounting


Techincal description

| ESB16 | ESB20 | ESB25 | ESB40 | ESB63 | ESB100 |
| :---: | :--- | :--- | :--- | :---: | :---: |
| - | EN20 | EN25 | EN40 | - | - |
| $16 A$ | $20 A$ | $25 A$ | $40 A$ | $63 A$ | $100 A$ |

Aux contact block EHO4-2O-2NO
Aux contact block EH04-11-1NO + 1NO

## Mini contactors



| Screw terminals |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| AC Control supply | 市 |  |  |  |  |  |
| 3－pole contactors | coil consumption 3．5w | Type | B6 | B7 | － | － |
| 3－pole reversing contactors | coil consumption 3.5 w | Type | － | － | VB6 | VB7 |
| 4－pole contactors | coil consumption 3.5 w | Type | B6 | B7 | VB6A ${ }^{\text {2 }}$ | VB7A ${ }^{2}$ |
| DC Control supply | 宁 |  |  |  |  |  |
| 3－pole contactors | coil consumption 3.5 w | Type | BC6 | $\begin{array}{r} \text { BC7 } \\ \text { B7D }^{1)} \end{array}$ | － | － |
| 3－pole interface contactors | coil consumption $1.4 . . .2 .4 \mathrm{w}$ | Type | BC6 | BC7 | － |  |
| 3 －pole reversing contactors | coil consumption 3.5 w | Type | － | － | VBC6 | VBC7 |
| 4－pole contactors | coil consumption 3.5 w | Type | BC6 | B7D | VBC6A ${ }^{\text {2 }}$ | VBC7A ${ }^{\text {2 }}$ |
| wide range types | extended coil voltage and temperature | Type | － | TBC7 |  |  |
| PLC types | coil consumption 1.7 w | Type | B6S ${ }^{1}$ | B7S ${ }^{1}$ |  |  |
| IEC Rated operational power AC－3 | $\frac{22-230-240 \mathrm{~V}}{380-400 \mathrm{~V}}$ | kW | 2.2 | 3 | 2.2 | 3 |
|  |  | kW | 4 | 5.5 | 4 | 5.5 |
| Rated operational power AC－1 | $400 \mathrm{~V} \theta \leq 40^{\circ} \mathrm{C}$ | A | 20 | 20 | 20 | 20 |
| UL／CSA 3－phase motor rating | 220－240 V AC | hp | 2 | 3 | 2 | 3 |
|  |  | hp | 3 | 5 | 3 | 5 |
| General use rating | 440－480 | A | $12(300 \mathrm{~V})$ | 16（600 V） | $12(300 \mathrm{~V})$ | 16（600 V） |


| $\theta_{\text {with integrated surge suppressor }}{ }^{2}$ with safety blocking function |  |  |
| :--- | :--- | :--- |
| Main accessories |  | CAF6 |
| Auxiliary contact blocks | Front mounting | CA6 |
|  | Side mounting | For reversing contactors |
| Connection sets | Varistor（AC／DC） | class 10 |
| Surge suppressor |  | RV－BC6 |
| Overload relay | class 10E，20E，30E |  |
| Thermal overload relays |  | T16 |
| Thermal and phase failure protection，with single setup possible | E16DU |  |
| Wlectronic overload relays |  |  |
| With single setup possible |  |  |
| Manual motor starters |  |  |


| Thermal／magnetic protection | class 10 | MS116，MS132 |
| :--- | :---: | :---: |
| Magnetic only types | MO132 |  |
| Connecting link to manual motor starters | BEEA7／132 |  |

## Contactor relays



|  |  | Screw terminals |
| :---: | :---: | :---: |
| AC Control supply | 直 |  |
| 4－pole contractor relays | coil consumption 3．5w Type | K6 |
| DC Control supply | 寝 |  |
| 4－pole contractors | coil consumption 3．5w Type | KC6 |
| 4－pole interface contractors | coil consumption 1．4．．． 2.4 w Type | KC6 |
| wide range types | extendedcoil volage and temperature Type | TKC6 |
| PLC types | coil consumption 1.7 w ．．． 2.8 w Type | K6S |
| IEC Rated operational power AC－15 | 22－230－240 V A | 4 |
|  | $380-400 \mathrm{~V} \mathrm{~A}$ | 3 |
| Rated operational power AC－13 | 24V A | 2.5 |
| － |  |  |
| Main accessories |  |  |
| Auxiliary contact blocks Front mounting |  | CAF6 |
| Side mounting |  | CA6－11K |



K6 K6...F

KC6...P
KC6...F
KC6...P

## M mini contactors



Main accessories

| Auxiliary contact blocks | Front mounting | MACN $/$ MARN |
| :--- | :--- | :--- |
|  | Side mounting | MACL/MARL |
| Electronic timers |  | MREBC |
| Connection sets | For reversing contactors | WKMIU |
| Surge suppressors |  | MPO |

## Overload relays

| Thermal overload relays | Class 10 | T16 |
| :--- | :--- | :--- |

Thermal and phase failure protection, with single setup possible
(1) Valid for N.O. contacts only.

## M mini contactor relays

|  |  |  | Screw terminals | Screw terminals for ring tongue ferrules |
| :---: | :---: | :---: | :---: | :---: |
| AC Control supply | ~ |  |  |  |
| 4 4-pole contactor relays | Coil consumption ( 50 Hz ) 5.3 VA | Type | MCRA..T | MCRA..R |
| DC Control supply | $\frac{1}{-1}$ |  |  |  |
| 4-pole contactor relays | Coil consumption 3 W | Type | MCRC...T | MCRC...R |
| 4 -pole low consumption contactor relays | Coil consumption $1.2 / 2 \mathrm{~W}$ | Type | MCRI..T / MCRK..T | MCRK...R |
| 4 -pole extended limits coil contactor relays | Coil consumption 4 W | Type | MCRC..TW | - |
| IEC Rated operational current AC-15 | 240 V | A | 6 | 6 |
|  | 400 V | A | 4 | 4 |
| Rated operational current DC-13 | 24 V | A | 5 | 5 |
| UL/CSA Pilot duty |  |  | A600, Q600 |  |
| Main accessories |  |  |  |  |
| Auxiliary contact blocks | Front mounting |  | MARN |  |
|  | Side mounting |  | MARL |  |
| Electronic timers |  |  | MREBC |  |
| Surge suppressor |  |  | MPO |  |

## Contactors accessory overview

## AF contactor main accessories



## A range contactor main accessories



## AX contactor main accessories



AX185, AX205


AX260 ... AX370


## MS and MO manual motor starters A complete motor protection concept



Fuseless protection saves costs, space and ensures a quick reaction under overload and short-circuit condition by switching off the motor within milliseconds. The full range of motor starters offer protection from 0.1 A to up to 100 A . The new family range has a harmonized range of accessories and offers the same features up to 80 A .


## Protection and control Protect equipment and installations

ABB offers a broad range of manual motor starters, for protection and control in almost every situation including hazardous areas, protecting installations from short-circuits, overloads and phase failures while also controlling the current flow through a simple ON/OFF switch.

## Continuous operation Secure uptime

Fuseless motor protection reduces maintenance costs and downtimes by avoiding fuse replacement after faults. Furthermore, MS132 and MS165 feature a magnetic trip indicator making troubleshooting easier.


## Speed up your projects Simplified design

Manual motor starters can be connected easily with ABB contactors or soft starters using the respective accessory. Additionally, the main range of accessories is shared across multiple starters (both with screw and Push-in Spring terminals available), making logistics and planning simpler.

## MS and MO manual motor starters A complete motor protection concept



Right solution for your application
MS116 offers protection up to 32 A and a breaking capacity up to 100 kA - all in a 45 mm wide housing. They are designed to meet requirements of most standard applications.


## All-in-one

ABB offers fuseless protection against short-circuits, phase failures and overloads including disconnect function - all in one single compact product.

High performance in compact size
MS132 and MS165 manual motor starters cover short-circuit breaking capacities up to 100 kA . In addition, every manual motor starter is temperature compensated up to $60^{\circ} \mathrm{C}$.


Protection wherever you are Manual motor starters are suitable for worldwide use. The wide range of certifications covers standards like IEC (CB), cULus, CCC, EAC and various ship approvals. MS132 and MS165 also apply to ATEX standards for hazardous areas.



Ready for IE3 motors MS116/MS132/MO132/MS165/MO165 comply with the latest IE3 N/H and
NE/HE motors. NE/HE requires comply with the latest IE3 $\mathrm{N} / \mathrm{H}$ a
$\mathrm{NE} / \mathrm{HE}$ motors. $\mathrm{NE} / \mathrm{HE}$ requires utilization category AC-3e.


## Just push it

With the new Push-in Spring terminals, one push is all you need for a faster than ever installation, an easier than ever wiring and a reliable as ever connection.

## Just push it! <br> The next evolution in motor starter solutions is here.

So up to 18.5 kW , one push is all you need!


Direct on-line Starter


Reversing Starter

## Save up to $50 \%$ wiring

time with Push-in
Spring compared to
Spring compared to
conventional spring
solutions. And the
connections are just as
reliable. So for speed,
ease and reliability, just
push it.

Also available with Push-in technology


Sentry safety relays


Monitoring relays
Time relays


## Push-in Spring solution Complete range, complete efficiency

The Push-in Spring motor starting solution products provide you with a range of benefits.


2-in-1
Benefit from both Push-in mode and Spring mode and use ferruled cables or cables without ferrules in the same terminal.

Tool-free connecting links 100\% tool-free mounting connecting links.


Compatible with screw range Mount accessories for control circuits on the screw range up to 45 kW AC-3 400 V on manual motor starters and up to 45 kW AC-3 400 V, 130 A AC-1 on contactors.


Tool-free busbars Parallel connection of manual motor starters without the need for tools (also certified for UL Type E/ Type F applications)


Just one tool for everything
You only need a 3 mm screwdriver in Spring mode as well as for de-wiring the complete solution.


Higher connecting capacity
The solution ranges up to 18.5 kW 400 V AC-3 and 50 A AC-1
(25 hp 480 V and
45 A 600 V general use).

## Manual motor starters

## Overview

|  |  |  |  |
| :---: | :---: | :---: | :---: |
| Type | MS116 | MS132 | MS165 |
| Thermal and electromagnetic protection | Yes | Yes | Yes |
| Electromagnetic protection | - | - | - |
| Phase loss sensitivity | Yes | Yes | Yes |
| Switch position | ON/OFF | ON/OFF/TRIP | ON/OFF/TRIP |
| Magnetic trip indication | - | Yes | Yes |
| Lockable handle without accessories | - | Yes | Yes |
| Disconnecting feature | Yes | Yes | Yes |
| Width | 45 mm | 45 mm | 55 mm |
| Rated operational current le | 0.10 ... 32 A | 0.10 ... 32 A | $10 . . .80 \mathrm{~A}$ |
| Setting range | 0.10 ... 32 A | 0.10 ... 32 A | $10 . . .80 \mathrm{~A}$ |
| Ambient air temperature | $-25 . . .+55^{\circ} \mathrm{C}$ (1) | $-25 \ldots+60^{\circ} \mathrm{C}(1)$ | -25 ... $+60^{\circ} \mathrm{C}$ (1) |

(1) Compensated

Accessories

| Auxiliary contact | HKF1, HK1 |  |  |  |
| :--- | :--- | :--- | :--- | :---: |
| Signaling <br> contact | for tripped alarm | SK1 |  |  |
| for short-circuit alarm | - | CK1 |  |  |
| Shunt trip |  | AA1 |  |  |
| Undervoltage release | UA1 |  |  |  |

Table for short-circuit ratings for 400/415 V AC

|  |  | Standard range MS116 |  |  | Performance range MS132, MS165 |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Selection parameters |  |  |  |  |  |  |  |
| Rated operational power | Setting range for thermal release | Type | Short-cir breakin Icu | acity Ics | Type | Short-circuit breaking capacity Icu | Ics |
| 0.03 kW (1) | $0.1 \ldots 0.16 \mathrm{~A}$ | MS116-0.16 | 100 kA | 50 kA | MS132-0.16 (2) | 100 kA | 100 kA |
| 0.06 kW | $0.16 \ldots 0.25 \mathrm{~A}$ | MS116-0.25 | 100 kA | 50 kA | MS132-0.25 (2) | 100 kA | 100 kA |
| 0.09 kW | $0.25 \ldots 0.4 \mathrm{~A}$ | MS116-0.4 | 100 kA | 50 kA | MS132-0.4 (2) | 100 kA | 100 kA |
| 0.18 kW | $0.4 \ldots 0.63 \mathrm{~A}$ | MS116-0.63 | 100 kA | 50 kA | MS132-0.63 (2) | 100 kA | 100 kA |
| 0.25 kW | 0.63 ... 1.0 A | MS116-1.0 | 100 kA | 50 kA | MS132-1.0 (2) | 100 kA | 100 kA |
| 0.55 kW | 1.0..1.6 A | MS116-1.6 | 100 kA | 50 kA | MS132-1.6 (2) | 100 kA | 100 kA |
| 0.75 kW | 1.6...2.5 A | MS116-2.5 | 75 kA | 50 kA | MS132-2.5 (2) | 100 kA | 100 kA |
| 1.5 kW | 2.5...4.0 A | MS116-4.0 | 75 kA | 50 kA | MS132-4.0 (2) | 100 kA | 100 kA |
| 2.2 kW | 4.0...6.3 A | MS116-6.3 | 50 kA | 50 kA | MS132-6.3 (2) | 100 kA | 100 kA |
| 4.0 kW | 6.3...10 A | MS116-10 | 50 kA | 50 kA | MS132-10 (2) | 100 kA | 100 kA |
| 5.5 kW | 8...12 A | MS116-12 | 50 kA | 25 kA | MS132-12 | 100 kA | 100 kA |
| 7.5 kW | 10...16 A | MS116-16 | 16 kA | 16 kA | MS132-16 (2) / MS165-16 | 100 kA | 100 kA |
| 7.5 kW | $14 . . .20 \mathrm{~A}$ |  |  |  | MS165-20 | 100 kA | 100 kA |
| 7.5 kW | 16...20 A | MS116-20 | 16 kA | 10 kA | MS132-20 (2) | 100 kA | 100 kA |
| 11 kW | $18 . . .25 \mathrm{~A}$ |  |  |  | MS165-25 | 100 kA | 100 kA |
| 11 kW | 20... 25 A | MS116-25 | 16 kA | 10 kA | MS132-25 (2) | 50 kA | 50 kA |
| 15 kW | 25...32 A | MS116-32 | 16 kA | 10 kA | MS132-32 (2) | 50 kA | 25 kA |
| 15 kW | 23 ... 32 A |  |  |  | MS165-32 | 100 kA | 100 kA |
| 22 kW | 30 ... 42 A |  |  |  | MS165-42 | 50 kA | 50 kA |
| 22 kW | 40 ... 54A |  |  |  | MS165-54 | 50 kA | 30 kA |
| 25 kW | - |  |  |  |  |  |  |
| 30 kW | $52 . . .65 \mathrm{~A}$ |  |  |  | MS165-65 | 50 kA | 30 kA |
| 37 kW | 62...73A |  |  |  | MS165-73 | 30 kA | 30 kA |
| 45 kW | 70...80 A |  |  |  | MS165-80 | 30 kA | 30 kA |

(1) 690 V AC
(2) Available with Push-in Spring terminals.

M0165
MO132

| - | - |
| :--- | :--- |
| Yes | Yes |
| - | - |
| ON/OFF/TRIP | ON/OFF/TRIP |
| - | - |
| Yes | Yes |
| Yes | Yes |
| 45 mm | 55 mm |
| $0.16 \ldots 32 \mathrm{~A}$ | $16 \ldots 80 \mathrm{~A}$ |
| - | - |
| $-25 \ldots+60^{\circ} \mathrm{C}$ | $-25 \ldots+60^{\circ} \mathrm{C}$ |

MS132-T

Yes
Yes
ON/OFF/TRIP
Yes
Yes
Yes
45 mm
$0.16 \ldots 25$ A
0.10 ... 25 A
$-25 . .+60^{\circ} \mathrm{C}$ (1)

| HKF1, HK1 | HKF1, HK1 |
| :--- | :--- | :--- |
| SK1 | SK1 |
| - | CK1 |
| AA1 | AA1 |
| UA1 | UA1 |

Performance range
Transformer protection
M0132, M0165
MS132-T

| Type | Short-circuit breaking capacity Icu | Ics |
| :---: | :---: | :---: |
| M0132-0.16 | 100 kA | 100 kA |
| M0132-0.25 | 100 kA | 100 kA |
| M0132-0.4 | 100 kA | 100 kA |
| M0132-0.63 | 100 kA | 100 kA |
| M0132-1.0 | 100 kA | 100 kA |
| M0132-1.6 | 100 kA | 100 kA |
| M0132-2.5 | 100 kA | 100 kA |
| M0132-4.0 | 100 kA | 100 kA |
| M0132-6.3 | 100 kA | 100 kA |
| M0132-10 | 100 kA | 100 kA |
| M0132-12 | 100 kA | 100 kA |
| M0132-16 / M0165-16 | 100 kA | 100 kA |
| M0165-20 | 100 kA | 100 kA |
| M0132-20 | 100 kA | 100 kA |
|  |  |  |
| M0132-25 / M0165-25 | $50 \mathrm{kA} / 100 \mathrm{kA}$ | $50 \mathrm{kA} / 100 \mathrm{kA}$ |
| M0132-32 | 50 kA | 25 kA |
| M0165-32 | 100 kA | 100 kA |
| M0165-42 | 50 kA | 50 kA |
| M0165-54 | 50 kA | 30 kA |
| M0165-65 | 50 kA | 30 kA |
| M0165-73 | 30 kA | 30 kA |
| M0165-80 | 30 kA | 30 kA |


| Type | Short-circuit <br> breaking capacity <br> Icu / Ics |
| :--- | :--- |
| MS132-0.16T (2) | 100 kA |
| MS132-0.25T (2) | 100 kA |
| MS132-0.4T (2) | 100 kA |
| MS132-0.63T (2) | 100 kA |
| MS132-1.0T (2) | 100 kA |
| MS132-1.6T (2) | 100 kA |
| MS132-2.5T (2) | 100 kA |
| MS132-4.0T (2) | 100 kA |
| MS132-6.3T (2) | 100 kA |
| MS132-10T (2) | 100 kA |
| MS132-12T | 100 kA |
| MS132-16T (2) | 100 kA |
| MS132-20T (2) | 100 kA |
|  |  |
| MS132-25T (2) | 50 kA |
| Transformer protection: |  |
| The instantaneous short-circuit current |  |
| setting is 20 times the rated operational |  |
| current. |  |

## Accessories

## MS116, MS132, MS165, MO132, MO165, MS132-T

Manual motor starters with accessories (MS116, MO132, MO165)


Manual motor starters (MS132, MS165) and circuit breakers for transformer protection (MS132-T) with accessories


## MS132-T circuit breakers for transformer protection

Low voltage transformers are used to supply power to control and auxiliary circuits in distribution and automation boards and to provide galvanic isolation. These transformers may be damaged by an electrical failure (short-circuit or overload on the primary side), therefore a proper protection should be provided.


Circuit breakers for transformers protection are specially designed for fuseless protection of control transformers on the primary side against overloads and short-circuits.

Selection table MS132-T with ABB control transformers:
Please refer to document no. 2CDC131111D0201


## Application example

Protection of transformers for power supply of control and auxiliary circuits, both in distribution and automation boards (checking, signaling, interlock, etc).

## Thermal and electronic overload relays

Thermal overload relays


| Type | TA25DU-M | TA42DU-M | TA75DU-M | TA80DU-M | TA110DU-M | TA200DU-M |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Current range | 0.10 ... 32 A | $18 . . .42 \mathrm{~A}$ | $18 . . .80 \mathrm{~A}$ | $29 . . .80 \mathrm{~A}$ | 66 ... 110 A | $66 . . .200 \mathrm{~A}$ |
| Trip class | 10A | 10A | 10A | 10A | 10A | 10A |
| Single mounting kit | DB25 | DB80 | DB80 | DB80 | DB200 | DB200 |
| For contactors | A09 ... A30 | A30 ... A40 | A50 ... A75 | A95 ... A110 | A95 ... A110 | A145 ... A185 |
| For contactors | AX09 ... AX32 | AX32 ... AX40 | AX50 ... AX80 | AX95 ... AX150 | AX95 ... AX150 | AX185 ... AX205 |


| Thermal overload relays |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| IEC: rated operational power AC-3 Fitting to contactors | $\begin{array}{r} 0.03 \ldots 4.0 \mathrm{~kW} \\ \mathrm{~B} 6, \mathrm{~B} 7, \mathrm{AS} \end{array}$ | $\begin{gathered} 4.0 \ldots 18.5 \mathrm{~kW} \\ \text { AFO9 ... AF38 } \end{gathered}$ | $\begin{array}{r} 18.5 \ldots 30 \mathrm{~kW} \\ \text { AF40, AF52, AF65 } \end{array}$ | $\begin{aligned} & 37 \ldots 45 \mathrm{~kW} \\ & \text { AF80, AF96 } \end{aligned}$ | $\begin{array}{r} 55 \ldots 75 \mathrm{~kW} \\ \text { AF116, AF140, AF146 } \end{array}$ | $90 \ldots 110 \mathrm{~kW}$ AF190, AF205 |
| Type | T16 | TF42 | TF65 | TF96 | TF140DU | TA200DU |
| Current range | $0.10 \ldots 16$ A | $0.10 \ldots 38 \mathrm{~A}$ | $22 . . .67 \mathrm{~A}$ | $40 \ldots 96$ A | $66 . . .142 \mathrm{~A}$ | $66 . . .200 \mathrm{~A}$ |
| Trip class | 10 | 10 | 10 | 10 | 10A | 10A |
| Separate mounting kit | DB16 | DB42 | - | - | - | - |
| Trip class |  |  | 10 |  |  | 10 |



| IEC: rated operational power AC-3 400 V | $0.03 \ldots 4.0$ kW | $4 \ldots 7.5$ kW | 4.0 ... 18.5 kW | $18.5 \ldots 30 \mathrm{~kW}$ | $37 . .45 \mathrm{~kW}$ | $55 . .75$ kW | $90 . .110 \mathrm{~kW}$ | 132... 200 kW |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Fitting to contactors | B6, B7, | AF09...AF16 | AF26 ... AF38 | AF40...AF65 | AF80, AF96 | AF116, AF140 | AF190, AF205 | AF265...AF370 |
| Type | E16DU | EF19 | EF45 | EF65 | EF96 | EF146 | EF205 | EF370 |
| Current range | $0.10 \ldots 18.9$ A | 0.10... 19 A | $9 . . .45 \mathrm{~A}$ | 25... 70 A | $36 \ldots 100 \mathrm{~A}$ | $54 \ldots 150$ A | $63 \ldots 210$ A | 115... 380 A |
| Separate mounting kit | DB16E | - | - | - | - | - | - |  |
| Trip class | 10E, 20E, 30E selectable |  |  |  |  |  |  |  |

## —

Electronic overload relays with external separate CT

| IEC: rated operational power AC-3 400 V |  |
| :--- | ---: |
| Fitting to contactors | $475 \ldots 560 \mathrm{~kW}$ |
| Type | E1250DU |
| Current range | $375 \ldots 1250 \mathrm{~A}$ |
| Trip class | $1050, \mathrm{AF} 1650$ |



## Electronic overload relays

| Type | E16DU | E45DU | E80DU | E140DU | EF205 |
| :---: | :---: | :---: | :---: | :---: | :---: |
| Current range | $0.10 \ldots 18.9$ A | $9 \ldots 45 \mathrm{~A}$ | $27 . . .80 \mathrm{~A}$ | 50... 140 A | $63 . .210 \mathrm{~A}$ |
| Trip class | 10E, 20E, 30E selectable |  |  |  |  |
| Single mounting kit | DB16E | DB45E | DB80E | DB140E | - |
| For contactors | A09 ... A16 | A26 ... A40 | A50 ... A75 | A95 ... 110 | A145 ... A185 |
| For contactors | AX09 ... AX18 | AX32 ... AX40 | AX50 ... AX115 | AX150 | AX185 ... AX205 |


|  | $37 \ldots 45 \mathrm{~kW}$ | $55 \ldots 75 \mathrm{~kW}$ | $90 \ldots 110 \mathrm{~kW}$ |
| ---: | ---: | ---: | ---: |
|  | 60 hp | $75 \ldots 100 \mathrm{hp}$ | $125 \ldots 150 \mathrm{hp}$ |
| AF80, AF96 | AF116, AF140 | AF190, AF205 |  |
| TF96 | TF140DU | TA200DU |  |
| $40 \ldots 96 A$ | $66 \ldots 142 \mathrm{~A}$ | $66 \ldots 200 \mathrm{~A}$ |  |
| 10 | 10 A | 10 A |  |




| $475 \ldots . .560 \mathrm{~kW}$ |
| ---: |
| $800 \ldots . .900 \mathrm{hp}$ |
| AF 1350, AF1650 |
| E1250DU |
| $375 \ldots 1250 \mathrm{~A}$ |
| $10 \mathrm{E}, 20 \mathrm{E}, 30 \mathrm{E}$ selectable |
| - |

## Contactors for capacitor switching

## UA..RA contactors for capacitor switching (UA16..RA to UA110..RA) with insertion of damping resistors

The insertion of damping resistor protects the contactor and the capacitor from the highest inrush currents.


Main pole - Utilization characterstics according to IEC

| Contactor type | AC operated | UA16..RA | UA26..RA | UA30..RA | UA50..RA | UA63..RA | UA75..RA | UA95..RA | UA110..RA |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Standards |  | IEC 60947-1 / 60947-4-1 and EN 60947-4-1 / 60947-4-1 |  |  |  |  |  |  |  |
| Rated operational voltage Ue max |  | 690 V |  |  |  |  |  |  |  |
| Rated frequency (without derating) |  | $50 / 60 \mathrm{~Hz}$ |  |  |  |  |  |  |  |
| Ac-6b utilization category <br> Rated operational power AC-6b(1) |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |
| For air temprature close $\quad \theta \leq 40^{\circ} \mathrm{C}$ | 230-240 V | 8 kvar | 12.5 kvar | 16 kvar | 25 kvar | 30 kvar | 35 kvar | 40 kvar | 45 kvar |
| to contactor | $400-415 \mathrm{~V}$ | 12.5 kvar | 22 kvar | 30 kvar | 40 kvar | 50 kvar | 60 kvar | 70 kvar | 80 kvar |
| 丰 r | 440 V | 15 kvar | 24 kvar | 32 kvar | 50 kvar | 55 kvar | 65 kvar | 75 kvar | 85 kvar |
| $\sqrt{d} \boldsymbol{1}$, | 500-550 V | 18 kvar | 30 kvar | 34 kvar | 55 kvar | 65 kvar | 75 kvar | 85 kvar | 95 kvar |
| $11111$ | 8 kvar | 22 kvar | 35 kvar | 45 kvar | 72 kvar | 80 kvar | 100 kvar | 120 kvar | 130 kvar |
| $\theta \leq 55^{\circ} \mathrm{C}$ | 230-240 V | 7.5 kvar | 11.5 kvar | 16 kvar | 24 kvar | 27 kvar | 30 kvar | 35 kvar | 40 kvar |
| $======\begin{array}{rl\|l} 1 & 1 \\ 7 & 1 \end{array}$ | $400-415 \mathrm{~V}$ | 12.5 kvar | 20 kvar | 27.5 kvar | 40 kvar | 45 kvar | 50 kvar | 60 kvar | 70 kvar |
| \| | I| | 440 V | 13 kvar | 20 kvar | 30 kvar | 43 kvar | 48 kvar | 53 kvar | 65 kvar | 75 kvar |
| Multi- step capacitor | 500-550 V | 16 kvar | 25 kvar | 34 kvar | 50 kvar | 60 kvar | 65 kvar | 75 kvar | 82 kvar |
| bank scheme | 690 V | 21 kvar | 31 kvar | 45 kvar | 65 kvar | 75 kvar | 80 kvar | 105 kvar | 110 kvar |
| $\theta \leq 70^{\circ} \mathrm{C}$ | 230-240 V | 6 kvar | 9 kvar | 11 kvar | 20 kvar | 23 kvar | 25 kvar | 30 kvar | 35 kvar |
|  | $400-415 \mathrm{~V}$ | 10 kvar | 15.5 kvar | 19.5 kvar | 35 kvar | 39 kvar | 41 kvar | 53 kvar | 60 kvar |
|  | 440 V | 11 kvar | 17 kvar | 20.5 kvar | 37 kvar | 42.5 kvar | 45 kvar | 58 kvar | 70 kvar |
|  | 500-550 V | 12.5 kvar | 20 kvar | 25 kvar | 46 kvar | 50 kvar | 55 kvar | 70 kvar | 78 kvar |
|  | 690 V | 17 kvar | 26 kvar | 32 kvar | 60 kvar | 65 kvar | 70 kvar | 85 kvar | 100 kvar |
| Max. permissible peak current î | Unlimited |  |  |  |  |  |  |  |  |
| Short circuit protection device for contactors gG type fuse(2) | 80 A | 125 A | 200 A |  |  |  |  | 250 A |  |
| Max. electrical switching | 240 cycles/h |  |  |  |  |  |  |  |  |
| Electrical durability AC-6b $\theta \leq \mathrm{Ue}$ $440^{\circ} \mathrm{C}$ | 250000 oper | rating cycles |  |  |  |  |  |  |  |
| $500 \mathrm{~V} \leq \mathrm{Ue} \theta \leq 690^{\circ} \mathrm{C}$ | 100000 oper | rating cycles |  |  |  |  |  |  |  |

[^28]
## Starters MA (Direct Online) and SDA (Star Delta)

For industrial and agriculture applications

$\overline{01}$

## $\overline{01}$

The isolation and short-circuit protection functions must be performed by a fuse isolator switch, a fuse switch, Manual motor starter(MPCB) or circui breaker externally Fuse breaker externally. Fuse rating recommended in this document should be used.

ABB is a global leader in power and automation technologies that enable utility and industry customers to improve performance, while lowering the environmental impact.
ABB in India serves customers in many segments through a wide manufacturing and marketing network.

ABB's range of Starters MA-(Direct Online Starters) and SDA (Fully Automatic Star- Delta Starters) have been designed to meet both industrial and agriculture applications. These starters are made with renowned European technology comprising globally recognized MA/AX/A range contactors and TA Overload relays, which protect your motors from overload and single phasing

## Salient features

- Suitable for industrial \& agriculture applications
- Conforms to IS 13947 (Part 4) \& IEC 60947-4-1
- Compact design of contactor with IP20 terminals
- Protection against overload and has built-in single phasing protection
- Overload relay with class 10-A tripping class
- Operating temperature from $-5^{\circ} \mathrm{C}$ to $55^{\circ} \mathrm{C}$
- Carbon sheet steel enclosure with powder coated and with IP42 ${ }^{\circ}$ protection

A combination starter performs the following functions:

- Circuit isolation
- Motor "ON - OFF" control"
- Overload protection


## Direct online starter

"MA" DOL consists of MA range contactors and TA25 overload relays assembled in sheet steel double color powder coated enclosure. These starters protect the motor against overload and single phasing and enable START and STOP of the motors.

## Universal Motor Controllers (UMC 100.3) Intelligent motor management

ABB's intelligent motor controllers combine motor protection and control functions, fieldbus and Ethernet communication, and fault diagnosis in a single device. They provide detailed operational, diagnostic and service data continuously, giving any plant an effective data source for predictive maintenance systems.


## Expansion modules

Flexibility is assured with a wide variety of expansion modules


## DIGITAL MODULES DX1XX-FBP. 0

Compact modules that increase the
number of digital inputs and outputs

- Inputs: DX111-FBP. 0 eight digital inputs 24 V DC, DX122-FBP. 0 eight digital inputs 110/230 V AC
- Outputs: four digital relay outputs, one configurable analog output


## Accessories

## Get even more from the UMC with the operating panel, current transformers, and earth leakage sensors



## CURRENT TRANSFORMERS CT4L / CT5L

Extend the integrated measuring system for larger motors

- For nominal motor currents > 63 A up to 850 A
- Linear transformer, 3-phase with terminal block



## EARTH LEAKAGE SENSORS CEM11

Summation current transformer for connecting to a digital input, mounting with a bracket on a DIN rail or wall

- Four versions available with diameters from 20 mm to 120 mm
- Simple residual current adjustment with rotary switch, including test position
- Flexible mounting


## FIM UMC Edition <br> Configuration tool for UMC100.3

Based on the latest device integration standard, Field Device Integration (FDI), this innovative software combines the benefits of two major technologies - EDD and DTM. Whether it's used on Windows tablets, laptops or PCs, it is user-friendly and easy to maintain.


Easy to install, use and maintain on Windows tablets, laptops or PCs.


## Parametrize

All required functions for a fast device setup are included and easy-to-use. Enter parametrization mode for configuring the UMC100.3, including the Custom Application Editor for creating individual motor control functions to suit your application.


Scans, identifies and enables access to device within just three minutes.


## Monitor

Monitor all relevant data like motor status, current, voltage and many more. Comprehensive diagnosis for faults and warnings are included out of the box and make the FIM UMC edition an intelligent data hub for predictive applications.


Connect to UMC100.3 via a simple serial link (control panel with USB port) or Profibus DP.


## Operate

Operate mode ensures easy testing of a setup. It includes start, stop and fault reset commands and shows the most important data. On and offline modes, bulk functions as well as project management are included.


Not convinced yet? Test the trial version.

[^29]
## Main areas of application

Benefit from ABB's Universal Motor Controller functionality in a wide variety of segments. Its flexibility, global recognition and comprehensive certification make it the top choice, no matter where you are.

01 Water supply and treatment plants

02 Mining facilities

03 Cement plants

## Cement factories

- Robust and compact design
- Several inputs, e.g. for querying the position of the damper limit switches


## Oil \& gas, chemicals

- Programmability
- Ground fault monitoring
- Undervoltage detection and configurable restart following voltage restart
- Protection of motors in hazardous environments (ATEX)
- Use in IT networks


## Mining

- Rated motor voltage of up to 1000 V
- Can be used at altitudes of up to 5000 m
- Ground fault monitoring


## Water supply and treatment

- Pump controls as required
- Underload detection with $\operatorname{Cos} \varphi$ measuring
- Pump cleaning application


## Others

- Steel plants
- Ships


## Pulp and paper

- Conformal coating
- Modular design
- Flexible communication


01

${ }_{0}$


03

## Electronic compact starters: HF range A Compact solution with great functionality in only 22.5 mm

## Electronic compact starters

Direct-on-line, reverse start, overload protection and emergency stop are all integrated in one compact device of only 22.5 mm width. Reliable 30 million switching cycles for motors up to $3 \mathrm{~kW} / 400 \mathrm{VAC}$, reduced wiring time and faults are additional benefits.


Short-circuit protection
Co-ordinated short-circuit protection for single and group mounting with manual motor starters is available.


## Safety and ATEX

In combination with Sentry safety relays the HFStarter reaches SIL3, PL e certification. Feel free to use safety tools like FSDT and Sistema. The libraries are online on ABB.com. Additionally safety variants are ATEX certified.


Control of cooling tanks
The HF range is used to control pumps and compressor for cooling.


## Solar tracker

The panels follow the sun and need to be switched frequently in a small cabinet.


## Snow canons

Similar to the solar tracker, the snow canon is switched left and right to ensure equal snow conditions.


Straightening metal
The metal is unrolled directly from the coil. The motor needs to be switched frequently.

## Softstarters portfolio Overview

## PSR - The compact range

PSR is our most compact softstarter with basic benefits and values. PSR can handle up to 100 starts per hour. Suitable for small motors.

Current: 3 A... 105 A

Application features



PSRC - For scroll compressor
PSRC is fast and easy to install with fixed settings. Designed for scroll compressors results in less stress on the compressor reducing the maintenance cost to a minimum.

Current: 3 A... 105 A

Application features


## PSE - The efficient range

The new generation PSE is a true general purpose softstarter. It's a perfect balance between high starting capacity and cost efficiency. Now featuring built-in fieldbus communication.

Current: 18 A... 370 A
Main voltage: 208 V... 600 V

Application features



## PSTX - The advanced range

PSTX is the most complete alternative for any motor starting application. Featuring built-in modbus and anybus modules that support all major communication protocols.

Current: 30 A... 1250 A
Main voltage: 208 V... 690 V

## Application features



## Softstarters selection

ABB softstarters offering consists of four ranges, covering every need. The products help you secure motor reliability, improve installation efficiency and increase application productivity.

|  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| Product range overview | PSR | PSRC | PSE | PSTX |
| Technology | Basic | Basic | General | Advanced |
| Motor size | Small - up to 105 A | Small - up to 105 A | Medium - up to 370 A | Large - up to 1250 A |
| Installation efficiency | Basic | Basic | Medium | High |
| Motor protection | - | - | Medium | High |
| Application | All | Scroll compressor | All | All |
| Application enhancement | Basic | Basic | Medium | High |
| Fieldbus Communication | Yes | Yes | Yes | Yes |
| Anybus Communication | - | - | - | Yes |
| Torque control | - | - | Yes | Yes |
| Heavy duty starts | - | - | Yes | Yes |
| Frame sizes | A, B, C, D | A, B, C, D | A, B, C | A, B, C, D, E, F |

## Selection process

## Determine softstarter series

First, determine the softstarter series that fulfill the needs of the application and motor. Use the guide on the left to explore the three series and the power range each one covers.

Match the softstarter size with the motor current When the softstarter series is selected, the correct size should now be determined. The selection of a softstarter is based on the current. Find the softstarter that corresponds to the motor current.

Fine tune and select the correct size
The last step is to fine tune the selection, and there are three different factors to consider:

- Normal or a heavy load: If the load is characterized as a heavy load, select the next size softstarter in the series.
- High ambient temperature
- High altitude

Use the equations and the table on the right to find the correct de-rating equation.

## Altitude formula

De-rate for altitudes between 1000-4000 m or 3280-13123 ft with the following equations for all softstarters:
In meters: \% of $\mathrm{Ie}=100-(\mathrm{x}-1000) / 150$
In feet: \% of FLA $=100-(y-3280) / 480$
Where $\mathrm{x} / \mathrm{y}$ is the actual altitude in $\mathrm{m} / \mathrm{ft}$

| Temperature equations |  |
| :--- | ---: |
| PSTX and PSR In Celsius: | $40 \ldots . .60{ }^{\circ} \mathrm{C}:$ Reduce le with $0.8 \% /{ }^{\circ} \mathrm{C}$ |
| PSTX and PSR In Fahrenheit: $104 \ldots 140{ }^{\circ} \mathrm{F}:$ Reduce FLA with $0.44 \% /{ }^{\circ} \mathrm{F}$ |  |
| PSE In Celsius: | $40 \ldots 60^{\circ} \mathrm{C}:$ Reduce le with $0.6 \% /{ }^{\circ} \mathrm{C}$ |
| PSE In Fahrenheit: | $104 \ldots 140^{\circ} \mathrm{F}:$ Reduce FLA with $0.33 \% /{ }^{\circ} \mathrm{F}$ |


| Typical applications |  |
| :--- | :--- |
| Normal duty start | Heavy duty |
| Bow thrusters | Centrifugal fan |
| Centrifugal pump | Conveyor belt (long) |
| Compressors | Crusher |
| Conveyor belt (short) | Stirrer |
| Elevator | Sawmill |

## Softstarters benefits and features



SECURE
MOTOR
RELIABILITY

Increase your motors lifetime... With ABB softstarters, starting currents are easily optimized to your load, application and motor size.

## ...by protecting it from electrical stresses.

Over ten motor protection features are included to keep your motor safe from overloads and network irregularities.

| Softstarter features | PSR | PSE | PSTX |
| :--- | :---: | :---: | :---: |
| Current limit | - | $\bullet$ | $\bullet$ |
| Current limit ramp and dual current limit | - | - | $\bullet$ |
| Electronic motor overload protection | - | $\bullet$ | $\bullet$ |
| Dual overload protection | - | - | $\bullet$ |
| Underload protection | - | $\bullet$ | $\bullet$ |
| Power factor underload protection | - | - | $\bullet$ |
| Locked rotor protection | - | $\bullet$ | $\bullet$ |
| Current/Voltage imbalance protection | - | - | $\bullet$ |
| Phase reversal protection | - | - | $\bullet$ |
| Customer defined protection | - | - | $\bullet$ |
| Motor heating | - | - | $\bullet$ |
| PTC/PT100 input for motor protection | - | - | $\bullet$ |
| Overvoltage/undervoltage protection | - | - | $\bullet$ |
| Earth-fault protection | - | - | $\bullet$ |

- = standard, $O=$ option, $-=$ not available


IMPROVE
INSTALLATION EFFICIENCY

Reduce your installation time and panel size...
ABB softstarterss are easy to install thanks to their compact design and many built-in features.
...by having everything that you need built in.
Built-in bypass saves energy and space while reducing heat generation: a complete motor starting solution in one unit designed and verified by ABB.

| Softstarter features | PSR | PSE | PSTX |
| :--- | :---: | :---: | :---: |
| Built-in bypass | $\bullet$ | $\bullet$ | $\bullet$ |
| Inside-delta connection possible | - | - | $\bullet$ |
| Graphical display and keypad | - | $\bullet$ | $\bullet$ |
| Detachable keypad | - | - | $\bullet$ |
| Motor runtime and start count | - | - | $\bullet$ |
| Programmable warning functions | - | - | $\bullet$ |
| Diagnostics | - | - | $\bullet$ |
| Overload time-to-trip | - | - | $\bullet$ |
| Overload time-to-cool | - | - | $\bullet$ |
| Analog output | - | $\bullet$ | $\bullet$ |
| Fieldbus communication | $O$ | $\bullet$ | $\bullet$ |
| Event log | - | $O$ | $\bullet$ |
| Multiple languages | - | - | 17 |
| Electricity metering | - | - | $\bullet$ |

- = standard, $\mathrm{O}=$ option, - = not available


INCREASE APPLICATION PRODUCTIVITY

Reduce the number of production stops...
ABB softstarters reduce mechanical stress on your application which increases uptime.
...by letting the softstarter do more than just starting.
Torque control, pump cleaning, motor break and many more features enables you to use your process to its full potential.

| Softstarter features | PSR | PSE | PSTX |
| :--- | :---: | :---: | :---: |
| Torque control | - | $\bullet$ | $\bullet$ |
| Torque limit | - | - | $\bullet$ |
| Coated PCBA | - | $\bullet$ | $\bullet$ |
| Limp mode | - | - | $\bullet$ |
| Jog with slow speed forward/ reverse | - | - | $\bullet$ |
| Dynamic brake | - | - | $\bullet$ |
| Stand still brake | - | - | $\bullet$ |
| Sequence start | - | - | $\bullet$ |
| Full voltage start | - | - | $\bullet$ |
| Kick start | - | $\bullet$ | $\bullet$ |
| Automatic pump cleaning | - | - | $\bullet$ |

- = standard, $O=$ option, - = not available


## Limit switches



ABB limit switches are the easiest reliable way to convert mechanical
movements into electrical signals. Use our wide offer to match your application.


Reliable in extreme conditions
Ready for anything
Plastic or metal casing limit switches are designed to operate in the most difficult environments. A high degree of protection up to IP67 and the positive contact opening, guarantee reliable operation.

24 Continuous operation

- 7 Keep your installation running 24 h a day

Limit switches secure your uptime. Their high mechanical durability can handle up to 30 million operations with contacts that are mechanically linked to actuators.

Easy to install

## Easy to use

Limit switches are easy to install and to use thanks to their three different types of electrical connections and cable length, in order to satisfy every design specifications.

## Limit Switches - Range overview

## Product selection guide


(1) Other configuration (2 N.C.) available on request. Please consult your ABB local sales organization.
(2) Other configuration (Slow Action : Simultaneous, Overlapping or non-overlapping) available on request. Please consult your ABB local sales organization.
(3) Other configuration (LS2. : Cable length up to 10 m ; LS3., LS4. : Pg11 and Pg13.5 gland thread) available on request. Please consult your ABB local sales organization.
(4) Other configuration (rotated head, special material, ...) available on request. Please consult your ABB local sales organization.

Note : Please note that extra Lead Time and Minimum Order Quantity may apply.

|  |  |
| :---: | :---: |
| Standard reinforced |  |
| Plastic | Metal |
| LS43P, LS45P | LS43M, LS45M |
| $41 \times 74 \times 41$ | $40 \times 77 \times 43$ |
| IP65 | IP66 |
| yes | - |
| IEC/EN 60947-1 <br> IEC/EN60947-5-1 <br> UL508 <br> CSA C22-2 No. 14 |  |
| Yes for Heads : 11, 12, 13, 41, 42, 71 and 72 <br> For shapes please see ordering details pages |  |
| - |  |
| 1 N.O. +1 N.C. |  |
| Snap Action (Zb) |  |
| Bottom entry |  |
| - |  |
| $1 \times$ ISO M20x1.5 |  |
| $1 \times 1 / 2^{\prime \prime}$ NPT |  |
| yes |  |
| $90^{\circ}$ |  |
| 1 | 1 |
| 2 | 2 |
| 2 | 2 |
| 2 | 2 |
| 2 | 2 |
| 2 | 2 |
| 2 | 2 |
| 1 | 1 |



01 Elevators


O2 Material handling and conveyors


## Pilot devices

## Reliable products, easy to select and install



ABB pilot devices are engineered for total reliability. Our products are tested to extremes and proven in the toughest environments. Their innovative design simplify the entire process, from selection to installation. Enclosures, signal towers and signal beacons complete the portfolio.

## $24 』$ Continuous operation

17 Engineered for tough environments
ABB pilot devices are designed with protection degree of up to IP69K and 4X, guaranteeing reliability in extreme environments - making ABB pilot devices ideal for use in demanding industries such as construction and food and beverage. An innovative design that automatically cleans contacts ensures high reliability for all products.

## Global availability

simple selection and stock management
ABB's core offering includes the pilot devices most in demand, so product selection is easier, stock management is simpler and product availability is higher.
Support for exporters is world-class, thanks to ABB's standardized global range, certified to comply with all major international standards.

## 的

Easy to install

## Save time and space

The unique design of ABB's modular ranges enable tool-free installation that is quick and simple.
It provides high flexibility for last-minute changes. With its all-in-one construction, the compact range reduces installation space and saves time.

## Pilot devices

Reliability that lasts

## Continuous operation

## Longer lifetime

- ABB pilot Devices are engineered and tested to sustain frequent use over time in any environment
High mechanical durability
- Tested to achieve mechanical life time of up to 10 million operations


## Ensuring electric connectivity

- Self-cleaning contacts ensure reliable operation without the need for maintenance, increasing uptime


The built-in wiping mechanism cleans the contacts when operated to remove dust and oxidation on the contacts and improve conductivity.

01 Mechanical durability test

02 Total protection against any kind of dust

03 Powerful water jets projected against the front from a distance of 3 meters

## Testing that goes beyond the standards



## Watch the video

## Dust and water proof

All ABB pilot devices are impenetrable to dust and are extremely resistant to water exposure.

## IP66

IP66-classed pilot devices can withstand highpressure water jets and are suitable for tough outdoor use.

## IP67

IP67-classed pilot devices can withstand immersion in one metre of water for 30 minutes. They are suitable for use in the harshest environments with water and dust.

## IP69K

IP69K pilot devices can withstand both rough treatment and intensive, high-temperature cleaning. They are ideal for environments with high sanitary requirements, such as the food and beverage industry.

Find full test description in general technical data section.

Trust ABB to produce products that work in any environment.


## Modular plastic range <br> Flexible configuration

A versatile selection of operators with high levels of flexibility and a broad choice of electrical ratings. Find the perfect solution for almost every application.



Every requirement covered with a wide choice of operators and bezels

## Compact range <br> All-in-one solution

The most efficient solution available, reducing installation time and cost. The compact range have the highest level of dust and water resistance on the market.


Fewer order codes make selection easy and save time.
All-in-one design makes installation fast.


## Interface relays and optocouplers

A proven technology used worldwide

Relays are universally applicable and are utilized in a diverse array of applications.
They are a significant element in contemporary industrial processes and are used in applications where galvanic isolation, signal separation, voltage coupling and signal amplification are required.


ABB offers a complete range of interface relays and optocouplers for increased flexibility and choice. This portfolio includes pluggable relays for easy interchangeability and optocouplers for an extended electrical life. The portfolio includes electromechanical relays and optocouplers - the electromechanical relays operate using an electromagnetic field, whereas optocouplers use light.

Optocouplers are predominantly used in applications where a high switching frequency is necessary. Furthermore, optocouplers do not contain any moving parts and are therefore bounce-free, immune to vibrations and possess a long electrical life. This wide selection of relays adheres to the highest global standards and satisfies the requirements for a diverse number of applications and needs.

## Billions

of relays operate and interface between control circuits and electrical loads


## Time relays

## Have the perfect timing- everywhere

Available in three different ranges to cover every application, the CT range time relays are used to provide reliable timing functions worldwide. In both industrial and building applications, the time relays of the CT range have proven their excellent functionality in daily use under the toughest conditions.

Choose ABB as the partner for all your low voltage timing control needs to leverage our wide variety of product options. From economic to high-end solutions - the range offers maximum value. Time relays are found everywhere, for example in air conditioning systems, heaters and fans in industrial and in residential buildings. On-delay, off-delay and a range of other functions cover all requirements.


## Shock

and vibration resistant CT-S relays are perfect for use in rolling stock

- Control panels
- Pump controls
- Star-delta motor starting
- Movable equipment like cranes
- Machine tools
- Automatic doors
- Car park barriers
- Assembly machines
- HVAC
- Compressor controls
- Transportation
- Industrial refrigeration
- Packaging machines
- Backing ovens
- Water and wastewater
- Wind
- Industrial cleaning processes



## Primary switch mode power supplies

 Excellent reliability in harsh environmentsAvailable in five different ranges to cover every application requirement, ABB's CP range power supplies are used to power valuable assets worldwide.
Communi-
cation
((O)))
Food
industry
lighting
industry


Choose ABB as your power supply partner and leverage our wide variety of product options. From economic to high-end solutions, the CP range offers maximum value. Their excellent reliability in daily use is well proven even under the toughest of conditions.



# Measuring and monitoring relays 

# Increase process availability and take action 

The relays inform users about abnormal conditions and allow them to take necessary corrective actions before severe and costly failures can occur.


Measuring and monitoring relays monitor and detect operating conditions with regard to phase, current, voltage, frequency, temperature, liquid level or insulation faults. The relays inform users about abnormal conditions and allow them to take necessary corrective actions before severe and costly failures can occur.

ABB offers the broadest range of measuring and monitoring relays in the industry - so you can source your critical components from a global supplier. Increase the reliability of your process equipment with controllers that deliver intelligent signals and settings to ensure maximum availability. Ensure continuous operation, engineer time savings and benefit from ABB's global support for measuring and monitoring relays.


## Time relays for industrial applications Offer overview



## CT-C: the compact range

The CT-C range combines lower cost with higher value and performance by offering essential functions in a space-saving 17.5 mm housing. The range offers a choice of 11 devices, including single and multifunctional types, with timing functions that range from 0.05 seconds to 100 hours. Equipped with a wide voltage range, the CT-C range is suitable for a huge variety of applications worldwide.

## CT-S: the high-performance range

The advanced CT-S range is ABB's universal range of electronic timers. It includes 22 single-function devices and 16 multifunction time relays, offering flexibility in operation with up to 13 functions. The devices feature seven or ten time ranges, adjustable from 0.05 seconds to 300 hours. Additionally, every device is available in two different connection technologies: familiar double-chamber cage connection terminals (screw terminals) and ABB's vibration-resistant Easy Connect technology (push-in terminals).

## Time relays for industrial applications Type selection

|  |  | multi－functional | single－functional | multi－functional | single－functional |
| :---: | :---: | :---: | :---: | :---: | :---: |
| Timing function |  | CT－C |  | CT－S |  |
| $\boxtimes$ | ON－delay | CT－MFC，CT－MKC | CT－ERC | CT－MVS，CT－MFS，CT－MBS， CT－WBS | CT－ERS |
|  | OFF－delay | CT－MFC，CT－MKC， CT－ARC | CT－AHC | CT－MVS，CT－MFS，CT－MBS | CT－APS，CT－AHS，CT－ARS |
| 区 | ON－and OFF－delay |  |  | CT－MVS，CT－MXS，CT－MFS， CT－MBS |  |
| 1几区 | Impulse－ON | CT－MFC，CT－MKC | CT－VWC | CT－MVS，CT－MFS，CT－MBS， CT－WBS |  |
| 1几 | Impulse－OFF | CT－MFC，CT－MKC， CT－ARC |  | CT－MVS，CT－MFS，CT－MBS |  |
| 1几【 | Impulse－ON and OFF |  |  | CT－MXS |  |
| $\Omega \boxtimes$ | Flasher starting with ON | CT－MFC，CT－MKC | CT－EBC | CT－MFS，CT－MBS，CT－WBS |  |
| 几 | Flasher staring with OFF | CT－MFC，CT－MKC | CT－EBC | CT－MFS，CT－MBS，CT－WBS |  |
| 几 | Flasher starting with ON or OFF |  |  | CT－MVS |  |
| 囚 | Pulse generator starting with ON or OFF |  | CT－TGC | CT－MXS |  |
| $1 \pi$ | Pulse former | CT－MFC，CT－MKC |  | CT－MVS，CT－MFS，CT－MBS |  |
| $\triangle$ | Star－delta change－over |  | CT－SDC，CT－SAC |  | CT－SDS |
| $\Delta 1 \Omega$ | Star－delta change－over with impulse |  |  | $\begin{aligned} & \text { CT-MVS. } 2 x \text {, } \\ & \text { CT-MFS, CT-MBS } \end{aligned}$ |  |
| $\Delta+$ | further functions （depending on device） |  |  | CT－MVS，CT－MXS，CT－MFS， CT－MBS，CT－WBS |  |
| Alternat | ng without time delay |  | CT－PAC |  |  |

A detailed explanation of the different timing functions can be found in the chapter＂Timing functions＂．
—
Synonyms

| Used expression | Alternative expression（s） |
| :--- | :--- |
| 1 c／o contact | SPDT |
| 2 c／o contacts | DPDT |
| voltage－related | wet／non－floating |
| volt－free | dry／floating |

## Measuring and monitoring relays Benefits and advantages



Higher utility class
The plastic housing material used meets the requirements for the highest flammability class. (UL94 V-0 rated)


## Snap-on housing

Tool-free DIN rail installation and deinstallation of the relay.



## Sealable transparent cover

Protection against unauthorized changes of time and threshold values.

## Measuring and monitoring relays Benefits and advantages



## Easy Connect technology

- Tool-free wiring and excellent vibration resistance.
- Push-in terminals provide connection of wires up to $2 \times 0.5-1.5 \mathrm{~mm}^{2}$ ( $2 \times 20-16$ AWG), rigid or fine-strand with or without wire end ferrules.
- Excellent vibration resistance - the right solution for harsh environments.



## Double-chamber cage connection terminals

Double-chamber cage connection terminals provide connection of wires up to $2 \times 0.5-2.5 \mathrm{~mm}^{2}(2 \times 20-14$ AWG) rigid or fine-strand, with or without wire end ferrules.

## LEDs for status indication

All actual operational states are displayed by front-face LEDs, simplifying commissioning and troubleshooting.


## Integrated marker label

Integrated marker labels allow the product to be marked quickly and simply. No additional marker labels are required.

## Measuring and monitoring relays Offer overview

Measuring and monitoring relays monitor and detect operating conditions with regard to phase, current, voltage, frequency, temperature, liquid level or insulation faults. The relays inform users about abnormal conditions and allow them to take necessary corrective actions before severe and costly failures can occur. Depending on the product model, measuring and monitoring relays are categorized into seven product families.


## Single-phase current monitoring relays

- Monitoring of motor current consumption
- Monitoring of lighting installations and heating circuits
- Monitoring of transportation equipment overload
- Monitoring of locking devices, electromechanical brake gear and locked rotors


## Single-phase voltage monitoring relays

- Speed monitoring of DC motors
- Monitoring of battery voltages and other supply networks


## Three-phase monitoring relays

- Voltage monitoring of mobile three-phase equipment
- Protection of personnel and installations against phase reversal
- Monitoring of the supply voltage of machines and installations
- Protection of equipment against damage caused by unstable supply voltage
- Switching to emergency or auxiliary supply
- Protection of motors against damage caused by unbalanced phase voltages and phase loss
- Suitable for HVAC applications


## Grid feeding monitoring relays

The CM-UFD.M* range monitors all voltage and frequency parameters in a grid and ensures the safe feeding of decentrally produced electrical energy into the grid.

- Monitoring of the voltage with up to 2 thresholds for over- and undervoltage
- Monitoring of the frequency with up to 2 thresholds for over- and underfrequency
- ROCOF (rate of change of frequency) and vector shift detection
- In compliance with several local standards


## Measuring and monitoring relays Offer overview

## Insulation monitoring relays

- Monitoring of electrically isolated supply mains for insulation resistance failure
- Detection of initial faults
- Protection against earth faults


## Temperature monitoring relays

Acquisition, messaging and regulation of temperatures of solid, liquid and gaseous media in processes and machines

- Motor and system protection
- Control panel temperature monitoring
- Frost monitoring
- Temperature limits for process variables, e.g. in the packing or electroplating industry
- Control of systems and machines like heating, air-conditioning and ventilation systems, solar collectors, heat pumps or hot water supply systems
- Bearing, gear oil and coolant monitoring


## Thermistor motor protection

CM-MSE and CM-MSS provide full protection of motors with integrated PTC resistor sensors.

Protection of motors against thermal overload, e. g. caused by insufficient cooling, heavy load starting conditions, undersized motors, etc.


## Liquid level monitoring relays

- Protection of pumps against dry running
- Protection against container overflow
- Control of liquid levels
- Detection of leaks
- Control of mixing ratios


# Measuring and monitoring relays Offer overview 



## CM-N range: Multifunctional range

- 45 mm wide housing
- Output contacts: $2 \mathrm{c} / \mathrm{o}$ (SPDT) contacts
- Continuous voltage range (24-240 V AC/DC) or single-supply
- Setting and operation via front-face operating controls
- Adjustment of threshold values and switching hysteresis via direct reading scale
- Adjustable time delays
- Integrated and snap-fitted front-face marker label
- Sealable transparent cover (accessory)


## CM-S range: Universal and multifunctional range

- Only 22.5 mm wide housing
- Output contacts: 1 or 2 c/o (SPDT) contacts
- One supply voltage range or supplied by measuring circuit
- Setting and operation via front-face operating controls
- Adjustment of threshold values and switching hysteresis via direct reading scale
- Integrated and snap-fitted front-face marker
- Snap-on housing: The relays can be placed on a DIN rail tool-free - just snap it on or remove it tool-free
- Sealable transparent cover (accessory)


## CM-E range: Economy range

- Only 22.5 mm wide housing
- Output contacts: $1 \mathrm{c} / \mathrm{o}$ contact or $1 \mathrm{n} / \mathrm{o}$ contact
- One supply voltage range
- One monitoring function
- Cost-efficient solution for OEM applications
- Preset monitoring ranges


## CM-TCN range: Smart temperature monitoring relays

- 45 mm wide housing
- Output contacts: $3 \mathrm{c} / \mathrm{o}$ contact
- Wide supply voltage range (24-240 V AC/DC)
- A wide range of settings, that can be adjusted flexibly
- NFC parametrization via smartphone app
- Back-lit LCD for easy reading and parametrization
- Embedded Modbus RTU communication interface


## Single-phase monitoring relays <br> Benefits and advantages



For the monitoring of currents and voltages in single-phase AC/DC systems, ABB's CM-range contains a wide selection of powerful and compact devices, all in an only 22.5 mm wide housing. This product range includes current and voltage monitoring relays for over- and undercurrent and voltage protection - from 3 mA to 15 A , and from 3 V to 600 V .


Continuous operation

Read the status of the relay at a glance: clear visualization of the device status via LEDs. Easy to adjust with rotary wheels and variants with push-in terminals make a quick and easy installation and setting possible.


Reliable in harsh conditions

All relays work reliably in environments with low temperatures down to $-25^{\circ} \mathrm{C}$. Additionally, the housing fulfills the UL 94 V-0 flammability standard requirements. Together with the vibration resistant push-in terminals, the relay is not only reliable, no matter the environment temperature, but is also durable to shock and vibration. Save time as retightening is no longer needed, and enhance the reliability and safety of the equipment.


Easy installation

## Single-phase monitoring relays Benefits and advantages

Characteristics current and voltage monitoring relays ${ }^{1)}$

- Monitoring of DC and AC currents: 3 mA to 15 A
- Monitoring of DC and AC voltages from 3-600 V
- TRMS measuring principle
- One device includes 3 current measuring ranges
- One device includes 4 voltage measuring ranges: 3-30 V; 6-60 V; 30-300 V; 60-600 V
- Over- and undercurrent monitoring
- Over- and undervoltage monitoring
- ON or OFF-delay configurable
- Open- or closed-circuit principle configurable
- Threshold values for >U and/or <U adjustable
- Latching function configurable



## Applications

- Protection of electronic or electromechanical devices against over- and under voltage or over- and under current
- DC motor speed control
- Battery monitoring
- Monitoring of AC or DC supplies
- Monitoring of heating or lighting circuits


## Voltage monitoring, single-phase

The ABB voltage monitoring relays CM-SRS.xx are used to monitor direct and alternating voltages within a range of 3-600 V. Over- or undervoltage detection can be preselected.

## Voltage window monitoring ( $\mathrm{U}_{\text {min }}, \mathrm{U}_{\text {max }}$ )

For the simultaneous detection of over- and undervoltages, the window monitoring relay CM-EFS. 2 can be used.

- Thresholds for >l and/or <l adjustable
- Fixed hysteresis of 5 \%
- Start-up delay $\mathrm{T}_{\mathrm{v}}$ adjustable 0; 0.1-30 s
- Tripping delay $\mathrm{T}_{\mathrm{v}}$ adjustable 0; 0.1-30 s
- $1 \times 2 \mathrm{c} /$ o contacts (common signal) or $2 \times 1 \mathrm{c} /$ o contact (separate signals for $>1$ and $<1$ ) configurable
- $1 \times 2 \mathrm{c} / \mathrm{o}$ contacts (common signal) or $2 \times 1 \mathrm{c} / \mathrm{o} \mathrm{contact}$ (separate signals for $>\mathrm{U}$ and $<\mathrm{U}$ ) configurable
- 22.5 mm width
- 3 LEDs for the indication of operational states
- Various approvals and marks
${ }^{1)}$ depending on device


## Current window monitoring ( $I_{\text {min }}, I_{\text {max }}$ )

The window monitoring relay CM-SFS. $2 x$ is available if the application requires the simultaneous monitoring of overand undercurrents.


## Current monitoring, single-phase

The ABB current monitoring relays CM-SRS.xx reliably monitor the occurrence of currents that exceed or fall below the selected threshold value. The functions overcurrent or undercurrent monitoring can be preselected. Single- and multifunction devices for the monitoring of direct or alternating currents from 3 mA to 15 A are available.

## Single-phase monitoring relays <br> Operating controls

## Current monitoring relays



## Single-phase monitoring relays <br> Operating controls

## Voltage monitoring relays



Adjustment of the threshold value >U for overvoltage


Adjustment of the tripping delay $\mathrm{T}_{\mathrm{v}}$

DIP switches $\boxtimes$ ON-delay

Closed-circuit principle
[-5 Open-circuit principle
$\boxminus$ Latching function activated
$\triangle$ Latching function not activated
एxod $2 \times 1 \mathrm{c} / \mathrm{o}$ (SPDT) contact
Weod $1 \times 2 \mathrm{c} / \mathrm{o}$ (SPDT) contacts


## Three-phase monitoring relays <br> Benefits and advantages



For the monitoring of voltages in a three-phase system or network, ABB's CM range contains a wide selection of powerful and compact devices. This product range includes voltage monitoring relays for phase sequence, phase loss, unbalance and monitoring of over- and under voltage from 160 V to 820 V .

Read the status of the relay at a glance: clear visualization of the device status via LEDs. Easy to adjust with rotary wheels and variants with push-in terminals make a quick and easy installation and setting possible.


Reliable in harsh conditions

All relays work reliably in environments with low temperatures down to $-25^{\circ} \mathrm{C}$. Additionally, the housing fulfills the UL 94 V-0 flammability standard requirements. Together with the vibration resistant push-in terminals, the relay is not only reliable no matter the environment temperature but is also durable to shock and vibration. Save time as retightening is no longer needed and enhance the reliability and safety not only for the equipment.


Easy installation

Like all devices from the measuring and monitoring portfolio, the three-phase monitoring relays are easily configurable via front facing potentiometers. Easy threshold configuration without calculation is accomplished by direct reading scales. For further configuration options, additional settings can be made via dip-switches, offering the flexibility to configure, for example, the working principle of the relays and the output configuration. The device can be set up before installation in the application and easy adjustments during the process are possible.

## Three-phase monitoring relays <br> Benefits and advantages



## Characteristics

- True RMS (TRMS) measuring principle
- Device for the use in mains with a frequency of $45-440 \mathrm{~Hz}$ and where harmonics are to be expected ${ }^{1)}$
- Adjustable phase unbalance threshold value
- Adjustable ON-delay/OFF-delay time
- Powered by the measuring circuit
- $1 \mathrm{n} / \mathrm{o}$ contact, 1 or $2 \mathrm{c} / \mathrm{o}$ contacts
- LEDs for the indication of operational states
- Multifunctional and singlefunctional devices
- Phase failure detection
- Phase sequence monitoring
- Over- and undervoltage monitoring (fixed or adjustable)
- Wide-range operating voltage guarantees world-wide operation
- Various approvals and marks
${ }^{(1)}$ devices CM-MPS. 23 and CM-MPS. 43



## Applications

- Control for connection of moving equipment (e.g. air conditioning compressors, refrigerated trucks and containers, and cranes)
- Control against reverse motor operation (lifting, handling, elevators, escalators, etc.)
- Control of sensitive three-phase supplies
- Overheating of the motor due to asymmetrical voltage
- Protection of a plant against destruction due to overvoltage
- Direction of rotation of the drive



## Three－phase monitoring relays <br> Operating controls

## S－range housing



Adjustment of the thresh－ old value＞U for overvolt－ age


Adjustment of the threshold value Asymetry for phase unbalance


DIP switches $\boxtimes$ ON－delay
$\square$ OFF－delayPhase sequence monitoring deactivatedPhase sequence monitoring activated
（凶）Phase sequence correction activatedPhase sequence correction deactivated新在 $2 \times 1 \mathrm{c} / \mathrm{o}$（SPDT）contact
． $1 \times 2001 \times 2 \mathrm{c} / \mathrm{o}$（SPDT）contacts


## Three-phase monitoring relays <br> Operating controls

## N-range housing



Adjustment of the threshold value >U for overvoltage


Adjustment of the threshold value <U for undervoltage


DIP switches
$\boxtimes$ ON-delay
OFF-delayPhase sequence monitoring deactivatedPhase sequence monitoring activated
(A) Phase sequence correction activated
$\circledast$ Phase sequence correction deactivated
2x+100 $2 \times 1 \mathrm{c} / \mathrm{o}$ (SPDT) contact
$1 \times 2001 \times 2 \mathrm{c} / \mathrm{o}$ (SPDT) contacts


Adjustment of the threshold value Asymmetry for phase unbalance


Indication of operational states R/T: red LED - Relay status / timing
F1: yellow LED Fault message F2: yellow LED -
Fault message


Adjustment of the tripping delay $\mathbf{T}$

## Grid feeding monitoring relays <br> Benefits and advantages



ABB's grid feeding monitoring relays detect unusual events in the public power grid and keeps it stable by automatically disconnecting and reconnecting the renewable power plant. The CM-UFD displays all relevant measuring data and events and can communicate them via a build-in communication interface. The cloud-based service Ability ${ }^{\text {TM }}$ EDCS enables customers to monitor the conditions in real-time, send the values into the cloud and access the diagnostics remotely.

Optimum interface


Global availability

## Reduce downtime by up to 70\%

Operate the device via LCD or remotely with the Modbus RTU. Users are informed immediately in case of an event in the public grid. Redundant microcontrollers ensure reliable measuring values and tripping.

## Cut installation time by up to 60\%

There's no need to learn every possible adjustment and its effects on your system - ABB's trained staff supports your business and answers your technical questions promptly.


Easy installation

## Commission \& configure up to $60 \%$ faster

Simple instructions, presets for local grid feeding standards, and ABB's intuitive menu structure make installation quicker. Commissioning and troubleshooting errors are prevented.

## Grid feeding monitoring relays <br> Benefits and advantages

## 4 <br> 

ABB's CM-UFD range are multi-functional grid feeding monitoring relays, installed between the renewable energy system and the public grid. The innovative relays guarantee grid stability and prevent blackouts. If the public grid's voltage or frequency moves out of the permitted ranges, the device uses a decoupling unit (e.g. contactor or breaker Tmax XT) to separate the renewable energy system from the public grid. As soon as the grid is stable again, the system is automatically reconnected.

The CM-UFD range provides different monitoring functions in accordance with several local grid feeding standards to detect over-/undervoltage and over-/underfrequency.


## Y $\square$

## Advantages

- Highly accurate measurement and setting
- Modbus RTU communication interface and ABB Ability ${ }^{\top M}$ EDCS connectivity
- Functional safety - single fault tolerances
- Clear multiline, backlit LCD
- Intuitive and user-friendly menu
- Event storage
- Pre-settings meet several local standards
- Type-tested to a number of local grid feeding standards by TÜV Süd



## Functionality

The device measures the ten-minute average value, voltage increases and decreases, as well as any changes in grid frequency. The rate of change of frequency (ROCOF) and vector shift monitoring to detect a loss of mains event can be easily configured.

## Grid feeding monitoring relays <br> Benefits and advantages

The cloud-based service Ability ${ }^{\text {TM }}$ EDCS enables customers to monitor the condition of CM-UFD.M*M in real-time and access the diagnostics remotely. This functionality is very important when operating in the field of critical power. Parametrize with ABB Ekip Connect and access data no matter where you are.

## Example architecture



The grid feeding monitoring relays can be connected to the cloud directly by using Ekip Com Hub module. Another option is to connect via Modbus RTU when there is some other device equipped with the Ekip Com Hub like the Emax 2 air-circuit breaker.

In addition to the Ekip Connect 3 software, the following hardware is required:

- Ekip UP (min. firmware 2.23)
- Ekip Com Hub (min. firmware 1.18)
- Ekip Com Modbus RTU (min. firmware 2.28)
- Ekip Supply
- Ekip T\&P cable
- CM-UFD.M*M (min. firmware 1.0.1)

For further information regarding integration into $A B B$ Ability ${ }^{\top M}$ EDCS, please use the application note "2CDC112280M0101 CM-UFD.M*M integration into ABB Ability ${ }^{\text {M }}$ EDCS".

## Grid feeding monitoring relays Operating controls



## Insulation monitoring relays <br> Benefits and advantages



The insulation monitoring relays of the CM-IWx range guarantee a continuous insulation monitoring of an IT system. The devices recognize insulation faults as they develop and warn immediately if the value has fallen below the minimum set threshold. This ensures a reliable operation of the system and prevents operational interruption caused by a second, more severe, insulation fault which may lead to a short circuit tripping the main circuit breaker.


Continuous operation

Keep the system online and reduce downtime with early pre-warnings which enable time for maintenance planning. Monitor voltage free networks for early fault detection. Due to variants with rail and ship approval, the devices have a wide range of applications.


#### Abstract

Safe and reliable detection of insulation faults according to the latest standards is what ABB's insulation monitoring relays deliver. The portfolio extends from standard to more challenging applications and can prevent fire due to fast and reliable earth fault detection. Built-in self-diagnosis and interrupted wire detection further ensure safety.


Easy installation

# Insulation monitoring relays Benefits and advantages 

## $\pi$ <br> WW

## Overview

The CM-IWx product family offers a convincing solution for monitoring ungrounded AC, AC/DC and DC networks according to EN/IEC 61557-8. An IT network is supplied either by an isolating transformer or a voltage source, such as a battery or generator. In these systems, no active conductor is directly connected to earth potential.

The high reliability of an IT system is guaranteed thanks to continuous insulation monitoring. The insulation monitoring device recognizes insulation faults (at least one conductor has a galvanic connection to earth potential) as they develop and immediately reports if the insulation resistance has fallen below a given threshold. Therefore, maintenance activities can be scheduled and executed while the plant keeps running.


Main benefits

- Increase plant availability and avoid costly unplanned stops of a plant / machine by quickly detecting faults first
- Prevents fires due to detection of a creeping deterioration of the insulation resistance
- The adjustment of the setting values is simple and done in a user-friendly way with rotary switches on the front of the device
- Device status is displayed with LEDs that are easy to read and understand
- Devices for standard and more challenging applications are available
- Variants with rail and ship approvals are available



# Insulation monitoring relays Benefits and advantages 

## CM-IWS.1-for unearthed AC, DC or mixed AC/DC systems



The CM-IWS. 1 serves to monitor insulation resistance in accordance with IEC 61557-8 in unearthed IT AC systems, IT AC systems with galvanically connected DC circuits, or unearthed IT DC systems with a voltage up to 250 VAC and 300 V DC. It can be configured to the requirements of the applications and therefore has multi-functional uses. The device is available with two different terminal versions. You can choose between the proven screw connection technology (double-chamber cage connection terminals) and the completely tool-free Easy Connect Technology (push-in terminals).

- For monitoring the insulation resistance of unearthed IT systems up to $U_{n}=250 \mathrm{~V} \mathrm{AC}$ and 300 V DC
- Test function
- According to IEC/EN 61557-8
- Rated control supply voltage 24-240 V AC/DC
- Prognostic measuring principle with superimposed square wave signal
- One measuring range $1-100 \mathrm{k} \Omega$
- 1 c/o (SPDT) contact, closed-circuit principle
- Precise adjustment by front-face operating controls in $1 \mathrm{k} \Omega$ steps
- Interrupted wire detection
- Fault storage / latching configurable by control input
- Screw connection or Easy Connect Technology available
- Housing material for highest fire protection classification UL 94 V-0
- Tool-free mounting on DIN rail as well as demounting
- 22.5 mm width
- 3 LEDs for status indication


## —

## CM-IWS. 2 - for unearthed pure AC systems



The CM-IWS. 2 serves to monitor insulation resistance in accordance with IEC 61557-8 in unearthed IT AC systems with a voltage up to 400 VAC . The CM-IWS. 2 can be configured to the requirements of the applications and therefore has multi-functional uses. The device is available with two different terminal versions. You can choose between the proven screw connection technology (double-chamber cage connection terminals) and the completely tool-free Easy Connect Technology (push-in terminals).

- For monitoring the insulation resistance of unearthed IT systems up to $U_{n}=400 \mathrm{~V} \mathrm{AC}$
- Test function
- According to IEC/EN 61557-8
- Rated control supply voltage 24-240 V AC/DC
- Measuring principle with superimposed DC voltage
- One measuring range $1-100 \mathrm{k} \Omega$
- Fault storage / latching configurable by control input
- Precise adjustment by front-face operating controls in $1 \mathrm{k} \Omega$ steps
- Screw connection or Easy Connect Technology available
- Housing material for highest fire protection classification UL 94 V-0
- Tool-free mounting on DIN rail as well as demounting
- $1 \mathrm{c} / \mathrm{o}$ (SPDT) contact, closed-circuit principle
- 22.5 mm width
- 3 LEDs for status indication


# Insulation monitoring relays Benefits and advantages 

## CM-IWN. 1 - for unearthed AC, DC or mixed AC/DC systems



The CM-IWN. 1 serves to monitor insulation resistance in accordance with IEC 61557-8 in unearthed IT AC systems, IT AC systems with galvanically connected DC circuits, or unearthed IT DC systems with a voltage up to 400 V AC and 600 V DC. The measuring range can be extended up to 690 VAC and 1000 V DC by using the coupling unit CM-IVN. It can be configured to the requirements of the applications and therefore has multifunctional uses. The CM-IWN. 1 is available with two different terminal versions. You can choose between the proven screw connection technology (double chamber cage connection terminals) and the completely tool-free Easy Connect Technology (push-in terminals).

- For monitoring the insulation resistance of unearthed IT systems up to $U_{n}=400 \mathrm{VAC}$ and 600 V DC, expansion to 690 V AC and 1000 V DC with CM-IVN
- Test function
- According to IEC/EN 61557-8
- Rated control supply voltage 24-240 V AC/DC
- Prognostic measuring principle with superimposed square wave signal
- Two measuring ranges $1-100 \mathrm{k} \Omega$ and $2-200 \mathrm{k} \Omega$
- Precise adjustment of the measuring value in 1 or 2 kW steps
- One ( $1 \times 2 \mathrm{c} / \mathrm{o}$ ) or two ( $2 \times 1 \mathrm{c} / \mathrm{o}$ ) threshold values Ran1/ R1 (warning) and Ran2/R2 (pre-warning) configurable
- Precise adjustment of the threshold values in $1 \mathrm{k} \Omega$ steps (R1) and $2 \mathrm{k} \Omega$ steps (R2)
- Interrupted wire detection configurable
- Non-volatile fault storage configurable
- Open- or closed-circuit principle configurable
- Screw connection or Easy Connect Technology available
- Housing material for highest fire protection classification UL 94 V-0
- Tool-free mounting on DIN rail as well as demounting
. 45 mm width
- 3 LEDs for status indication
- 

CM-IWM. 10 and CM-IWM. 11 - for unearthed AC, DC or mixed AC/DC systems with up to 1500 V measurement voltage


The insulation monitors CM-IWM. 10 and CM-IWM. 11 provide the best and up-to-date insulation monitoring of modern IT systems in an optimum and state of-the-art way fulfilling the relevant standards. The devices can be used in the most flexible way for AC, DC and AC/DC systems even with large leakage capacity to earth (PE). The adjustment of the setting values is simple and done in a user-friendly way on two rotary switches on the front of the device. Via LEDs the measured value, device parameters and device status are indicated easy to read.

- Insulation monitoring according to IEC/EN 61557-8
- Detection of symmetric and asymmetric insulation faults
- $1 \mathrm{c} /$ o contact each for pre-warning and warning
- Measuring circuits can be disconnected via control terminals, e.g. for mains couplings
- Pre-warning threshold setting range: $20 \mathrm{k} \Omega \ldots 2 \mathrm{M} \Omega$
- Warning threshold setting range: $1 \mathrm{k} \Omega \ldots 250 \mathrm{k} \Omega$
- Open- or closed-circuit principle configurable
- Setting the maximum earth leakage capacitance to shorten the response time
- Simple, clearly arranged adjustment of the device with screwdriver
- LED chain to indicate the current insulation resistance
- Display of active measuring circuits
- Automatic and manual device self-test
- Alarm storage selectable
- External test and reset push button can be connected
. 90 mm width


## Insulation monitoring relays Operating controls

## CM-IWS



Test and reset button


Configuration and setting Front-face rotary switches for threshold value adjustment:

- R. 1 for R1 tens figures:
$0,10,20,30,40,50,60$, $70,80,90 \mathrm{k} \Omega$ in ten $\mathrm{k} \Omega$ steps
- R. 2 for R1 units figures: $1,2,3,4,5,6,7,8,9,10$ $k \Omega$ in one $k \Omega$ steps



## Insulation monitoring relays Operating controls

## CM-IWN



Front-face rotary switches to adjust the threshold value:

- R1.1 for R1 tens figure:
$0,10,20,30,40,50,60$, $70,80,90 \mathrm{k} \Omega$ in ten $\mathrm{k} \Omega$ steps
- R1.2 for R1 units figure: $1,2,3,4,5,6,7,8,9,10$ $k \Omega$ in one $k \Omega$ steps
- R2.1 for R2 tens figure: $0,20,40,60,80,100,120$, $140,160,180 \mathrm{k} \Omega$ in twenty $k \Omega$ steps
- R2.2 for R2 units figure: $2,4,6,8,10,12,14,16$, $18,20 \mathrm{k} \Omega$ in two $\mathrm{k} \Omega$ steps



## Thermistor motor protection relays Benefits and advantages



The thermistor motor protection relays of the CM-MSx range protect motors with PTC sensors against high temperature. These sensors are incorporated in the motor windings, thus measuring the motor heat directly.
continuous
operation

By using thermistor motor protection relays from $A B B$, the down and commissioning time can be reduced. The relay is continuously monitoring the sensor circuit to detect short-circuit or interrupted i.e. wire faults, thus contributing to maintenance and time saving in case of faults. In addition, the clear error messages of the front LEDs makes it possible to distinguish between the various fault causes.

Reliable in harsh conditions

Direct motor protection through temperature monitoring of the motor winding offers $100 \%$ motor protection, even under the most difficult ambient conditions. The ABB thermistor motor protection relays give you access to worldwide markets and are approved by local and international standards for many applications such as industry, renewable energies, the marine sector and dangerous and explosive environments. To prove that, the CM-MSS thermistor motor protection relays are certified according to ATEX Ex II (2) G and D for environments with explosive gas or dust loads.


Easy installation

Due to the compliance with the latest standards, there is no need to make any adjustments on the device. All relays come with two different connection possibilities - screw or push-in - to make any adjustments on the installation a breeze. Thanks to direct measurement of the motor temperature, dimensioning of the thermistor motor protection relay, considering the size of the motor, is not necessary.

# Thermistor motor protection relays Applications 



## Direct temperature monitoring

Generally, motor damage caused by overload or overheating situations can be prevented in different ways. Compared to the indirect temperature measuring which monitors the motor current, the temperature inside the motor can be measured by direct temperature measuring. This enables direct control and evaluation of different operating conditions:
Therefore, the consequences from overheating, such as abrasion as well as electrical failures, can be prevented. The direct measuring principle is carried out by a combination of the thermistor motor protection relay and three PTC sensors which are installed directly in the motor by the manufacturer. Those 3 PTC sensors are placed directly at the thermal hotspots, the motor windings.


Motor protection using current- and temperature-dependent protective devices
IEC 60204 stipulates that motors must be protected from overheating at a rating of 0.5 kW and higher. The protection can be provided or executed by overload protection, overtemperature protection or current limiting. For motors with frequent starting and braking, and in environments where cooling may be impaired (e.g. by dust), it is recommended to use the overtemperature protection option in the form of a protective device coordinated with this mode of operation.

On rotor-critical motors, overtemperature detection in the stator windings can lead to delayed and hence inadequate protection. In this case, the standards stipulate additional protection, e.g. by means of an overload relay. This combination of thermistor motor protection and an overload relay is recommended for full motor protection in case of frequent starting and braking of motors, irregular intermittent duty or excessive switching frequency.


## Operating mode

The thermistor motor protection relays are used to monitor the temperature of motors or generators equipped with PTC sensors type A according to the latest product standard IEC/EN 60947-8. The sensors are built-in into the motor windings, measuring the motor heating. In case of an increase of the temperature in the motor, the resistance of the PTC sensors increases as well. If the motor heats-up excessively ( $>2.83 \mathrm{k} \Omega$ ), the output relay(s) de-energize(s) and the corresponding LED displays the overtemperature. A short circuit and an interrupted wire within the sensor circuit can also be detected. A reset is only possible after cooling down of the motor ( $<1.1 \mathrm{k} \Omega$ ) or after a wire interruption, or a short circuit within the sensor circuit has been removed. A reset after tripping can be done manually with the Test / Reset button, externally with a push button between S1 and 1T2/2T2, or automatically by jumpering S1-1T2/2T2.

## Thermistor motor protection relays <br> Offer overview

## Thermistor motor protection relays Operating controls



## Temperature monitoring relays with potentiometer Benefits and advantages



The temperature monitoring relays of the CM-TCS range are able to measure temperatures of solids, liquids and gaseous media using PT100 sensors. Overtemperature and undertemperature monitoring, as well as open- or closed-circuit principle is configurable for all devices. As soon as the temperature falls below or exceeds the set threshold value, the output relays change their positions and the front-face LED‘s display the current status.


Continuous operation


## Reliable in harsh conditions

By using temperature monitoring relays, both the downtime and the commissioning time can be reduced. The relay is continuously monitoring the sensor circuit to detect short-circuit or interrupted wire faults. The high accuracy of the measuring input leads to a fast detection of exceeding threshold values. In case of fault, maintenance effort is reduced and time saved.


Easy installation

All relays work reliably in environments with low temperatures down to $-40^{\circ} \mathrm{C}$. Additionally, the housing fulfills the UL 94 V-0 flammability standard requirements. Together with the vibration resistant push-in terminals, the relay is not only reliable no matter the environment temperature but is also durable to shock and vibration. Save time as retightening is no longer needed and enhance the reliability and safety not only for the equipment.

Like all devices from the measuring and monitoring portfolio, the CM-TCS relays are easily configurable via front facing potentiometers. Easy threshold configuration without calculation is accomplished by direct reading scales. For further configuration options, additional settings can be made via dip-switches, offering the flexibility to configure, for example, the working principle of the relays and the output configuration. The device can be set up before installation in the application and easy adjustments during the process are possible.

## Temperature monitoring relays with potentiometer Applications

The temperature monitoring relays CM-TCS monitor overtemperature, undertemperature, or temperatures between two threshold values (window monitoring) with a PT100 sensor.

As soon as the temperature falls below or exceeds the threshold value, the output relays change their positions according to the configured functionality.


The current status is displayed by frontfaced LEDs. Regardless of the selected configuration, the device is monitoring its measuring circuit for interrupted wires or short-circuits.



## Temperature monitoring relays with potentiometer Operating controls



Push-in and screw terminals


Measuring input: PT100


Adjustment of the threshold value
$-50 \ldots+50^{\circ} \mathrm{C}$
$0 \ldots+100^{\circ} \mathrm{C}$
$0 \ldots+200^{\circ} \mathrm{C}$


## One look, one touch - one device Features and benefits



Set up these innovative temperature monitoring relays exactly as you need, either via a back-lit LCD or smartphone app. Parametrization and configuration are just one touch away with the ABB EPiC app - even in a non-powered state - reducing installation time by $80 \%$. And with just one relay covering a wide range of application, stocks can be reduced significantly, making ABB's Smart monitoring relays a true game changer.

## One look - back-lit LCD for easy reading and parametrization



Easy to install


Optimum interface

Everything you need at a glance: the LCD at the front of the relay shows the currently measured values and maintenance data. And with just one push, the symbol-based menu structure can be accessed via the push-rotate button. Simply set the thresholds and parameters with the help of an intuitive and future-ready interface.

## One touch - NFC parametrization via smartphone app

One touch is all that is needed for fast, easy and intuitive configuration with the ABB EPiC smartphone app. Simply touch the relay with your mobile phone: Parameter settings can be edited and stored in the app and then copied to different devices, even if they are not in the powered state. Available in a range of different languages, installation and configuration have never been so easy.

## One device - for thermal protection and condition monitoring

Smart temperature monitoring relays ensure that your application remains operational by detecting potential failures in advance. They protect the life of your assets by providing early detection of


Continuous operation unacceptable temperature rises and the need for maintenance. The relay is configurable over a wide range of settings and can be adjusted flexibly. Set a pre-alarm and alarm thresholds according to application needs. Increase personal safety by monitoring temperature remotely with Modbus RTU or ABB Ability ${ }^{\top M}$ Energy and Asset Manager.

## One look - back-lit LCD <br> Easy reading and setup with one push

Just one look is all it takes to see the status and measured values of the relay, easily navigate through the symbol-based menu and even configure the device with the new, back-lit LCD at the front of the relay.

## Start screen

Know the status at one glance.

## Symbol-based menu structure

Due to the symbol-based menu structure, there is no need for any translation, which helps avoid misunderstandings and dramatically increases efficiency in after sales support.


## Pre- and user-defined settings

For frequently used applications, the device offers predefined settings to save installation time. Parameters can be individually set and saved in one of four user settings.


## Diagnostic data

Event history, operating hours counter, statistics and others are easily accessible from the menu


## Back-lit LCD

The back-lit LCD at the front of the relay shows the currently measured values and maintenance


## Password \& parameter log

Improved security is achieved through the recorded password and parameter log.

## One touch - setup via smartphone app Powerless configuration with NFC

Configuration and parametrization of temperature monitoring relays has never been simpler. One touch is all that is needed for fast, easy and intuitive configuration with the ABB EPiC mobile phone app.


## Near Field Communication (NFC)

NFC is an international transmission standard based on radio-frequency identification technology for the contact-less exchange of data.This technology is already integrated into most electronic devices like tablets and smartphones and part of everyday life, e.g. for contactless payment.

## ABB EPiC smartphone app

Electrification Products intuitive Configurator (EPiC) is a mobile application that makes it possible to configure and check the status of ABB low voltage products. The app is available for free - just download it and connect to your smart monitoring relays, circuit breakers and other devices.


## Easy visualization

Monitor the status of the relay and read the measured values in the app.

## Store and send parameters

Store a set of parameters in the app and distribute them globally and copy them to other devices.


## Powerless adjustment

Parametrize and configure the relays even while not connected to a power supply, e.g. on office desks.


## One touch setup

Handle the relays with just one touch- just hold the smartphone against the front of the relay.


## Copy and paste functionality

Simply copy the settings from one device to another-with just one touch to the relay.

## Event history

Examine the history of the device and recent events.

## Built-in connectivity

Communication via embedded Modbus RTU

The smart temperature monitoring relay CM-TCN. 012 supports the data transfer using the Modbus RTU communication protocol. The communication interface RS-485 is embedded in the relay and does not require installation of any accessories.


## CM-TCN manual

Modbus communication map and information about the device configuration can be found in the CM-TCN user manual


The communication interface makes it possible to:


Read the temperature measurements, relays state and temperature sensors status.


Access the condition monitoring data such as event history, operating hours counter, maintenance counter, statistics.


Configure the smart monitoring relay remotely.


Reset the history and settings (trip counter, event history, etc)


Read system information (serial number, firmware version)


Control output relays and trigger them in case of the communication bus error


Client



Server 1



Server 2


Server $\mathbf{N}$

## Operating controls



Push-in and screw terminals


3 measuring inputs PT100, PT1000, PTC, NTC


Back-lit LCD
Symbol-based menu structure


Push-rotate button
Intuitive operation
with just one button


LED status
indication
Red: Failure
Yellow: NFC ready for pairing
Green: Control supply
voltage applied; no failure


Connection terminals
Wide terminal spacing allows connection of wires: $2 \times 1.5 \mathrm{~mm}^{2}$ ( $2 \times 16$ AWG) with wire end ferrules or $2 \times 2.5 \mathrm{~mm}^{2}$ ( $2 \times 14$ AWG)
without ferrules.

## Liquid level monitoring relays Benefits and advantages



ABB's liquid level monitoring relays are the ideal solution to regulate and control liquid levels and ratios of mixtures of conductive fluids. The assortment includes single- or multifunctional devices which can be used for overflow protection, dry-running protection of pumps, filling and draining applications as well as max. and min. level alarming.


Global availability

The liquid level monitoring relays are designed to provide a wide supply voltage range, making global differences irrelevant. Additionally, the CM-ENS range meets a broad range of standards and requirements. Together with ABB's global support and sales network, using CM-ENS gives customers the confidence of worldwide sourcing - no matter where they build, install or operate their equipment.


Reliable in harsh conditions

High immunity against electromagnetic disturbances is ensured due to advanced measuring technology. Additionally, the housing fulfills the UL $94 \mathrm{~V}-0$ flammability standard requirements. Together with the vibration resistant push-in terminals, the relay is not only reliable no matter the environment temperature but is also durable to shock and vibration. Save time as re-tightening is no longer needed and enhance the reliability and safety not only for the equipment.


Improve installation efficiency

Like all devices from the measuring and monitoring portfolio, the CM-ENS relays are easily configurable via front facing potentiometers. Easy threshold configuration without calculation is accomplished by direct reading scales. The device can be set up before installation in the application and easy adjustments during the process are possible.

# Liquid level monitoring relays <br> Benefits and advantages 



Operating principle
Liquid level control relays CM-ENS are designed to monitor levels of conductive liquids and media and is used, for example, for liquid level control in pump systems. The measuring principle is based on the resistance change sensed by single-pole electrodes. To avoid electrolytic phenomena, an AC current runs across the probes.
A selector switch on the front panel allows selection of the required function and the sensitivity range.


Suitability

| Suitable for |  | Not suitable for |  |
| :--- | :--- | :--- | :--- |
| spring water | acids, bases | chemically pure water | ethylene glycol |
| drinking water | liquid fertilizers | fuel | concentrated alcohol |
| sea water | milk, beer, coffee | oils | paraffin |
| sewage | non-concentrated alcohol | explosive areas (liquid gas) | lacquers |



Characteristics

## CM-ENS.1x

- Control of one or two liquid levels (min/max)
- Fill or drain function
- Adjustable response sensitivity 5-100 k $\Omega$


## CM-ENS.2x

- Control of one or two liquid levels (min/max)
- Fill (UP) or Drain (DOWN), adjustable via front-face potentiometer
- Adjustable response sensitivity 0.1-1000 k $\Omega$


## All CM-ENS devices

- Devices with wide rated control supply voltage $24-240 \mathrm{~V}$ AC/DC
- Cascadable
- High EMC immunity
- 3 LEDs for the indication of operational states
- Screw connection technology or Easy Connect Technology
- Housing material for highest fire protection classification UL 94 V-0
- Tool-free mounting and demounting on DIN rail
- 22.5 mm (0.89 in) width


## CM-ENS. 31

- Control of one or two liquid levels (min/max)
- Fill (UP) or Drain (DOWN), adjustable via front-face potentiometer
- Adjustable response sensitivity 0.1-1000 k $\Omega$
- Selectable ON- or OFF-delay
- $2 \mathrm{c} / \mathrm{o}$ (SPDT) contacts


## Primary switch mode power supplies <br> Overview


#### Abstract

Modern power supply units are a vital component in energy management and automation technology. As your global partner in these areas, ABB pays the utmost attention to the resulting requirements. Innovation is the key to ABB's power supply product program.


## Power supplies for industrial applications



## CP-E range: economy range

The CP-E range offers enhanced functionality while the number of different types has been considerably reduced. Now all power supply units can be operated at an ambient temperature of up to $+70^{\circ} \mathrm{C}$. The $\mathrm{CP}-\mathrm{E}$ range 24 V devices over 18 W offer an output/contact for monitoring of the output voltage and remote diagnosis. Optimized for worldwide applications, the CP-E power supplies can be supplied within a wide range of AC or DC voltages. The output voltage is continuously adjustable, ensuring optimal adaptation to the application, e.g. compensating the voltage drop caused by a long line length. For decoupling of parallel connected power supplies below or equal to 56 V , redundancy modules are available in order to achieve true redundancy.


## $C P-T$ range: three-phase range

The CP-T range of three-phase power supply units perfectly complements ABB's existing power supply offering in terms of design and functionality, giving you more advanced options for your three-phase applications. Solid state output for function monitoring and remote diagnostics is available. The range is to be used in 340-575 V AC or 480-820 V DC supply systems. Its continuously adjustable output voltage ensures optimal adaptation to the application, e.g. compensating the voltage drop caused by a long line length.


## CP-S. 1 range: high-efficiency range

CP-S. 1 power supplies: high efficiency and reliability delivered in a compact footprint. Designed for a huge variety of applications, including machine building segments, this advanced range boosts an integrated $150 \%$ power reserve for five seconds and operates at an efficiency of up to $94 \%$. With overheat protection, active power factor correction, a broad certified AC and DC input range and extensive worldwide approvals including marine, the all-new CP-S. 1 power supplies are a preferred choice for multiple industrial applications.

## Primary switch mode power supplies Overview

## Power supplies for industrial applications

## CP-C. 1 range: high-performance range

The CP-C. 1 power supplies are ABB's high-performance and most advanced range. With excellent efficiency, high reliability and innovative functionality, the CP-C. 1 range is ready to take on the most demanding industrial applications.
These power supplies have a $150 \%$ integrated power reserve and operate at an efficiency of up to $94 \%$. They are equipped with overheat protection and active power factor correction. Combined with a broad AC and DC input range and extensive worldwide approvals, the CP-C. 1 power supplies are the preferred choice for professional DC applications. Giving the power to control.


## CP-B range: short time buffers

ABB offers an innovative and completely maintenance- free product range for buffering the 24 V DC supply in case of interrupted mains on the primary side of the switch mode power supply.

- Ultra cap based buffer modules for short time UPS systems
- Rated input voltage 24 V DC
- Rated currents 3 A, 10 A and 20 A
- 10 A buffer module with increased capacity to buffer up to 9 min ( $10 \%$ load)
- LEDs for status indication
- Higher than 90 \% efficiency
- Signaling and status outputs
- Buffering times at $100 \%$ load current from 13 s to 50 s (depending on device)


## Power supplies for building applications



## CP-D range: distribution panel design

The CP-D range of power supply units in MDRC design (modular DIN rail components) fits into all domestic installation and distribution panels. With their width of only 18 to 90 mm , the CP-D range switch mode power supplies are ideally suited for installation in distribution panels. The range is optimized for worldwide applications: The CP-D power supplies can be supplied with 90-264 V AC or 120-375 V DC. The continuously adjustable output voltage (CP-D > 10 W ) ensures optimal adaption to the application, e.g. compensating the voltage drop caused by a long line length. An additional redundancy unit CP-D RU to establish true redundancy is available.


For certifications and approvals, please refer to the download section on the product web pages.

## CP-T range <br> Benefits and advantages

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## Characteristics

- Rated output voltages $24 \mathrm{~V}, 48 \mathrm{~V}$ DC
- Output voltage adjustable via front-facing rotary potentiometer "OUTPUT Adjust"
- Rated output currents $5 \mathrm{~A}, 10 \mathrm{~A}, 20 \mathrm{~A}, 40 \mathrm{~A}$
- Rated output powers 120 W, 240 W, 480 W, 960 W
- Three-phase operation (see derating note)
- Two-phase operation (25 \% derating possible, see derating note)
- Supply range $3 \times 400-500$ V AC ( $3 \times 340-575 \mathrm{~V} \mathrm{AC}, 480-820 \mathrm{~V}$ DC)
- Typical efficiency of $93 \%$
- Low power dissipation and low heating
- Free convection cooling (no forced cooling with ventilators)
- Ambient temperature range during operation $-40 . . .+70^{\circ} \mathrm{C}^{1)}$
- Open-circuit, overload and short-circuit stable
- Integrated input fuse
- Redundancy unit CP-C.1-A-RU (-C) offering true redundancy, available as accessory
- LEDs for status indication
- Signalling contact "13-14" (solid-state) for output voltage OK on 24 V devices
- Various approvals and marks
${ }^{1)} 480 \mathrm{~W}$ variants: $-30 \ldots+70^{\circ} \mathrm{C}$



## Main benefits

## Signalling output

Some devices of the CP-T series offer a solid-state output for function monitoring and remote diagnostics.

## Wide input range

Optimized for worldwide applications: The CP-T power supplies can be used in 340-575 V AC or 480-820 V DC supply systems.


## Adjustable output voltage

The CP-T range features a continuously adjustable output voltage. Thus, they can be optimally adapted to the applications, e.g. compensating the voltage drop caused by a long line length.


## CP-S. 1 power supply range Benefits and advantages



CP-S.1 power supplies: high efficiency and reliability delivered in a compact footprint. Designed for a huge variety of applications, including machine building segments, this advanced range boosts an integrated 150 \% power reserve for five seconds and operates at an efficiency of up to $94 \%$. With overheat protection, active power factor correction, a broad certified AC and DC input range and extensive worldwide approvals including marine, the all-new CP-S. 1 power supplies are a preferred choice for multiple industrial applications.


Space saving


## Outstanding power to space ratio

In comparison to other power supply ranges on the market, ABB's CP-S. 1 range achieves space savings up to $50 \%$. Together with the high-efficiency and reduced power losses features, CP-S. 1 is a space and cost saving solution for applications where size matters.

## System reliability

The power reserve functionality provides additional power of starting heavy loads. CP-S. 1 offers $150 \%$ of the nominal current for five seconds to start e.g. heavy loads reliably. Together with ABBs redundancy modules CP-C.1-A-RU as well as buffer modules CP-B range - buffering the load in case of power losses on grid side - increase the availability and finally the system reliability further. Coated PCBA completes CP-S. 1 range offering for OEM machine builders.

## Global availability

CP-S. 1 range can be used in multiple installations in the world. A certified wide AC and DC input voltage range as well as a variety of approvals incl. marine, giving you the confidence of world-wide sourcing - no matter where you build, install or operate your equipment.

## CP-S. 1 power supply range $\mathrm{CO}_{2}$ reduction



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output ox


$\square$
Main benefits

Complete offering
A complete 24 V DC offering from 3 A up to 40 A in metal enclosure suits perfectly to OEM machine building requirements.

## Small footprint

CP-S. 1 power supplies can save the valuable installation space of the control cabinet due to compact design and high efficiency.

## Robust design

Coated PCBA and marine certification enable CP-S. 1 power supplies being the perfect match for e.g. Wind, Solar, Marine applications.

## Redundancy units

True redundancy could be achieved by using the optional redundancy unit CP-C.1-A-RU.


## CP-S. 1 power supplies Operating controls



## CP-S. 1 power supplies <br> Application example Softstarter and Safety*)

A sawmill or lumber mill is a facility where logs are processed into lumber. Modern sawmills use a motorized saw to cut logs lengthwise to make long pieces, and crosswise to determine length according to standard or custom sizes (dimension lumber). The "portable" sawmill is of simple operation. The log lies flat on a steel bed, and the motorized saw cuts the log horizontally along the length of the bed by the operator manually pushing the saw. The simplest type of sawmill consists of a chainsaw and a custom-made jig ("Alaskan sawmill"), with similar horizontal operation. Energy management is a point of great interest.

Application example: Softstarter and Safety (SIL3/PLe, motor power/starting: <15 kW)


| \# | Order code | Desription |
| :---: | :---: | :---: |
| 1 | 1SFA619100R1012 | Pushbutton CP1-10G-10 |
| 2 | 1SFA619100R1041 | Pushbutton CP1-10R-01 |
| 3 | 1SFA619100R1015 | Pushbutton CP1-10W-10 |
| 4 | 1SBV010510R1211 | Limit switch 30 mm wide, 1 ISO M $16 \times 1.5$ cable entry on the bottom, plain plastic plunger actuator and 1 N.O. +1 N.C. snap action (Zb type) contacts |
| 5 | 1SBV010510R1211 | Limit switch 30 mm wide, 1 ISO M $16 \times 1.5$ cable entry on the bottom, plain plastic plunger actuator and 1 N.O. +1 N.C. snap action (Zb type) contacts |
| 6 | 1SVR405600R1000 | Pluggable interface relay CR-P024DC1 1c/o, A1-A2 $=24 \mathrm{~V}$ DC, $250 \mathrm{~V} / 16 \mathrm{~A}$ with socket |
| 7 | 1SVR405600R1000 | Pluggable interface relay CR-P024DC1 1c/o, A1-A2 $=24 \mathrm{~V}$ DC, $250 \mathrm{~V} / 16 \mathrm{~A}$ with socket |
| 8 | 1SVR320661R1000 | Power supply CP-S. $124 / 10.0$, In: 100-240 V AC, $100-250 \mathrm{~V}$ DC, Out: 24 V DC |
| 9 | 1SVR427060R1000 | Buffer module CP-B 24/10.0, 24 V DC / 10 A , energy storage 13.700 Ws |
| 10 | 2TLA010050R0000 | Sentry safety relay SSR10 24 V |
| 11 | 2TLA030054R0100 | Emergency stop INCA 1 |
| 12 | 2CCS861002R0064 | High-performance miniature circuit breaker S801S-C6-R |
| 13 | 1SFA898103R7000 | Softstarter PSTX30-600-70 |
| 14 | 1SFA619403R5022 | Pilot light CL2-502G 24 V AC/DC |
| 15 | 1SFA619403R5021 | Pilot light CL2-502R 24 V AC/DC |
| 16 | 1SFA619403R5021 | Pilot light CL2-502R 24 V AC/DC |
| 17 | 2TLA030053R0000 | Reset button Smile 11 RA |
| 18 | 1SVR405600R1000 | Pluggable interface relay CR-P024DC1 $1 \mathrm{c} / \mathrm{o}, \mathrm{A} 1-\mathrm{A} 2=24 \mathrm{~V}$ DC, $250 \mathrm{~V} / 16 \mathrm{~A}$ with socket |
| 19 | 1SCAO22399R6590 | Safety switch OTP16KA3M |
| 20 | 1SBL176082R3022 | 2x Contactor AFS16Z-30-22-30 24 V DC |

[^30]
## CP-C. 1 range <br> Benefits and advantages



The high-performance CP-C. 1 power supplies are ABB's most advanced range. With excellent efficiency, high reliability and innovative functionality, it is ready to take on the most demanding of industrial applications These power supplies have a 150 \% integrated power reserve, operate at an efficiency of up to $94 \%$ and are equipped with overheat protection and active power factor correction. Combined with a broad AC and DC input range and extensive worldwide approvals, CP-C. 1 power supplies are the preferred choice for professional DC applications. ATEX and IECEx approvals are available for the use in hazardous areas.
$\stackrel{24}{2} / 7$
Continuous
operation


Project cost reduction

- Power reserve design to allow performance with up to $150 \%$ more current
- Redundancy setup of the application possible to allow parallel operation
- Long lifetime
- High peak currents for switching on capacitive loads are supported
- Up to $94 \%$ efficiency saves money for energy during operation
- Less need for external cooling in the cabinet
- Small size to reduce space needed in panel


Reliabel in harsh conditions

- Extended ambient temperature range during operation $-40 \ldots+70^{\circ} \mathrm{C}$ with coated PCBA version
- IECEx/ATEX approvals for hazardous locations available
- High MTBF values


## CP-C. 1 range <br> Benefits and advantages



## Characteristics

- Rated output voltage 24 V DC
- Power reserve design delivers up to $150 \%$ at $\mathrm{T}_{\mathrm{a}} \leq 40^{\circ} \mathrm{C}$
- Output voltage adjustable via front-facing rotary potentiometer "OUTPUT Adjust", 22.5-28.5 V
- High efficiency of up to 94 \%
- Low power dissipation and low heating
- Free convection cooling (no forced cooling)
- Devices with coated PCBAs for harsh environments and with extended temperature range
- Open-circuit, overload and short-circuit stable
- Integrated input fuse
- OUTPUT OK - signaling output " $13-14$ " (relay), Power reserve signaling output " $1>I_{R}$ (transistor)
- Redundancy unit offers true redundancy, available as accessory
- Various approvals and marks


Main benefits
The primary switch mode power supply CP-C. 1 has a wide range of certified AC and DC input voltages. Furthermore, the CP-C. 1 is equipped with capacitors that ensure a hold-up time of at least 50 ms . This enables worldwide usage and permits safe operation in fluctuating networks and battery-powered applications.

With their robust metallic housing and the reliable construction, CP-C. 1 power supplies are suitable for applications in industrial environments. The CP-C.1-C units have coated PCBAs, which enables their use in harsh industrial environments. The power reserve of up to $150 \%$ enables trouble-free starting of heavy loads eliminating the need for an oversized power supply.

## Signaling output

To communicate the status of the power supply, the CP-C. 1 is equipped with a relay output to signal OUTPUT OK as well as a transistor output $\mathrm{I}>\mathrm{I}_{\mathrm{R}}$ to indicate when the power reserve is active. These signals can be used for communication with a higher level control system, e.g. a PLC.
Depending on the logic of the higher level control system, an appropriate action is initiated by forwarding the signal. The receptor of this signal could be a contactor, a signal tower, or an interface relay.

## CP-B range

## Benefits and advantages



ABB's ultra-capacitor based CP-B buffer modules serve to ensure a short-term uninterrupted power supply system with a voltage of $24 \mathrm{~V} D C$ by buffering the load in case of power loss.

The buffer modules feature a technology for storing energy: the use of ultracapacitors obviates the need for maintenance and exempts deep discharge in comparison to batteries.

- Maintenance-free, ultra-capacitor technology
- Temperature resistant
- No discharge
- Small footprint


## CP-B range <br> Benefits and advantages

Power supply systems have to be highly reliable in most areas of energy management and automation technology. Often, batteries are used for supporting the supply system in case of mains failures. Batteries have limited lifetimes depending on environmental parameters and have to be maintained regularly, which causes extra work and costs.

Using the ultra-capacitor technology, ABB offers an innovative and completely maintenance-free new product for buffering the 24 V DC supply in case of interrupted mains on the primary side of the switch mode power supply.

The CP-B range is an ultra-capacitor buffer energy storage system for power supply units which ensures a short term uninterrupted power supply system. In case of power loss, the energy stored in the capacitor guarantees that the load is continually provided for up to several hundred seconds depending on the load current.


## Characteristics

- 3 buffer modules for buffering 24 V DC:

CP-B 24/3.0 (3 A / 1 kWs ${ }^{1}$ )
CP-B 24/10.0 (10 A / $13.7 \mathrm{kWs}^{11}$ )
CP-B 24/20.0 (20 A / 8 kWs ${ }^{1}$ )

- LEDs for status indication
- Relay contacts for status messaging
- Very high backup times (e.g. with CP-B 24/10.0 up to 9 minutes and 30 s minutes at 1 A load current)
- Short charging times
- High efficiency, higher than 95 \%
- Wide temperature range
- DIN rail mountable, compact housing
- Extended temperature range $-40 . . .60^{\circ} \mathrm{C}$
${ }^{1)}$ internal energy buffer


[^31]
## Electronic protection devices EPD24

Benefits and advantages


With its narrow width of only 12.5 mm, EPD24 can fit everywhere - it can even be mounted side-by-side.

Its adjustable and fixed current ratings, projectable protection through current limitation as well as a single trip curve for all types of loads allow for use in a wide field of applications.

## Highlights

- Safety and reliability
- Operational continuity
- Worldwide use thanks to relevant certifications
- Compact and effective


## Electronic protection devices EPD24 Applications



## Features

- Selective load protection, one electronic tripping characteristic.
- Active current limitation for safe connection of capacitive loads up to $20,000 \mu \mathrm{~F}$ and on overload/short circuit
- Current ratings 0.5... 12 A
- Reliable overload disconnection with $1.1 \times \mathrm{I}_{\mathrm{N}}$
- Manual ON/OFF button
- Clear status and failure indication through LED and integrated auxiliary contact
- Integral fail-safe element adjusted to current rating
- Width per unit only 12.5 mm
- Rail mounting
- Ease of wiring through busbar LINE+ and 0 V as well as signal bars
- UL- and CSA-approvals allow international use of the devices




## Applications

- Packaging machines
- Automation
- Automation \& Process Control
- Automotive Manufacturing
- Chemical, Oil \& Gas
- Medical Equipment
- Pharmaceutical \& Food
- Power Engineering DC 24 V
- Renewable Energy
- Steel Production



# Interface relays and optocouplers Offer overview 

Relays are universally applicable and are utilized in a diverse array of applications. They are a significant element in contemporary industrial processes and are used in applications where galvanic isolation, signal separation, voltage coupling and signal amplification are required.

The ABB portfolio includes electromechanical relays and optocouplers. The electromechanical relays operate using an electromagnetic field whereas optocouplers use light. Optocouplers are predominantly used in applications where a high switching frequency is necessary. Furthermore, optocouplers do not contain any moving parts and are therefore bouncefree, immune to vibrations and possess a long electrical life.


## CR-S range

## The slim line of interface relays and optocouplers

The pluggable interface relays and optocouplers of the CR-S range are used for electrical isolation, amplification and signal matching between the electronic controlling, e.g. PLC, iPC or field bus systems and the sensor / actuator level. The CR-S range combines the flexibility of a modular system and the ability of switching high currents on a small footprint thus can be used in applications where space saving is essential. The CR-S range also includes complete versions consisting of a relay, socket and marker.

## CR-P range

The pluggable pcb interface relays and optocouplers
The pluggable interface relays of the CR-P range are used for electrical isolation, amplification and signal matching between the electronic controlling, e.g. PLC, iPC or field bus systems and the sensor / actuator level. The CR-P range offers highest current switching in an IP67 rated relay housing. Furthermore, nine different coil voltages are available to suit world wide applications and even gold contact versions are available which is essential when it comes to switch sensitive signals. The CR-P range also includes complete versions consisting of a relay, socket, holder, marker and function module.

# Interface relays and optocouplers Offer overview 

## CR-M range <br> The pluggable miniature interface relays

The pluggable interface relays of the CR-M range are used for electrical isolation, amplification and signal matching between the electronic controlling, e.g. PLC, iPC or field bus systems and the sensor / actuator level. The CR-M range offers up to 4 contacts in one relay and a built in test button which makes a circuit check fast and easy. 12 different coil voltages are available to suit world wide applications and even gold contact versions are available which is essential when it comes to switch sensitive signals. The CR-M range also includes complete versions consisting of a relay, socket, holder, marker and where applicable a function module.

## CR-U range

## The pluggable universal interface relays

The pluggable interface relays of the CR-U range are used for electrical isolation, amplification and signal matching between the electronic controlling, e.g. PLC, iPC or field bus systems and the sensor / actuator level. The CR-U range offers up to 3 contacts in one relay and a built in test button which makes a circuit check fast and easy. 12 different coil voltages are available to suit world wide applications.

## R600 range

## Boxed interface relays and optocouplers

Boxed interface relays of the R600 range are used for electrical isolation, amplification and signal matching between the electronic controlling, e.g. PLC, iPC or field bus systems and the sensor / actuator level. The relay itself is built in thus the perfect solution because this design fulfills highest vibration requirements. The compact design and different connection terminal possibilities further optimize your panel installation.

## Applications of interface relays

A proven technology used worldwide

Relays are universally applicable and are utilized in a diverse array of applications. They are a significant element in contemporary industrial processes and are used in applications where galvanic isolation, signal separation, voltage coupling and signal amplification are required.


## Circuit multiplication

A single voltage signal may be used to simultaneously perform up to four different switching operations. Each output contact can be used to switch load circuits with different voltage and current levels.


## Galvanic isolation

Interface relays are excellently suited to ensure safe galvanic isolation, i.e. separation between control circuit and load circuit.


Voltage conversion
Interface relays allow for small voltage signals to switch much larger loads. For example: a 24 V DC 10 mA signal can be used to switch a 230 V AC 16 A load.

## Billions

of relays operate and interface between control circuits and electrical loads.


## Pluggable interface relays and optocouplers Socket and terminal connection types

## Standard sockets




01 Standard socket CR-P

Logical sockets


03 Logical socket CR-P

Position of connection terminals:
Coil connection (A1-A2) on lower side of the socket, contact connections ( $\mathrm{n} / \mathrm{o}$ and $\mathrm{n} / \mathrm{c}$ contacts) on the lower and upper side of the socket.

## Terminal connection types



05 Screw type


06 Spring type


07 Fork type

Position of connection terminals:
Coil connection (A1-A2) on lower side of the socket, all contact connections (common contacts, $\mathrm{n} / \mathrm{o}$ and $\mathrm{n} / \mathrm{c}$ contacts) on the upper side of the socket.

A variety of sockets are available for interface relays and optocouplers to meet the needs of different applications such as vibration- intensive environments.

## Pluggable interface relays and optocouplers Relay components

## -

CR-S range


## CR-P range



## Pluggable interface relays and optocouplers Relay components

## CR-M range



CR-U range


## Boxed interface relays and optocouplers R600 range Overview



## Marine certification

The R600 range offers the LR approval, which allows usage of the boxed interface relays and optocouplers in many applications around the marine segment. The performance of the R600 range has been proven by successfully passing tests required for operating under harsh conditions.


## Safe operation

High resistance to vibration and shock thanks to the relay soldered inside of the housing. Wrong relay replacement or relay lose not possible . Devices with immunity to leakage currents.


## Longevity

Optocoupler with transistor, MOS-FET and Triac output ensure a longer lifetime, higher reliability and quiet operation.

## Easy to mount

The R600 interface relays and optocouplers are easy to mount by snapping onto a DIN-rail according to IEC/EN 60715. Time saving wiring thanks to a jumper bar.

## We deliver and support the world with premium, intelligent machine safety solutions.




## Logic units

## The ABB safety products offering includes a range of logic units to suit different types and sizes of safety applications

## Sentry

## Safety relays

Sentry is a range of safety relays that are powerful and easy to use. There are basic Sentry models for simple applications and easy output expansion, as well as highly flexible models with extremely accurate timer functions and a display in the front for configuration and trouble shooting.

## Vital

## Safety controllers

Vital is a configurable safety controller that does not require any programming. It uses the ABB Jokab Safety DYNlink system that enables Vital to supervise multiple safety functions that normally would have required several safety relays in order to reach the highest level of safety.

## Pluto

## Programmable safety controllers

Pluto is a programmable safety controller that is cost effective, powerful and compact. Pluto can control most types of safety devices on the market, as well as DYNlink safety devices, analog sensors, encoders, contactors, valves and many more. Models with safety bus communication simplify the design of safety systems, thanks to our All-Master concept.

A wide range of gateways allows communication with other networks and also remote monitoring of a Pluto system.

Programming is easily done in the free of charge software Pluto Manager.

## B\&R X20 SafeLOGIC

## Safety PLC

$B \& R$ is part of $A B B$ and offers safety PLC's for processing lines and machines automated with $B \& R$.

The very compact X20 system offers a wide range of different modules and is especially efficient to wire and maintain thanks to its 3-part modularity.

SafeLOGIC is the ideal safety extension for a B\&R automated application. It is not intended as a standalone model (as opposed to Pluto).
$B \& R$ supports all $A B B$ safety sensors with potential free contacts. For this use case, the B\&R SafeIO module provides a unique pulse signal which ensures best cable diagnostic.
$B \& R$ supports all $A B B$ safety sensors with OSSD interface. For this use case, the B\&R SafeIO module provides a filter that handles the short interruptions in the OSSD signals.
$B \& R$ also supports all $A B B$ safety sensors with DYNlink interface.

Please contact your B\&R sales office for more information.


## General machinery

With a wide range of sensors and control devices ABB Safety Products has suitable safety solutions to most safety functions for machine builders and OEM.


## Eden

Non-contact sensor
Easy to install, highest level of safety and high reliability.

## Safeball

Two-hand control device
Ergonomic design, easy to install and highest level of safety.


Safety mats, edges and bumpers
Pressure sensitive devices
Custom made with durable design.

## Orion

Optical safety device
Reduce complexity, cost and downtime.

## Smile/Inca

## Emergency stop

Compact design and easy to install.
LED's give good diagnostics.

## Magne

Magnetic process lock
Robust and reliable design that is easy to install.


## Food and beverage

ABB has a long experience of developing safety products and solutions adapted for the harsh environment and requirements in food and beverage industry.


## Sense

Magnetic non-contact switch
Reliable in harsh environment, easy to install and highest level of safety.


## EStrong

Emergency stop
Robust design and reliable in harsh environments.

## MKey

Mechanical key switch
Reliable in harsh environments, strong holding force, robust design and flexible mounting.


## Orion (Wet)

Optical safety device with Wet protective housing
Easy to install, minimized cabling and reliable in harsh environments.

## Robotics

Thanks to a close cooperation with ABB Robotics and as a longtime member of the ISO international robotics committee, ABB Safety Products has many products and solutions well suited for the robotics industry.


## Safety production <br> ABB Jokab Safety




## Introduction and overview Selection guide

The safety controllers from ABB can monitor anything from a single safety function to complete manufacturing lines.

|  | Pluto | Vital | Sentry |
| :---: | :---: | :---: | :---: |
| Image |  |  |  |
| Type | Programmable safety controller | Safety controller | Safety relay |
| Description | A cost-effective, powerful and compact programmable safety controller for all types of safety applications. | A configurable safety controller that can monitor all safety devices on smaller machines. | Powerful and easy-to-install safety relays suitable for all common types of safety devices. |
| Application(s) | Monitoring of multiple safety devices and several safety functions, as well as control of machines and/ or processes. Many I/Os and programmable logic. | Monitoring multiple safety devices with all the advantages of the DYNlink system. | Monitoring safety devices with one safety function, as well as expansion of safety outputs, with or without time delay. |
| Compatible safety devices | All types of conventional safety devices and DYNlink devices | DYNlink devices | All types of conventional safety devices |
| Advantages | - Easy-to-use while still allowing advanced programming <br> - Free software <br> - Easy system modification <br> - Gateway communication with all main fieldbuses | - Monitor up to 30 sensors in series maintaining Cat. 4/PLe <br> - No programming | - Easy and fast to install with push-in terminals <br> - Universal models for all common applications <br> - Extensive status information <br> - Advanced timer functions <br> - Multireset of up to 10 safety relays |

## Programmable safety controller Pluto

Pluto is a cost effective, powerful and compact programmable safety controller used in a variety of applications: in large and small systems for process and functional safety.

Pluto can control most types of safety devices on the market, as well as ABB Jokab Safety DYNlink safety devices, analog sensors, encoders, contactors, valves and many more. Programming is done easily in the complimentary software, Pluto Manager.

The models with safety bus communication simplify the design of safety systems, thanks to our
 All-Master concept. A wide range of gateways allows communication with other networks and also remote monitoring of a Pluto system.


Speed up installation

## Great flexibility

Up to 32 Pluto units can exchange data on the same safety bus, and the unique All-Master system allows simple scaling, splitting and modification.

## Powerful yet compact

Unexpected features for its size, like real programming and speed monitoring, enables replacement of more complex PLC systems in some applications.

More sensors and less cabling
The DYNlink solution allows series connection of up to 10 safety devices on each input.
StatusBus and light button feature also reduces cabling to a minimum.


Optimum interface

## Programming software free of charge

 Pluto Manager is an easy to use PC based programming software provided free of charge.
## Easy programming

Ready-made TÜV approved function blocks for safety functions make it easy to reach PL e/SIL3. Ladder logic and text programming allow the design of more advanced functions and the control of complete machines.

Communication with external networks
Pluto gateways provide a two-way communication between the Pluto safety bus and other field buses.


Continuous operation

## Easy modification

Easy and quick replacement of units without any configuration.

## Flexible monitoring

Online monitoring from any Pluto in the system and remote monitoring and control with an Ethernet gateway.

## Features

## Pluto

## I/Os

Failsafe inputs (I) are used to connect the safety devices to be monitored. Some of them can be used as analog inputs and counter inputs. The choice is made in the Pluto program when the I/Os are configured. Depending on the model, the analog inputs can be low resolution $0-27 \mathrm{~V}$ or high resolution $0-10 \mathrm{~V} / 4-20 \mathrm{~mA}$. The fast counter inputs can handle frequencies up to 14 kHz .

Failsafe inputs/non-failsafe outputs (IQ) are terminals that can be used as failsafe inputs or communication outputs (non-failsafe). The choice is made in the Pluto program when the I/Os are configured. A specific configuration is "light button" which means that both the contact and the LED indicator of an illuminated push-button are connected to only one IQ, thus saving one I/O.

Failsafe outputs (Q) are individually safe and independently programmable outputs. There are both relay and transistor outputs. The transistor outputs deliver a negative voltage (-24 VDC) that facilitates the detection of a short circuit with other voltage potentials and increases safety. The transistor outputs are primarily intended for electromechanical components such as contactors and valves.

## DYNlink solution

The DYNlink circuit is a unique solution that allows up to 10 DYNlink devices to be connected in series to a Pluto input while still reaching up to Cat. 4/PL e/SIL3. This saves inputs and cabling, since to reach the same level with standard two-channel safety devices, two inputs are necessary and series connection is not possible.
The DYNlink solution checks the signal 200 times/second and a fault such as a short circuit will be detected before any safety device is used.
Examples of DYNlink devices are Eden and Smile Tina. Most two-channel safety devices can be connected to the DYNlink solution using Tina adapters.

## StatusBus functionality

The StatusBus functionality is available with some DYNlink devices and allows to collect the status of each individual safety device, even when connected in series. A single input on Pluto can collect the status of up to 30 safety devices. The devices are connected using standard cable and M12-5 connectors. No specific bus cable or extra communication module is necessary. All Pluto models offer the StatusBus functionality.


## Safety bus with All-Master function

The unique All-Master system allows simple scaling, splitting and modification of the safety system.

In a traditional safety PLC network, there is one Master and additional Slave units. But for Plutos connected to a safety bus, all units are Masters and make their own decisions, while still having the possibility to listen to what is happening to the other Plutos on the safety bus. This enables great flexibility when it comes to modification of the safety system. It also enables very simple replacement of a broken Pluto, since all Plutos have a copy of the application software of all other Plutos on the safety bus stored locally. If the replacement Pluto is given the same ID as the broken Pluto (using IDFIX), the software is downloaded from the safety bus with a simple button on the front of Pluto.

Up to 32 Pluto units can be connected to the Pluto safety bus. The Pluto S20 and S46 are stand-alone models and cannot be connected to the Pluto safety bus. All other models have bus functionality. The Safety bus functionality is necessary in order to use a Pluto gateway.

## Features

Pluto

## Pluto Manager

Pluto Manager is the programming software for Pluto, downloaded free of charge from our website http://new. abb.com/low-voltage/products/safety-products/program-mable-safety-controllers/pluto
An update function in Pluto Manager helps you to always have the latest version installed as long as you have an Internet connection. Pluto Manager is a user friendly PC software that allows a simple configuration of the Pluto I/Os and programming in ladder logic and with TÜV approved function blocks.


Examples of what the available function blocks can handle:

- Two-channel safety devices, with or without Reset and Monitoring.
- Single channel functions with Reset.
- Muting functions
- Encoders and counters
- Communication with Gateways and StatusBus

Examples of ladder logic functions provided:

- Boolean instructions, Edge/inverted edge detection, Latch function, Toggle
- Timers
- Addition, Subtraction, Multiplication, Division
- Remanent memories
- Registers: 16 and 32 bit
- Sequence programming
- Option handling
- Online monitoring

In Pluto Manager there is a unique Option handling function suitable for series production of machines with different customer options. All versions of a machine type can have the same PLC program. To handle the different customer options, check boxes are used to set memories that activate the different functions of the code.

## Current monitoring

Pluto A20 has a special current monitoring function. The function is mainly used to check if the connected muting lamps are working.

## Remote monitoring and control

Remote monitoring allows the connection to a remote Pluto system via the Internet and an Ethernet gateway. Pluto Manager is used for the monitoring.
This function can be used for:

- Support of local maintenance personnel during troubleshooting
- Regular monitoring of the status of the machine or process
- Follow-up of operational data like number of cycles/day or runtime.

Pluto Manager also offers remote control of a Pluto system using the Internet and an Ethernet gateway. With the remote control function it is possible to:

- Download a program from PC to the remote Pluto
- Configure addressing of AS-i and StatusBus slaves, write IDFIX code
The security of the remote control function is guaranteed by use of the K-button on Pluto. A change in a remote Pluto system cannot be made without a person at the remote Pluto confirming the action by pressing the K-button.

Configuration of the gateway itself, e.g. switching remote control on/off, can only be made via the programming port on the gateway and not via the Ethernet port.


## Safety controller <br> Vital

Vital is a configurable safety controller that does not require programming. It uses the DYNlink system, which allows up to 30 safety devices to be connected in series to the same circuit, while achieving PLe.

This enables a single Vital to supervise all safety functions on many machines that otherwise would have required a programmable safety controller or multiple safety relays.

Vital is also commonly used to supervise all emergency stops for larger machine lines.


## Speed up your

projects

## Easy connection

Reduced installation and engineering time thanks to simple installation with serial connection using M12 connectors.

No programming required
The use of only one safety module without any programming simplifies engineering, commissioning and replacement.

## Less components

Significantly less components needed to achieve PLe/SIL 3.



## Continuous operation

## LED diagnostics

Integrated LED diagnostics reduces down time when troubleshooting.

Detachable connection blocks
Detachable connection blocks simplify replacement.

## Exchange without configuration

The configuration is made with jumpers in the detachable connection blocks. In case of exchange, the new unit automatically gets the correct configuration.


Safety and protection

Easy to reach highest safety level The DYNlink solution makes it possible to maintain the highest level of safety with up to 30 sensors connected in series.

## Extensive fault detection

The DYNlink solution enables unique fault detection features and prevents 2-channel faults.

## Safety relay

## Sentry

The Sentry safety relays are powerful and easy to use safety relays, suitable for all common types of safety applications.

The Sentry series contains basic models for simple applications and easy output expansion, as well as highly flexible models with extremely accurate timer functions.

Sentry safety relays are used in both simple and more advanced safety solutions when safety devices need to be monitored according to the requirements of functional safety standards.


Continuous
operation

## LEDs and display

LEDs in 3 colours allow for more status messages and simplify troubleshooting. Models with display offer preset configurations and extensive fault information.

## Advanced timer functions

Timer functions with an accuracy of $\pm 1 \%$ minimize unnecessary downtime.

## Multi-reset

The multi-reset function enables reset of up to 10 Sentry safety relays using just one reset button.



## Speed up your

projects

## Twice as fast to install

Push-in terminals are twice as fast compared to regular spring loaded connectors.

## Handles ferruled and rigid cables

Both ferruled and rigid cables are easy to just push into the push-in terminals by hand.

## No tools required for installation

 No tools are required for connecting a cable in the push-in terminals. Just use the cable to push into the opening.

Easy to
install

## Detachable terminal blocks

Detachable terminal blocks speed up connection and replacement.

## Switch for reset selection

Manual or automatic reset easily selectable by switch.

## Powerful outputs

Powerful outputs allow to drive larger contactors and simplify installation by saving the use of an intermediary contactor.

Uninterrupted power supply
Standalone and modular portfolio 1 kVA to 6 MVA

## ABB's UPS manufacturing principles


#### Abstract

In ABB, quality is an integral part of our business ethos. Quality guides our actions to ensure we meet our responsibilities and obligations to our customers, our employees, our partners, our suppliers and to our shareholders.


## ABB's commitment to deliver high quality

- Deliver on-time and on-quality products, systems and services that meet or exceed our customers' expectations.
- Identify and understand our customer's expectations, measure customer perceptions and implement improvements to increase customer satisfaction.
- Enable and engage our employees at all levels in a relentless drive to improve operational performance along the value chain from suppliers to customers.
- Increase the motivation and skills of our employees to add value to our customers and our businesses through continual training and development.
- Leverage our partners' and suppliers' strengths to improve our products and our businesses from product design through production, installation and operation.
- Embed social responsibility and company ethics policies in our business practices.
- Continually improve environmental, health and safety performance through all products, operations, systems and services.


## Manufacturing

Quality in manufacturing begins with the order from the customer. We practice made-to-order manufacturing - a lean approach that exploits just-in-time supply and that treats each and every customer order as a single, valuable entity. Each product is individually tested before leaving the factory with a 100 percent pretest on modules individually and a 100 percent final test on modular and standalone UPSs.

Quality only becomes quality when it is measured and for this reason we employ key performance indicators (KPIs) some of which are:

- Safety
- Quality from the suppliers (part-per-million defect rates and on-time delivery)
- Quantity of products /items produced for new business and for service departments (after sales)
- Internal first-pass yield
- On-time delivery of the finished product



## Product quality assurance

In ABB, we believe in getting it right the first time and keeping it that way. For that reason, we engage in component homologation as well as the identification of critical components. Suppliers are fully vetted and qualified, on an ongoing basis, and our test verification plan and type testing assures our quality standards even further.

The ABB product development gate model is deployed all the way through to product launch from initial conception through development to final full release, and after - right up to gate seven. The gate model involves every part of the organization and this ensures that every aspect of the new product is covered, guaranteeing the very best quality.

Should non-conformities arise, ABB has a comprehensive set of monitoring tools with which to examine the issue. This is backed up by a three-level support model:

- Level 1: solving problems in the field
- Level 2: statistical analysis and mitigation action definition
- Level 3: root cause analysis

$\overline{01}$


## Environmentally friendly

ABB has stated policies that drive the company to be as environmentally friendly as possible. One example of this is our product test bay used for all UPS final testing, which features an energy recovery system. This so-called GREEN (Generating Recycled Ecological Energy Network) test bay is a facility that recycles the greater part of the energy used during a UPS test. Only nine percent of the energy used is from the mains; 91 percent is recovered energy. This re-use is far more beneficial than having a traditional resistor load that merely turns the energy into heat, thus wasting it.

Further, the modern ABB building has an efficient heating / cooling system (energy management) as well as strict rules for recycling and managing discards.

## Certification

Product certification

- Accredited third-party certification:

|  | UPS standards | Low-voltage <br> devices standards |
| :--- | :--- | :--- |
| Safety | IEC / EN 62040-1 | IEC/EN 60950-1 |
| EMC | IEC / EN 62040-2 | IEC/EN 61000-6-2 |
|  |  | IEC/EN 61000-6-4 |
|  |  | IEC/EN 61000-4-2 |
|  |  | IEC/EN 61000-4-3 |
|  |  | IEC/EN 61000-4-4 |
|  |  | IEC/EN 61000-4-5 |
|  |  |  |
| Performance | IEC /EN 62040-3 |  |
| Environmental | IEC/EN 62040-4 |  |
| aspects |  |  |

Factory certification

- ISO 9001 and 14001
- OHSAS18001


# ABB's modular UPS design Ensuring high availability and best-in-class power technology 

01 In DPA, each UPS module has all the hardware and software it needs for autonomous operation.

## ABB's approach to modular power protection

Despite all the precautions taken during the design and operation of data centers and related control processes, situations can arise in which external power is compromised - either in terms of quality or availability. Such events could result in data loss, nonavailability of essential services, risk to hardware and very high financial losses. This makes a highly dependable UPS missioncritical. Therefore, the most critical loads should be protected by the very best UPS design Decentralized Parallel Architecture (DPA ${ }^{\top M}$ ).

ABB, a pioneer and leader in large, modular UPSs, provides a full range of modular DPA power protection products as well a standalone solutions. In the following four pages, we will focus on our approach to modular power protection and describe how these modular solutions can help ensure a supply of clean, reliable power to the customer's application.

## DPA architecture

Key benefits

- Distributed control and power
- No single point of failure
- Independent online swappable modules

In DPA, each UPS module contains all the hardware and software required for full UPS system operation. Modules share no common components and each module is a fully functional UPS, so a DPA parallel system offers extremely high system reliability and uptime is maximized. UPS modules can be paralleled to provide redundancy or to increase the system's total capacity.

Some modular UPS systems with a centralized parallel architecture (CPA) have centralized control or hardware. This renders them very vulnerable should a fault occur on one of these centralized components; one fault can bring down the entire UPS system.

With DPA, on the other hand, the UPS is modularized and each module has all the hardware and software needed for autonomous operation - rectifier, inverter, battery converter, static bypass switch, back-feed protection, control logic, display, and mimic diagram for monitoring and control. With all the critical components duplicated and distributed between individual units, potential single points of failure are eliminated. In the unlikely event of one UPS module failing, the failed module will be automatically isolated and the overall system will continue to operate normally.

## Modular UPS with no common components

 (Decentralized Parallel Architecture)

## Online swappable modules (OSM)

## Key benefits

- Replace or add modules with no downtime
- Simple power upgrade
- No downtime during maintenance

True "online-swap" modularity enables the safe removal and insertion of UPS modules without risk to the critical load and without the need to either transfer it onto raw mains or remove power from it. Modules can therefore be replaced or added without any system downtime. It is simple to upgrade power capability as critical load power requirements grow. Additionally, modules can easily be removed for service or replaced if faulty, without compromising the availability of the system. Only a truly redundant architecture like DPA allows online modules to be swapped out while the system is running.

This unique aspect of modularity directly addresses continuous uptime requirements, significantly reduces mean time to repair (MTTR), reduces inventory levels of spare parts and simplifies system upgrades. This approach pays off too when it comes to serviceability and availability, as there is no downtime and the service personnel do not need special skills.

## Scalability

Key benefits

- Vertical and horizontal scalability
- Cost-effective "rightsizing"
- Easy configuration and reconfiguration

The ability to scale the system means the UPS can be sized exactly to fit prevailing needs and modules can simply be added as requirements grow. This means that you only power, cable and cool what you need.

The DPA 500, for example, allows five 100 kW modules to be mounted in one cabinet and six cabinets to be configured in parallel to provide a top rating of 3 MW . Power consumption is the topic of greatest concern for data center operators and the energy savings made by this modular approach over the service life time of the UPS are substantial. Human error is reduced too: Because things are so simple, wiring errors are eliminated, and configuration and reconfiguration are child's play.


# ABB's modular UPS design Ensuring high availability and low total cost of ownership 

## Availability

Key benefits

- 99.9999\% (6 nines) availability

By combining the benefits of Decentralized Parallel Architecture, parallel redundancy and online swap modularity, ABB's UPSs have a high mean time between failure (MTBF) and a low mean time to repair (MTTR). This delivers six nines availability - a highly desirable quality required by data centers in pursuit of zero downtime.

The surest way to increase availability of power is to introduce redundancy to the UPS system and to minimize its maintenance and repair time. MTBF and MTTR are common parameters in the UPS industry and both impact system availability. Availability is formally defined as:
MTBF / (MTBF +MTTR) $\times 100 \%$

The modular DPA concept allows the modules to work as one system but without interdependence. Quick and simple repair by swapping modules, which can be held as spares on-site or at a nearby service center, minimizes the system's MTTR.

## Low total cost of ownership

Key benefits

- Over 97\% true online efficiency
- Eco-mode efficiency $\geq 99 \%$
- Cost-effective scalability to "right size" system
- Low service costs

The modularity and scalability described help minimize the cost of ownership, but costs are held down too by implementing designs that have best-in-class energy efficiency.

ABB's DPA 250 S4, for example, operates with an efficiency of over 97 percent. Its efficiency curve is very flat so there are significant savings in every working regime. Further energy savings can be made by operating the UPS in eco-mode, which increases the efficiency to $\geq 99$ percent.

Online double conversion efficiency


## -

01 Example of a changing (increasing) load up to 120 kW in 4 years.

02 Vertical modularity minimizes space requirements and maximizes predictability of future space requirements. In the example shown, $2 \mathrm{~m}^{2}$ is saved.

The UPS capacity can be changed with changing load, eliminating the need to oversize the UPS upfront.


01

Modularity lends itself well to keeping UPS footprint small, too - ideal for data centers, where real estate can be restricted and expensive. A modular UPS rack has a small footprint and when extra modules are added, no extra floor space is taken up.

But the advantages of DPA modularity go further as installation and servicing costs are also kept low: A straightforward modular concept simplifies and speeds every step of the deployment process - from planning, through installation and commissioning to full use. DPA modularity also reduces costs as service engineers need less training and spend less time on-site, and any risks of data or production loss are minimized. Inventory levels of spare parts are reduced.

Highly dependable UPSs are mission-critical for many parts of industry. DPA delivers unmatched UPS availability and serviceability, scalability, flexibility and low energy usage.

There are no better UPS architectures available to those users whose critical electrical loads represent a valuable commercial asset that must be kept powered at all costs.

## Standalone solution <br> $2 \times 60 \mathrm{~kW}(\mathrm{~N}+1)$ UPS until year 1 <br> $3 \times 60 \mathrm{~kW}(\mathrm{~N}+1)$ UPS years $1-4$ <br> Oversized capacity <br> Modular solution <br> 20 kW UPS modules can be added or removed at any time according to the actual need. <br> Typical 4-year-load curve of a medium-sized data center



## UPS product overview 1 kVA to 10 kVA Single phase UPS



| GENERAL DATA | PowerValue 11T | Powervalue 11 RT G2 IN |
| :---: | :---: | :---: |
| UPS frame rated power | 1/2/3/6/10 kVA | 1/2/3/6/10 kVA |
| UPS module rated power | - | - |
| UPS output rated PF | 0.9 | 1.0 |
| Max. No. of parallel frames | - | Up to 4 units ( $6-10 \mathrm{kVA}$ ) |
| Max. No. of parallel modules across frames | - |  |
| Max. system power | 10 kW | 40 kW |
| Wiring | 1-ph + N + PE | 1-ph +N+PE |
| UPS type | Standalone tower | Rack or tower convertible |
| Topology | Online double conversion | Online double conversion |
| INPUT |  |  |
| Nominal input voltage | $\begin{aligned} & \hline \text { 220/230/240 VAC (1-3 kVA) } \\ & \text { 208/220/230/240 VAC (6-10 kVA) } \end{aligned}$ | 208, 220, 230, 240 VAC |
| Voltage range | $\begin{aligned} & 100-300 \text { VAC }(1-3 \mathrm{kVA}) \\ & 110-300 \text { VAC }(6-10 \mathrm{kVA}) \end{aligned}$ | $\begin{aligned} & 120-300 \text { VAC }(1-3 \mathrm{kVA}) \\ & 100-276 \text { VAC }(6-10 \mathrm{kVA}) \end{aligned}$ |
| Frequency range | $\begin{aligned} & 45-55 \mathrm{~Hz}(1-3 \mathrm{kVA}) \\ & 46-54 \mathrm{~Hz}(6-10 \mathrm{kVA}) \end{aligned}$ | $45-55 \mathrm{~Hz}$ |
| Current THD at 100\% load | $12 \%$ with full resistive load ( $1-3 \mathrm{kVA}$ ) <br> < $5 \%$ with full resistive load ( $6-10 \mathrm{kVA}$ ) | < $5 \%$ |
| Power factor at 100\% load | $\begin{aligned} & \geq 0.95(1-3 \mathrm{kVA}) \\ & \geq 0.99(6-10 \mathrm{kVA}) \end{aligned}$ | $\geq 0.99$ |
| OUTPUT |  |  |
| Rated output voltage (load dependent) | $\begin{aligned} & \text { 220/230/240 VAC (1-3 kVA) } \\ & 208 / 220 / 230 / 240 \text { VAC (6-10 kVA) } \end{aligned}$ |  |
| Voltage THD (with linear load) | < 3\% linear load, <br> < 6\% non-linear load (1-3 kVA) <br> < 3\% linear load, <br> < 5\% non-linear load (6-10 kVA) | < 2\% linear load, <br> < $5 \%$ non linear load (1-3 kVA) <br> < 2\% linear load, <br> < 4\% non linear load (6-10 kVA) |
| Rated frequency | 50 Hz | 50 Hz |
| EFFICIENCY |  |  |
| Line-interactive | - | - |
| Double conversion | $\begin{aligned} & \text { Up to } 90 \%(1-3 \text { kVA) } \\ & 92 \% \text { for } 6 \text { kVA } \\ & 93 \% \text { for } 10 \text { kVA } \end{aligned}$ | $\begin{aligned} & \text { Up to 92\% (1-3 kVA); } \\ & 94 \% \text { (6-10 kVA) } \end{aligned}$ |
| Eco-mode | Up to 95\% (1-3 kVA) <br> Up to 98\% (6-10kVA) | Upto 98\% |
| COMMUNICATIONS |  |  |
| User Interface | LCD | LCD |
| Communication ports | SNMP; ModBus; AS400; Environmental monitoring sensor probe | USB, RS-232, SNMP slot, potential-free contacts |
| Software | Monitoring and shutdown software available as option |  |

## UPS product overview <br> 10 kVA to 5 MVA

3 Phase Standalone UPS

|  |  |  |  |
| :---: | :---: | :---: | :---: |
| GENERAL DATA | PowerScale 33 (Transformerless) | PowerWave 33 (Transformerless) | SG Series (Transformer based) |
| UPS frame rated power | 10/15/20/25/30/40/50 kVA | $\begin{aligned} & \text { 60/80/100/120/160/200/ } \\ & 250 / 300 / 400 / 500 \mathrm{~kW} \end{aligned}$ | 10-500 kVA |
| UPS module rated power | - | - | - |
| UPS output rated PF | 0.9 | 1.0 | 0.9 |
| Max. No. of parallel frames | Up to 20 units | Up to 10 units | Up to 6 units |
| Max. No. of parallel modules across frames | - | - | - |
| Max. system power | 1000 kVA | 5000 kW | 3000 kVA |
| Wiring | $3 \mathrm{ph}+\mathrm{N}+\mathrm{PE}$ | $3 \mathrm{ph}+\mathrm{N}+\mathrm{PE}$ | $3 \mathrm{ph}+\mathrm{N}+\mathrm{PE}$ |
| UPS type | Standalone tower | Standalone tower | Standalone tower |
| Topology | Online double conversion | Online double conversion | Online double conversion |
| INPUT |  |  |  |
| Nominal input voltage | $\begin{aligned} & 220 / 380,230 / 400, \\ & 240 / 415 \text { VAC } \end{aligned}$ | $\begin{aligned} & 220 / 380,230 / 400, \\ & 240 / 415 \text { VAC } \end{aligned}$ | $\begin{aligned} & 380 / 400 / 415 \text { VAC } \\ & 340-460 \text { VAC } \end{aligned}$ |
| Voltage range | 161/280-264/460 VAC | 138/240-264/460 VAC | 340-460 VAC |
| Frequency range | 35-70 Hz | 35-70 Hz | $45-66 \mathrm{~Hz}$ |
| Current THD at 100\% load | $\leq 3 \%$ | $\leq 4 \%$ | < $2 \%$ |
| Power factor at 100\% load | $\geq 0.99$ | $\geq 0.99$ | 0.99 |
| OUTPUT |  |  |  |
| Rated output voltage (load dependent) | $\begin{aligned} & 220 / 380,230 / 400, \\ & 240 / 415 \text { VAC } \end{aligned}$ | $\begin{aligned} & 220 / 380,230 / 400, \\ & 240 / 415 \text { VAC } \end{aligned}$ | $3 \times 380 / 400 / 415$ VAC |
| Voltage THD (with linear load) | < 2\% | < 2\% | < 1.5\% |
| Rated frequency | 50 or 60 Hz (selectable) | 50 or 60 Hz (selectable) | 50 or 60 Hz (selectable) |
| EFFICIENCY |  |  |  |
| Line-interactive | - | - | - |
| Double conversion | Up to 95.5\% | Up to 96\% | up to 94.6\% |
| Eco-mode | 98\% | 99\% | up to 98.7\% (eBoost) |
| COMMUNICATIONS |  |  |  |
| User Interface | LCD + mimic diagram | Graphical touch screen (optional on 160 - 200 kW ), LCD+mimic diagram (on 60-200 kW only) | System Graphical Diyplay LCD |
| Communication ports | USB (optional), RS-232, SNMP slot, potential-free contacts (optional) | USB, RS-232, SNMP slot, potential-free contacts | RS232, SNMP <br> (Modbus IP, RS232, RS485 <br> \& BacNet IP) |
| Software | Monitoring and shutdown software available as option |  |  |

# UPS product overview 10 kVA to 1.5 MVA <br> 3 phase Modular UPS 

|  |  |  |  |  |
| :--- | :--- | :--- | :--- | :--- |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |

## UPS product overview 1 kVA to 6 MVA <br> 3 phase Modular UPS

| GENERAL DATA | Conceptpower DPA 500 | MegaFlex DPA |
| :---: | :---: | :---: |
| UPS frame rated power | 500 kW | 1000/1500 kW |
| UPS module rated power | 100 kW | 250 kW |
| UPS output rated PF | 1.0 | 1.0 |
| Max. No. of parallel frames | Up to 6 frames | Up to 4 frames |
| Max. No. of parallel modules across frames | 30 modules | 24 modules |
| Max. system power | 3000 kW | 6000 kW |
| Wiring | $3 \mathrm{ph}+\mathrm{N}+\mathrm{PE}$ | $3 \mathrm{hh}+\mathrm{N}+\mathrm{PE}$ |
| UPS type | Modular (DPA) | Modular (DPA) |
| Topology | Online double conversion | Online double conversion |
| INPUT |  |  |
| Nominal input voltage | $\begin{aligned} & \hline 220 / 380,230 / 400 \\ & 240 / 415 \text { VAC } \end{aligned}$ | 220/380, 230/400, 240/415 VAC |
| Voltage range | 161/280-264/460 VAC | 161/280-264/460 VAC |
| Frequency range | $35-70 \mathrm{~Hz}$ | $40-70 \mathrm{~Hz}$ |
| Current THD at 100\% load | < 3.5\% | <4\% |
| Power factor at 100\% load | $\geq 0.99$ | $\geq 0.99$ |
| OUTPUT |  |  |
| Rated output voltage (load dependent) | 220/380, 230/400, 240/415 VAC | 220/380, 230/400, 240/415 VAC |
| Voltage THD (with linear load) | < 2\% | < 2\% |
| Rated frequency | 50 or 60 Hz (selectable) | 50 or 60 Hz (selectable) |
| EFFICIENCY |  |  |
| Line-interactive | - | - |
| Double conversion | Up to 96\% | Up to 97.4\% |
| Eco-mode | 99\% | 99\% |
| COMMUNICATIONS |  |  |
| User Interface | Module level LCD+mimic diagram, | Module level LCD+mimic diagram, |
| Communication ports | System graphical display USB, RS-232, SNMP slot, potential-free contacts | System graphical display USB, RS-232, potential-free contacts, ABB network card |
| Software | Monitoring and shutdown software ava | le as option |

## Ty-Fast ${ }^{\circledR}$ Fastening solutions

Easily bundle, secure and manage your cables


#### Abstract

ABB offers a complete range of all plastic cable ties to fasten cables in the most demanding applications.


## Ty-Fast ${ }^{\circledR}$ all plastic ties

The all-plastic cable ties are available in lengths from 100 mm to 1220 mm and widths from $2,5 \mathrm{~mm}$ to $12,2 \mathrm{~mm}$, offering a loop tensile strength up to 1200 N . These cable ties will satisfy bundling requirements up to $375,5 \mathrm{~mm}$. Made of halogen and silicone free Polyamide 6.6, Ty-Fast® ${ }^{\circledR}$ cable ties are available in natural and black UV-resistant and heat stabilized material.

Ty-Fast ${ }^{\circledR}$ cable ties meet shipbuilding classification such as DNV-GL, Lloyd's Register of Shipping, Bureau Veritas. Ty-Fast ${ }^{\circledR}$ cable ties have a CE declaration, supported by compliance to the low voltage directive and EN/IEC 62275. On top the Ty-Fast ${ }^{\oplus}$ range is also compliant to UL 62275.

State-of-the-art robotic and raw material handling equipment assures product and material integrity throughout the manufacturing process.

The integrally formed polyamide pawl combines low insertion and high locking strength.

The low profile head significantly reduces the potential for snagging during installation.

Quick and easy pull through increases productivity, reduces operator fatigue.

Tail with finger grip design that helps operator grasp and pull ties snugly.

Sure grip tab keeps the tail from popping out while being treated, then holds it securely for final tightening by hand or tool.

## *

Ty-Fast ${ }^{\circledR}$ cable ties for demanding applications An all-in one solution: UV resistant and with enhanced temperature range.

## All plastic cable ties

Ty-Fast ${ }^{\circledR}$ product code structure

Tie

TY


TY
100


Tie length code
for lengths from 100 mm up to 1220 mm

## Dimension <br> code <br> XXXX



18


Tie width/tensile strength code
$18=2.5 \mathrm{~mm} /(80 \mathrm{~N})$
$40=3.6 \mathrm{~mm} /(180 \mathrm{~N})$
$50=4.6 \mathrm{~mm} /(220 \mathrm{~N})$
$120=7.6 \mathrm{~mm} /(540 \mathrm{~N})$
$175=8.8 \mathrm{~mm} /(780 \mathrm{~N})$
$245=12,2 \mathrm{~mm} /(1200 \mathrm{~N})$

## Special type code <br> X



Color/material
$\mathrm{X} \quad$ The letter " X " is used in define black Polyamide 6.6
the item number to

UV-resistant cable ties

All product references are made of halogen free and silicone free

100


Blank = Bulk packaging
(500, 1000 ties per bag depending on the cable tie dimension)
$50=50$ ties in a bag
$100=100$ ties in a bag
$\mathrm{L}=50$ ties in a bag
$C=100$ ties in a bag
$D=500$ ties in a bag
$M=1000$ ties in a bag

Note: Nylon (Polyamide 6.6) is inherently susceptible to environmental conditions. Ty-Fast® ${ }^{\text {c }}$ cable ties are moisturised to optimum performance levels at machine-side and should be stored in cool dry areas out of direct sunlight. Cable ties are packaged in plastic bags to contain moisture and should remain sealed until ready for use.

## Easy handling

The turned up tail makes orientation and handling easy, even in blind installations or tight locations.

Easy installation
The specially designed thin tail with grips makes installing the ties easy, even when wearing gloves.

## Ty-Rap® ${ }^{\circledR}$

## Detectable ties

- Detectable with metal detectors, X-Ray equipment
- Help achieve the HACCP EU directive
- Bright blue color also helps visual detection
- Nylon (Polyamide) version with metal particles
- Polypropylene version with particles of metal: which is floating + has increased resistance to chemicals / acidity


Special cable ties for extreme conditions

- Polypropylene: increased chemical resistance
- Fluoropolymer (ETFE) for extreme applications: - resistant to radiation: nuclear plants
- to very low pressure/vacuum: aerospace
- to high temperature $\left(+150^{\circ} \mathrm{C}\right)$ and chemicals
- Fluoropolymer (ECTFE) for extreme - applications with low smoke requirements



## Ty-Rap ${ }^{\circledR}$ cable ties

UV-resistant and flame retardant for rail applications

- "Grip of Steel" Non-magnetic stainless steel locking barb - marine grade type 316
- Rounded edges to prevent sharp edges from damaging cables
- Smooth, notchless body, making the cable ties stronger
- Ribbed and stippled surface to prevent the tie from slipping under vibration conditions and external shock
- UV-resistant and flame retardant Ty-Rap ${ }^{\circledR}$ cable ties are certified to the latest standard for the train industry:
- NFF 16-101 standard, EN 45545-2
- Different dimensions up to a tensile strength of 540N



## Wire termination \& connectors

$A B B$ is a recognized leader in providing electrical connectors suitable for the majority of all electrical applications.

## Main products \& benefits:

## Color Keyed ${ }^{\circledR}$

System solution designed to meet the most stringent testing requirements. Our Color-Keyed lugs are made of 99.9\% pure, oxygen free copper. The Color-Keyed color coded crimping system assures the right die is used with the right lug resulting in an accurate, reliable crimp

## Dragon Tooth ${ }^{\circledR}$ insulation piercing connectors

ABB insulation piercing connectors make a permanent, low resistance connection for splicing, tapping, and terminating magnet wire from 32 AWG to 460,000 CMA copper and from 20 AWG to 460,000 CMA aluminum conductors in motor and transformer applications.

## Shield-Kon ${ }^{\circledR}$ connectors

One-piece solderless, wraparound shield connectors terminate shielded cable in seconds with uniform precision while preventing cable damage that may be caused by soldering.

## Sta-Kon ${ }^{\circledR}$ \& Spec-Kon ${ }^{\circledR}$ terminals

Sta-Kon and Spec-Kon terminals, made of highconductivity copper with corrosion-resistant plating, include marked stud and wire sizes, a long chamfered barrel to eliminate missed crimps, a deep internal serration to produce a larger contact area, and selective annealing, to leave the barrel soft for crimping while the tongue remains strong. Sta-Kon is our UL / imperial terminals range and Spec-Kon our IEC / metric portfolio.

## Comfort crimp compression tool

The most comfortable and ergonomically friendly crimp tool on the market. Requires the lowest handle force of any tool in its class. Shure-Stake mechanisms ensure a complete crimp cycle before releasing and results in a proper/completed crimp every time.


## Our offering



## Compression connector tools

## The Furse

## Total Solution approach

## 1. Structural lightning protection

From Furse air termination systems including air rods and strike plates to capture lightning strikes, through to our comprehensive range of down conductors and lightning protection components which channel lightning energy safely to a Furse earth termination network.

Including:

- Air termination systems
- Lightning protection conductors
- Conductor clips, clamps \& holdfasts
- Bimetallic connection components



1 Structural lightning protection | 2 Electronic systems protection | 3 Earthing

## 2. Electronic systems protection

Our extensive range of equipotential bonding and transient overvoltage Surge Protection Devices (SPDs) providing fully coordinated protection against transient overvoltages. SPDs are able to cover all incoming and outgoing metallic service lines including power, data, signal and telecoms.

Including:

- Lightning equipotential bonding SPDs
- Mains power transient overvoltage SPDs
- Data, signal \& telecommunication lines SPDs
- DC power \& photovoltaic system SPDs




## 3. Earthing

The combination of Furse earth electrodes, clamps, conductors and equipotential bonding bars which provide lightning and transient overvoltage energy with an effective, low resistance route from lightning protection system to earth.

Including:

- Earth rods \& conductor systems
- Mechanical earth clamps \& bonds
- FurseWELD exothermic welding
- Earth bars \& equipotential bonding



## 4. Design and technical support

Furse technical design teams ensure all designs for lightning protection, earthing and transient overvoltage protection meet relevant National and International standards, whilst our sales engineers provide key updates on lightning protection matters.

Including:

- Lightning protection system design
- Site surveys \& earthing analysis
- Lightning protection seminars \& training
- Technical guides \& StrikeRisk software



## Surge protection devices for data and communication technology Selection table

| PROFIBUS Systems HART Systems |  |  |  | OVR RS485 <br> Flat/DIN Mount <br> 7TCA085400R0311 |
| :---: | :---: | :---: | :---: | :---: |
| Ethernet |  | withPoE: |  | Cat-5 (100 Mbps) <br> OVR Cat-5e <br> 7TCA085400R0289 <br> 7TCA085400R0290 |
| Video <br> Surveillance CCTV* | 5V CCTV with BNC connector, power, and telemetry line |  |  | OVR CCTV/B* <br> Video signal 7TCA085400R0296 |
| $\begin{aligned} & \text { 4-20 mA } \\ & \text { current loops } \end{aligned}$ |  | Screw terminals $30 \mathrm{~V}$ |  | OVR SL30L/4-20 <br> 7TCA085400R0371 |
| Bus Interface |  | Female coaxial connector: |  | OVR SL06 MODBUS and CAN-Bus |
|  |  | Screw terminals: |  | OVR TN <br> Flat Mount <br> 7TCA085400R0345 |
| Telephone ISDN DSL |  |  |  | OVR TN/RJ11-6/6 6P6C Connector 7TCA085400R0359 |
|  | LSA-PLUS connection |  |  | OVR KT1 <br> Single module 7TCA085400R0305 |
| TV: Satellite, Cable |  |  |  | OVR CATV/F Cable 7TCA085400R0293 |
| 2 wire systems $(30 \mathrm{~V})^{*}$ |  |  |  | OVR 30E <br> Flat Mount 7TCA085400R0353 |
| 3 wire systems $(30 \mathrm{~V})^{*}$ |  |  |  | OVR SL30/3W <br> Slim Mount <br> 7TCA085400R0331 |
| Hazardous Areas <br> ATEX/IEC approved |  |  |  | OVR SL15X <br> 15 Volt <br> 7TCA085400R0386 |
| Resistance <br> Temperature <br> Detectors (RTD) |  |  |  | OVRRTD <br> Flat/DIN Mount 7TCA085400R0313 |

* also available in other system voltages, see HK T2 K4


OVR SL30X
30 Volt
7TCA085400R0387


OVR SL RTD
Slim (DIN Mount)
7TCA085400R0315

OVRRTDQ
Multiple Lines (DIN
Mount)
7TCA085400R0314

## Adaptaflex <br> Flexible non-metallic conduit systems

Adaptaflex have a wide selection of flexible non-metallic conduit systems available in many different materials, ranging from lightweight to heavyweight.

As standard, our conduit ranges are offered in nominal conduit sizes from 10 mm up to jumbo size 106 mm for larger cable carrying capacity. Our solutions offer a wide range of specifications and specialist properties, including Fast Fit, Low Fire Hazard (LFH), Enhanced Low Fire Hazard (ELFH) and EMI screening. Additionally, many of our conduit systems have industry recognised approvals including British Kitemark, CE Approval, UL 1696, NF, LUL, DB, Lloyds Register amongst others.

As well as our flexible non-metallic conduits, we also offer a range of fittings specifically designed to maintain system integrity including straights, $90^{\circ}$ and $45^{\circ}$ elbows, with metric, PG, PF and NPT threads. To top it off, we also have a host of accessories including locknuts, sealing washers and multiway adapters, to help facilitate quick and easy system installation.


Features \& benefits include:

- Non-metallic conduit systems do not corrode/rust
- Wide variety of fittings, large choice of solutions
- Lightweight and quick to install (cut \& assemble fittings)
- High fatigue life
- Flexibility allowing quick return to original shape
- Adaptalok Fast Fit - "Push Twist Pull" installation
- UNEF, Metric, PG, Gas \& NPT threads
- Proven patented design - over 20 years in service


## Non-metallic conduits

|  |  |  |  |  | ¢орив |
| :---: | :---: | :---: | :---: | :---: | :---: |
| Polyamide conduits (Type PA) | Modified polyamide conduits | Polypropylene conduits (Type PP) | Polyetherketone (Type PK) | PVC conduits | EMI screening conduits |

## Non-metallic Adaptalok ATS \& Hi-Spec fittings



External male Adaptalok ATS fittings


Internal female Adaptalok ATS fittings


Swivel coupler and panel mounting fittings


Female thread fittings for Jacob glands


Fittings for
Polyetherketone (Type PK) conduits


Composite fittings

Non-metallic accessories


## Adaptaflex <br> Flexible metallic conduit systems

Adaptaflex have a wide selection of flexible metallic conduit systems manufactured either in galvanized steel or stainless steel.

As standard, our conduit ranges are offered in nominal conduit sizes from 3 mm up to 75 mm for larger cable carrying capacity. Our solutions offer a wide range of specifications and specialist properties, including Liquid Tight, Low Fire Hazard (LFH) and EMI screening. Additionally, many of our conduit systems have industry recognised approvals including British Kitemark, CE Approval, UL 1696, NF, LUL, DB, Lloyds Register amongst others.

As well as our flexible metallic conduits, we also offer a range of fittings specifically designed to maintain system integrity including fixed and swivel fittings, straights, $90^{\circ}$ and $45^{\circ}$ elbows. To top it off, we also have a host of accessories including locknuts, enlargers, reducers and converters, to help facilitate quick and easy system installation.

Metallic conduits


Steel conduit


Liquid resistant covered steel


Liquid tight covered steel with anti-microbial options


EMI screening solutions with under or overbraided options

## Metallic fittings



Fittings for use with steel conduits


Fittings for liquid resistant covered steel conduits


Fittings for liquid tight and antimicrobial conduits


Fittings for braided steel conduits

Metallic accessories


# Kopex-Ex solutions <br> Ex metallic conduit systems 

Kopex-Ex cable protection systems have been specifically designed to provide the optimal safe solution for protecting cables in hazardous areas. Our wide selection of metallic conduit systems are manufactured either in galvanized steel or stainless steel, providing liquid tight solutions for especially demanding hazardous environments.

All metallic conduit systems meet the strictest worldwide standards for use in explosive hazardous atmospheres including ATEX, IECEx and EAC Ex.

As well as our metallic conduits, we also offer a range of fittings specifically designed to maintain system integrity including fixed and swivel fittings, straights, $90^{\circ}$ and $45^{\circ}$ elbows. This also includes a wide range of cable glands to facilitate the installation and termination of most cable types, armoured and non-armoured in all applications, including EMC and heat-trace applications. To top it off, we also have a host of accessories including locknuts, enlargers, reducers and converters, to help facilitate quick and easy system installation.


## Features \& benefits include:

- Steel/stainless steel core with polymer jacket, offering high IP rating and mechanical protection
- High compression/crush strength Tensile strength - pull off load under tension
- Impact resistance
- Inherent fire protection on uncoated versions
- Corrosion resistant - stainless steel options
- Braided-High level EMI screening with tinned copper overbraiding
- Single entry fittings for a more manageable \& costeffective solution to hazardous area installations


## Ex metallic conduits



Oil resistant PVC conduits


Low Fire Hazard (LFH) conduits


High temperature, high flexibility conduits

## Ex metallic fittings



Ex de-HA-G1 barrier gland


Ex de - HA-G1 90 elbow gland


Ex de-HA-U universal gland


Ex e-EXQ fitting


Exe-90́ EXS fitting


Exe-45 EXR fitting

## Ex metallic accessories



Stopping plugs


Ex de-Thread converters


Ex de-Metallic couplers


Hex locknut

# Kopex-Ex solutions <br> Ex non-metallic conduit systems 

Kopex-Ex cable protection systems have been specifically designed to provide the optimal safe solution for protecting cables in hazardous areas. Our range of non-metallic conduit systems meet the strictest worldwide standards for use in explosive hazardous atmospheres including ATEX, IECEX, UL/CSA and EAC Ex.

The corrugated construction incorporates high fatigue life whilst providing good flexibility. For more demanding applications there is a wide-ranging high specification series of conduit
 with enhanced low fire hazard properties. In addition a range of fittings are specifically designed to maintain system integrity.

## Features \& benefits include:

- Corrugated non-metallic conduit offering high flexibility and moderate mechanical protection
- Allows theconstruction of Exharnesses for more intricate or complex routing requirements
- For Ex e applications
- Non corrosive materials
- Wider variety of fittings-much larger solutions choice
- Quicker to install (cut \& assemble fittings)
- Lighter in weight
- Better fatigue life
- Return to shape


## Ex non-metallic conduit systems



Anti-static nylon conduit (EXB)


Overbraided conduit (EXBB)


Type EXPQ Straight metallic fitting for use with EXB conduit


Type EXBQ - Straight metallic fitting for use with EXBB conduit

## Accessories for hazardous and industrial areas

## Thread converters

- Nickel plated brass and stainless steel
- Convert metric PG and NPT thread forms


## Stopping plugs

- Nickel plated brass, stainless steel or nylon.
- Also available with Hex head or Dome head.


## Other accessories

A full range of accessories is also available to support installations including:

- Earth tags
- Sealing joint washer
- Hex locknuts
- Serrated washers


## T\&B Liquidtight systems ${ }^{\circledR}$

ABB is introducing T\&B Liquidtight Systems ${ }^{\circledR}$, a complete solution for flexible metallic cable protection, to the world. Thomas \& Betts has been a market leader in flexible metallic liquid-tight conduits, fittings and accessories for many years in North America. ABB is now introducing a complete range of $T \& B$ Liquidtight products to the global market that meet international requirements. The ABB T\&B Liquidtight Systems flexible metallic conduit solutions include a broad product range that is unmatched in the market, including solutions for general purpose, oil resistant, wide or extreme temperature, and aluminum applications.

T\&B liquidtight systems ${ }^{\circledR}$ provides global industrial solutions for Flexible Metallic Conduit (FMC) Protection Systems across a wide variety of application requirements. The $T \& B$ liquidtight systems ${ }^{\circledR}$ is founded on the market leading Ser. 5200/5300 liquidtight "T\&B fittings", with highest quality flexible metallic conduits and seal gaskets. System ingress protection to UL 50/50E, CSA C22.2 and IEC 60529 IP ratings provides the ideal solution when connecting the T\&B liquidtight systems ${ }^{\circledR}$ for indoor or outdoor installations to switchgear electrical enclosures, control cabinets, pushbutton stations, motor junction boxes and more.

## Main benefits

- Global approvals and certifications including UL, CSA, IEC/EN, CE, RoHS
- Widest range of trade sizes in the industry from $3 / 8$ " to 6 " ( 12 mm to 155 mm )
- Highest quality liquid tight fittings including steel/malleable iron, aluminum, stainless steel, high temperature, brass nickel plated and push-in variants
- Flexible metallic conduits with the highest quality cores and smooth extruded jackets
- Protection from corrosion, oils, chemicals, solvents, water hose down, UV, low smoke \& toxicity environments
- System Ingress ratings per UL50/50E, CSA and IEC IP, matching enclosure system ingress ratings
- Complete global technical documentation and time saving selection tools


## T\&B Liquidtight Systems ${ }^{\text { }}$



## Our offering



ABB T\&B flexible metallic conduits


ABB T\&B metallic fittings


T\&B accessories

## Harnessflex <br> Superior protection for automotive wiring harnesses

Established in 1984, Harnessflex is a leading designer and manufacturer of flexible conduit systems and connector interfaces, protecting critical electrical and electronic wiring assemblies in the automotive industry.

Harnessflex offers complete system solutions for the routing and protection of electrical wiring against damage by mechanical abrasion, liquid ingress and corrosion salts. Using a Harnessflex conduit system ensures that vulnerable connectors are not exposed to the elements, impact of foreign bodies or jet washing, all of which can cause vehicle malfunction and failure.

Our success has come from our systematic commitment to providing an extensive range of high-grade quality components. Combining a full range of slit and un-slit conduit,
 fittings and connectors, we also offer a large range of hinged system components and connector interfaces.

## Applications

- Agricultural vehicles
- Construction vehicles
- Engine manufacturers
- Harness Manufacturers



## Conduits

Our conduit range is available in many different materials, including lightweight, with enhanced low fire hazard properties and increased tolerance to extreme temperatures.


## Sealed Fittings

Sealed fittings that are designed to protect against high pressure washdown, excessive cable strain and mechanical abrasion.

- Truck \& bus manufacturers
- Tanker \& trailer manufacturers
- Specialist vehicle components
- Military vehicles



## Hinged Fittings

Hinged fittings are designed to protect against liquid ingress and ensure correct assembly, featuring an internal backstop that eliminates any problems caused by unevenly cut conduit.


## TempGuard Range

Cable protection solutions for the automotive market that are tested to be able to withstand extremely high temperatures (up to $200^{\circ} \mathrm{C}$ ).


## Connector Interfaces

Harnessflex connector interfaces are designed for use in areas where electrical connectors are vulnerable to high pressure washing.


## Accessories

A range of accessories that compliments the Harnessflex product offering.

## Harnessflex connector interfaces

Quick reference chart

CONNECTOR KEY:

| (1) TEAmp Superseal | (5) TEAMPSEAL 16 | (10) TE/Deutsch-DT Series | (14) FCI Automotive Apex 2.8 | (18) Aptiv Series $90^{\circ}$ |
| :---: | :---: | :---: | :---: | :---: |
| (2) TE AMP Superseal $90^{\circ}$ | (6) TEAMPSEAL $1690^{\circ}$ | (11) TE/Deutsch-DT Series $90^{\circ}$ | (15) FCl Automotive Apex $2.890^{\circ}$ | $(18)$ Kostal |
| (3) TE AMP Junior \& Mini timer | (8) TE Econoseal | (12) TE/Deutsch-DRC50 Series | (15) Bosch Compact | (19) Kostal $90^{\circ}$ |
| (4)TE AMP Junior \& Minitimer $90^{\circ}$ | (9) TE Econoseal $90^{\circ}$ | (13) Heavy Duty Series | (16) Bosch Compact $90^{\circ}$ | (20) Kostal SLK Series $90^{\circ}$ |
|  |  |  | (17) Aptiv Series | (21) Sumitomo |




|  |  | 19 |  |  |  | 20 <br> Kostal SLK Series $90^{\circ}$ |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  | Kostal |  |  |  |  |
| Part no. | Tempguard Part no. | Interface | Connector | Part no. | Tempguard Part no. | Interface | Connector |
| CI16-LK20 | - | 20 way | 9430010 | C108-90-SLK28-2 | - | 2 way | 09-4440-2* |
| PG21-LK20 | - | 20 way | 9430010 | C108-90-SLK28-3 | - | 3 way | 09-4440-3* |
| C108-SLK28-2 | - | 28 way | 9441391 | CI12-90-SLK28-4 | - | 4 way | 9441491 |
| CIO8-SLK28-3 | - | 28 way | 9441391 |  |  |  |  |
|  |  |  |  |  |  |  |  |
|  |  |  | Kostal $90^{\circ}$ |  |  |  |  |
| Part no. | Tempguard Part no. | Interface | Connector |  |  |  |  |
| C108-90-K2C | - | 2 way | 9442291 |  |  |  | Millflex ABS |
| C108-90-K3C | - | 3 way | 9302231 |  | Tempguard |  |  |
| C112-90-k2C | - | 2 way | 9442291 | Part no. | Part no. | Interface | Connector |
| C112-90-K3C | - | 3 way | 9302231 | C108-MF2 | - | 2 way | - |
| CI12-90-K10C | - | 10 way | 9331031 | CI10-MF2 | - | 2 way | - |
|  |  |  |  | Cl12-MF2 | - | 2 way | - |



## OCAL

## Corrosion Resistant Conduit Systems

With outstanding performance in corrosive environments, Ocal® PVC-coated conduit and fittings extend the life of your electrical system for many years beyond the lifespan of standard rigid conduit systems.

## A complete corrosion protection solution

- Industry-leading thread protection through a hotdipped galvanizing process, and industry-leading UL® Listed type 4X PVC-coated conduit bodies.
- ABB supplies Ocal PVC-coated conduit with hot-dip galvanized threads. Hot-dip galvanizing is the process through which the steel shell is dipped in molten zinc, causing the zinc to penetrate the steel.
- ABB supplies Ocal PVC-coated conduit with a full undisturbed zinc coating under the PVC coating, fulfilling the requirement of NEMA RN-1 regarding the restriction of harmed or eroded zinc coating over the conduit.
- UL Listed including UV resistance testing.
- Ocal supplies "double-coat" coated fittings, enhancing corrosion protection by applying coating to the interior and exterior of the fittings before PVC coating.


## Features

- Ocal® UL verified Nema 4X conduit body: The Ocal UL 4 X conduit body, including covers with a leakproof O-ring seal, has been UL verified to meet the latest NEMA standard for both corrosion and damage from liquids.


Ocal

## Cable glands and accessories

## Everything you need, anywhere in the world... A one-stop solution for high quality cable glands



Our range offers high-specification protective cable glands suitable for harsh conditions, including high or extreme temperature ranges, oil and UV exposure, food \& beverage use or highly corrosive environments. Solutions are also readily available for a broad range of general purpose uses.

## Available approvals and certifications

Our products are designed to comply with required standards providing superior performance no matter where they are applied.

## 

## Cable gland products by industries



Food \& beverage cable glands

ABB's high quality cable glands can help extend the life of electrical systems in a food and beverage plant's challenging environments while reducing system changeover and downtimes.


Rail cable glands

ABB cable glands comply to the latest European safety standard EN45545 and achieve the highest fire performance HL3 rating for both interior and exterior locations, suitable for rail vehicle and infrastructure usage.


Hazardous area cable glands

ABB hazardous area cable glands are designed and manufactured to meet the demands of rigorous and arduous operating environments in addition to ATEX and IECEx standards.


Industrial cable glands

ABB industrial cable glands can be installed anywhere. Supported by global certifications and type approvals, we have a solution for most applications.

## Power distribution, cable management, connection \& protection <br> Designed to perform in the oil \& gas industry



High performance \& reliability during demanding conditions is the starting point for us for all our products and services in the oil \& gas industry.

Intensive testing and certification by recognized authorities result in a portfolio meeting highest international standards and legislation. With over 145,000 people in 100 countries, ABB can quickly support local needs in a global offshore / oil \& gas environment.


## Ex proof conduit systems and fittings.

- Liquid tight, flexible metallic and non-metallic


## conduit.

- Flameproof Ex d, Ex e fittings.
- Non-metallic, conduit systems for really dynamic applications.
- Ideal for running multiple cores from one point to another.
- Available for oil-resistant, high-temperature and low and limited fire hazard applications.



## Ex proof metallic cable glands.

- Ex d, Ex e single or double compression glands.
- Exd, Ex e compound barrier glands.
- ATEX / IECEx certified.
- Wide range of cable sizes
- IP66, IP68 ratings.


## C2 Series - Ex de single compression cable glands

- Flameproof Ex d and Increased safety Ex e
- Suitable for use in Zone 1, 2,21 and 22
- For use with non-armored circular cable types
- Wide cable range
- Deluge proof



## Designed to perform.

ABB understands continuous operation and reliability are essential for your business. Our solutions are designed to support you to:

- Maintain a safe environment for personnel and areas classified as hazardous.
- Battle extreme temperatures, UV resistance and other harsh conditions.
- Protect your cables and wire from liquid ingress \& corrosion.
- Reduce your total cost of ownership | ease of design \& installation and low energy \& maintenance cost.


## Ty-Met ${ }^{\text {" }}$



- Ballock, ladder type, releasable, identification, tooling.
- Strong, safe installation with dual locking mechanism.
- Coated version | halogen free, non-toxic polyester.
- Uncoated version | for extreme / high temperature applications: $-80^{\circ} \mathrm{C}$ to $+300^{\circ} \mathrm{C}$.
- Corrosion resistant 316 grade stainless steel.
- Ultraviolet resistant, weather \& fire-proof, resistant to radiation, chemicals, absolutely fireproof.

Ty/Ra/ ${ }^{\oplus}$ High performance nylon cable ties.

- Withstand temperatures between $-40^{\circ} \mathrm{C}$ to $150^{\circ} \mathrm{C}$
- Tensile strength up to 540 N .
- Flame retardant, Ultraviolet resistant.
- Extra-high temperature resistant nylon.
- Flammability ratings UL94V-2 and V-0.
- Provides a smooth and low-profile look.


## Color-Keyed ${ }^{\circ}$ compression connectors.

- Solid, homogenous connection via special system utilizing compression tools with matching dies that forms connector \& wire.
- Made of $99.9 \%$ pure, oxygen free copper.
- Assured high conductivity, conforms IEC 61238.
- Straight 1 hole / 2 hole :10-400mm² M5 to M24 $45^{\circ} / 90^{\circ}: 10 \mathrm{~mm}^{2}$ till $240 \mathrm{~mm}^{2}$ M6 to M16.


## fulse Earthing and lightning protection.

- Provides total solution to earthing \& lightning
- Risk assessment complying to latest IEC 62305-2 standards.
- Soil resistivity surveys by team of experienced surveyors are key to creating effective earthing system.
- Latest CDEGS software to optimise designs and provide range of customised detailed reports.


## Power distribution, cable management, connection \& protection

Designed to perform in the oil \& gas industry


Metallic flexible conduit systems.

- Designed for extreme temperature environments.
- Operating temperature range $-50^{\circ} \mathrm{C}$ to $350^{\circ} \mathrm{C}$
- Tensile strength - pull off load under tension.
- Impact resistance.
- More than 20 different conduit types.
- Enhanced low fire hazard conduit with stainless steel overbraid.
- Inherent fire protection on uncoated versions.
- Weather resistant.
- SPL conduit systems - liquid-tight oil resistant covered steel flexible conduit.
- LFH-SP conduit systems.
- Metallic and non-metallic IP40-IP69K on specialist fittings.


## Adaptafien



Nylon flexible conduit systems.

- Provide excellent flexing and fatigue life in extreme operating temperature ranges.
- Extreme resistance to lubricants and corrosive chemicals.
- PA / PR conduit systems, polyamide (Nylon) 6 , self extinguishing, halogen free, very high ultraviolet resistance.
- Conduit diameters non-metallic: $13 \mathrm{~mm}-106 \mathrm{~mm}$.


## Adaptalok ATS ${ }^{\text {™ }}$ system.

- Ingress protection ratings: IP66 / 67 / 68/69K.

- Integral face seal washer guaranteed fit, cannot be lost or fitted incorrectly.
- Elastomer with 3 visible confirmation points.
- One piece fast fit (Push - Twist - Pull) installation.
- Visual fitting guides - highly visible elastomer markings on lugs.
- Proven clip design - pitch independent, secure fitment to coarse and fine pitch conduits.



## Key business drivers for oil \& gas industry:

- Maintaining a safe environment in process areas classified as hazardous locations (Zone 1, 2 and 21, 22).
- Unforgiving time schedules to meet investment deadlines.
- Battling corrosion.
- Managing unpredictable raw material costs.
- Adapting to changing technologies used to find energy resources.
- Increating environmental and community demands.



## Adaptaflen Adaptaflex product approvals.

- Lloyds Register Type Approved.
- UR.

- BSI Kitemark to IEC 61386.
- CE marked to Low Voltage Directive.

13 - UL Listed to UL514B and CSA Approved (Liquid Tight Type SPUL).

## Designed to perform.

$A B B$ understands continuous operation and reliability are essential for your business. Our solutions are designed to support you to:

- Maintain a safe environment for personnel and areas classified as hazardous.
- Battle extreme temperatures, UV resistance and other harsh conditions.
- Protect your cables and wire from liquid ingress \& corrosion.
- Reduce your total cost of ownership | ease of design \& installation and low energy \& maintenance cost.


Ocal'
OCAL-BLUE ${ }^{\circledR}$ PVC-coated conduit \& fittings system.

- PVC-coated, hot-dipped galvanised conduit and threads.
- Complies fully with UL®6, NEMA RN-1 and ANSI C80.1.
- Superior corrosion protection against harsh elements.
- Interior blue polyurethane provides corrosion protection around copper wire or fiber optics.


## T\&B' Fittings



T\&B' Fittings


T\&B' Fittings


T\&B' Fittings


Star Teck ${ }^{\circledR}$ Extreme ${ }^{\circledR}$ jacketed metal-clad and Teck cable termination fittings.

- Suitable for extreme locations.
- Form a strong mechanical grip and water and/or oil-resistant termination.
- Provide grounding continuity of cable armor.
- Patented powergrip grouding ring for easy installation.
- Designed to accommodate a broad range of cables.
- Built-in sealing device provides a $360^{\circ}$ seal when enclosure surface is rough or uneven.
- NEMA 4, 4X (stainless steel), 6P ratings. UL Listed and CSA Certified.

Star Teck ${ }^{\circledR}{ }^{\text {Extreme }}$ Director ${ }^{\text {TM }}$ cable fittings.

- Truly adjustable series of range-taking fittings for flexibility in space-constraint locations.
- Exclusive swash-plate design, angle adjustable from $90^{\circ}$ to $180^{\circ}$.
- Accept a range of jacketed metal-clad and teck cable diameters.
- Easy to install (Install - Insert - Rotate - Done) and disconnect.
- UL Listed, NEMA 4, Class I Div 2 / Zone 2 and Class II Div 2 / Zone 22 when installed.
$52^{\circledR}$ series high temperature flexible metal liquid-tight fittings.
- Withstand temperature range between $-60^{\circ}$ to $150^{\circ} \mathrm{C}$.
- Steel or malleable iron construction, electrozinc plated and chromate coated for corrosion protection.
- Plastic sealing ring to provide a water-tight / oil-tight seal.
- Available in straight, 450 and $90^{\circ}$ versions

Ex proof flexible couplings - XP Flex couplings.

- Explosion-proof and dust-ignition proof for use in hazardous locations.
- Flexible design makes it easy to achieve tight bends in conduit systems in confined spaces or vibration-prone locations.
- Corrosion resistant | ideal for washdown areas.
- Flexible bronze construction with arc-resistant inner sleeve and brass fittings.
- Terminated with two threaded female end fittings and male close nipples.
- UL Listed and CSA Certified for hazardous locations. Class 1 Div 1 and Div 2, Class II Div 1, Class III.


## System pro M Portfolio overview

With the ABB System pro M portfolio, we offer a complete system solution including MCBs, RCCBs, RCBOs, SDs, busbars accessories and consumer units.

## MCB - Miniature Circuit Breaker

- Protect installations against overloads and short-circuit, guaranteeing reliability and safety of operations
- SB200 M MCB with breaking capacity of 10kA
- B characteristic, 1/2/1P+N pole configurations in all sizes up to 40A.
- C characteristic in $1 / 2 / 3 / 4 / 1 \mathrm{P}+\mathrm{N} / 3 \mathrm{P}+\mathrm{N}$ Pole configurations in all sizes up to 63A
- D characteristic in 1/2/3/4 Pole configurations in all sizes up to 63A


## RCCB - Residual Current Circuit Breaker

- Sensitive only to earth fault current, therefore they have to be connected in series with a MCB or a fuse to protect them against over-currents and short-circuits
- FB200 RCCB with sensitivity $30 / 100 / 300 \mathrm{~mA}$ in AC type and 2/4P configuration up to 63A, corresponding to all requirements in residential applications


## RCBO

- Combined protection against both earth-fault currents and overloads or short-circuits in one single device
- DS201 M RCBO with breaking capacity 10kA
- C characteristics, AC and APR types, 30/100/300mA sensitivity and $2 \mathrm{P}+\mathrm{N}$ configuration up to 40 A

SD - Switch disconnector

- Opening a disconnector ensures isolation of downstream circuit
- SDB200 with 2/3/4P configurations in all sizes up to 63A


## Accessories

- Busbar with $12 / 56 / 57$ pins in $1 / 2 / 3 / 4 \mathrm{P}$ to ensure easy and reliable wiring


Busbar

-
S2C-H6-...
Auxiliary contact


- $\mathrm{S} 2 \mathrm{C}-\mathrm{S} / \mathrm{H} 6 \mathrm{R}$ Signal/Auxiliary contacts

S2C-A


Shunt trip



ABB ITUS distribution enclosures

## A collaborative effort

## Meeting the right requirements

ABB ITUS series Distribution Enclosures put no limits to your imagination. Gone are the days when enclosures were meant only for archaic needs. With the ABB ITUS series enclosures, you can rest assured that it will not only perform at its peak, but also blend in with the rest of your interiors. Using ABB's innovative designs, domain expertise and standards, ABB ITUS is ready to help you to be today's trendsetter.


## Miniature Circuit Breaker SB200 M The details make the difference




State-of-the-art design (Aesthetics \& Ergonomics)
Elegant in appearance. Knob designed for easy operation.

## IP20 protection

IP 20 - finger safe terminals. The System pro M compact ${ }^{\oplus}$ MCBs are equipped with $25 \mathrm{~mm}^{2}$ cylinder lift twin terminals, a well-proven and reliable technology - designed for sophisticated industrial use. The cross wiring can easily be done by inserting the System pro M compact® busbars into the rear terminal part and then the incoming wires into the front part of the terminal.


## Laser marking

All printing of the SB200 M MCBs, like the approvals on the product identification, are printed by a laser. Laser printing ensures a friction, scratch and solvent resistant marking on the MCBs. Easy identification of the products in case of maintenance or replacement, due to safe laser printing.


## Labelling area

Provision for providing label enables easy identification of circuit during installation, operation \& maintenance.


Housing cover with fire retardant material
High performance, $100 \%$ recyclable plastic material with fire retardant, high melting point, low water absorption \& high dielectric strength properties. ABB is taking care of the environment... with the latest generation of thermoplastics, it is possible to recycle the MCBs especially the thermoplastic housing material can be re-used. SB200 is 100\% free of halogens.


## Accessories mountable

Wide range of add-on accessories having 30 different types of accessories. Max possibility of Mounting: 4 different accessories on the right side and 1 on the left side ensures highest flexibility of functions. Universal contact, motorised unique accessory like mechanical tripping devices available only with ABB.

## Miniature Circuit Breaker SB200 M

Technical data


General data

| Standards | IEC/IS 60898-1, IEC/IS 60947-2 |
| :---: | :---: |
| Poles | B: $1 \mathrm{P}, 1 \mathrm{P}+\mathrm{N}, 2 \mathrm{P}$ |
|  | C: $1 \mathrm{P}, 2 \mathrm{P}, 3 \mathrm{P}, 4 \mathrm{P}, 1 \mathrm{P}+\mathrm{N}, 3 \mathrm{P}+\mathrm{N}$ |
|  | D: 1P, 2P, 3P, 4P |
| Rated short-circuit capacity (Icn) | 10 kA |
| Rated ultimate short-circuit breaking capacity Icu (acc.to IEC 60947-2) | 15 kA |
| Tripping characteristics | B, C, D |
| Reference temperature for tripping characteristics | $30^{\circ} \mathrm{C}$ |
| Energy limiting class (B-,C-Curve) | 3 |
| Rated voltage Ue | 1P : 240/415 V AC |
|  | $1 \mathrm{P}+\mathrm{N}: 240 \mathrm{~V}$ AC |
|  | 2...4P : 415 V AC |
|  | $3 P+N: 415 \mathrm{~V}$ AC |
| Rated current In | $\text { B: } 6,10,16,20,25,32,40 \mathrm{~A}$ |
|  | C\&D: $0,5,1,1,6,2,3,4,6,10,16,20,25,32,40,50,63$ A |
| Rated frequency | 50 Hz |
| Max. Power frequency recovery voltage (Umax) | 1P: 264 V AC ; 60 V DC; |
|  | $1 \mathrm{P}+\mathrm{N}: 264 \mathrm{~V} \mathrm{AC} ;$ |
|  | 2...4P:457 V AC; 2P: 120V DC; |
| Min. operating voltage | 12 VAC |
| Rated insulation voltage Ui acc. to IEC/EN 60664-1 | $250 \mathrm{~V} \mathrm{AC} \mathrm{(phase} \mathrm{to} \mathrm{ground)}$,440 V AC (phase to phase) |
| Rated impulse withstand voltage Uimp. (1.2/50 $\mathrm{s}^{\text {s }}$ ) | 4 kV (test voltage 6.2kV at sea level, 5 kV at 2.000 m ) |
| Dielectric test voltage | 2 kV ( $50 / 60 \mathrm{~Hz}, 1 \mathrm{~min}$. |
| Overvoltage category | III |
| Pollution degree | 3 |
| Electrical endurance | $\begin{aligned} & \text { In < 32A: } 20.000 \text { ops.(AC), } \\ & \text { In } \geq 32 \mathrm{~A}: 10.000 \text { ops.(AC); } \end{aligned}$ |
|  | 1.000 ops. (DC); 1 cycle ( $2 \mathrm{~s}-\mathrm{ON}, 13 \mathrm{~s}$ - OFF, $\mathrm{In} \leq 32 \mathrm{~A}$ ), 1 cycle |
|  | (2s - ON, 28s - OfF, In >32A) |
| Mechanical data |  |
| Housing | Insulation group II |
| Toggle | Insulation group II, black, sealable |
| Contact position indication | White Marking on toggle ( I ON / O OFF ) |
| Protection degree acc. to EN 60529 | IP20, IP40 in enclosure with cover |
| Mechanical endurance | 20.000 ops. |
| Shock resistance acc. to IEC/EN 60068-2-27 | $25 \mathrm{~g}-2$ shocks - 13 ms |
| Vibration resistance acc. to IEC/EN 60068-2-6 | $5 \mathrm{~g}-20$ cycles at $5 \ldots 150 \ldots 5 \mathrm{~Hz}$ with load 0.81n |
| Environmental conditions (damp heat) acc. to IEC/EN 60068-2-30 | 28 cycles with $55^{\circ} \mathrm{C} / 90-96 \%$ and $25^{\circ} \mathrm{C} / 95-100 \%$ |
| Ambient temperature | $-25 \ldots+55^{\circ} \mathrm{C}$ |
| Storage temperature | $-40 \ldots+70^{\circ} \mathrm{C}$ |


| Installation |  |
| :--- | :--- |
| Terminal | Cage terminal |
| Cross-section of conductors (top / bottom) Solid, Stranded | $25 \mathrm{~mm}^{2} / 25 \mathrm{~mm}^{2}$ |
| Flexible | $16 \mathrm{~mm}^{2} / 16 \mathrm{~mm}^{2}$ |
| Cross-section of busbars (top / bottom) | $10 \mathrm{~mm}^{2}$ |
| Tightening torque | 2 Nm |
| Screwdriver | $\mathrm{No}$.2 Pozidrive |
| Mounting | On DIN rail 35 mm acc. to EN 60715 by fast clip |
| Mounting position | Any |
| Supply | Optional |
| Dimensions and weight |  |
| Mounting dimensions acc. to DIN 43880 | Mounting dimension 1 |
| Pole dimensions (H x $\times$ W) | $85 \times 69 \times 17.5 \mathrm{~mm}$ |
| Pole weight | ca. 115 g |
| Combination with aux. elements |  |
| Auxiliary contact | yes |
| Signal contact | yes |
| Shunt trip | yes |
| Undervoltage release | yes |
| Overvoltage release | yes |
| Rotary handle | yes |
| Mechanical tripping device | yes |
| Padlock enabled | yes |
| Motor operating device | yes |
| Approvals | yes |

## Miniature Circuit Breaker SB200 DC Right product for right application

The range impresses with its performance, approvals and high in-built short-circuit breaking capacity for DC applications. Can be used in SP version at 250 V DC and DP version upto 500V DC.


Polarity marking.


Approvals and standard.


State-of-the-art design (Aesthetics \& ergonomics) Elegant in appearance and the knob is designed for easy operation.


## Laser marking

All printing of the SB200 MCBs, like the approvals on the product identification are printed by a laser. The laser printing ensures a friction, scratch and solvent resistant marking on the MCBs. Easy identification of the products in case of maintenance or replacement, due to safe laser printing.


Housing cover with fire retardant material
High performance 100\% recyclable plastic material with fire retardant, high melting point, low water absorption \& high dielectric strength properties. ABB is taking care of the environment... with the latest generation of thermoplastics, it is possible to recycle the MCBs especially the thermoplastic housing material can be re-used. SB200 is 100\% free of halogens.


## IP20 protection

IP 20 - finger safe terminals. The System pro M compact ${ }^{\circledR}$ MCBs are equipped with $25 \mathrm{~mm}^{2}$ cylinder lift twin terminals, a well-proven and reliable technology-designed for sophisticated industrial use.
The cross wiring can be easily done by inserting the System pro M compact ${ }^{\circledR}$ busbars into the rear terminal part and then the incoming wires into the front part of the terminal.


## Labelling area

Provision for providing label enables easy identification and polarity marking of circuit during installation, operation \& maintenance.


## Accessories mountable

Wide range of add-on accessories having 30 different types of accessories. Max. possibility of mounting: 4 different accessories on the right side and 1 on the left side ensures highest flexibility of functions. Universal contact, motorised unique accessory like mechanical tripping devices available only with ABB.


## Miniature Circuit Breaker SB200 DC

Technical data


General data

| Standards | IS/IEC 60947-2 |
| :---: | :---: |
| Poles | 1P, 2P |
| Rated short-circuit capacity Icu | 6 kA |
| Rated service short-circuit breaking capacity Ics | 6 kA |
| Tripping characteristics | $7-15 \times \ln$ |
| Reference temperature for tripping characteristics | $55^{\circ} \mathrm{C}$ |
| Rated voltage Ue | $\begin{aligned} & \text { 1P: } 250 \mathrm{VDC} \\ & \text { 2P: } 500 \mathrm{~V} \text { DC } \end{aligned}$ |
| Rated current In | $1,6,2,3,4,6,10,16,20,25,32,40,50,63 \mathrm{~A}$ |
| Max. power frequency recovery voltage (Umax) | $1,1 \times \mathrm{Ue}$ |
| Min. operating voltage | 12 V DC |
| Rated impulse withstand voltage Uimp. (1.2/50 $\mu$ s) | 4 kV (test voltage 6.2 kV at sea level, 5 kV at 2.000 m ) |
| Dielectric test voltage | 2 kV ( $50 / 60 \mathrm{~Hz}, 1 \mathrm{~min}$.) |
| Pollution degree | 3 |
| Electrical endurance | 1.000 ops. |
| Mechanical data |  |
| Housing | Insulation group I |
| Toggle | black sealable in ON-OFF position |
| Contact position indication | White Marking on toggle ( I ON / O OFF ) |
| Protection degree acc. to EN 60529 | IP20, IP40 in enclosure with cover |
| Mechanical endurance | 20.000 ops. |
| Shock resistance acc. to IEC/EN 60068-2-27 | $25 \mathrm{~g}-2$ shocks -13 ms |
| Vibration resistance acc. to IEC/EN 60068-2-6 | $5 \mathrm{~g}-20$ cycles at $5 \ldots 150 \ldots 5 \mathrm{~Hz}$ with load 0.8In |
| Environmental conditions (damp heat) acc. to IEC/EN 60068-2-30 | 28 cycles with $55^{\circ} \mathrm{C} / 90-96 \%$ and $25^{\circ} \mathrm{C} / 95-100 \%$ |
| Ambient temperature | $-25 \ldots+55^{\circ} \mathrm{C}$ |
| Storage temperature | $-40 \ldots+70^{\circ} \mathrm{C}$ |
| Installation |  |
| Terminal | Cage terminal |
| Cross-section of conductors (top / bottom) Solid, Stranded | $25 \mathrm{~mm}^{2} / 25 \mathrm{~mm}^{2}$ |
| Flexible | $16 \mathrm{~mm}^{2} / 16 \mathrm{~mm}^{2}$ |
| Cross-section of busbars (top / bottom) | $10 \mathrm{~mm}^{2}$ |
| Tightening torque | 2 Nm |
| Screwdriver | No. 2 Pozidrive |
| Mounting | On DIN rail 35 mm acc. to EN 60715 by fast clip |
| Mounting position | Any |
| Supply | Note polarity of device |


| Dimensions and weight |  |
| :--- | :--- |
| Mounting dimensions acc. to DIN 43880 | Mounting dimension 1 |
| Pole dimensions (H x D x W) | $85 \times 69 \times 17.5 \mathrm{~mm}$ |
| Pole weight | ca. 115 g |
| Combination with aux. elements |  |
| Auxiliary contact | yes |
| Signal contact | yes |
| Shunt trip | yes |
| Undervoltage release | yes |
| Overvoltage release | yes |
| Rotary handle | yes |
| Mechanical tripping device | yes |
| Padlock enabled | yes |
| Motor operating device | yes |

## Miniature Circuit Breakers

Selection table


## -

Miniature Circuit Breakers
Selection table



## Miniature Circuit Breakers

## Selection table

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Series |  |  | $\begin{aligned} & \text { O} \\ & \underset{\sim}{u} \end{aligned}$ | $\Sigma$ 0 i $\sim$ | $\begin{aligned} & \sum_{0} \\ & \text { O } \\ & \text { U U } \\ & \text { un } \end{aligned}$ |  | 0 0 0 0 0 |  |  | 0 0 0 0 0 |  | $\begin{aligned} & \text { ¢ } \\ & \text { O} \\ & \text { O } \\ & \sim \\ & \sim \end{aligned}$ | $n$ 0 0 0 $n$ |
| Characteristics |  |  | $\begin{aligned} & \mathrm{B}, \mathrm{C}, \mathrm{D}, \\ & \mathrm{~K}, \mathrm{Z} \end{aligned}$ | $\begin{aligned} & \mathrm{B}, \mathrm{C}, \mathrm{D}, \\ & \mathrm{~K}, \mathrm{Z} \end{aligned}$ | B, C, K, Z | $\begin{aligned} & \mathrm{B}, \mathrm{C}, \mathrm{D}, \\ & \mathrm{~K}, \mathrm{Z} \end{aligned}$ | $\begin{aligned} & \mathrm{B}, \mathrm{C}, \mathrm{D}, \\ & \mathrm{~K}, \mathrm{Z} \end{aligned}$ | $\begin{aligned} & \mathrm{B}, \mathrm{C}, \mathrm{D}, \\ & \mathrm{~K}, \mathrm{Z} \end{aligned}$ | $\begin{aligned} & \mathrm{B}, \mathrm{C}, \mathrm{D}, \\ & \mathrm{~K}, \mathrm{Z} \end{aligned}$ | $\begin{aligned} & \mathrm{B}, \mathrm{C}, \mathrm{D}, \\ & \mathrm{~K}, \mathrm{Z} \end{aligned}$ | $\begin{aligned} & \mathrm{B}, \mathrm{C}, \mathrm{D}, \\ & \mathrm{~K}, \mathrm{Z} \end{aligned}$ | K | B,C |
| Rated current [ A ] |  |  | $\begin{aligned} & 0.5 \leq \\ & \ln \\ & \leq 63 \end{aligned}$ | $\begin{aligned} & 0.5 \leq \\ & \ln \\ & \leq 63 \end{aligned}$ | $\begin{aligned} & 0.2 \leq \\ & \ln \\ & \leq 63 \end{aligned}$ | $\begin{aligned} & 0.2 \leq \\ & \ln \\ & \leq 25 \end{aligned}$ | $\begin{aligned} & 32 \leq \\ & \ln \\ & \leq 40 \end{aligned}$ | $\begin{aligned} & 50 \leq \\ & \text { In } \\ & \leq 63 \end{aligned}$ | $\begin{aligned} & 0.2 \leq \\ & \ln \\ & \leq 25 \end{aligned}$ | $\begin{aligned} & 32 \leq \\ & \ln \\ & \leq 40 \end{aligned}$ | $\begin{aligned} & 50 \leq \\ & \ln \\ & \leq 63 \end{aligned}$ | $\begin{aligned} & 0.2 \leq \\ & \ln \\ & \leq 63 \end{aligned}$ | $\begin{aligned} & 6 \leq \\ & \ln \\ & \leq 20 \end{aligned}$ |
| IEC/EN Ics | 1, | 24 | 20 |  |  |  |  |  |  |  |  |  |  |
| 60947-2 | $1 \mathrm{P}+\mathrm{N}$ | 60 | 10 | 10 |  | 15 | 10 | 10 |  |  |  |  |  |
| Direct current |  | 72 |  |  |  |  |  |  | 12.5 | 10 | 7.5 |  |  |
| $\mathrm{T}=\mathrm{I} / \mathrm{R} \leq 5 \mathrm{~ms}$ <br> for |  | 125 |  |  |  |  |  |  |  |  |  |  |  |
| all series, |  | 220 |  |  | 10 |  |  |  |  |  |  |  |  |
| except S280 |  | 250 |  |  |  |  |  |  |  |  |  |  |  |
| UC and | 2 | 48 | 20 |  |  |  |  |  |  |  |  |  |  |
| S800S-UC, |  | 125 | 10 | 10 |  | 15 | 10 | 10 | 12.5 | 10 | 7.5 |  |  |
|  |  | 250 |  |  |  |  |  |  |  |  |  |  |  |
|  |  | 440 |  |  | 10 |  |  |  |  |  |  |  |  |
|  |  | 500 |  |  |  |  |  |  |  |  |  |  |  |
|  |  | 800 |  |  |  |  |  |  |  |  |  |  |  |
|  | 3,4 | 375 |  |  |  |  |  |  |  |  |  |  |  |
|  |  | 500 |  |  |  |  |  |  |  |  |  |  |  |
|  |  | 750 |  |  |  |  |  |  |  |  |  |  |  |
|  |  | 1200 |  |  |  |  |  |  |  |  |  |  |  |
| UL 1077/ Int. | 1, | 120 | $10^{* 16}$ |  |  | 10 | 10 | 10 | 10 | 10 | 10 |  |  |
| C22.2 cap. | $1 \mathrm{P}+\mathrm{N}$ | 240 |  |  |  |  | 10 | 10 | 10 | 10 | 10 |  |  |
| No 235 |  | 277 | $6{ }^{* 16}$ | 6 | 6 | 10 | 10 | 10 | 10 | 10 | 10 | 10 |  |
| Alternating current | 2, 3, 4 | 240 | $10 * 16$ |  |  | 10 | 10 | 10 | 10 | 10 | 10 |  |  |
|  |  | $\begin{aligned} & \hline 480 \\ & \mathrm{Y} / 277 \\ & \hline \end{aligned}$ | 6*16 | 6 | 6 | 10 | 6 | 6 | 10 | 10 | 10 |  |  |
| UL 1077/ Int. | 1, | 60 | $10^{* 16}$ | 10 |  |  |  |  | 10 | 10 | 10 |  |  |
| C22.2 cap. | $1 \mathrm{P}+\mathrm{N}$ | 125 |  |  |  |  |  |  |  |  |  |  |  |
| No 235 |  | 250 |  |  | 10 |  |  |  |  |  |  |  |  |
| Direct current | 2, 3, 4 | 125 |  | 10 |  |  |  |  | 10 | 10 | 10 |  |  |
|  |  | 250 |  |  |  |  |  |  |  |  |  |  |  |
|  |  | 500 |  |  | 10 |  |  |  |  |  |  |  |  |
| UL 489/ C22.2 Int. | 1 | 240 |  |  |  |  |  |  |  |  |  |  |  |
| No 5 cap. |  | 277 |  |  |  |  |  |  |  |  |  |  |  |
| Alternating | 2, 3, 4 | 240 |  |  |  |  |  |  |  |  |  |  |  |
|  |  | $\begin{aligned} & 480 \\ & \mathrm{Y} / 277 \end{aligned}$ |  |  |  |  |  |  |  |  |  |  |  |
| ```UL 489/ C22.2 Int. No 5 cap. Direct current``` | 1 | 48 |  |  |  |  |  |  |  |  |  |  |  |
|  |  | 60 |  |  |  |  |  |  |  |  |  |  |  |
|  |  | 125 |  |  |  |  |  |  |  |  |  |  |  |
|  | 2 | 96 |  |  |  |  |  |  |  |  |  |  |  |
|  |  | 125 |  |  |  |  |  |  |  |  |  |  |  |
|  |  | 250 |  |  |  |  |  |  |  |  |  |  |  |

[^32][^33]${ }^{* 14}$ char. B, C

* 15 only 2 poles (connection in series)
*16 UL 1077 only
${ }^{* 17} \leq 40 \mathrm{~A}$
${ }^{*} 18>40 \mathrm{~A}$
$* 19 \leq 35 \mathrm{~A}$
$* 20$
* 


## -

Miniature Circuit Breakers
Selection table


|  |  | $\Sigma$ 0 0 N un |  |  | U à O O un | ᆭ O U |  |  | $\begin{aligned} & \stackrel{-1}{0} \\ & \text { N } \\ & \text { z } \end{aligned}$ | U O N | $\sum$ N N n n | $\sum_{U}$ O Nun |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| C,Z | K | C, Z | K | K | K, Z | C | B,C | B,C | B,C,D | B,C | B,C | B,C | B, C |
| $\begin{aligned} & 0.2 \leq \\ & \ln \\ & \leq 40 \end{aligned}$ | $\begin{aligned} & 0.2 \leq \\ & \ln \\ & \leq 35 \end{aligned}$ | $\begin{aligned} & 50 \leq \\ & \text { ln } \\ & \leq 63 \end{aligned}$ | $\begin{aligned} & 40 \leq \\ & \text { In } \\ & \leq 63 \end{aligned}$ | $\begin{aligned} & 0.2 \leq \\ & \ln \\ & \leq 63 \end{aligned}$ | $\begin{aligned} & 1 \leq \\ & \text { In } \\ & \leq 63 \end{aligned}$ | $\begin{aligned} & 2 \leq \\ & \text { In } \\ & \leq 40 \end{aligned}$ | $\begin{aligned} & 2 \leq \\ & \ln \\ & \leq 40 \end{aligned}$ | $\begin{aligned} & 2 \leq \\ & \ln \\ & \leq 40 \end{aligned}$ | $\begin{aligned} & 2 \leq \\ & \ln \\ & \leq 40 \end{aligned}$ | $\begin{aligned} & 2 \leq \\ & \ln \\ & \leq 40 \end{aligned}$ | $\begin{aligned} & 2 \leq \\ & \ln \\ & \leq 40 \end{aligned}$ | $\begin{aligned} & 2 \leq \\ & \ln \\ & \leq 32 \end{aligned}$ | $\begin{aligned} & 80 \leq \\ & \ln \\ & \leq 100 \end{aligned}$ |
| 15 | 15 | 10 | 10 |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
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| 15 | 15 | 10 | 10 |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
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|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  | 10 | 10 | 10 |  |  |  |  |  |  |  |  |  |
| 10 | 10 |  |  | $10 * 19$ |  |  |  |  |  |  |  |  |  |
|  |  | 10 | 10 | 10 |  |  |  |  |  |  |  |  |  |
| 10 | 10 |  |  | $10 * 19$ |  |  |  |  |  |  |  |  |  |
| 10 | 10 | 10 | 10 |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  | 14 |  |  |  |  |  |  |  |  |
|  |  |  |  |  | $14 * 17$ |  |  |  |  |  |  |  |  |
| 10 | 10 | 10 | 10 |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  | $14 * 15$ |  |  |  |  |  |  |  |  |
|  |  |  |  |  | $14 * 15 * 17$ |  |  |  |  |  |  |  |  |

## High performance Circuit Breakers

Selection table

|  |  |  |  |  |  |
| :--- | :--- | :--- | :--- | :--- | :--- |
|  |  |  |  |  |  |

*1 only up to 40 A; 10 kA up to 50/63 A
*2 only for "D" characteristic
*3 values are not for all rated currents
*5 1500 V DC for 4P
*8 max. values. Detailed values on page 2/12
*9 relevant product standard: E DIN VDE 0645 (based on IEC/EN 60898-1 and IEC/EN 60947-2)
*10 by 250 V DC 1-pole, 600
${ }^{* 12} \leq 25 \mathrm{~A}$

High performance Circuit Breakers
Selection table

|  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| $\infty$ 0 0 0 0 | 7 | 3 0 0 0 0 |  |  | $\begin{aligned} & \text { i } \\ & 0 \\ & 0 . \\ & 0 . \\ & \text { on } \\ & \text { in } \end{aligned}$ |
| B, C, D, K | C, K | Z, K | UCZ | PVS | PV-SP |
| $\begin{aligned} & 32 \leq \\ & \ln \leq 125 \end{aligned}$ | $\begin{aligned} & \mathrm{C}: 10 \leq \ln \leq 32 \\ & \mathrm{~K}: 0.5 \leq \ln \leq 125 \end{aligned}$ | $\begin{aligned} & 10 \leq \\ & \ln \\ & \leq 100 \end{aligned}$ | 10-80 | $5$ | $\begin{aligned} & 5 \leq \\ & \ln \\ & \leq 125 \end{aligned}$ |
| 10 *23 |  |  |  |  |  |
| 16 |  |  |  |  |  |
|  |  | 30 |  |  |  |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
|  | $\begin{aligned} & 1.5(0.5 \ldots 5 \text { A), } 4(6 \ldots \\ & 63 \text { A) } \\ & 3(80 \ldots 125 \text { A) } \end{aligned}$ |  |  |  |  |
| 16 |  |  |  |  |  |
|  |  | 50 |  |  |  |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
|  | $\begin{aligned} & 1.5(0.5 \ldots 5 \mathrm{~A}) \\ & 4(6 \ldots 63 \mathrm{~A}) \\ & 3(80 \ldots 125 \mathrm{~A}) \end{aligned}$ |  |  |  |  |
|  |  |  |  |  |  |
| 10 |  |  |  |  |  |
|  |  | 25 |  |  |  |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
|  | $\begin{aligned} & 1.5(0.5 \ldots 5 \mathrm{~A}) \\ & 2.5(6 \ldots 63 \mathrm{~A}) \\ & 2(80 \ldots 125 \mathrm{~A}) \end{aligned}$ |  |  |  |  |
| 10 |  |  |  |  |  |
|  |  | 40 |  |  |  |
|  |  |  |  |  |  |
|  | $\begin{aligned} & 1.5(0.5 \ldots 5 \mathrm{~A}) \\ & 2.5(6 \ldots 63 \mathrm{~A}) \\ & 2(80 \ldots 125 \mathrm{~A}) \\ & \hline \end{aligned}$ |  |  |  |  |

*21 for S804U-UCZ only
${ }^{* 22}$ for S804U-PVS only
*23 D125 only IEC/EN60947-2

## High performance Circuit Breakers

Selection table

*1 only up to 40 A; 10 kA up to $50 / 63$ A
*2 only for "D" characteristic
*3 values are not for all rated currents
*5 1500 V DC for 4P
*6 3 poles
*7 4 poles
*8 max. values. Detailed
values on page 2/12
*9 relevant product standard: E DIN VDE 0645
(based on IEC/EN 60898-1 and IEC/EN 60947-2)
*10 by 250 V DC 1-pole, 600
V3-and 4-pole
${ }^{* 11}$ by 600 V DC 2-pole
${ }^{*} 12 \leq 25 \mathrm{~A}$

## High performance Circuit Breakers

Selection table


## High performance Circuit Breakers

Selection table


High performance Circuit Breakers
Selection table

|  |
| :--- | :--- | :--- |

## Switch Disconnector SDB200 The details make the difference



IP20 - finger safety.

Fully compatible with all System pro M devices and accessories.

Patented housing design:
Environment-friendly and performance-optimized.


## Patented Housing Design

By using state-of-the-art housing material, ABB is taking care of the environment. With the latest generation of halogen-free thermoplastics for SDB200, it is possible to recycle the switch disconnectors completely without environmental pollution. The material works for the stability.


## Laser printing

All labels on the SDB200, as the approvals on the dome, technical details and the product identification, are printed by a laser. The laser printing ensures a friction, scratch and solvent resistant marking on the switch disconnectors for easy identification in case of maintenance or replacement. For control and acceptance procedure, it is important to see all markings also in the mounted position.


## Highest performance

With a rated voltage of $253 / 440 \mathrm{~V} \mathrm{AC}$, a rated conditional short-circuit current of 25 kA , terminals with protection from misconnection, a "Real CPI" switching position display, as well as full compatibility with all MCB accessories, the SDB200 is unique in its field of application. SDB200 complies with IEC/EN 60947-3.


ISI and CE marking
In addition to the international standards and markings IEC, the product is certified as per latest Indian Standards (ISI)


## IP20 protection

IP 20 - finger safe terminals. The System pro M compact® MCBs are equipped with $25 \mathrm{~mm}^{2}$ cylinder lift twin terminals, a well-proven and reliable technology - designed for sophisticated industrial use. The cross wiring can be easily done by inserting the System pro M compact ${ }^{\circledR}$ busbars into the rear terminal part and then the incoming wires into the front part of the terminal.


## Wide range of accessories

SDB200 is fully compatible to the complete range of System pro M compact accessories like:

- Auxiliary contacts, to be mounted on the left side, the right side or bottom fitting
- Shunt trips
- Undervoltage release
- Motor operating devices


## Switch Disconnector SDB200

## Technical data



| General data |  |
| :---: | :---: |
| Standards | IS/IEC 60947-3 |
| Poles | 2P, 3P, 4P |
| Rated current In | 40,63 A |
| Utilization category | AC-22A, DC-21B |
| Rated voltage Ue | 2...4P:415 V AC |
| Insulation voltage Ui | 250/440 V AC |
| Max. power frequency recovery voltage (Umax) | 2...4P : $457 \mathrm{~V} \mathrm{AC} ; 2 \mathrm{P}: 120 \mathrm{~V}$ DC |
| Min. operating voltage | 12 V AC |
| Rated frequency | 50 Hz , DC |
| Suitable for isolation | yes |
| Rated conditional short-circuit current | 10 kA in series with $\mathrm{NH} 00 \leq 63 \mathrm{~A} \mathrm{gG}$ |
| Overvoltage category | III |
| Pollution degree | 3 |
| Rated impulse withstand voltage Uimp. (1.2/50 s ) | 4 kV (test voltage 6.2kV at sea level, 5 kV at 2.000 m ) |
| Dielectric test voltage | 2 kV ( $50 / 60 \mathrm{~Hz}, 1 \mathrm{~min}$. |
| Overvoltage category | III |
| Pollution degree | 3 |
| Electrical endurance | le < 32 A: 20,000 ops. (AC), le $\geq 32$ A: 10,000 ops. (AC), 1,000 ops (DC) |


| Mechanical data |  |
| :--- | :--- |
| Housing | Insulation group II |
| Toggle | Insulation group II, red, sealable |
| Contact position indication | White marking on toggle (I ON / O OFF ) |
| Protection degree acc. to EN 60529 | IP20, IP40 in enclosure with cover |
| Mechanical endurance | 20.000 ops. |
| Shock resistance acc. to IEC/EN 60068-2-27 | $25 \mathrm{~g} \mathrm{-2} \mathrm{shocks}-13 \mathrm{~ms}$ |
| Vibration resistance acc. to IEC/EN $60068-2-6$ | $5 \mathrm{~g}-20$ cycles at $5 \ldots 150 \ldots 5 \mathrm{~Hz}$ with load 0.8 In |
| Environmental conditions (damp heat) acc. to IEC/EN $60068-2-30$ | 28 cycles with $55^{\circ} \mathrm{C} / 90-96 \%$ and $25^{\circ} \mathrm{C} / 95-100 \%$ |
| Ambient temperature | $-25 \ldots+55^{\circ} \mathrm{C}$ |
| Storage temperature | $-40 \ldots+70^{\circ} \mathrm{C}$ |


| Installation |  |
| :--- | :--- |
| Terminal | Cage terminal |
| Cross-section of conductors (top / bottom) Solid, Stranded | $25 \mathrm{~mm}^{2} / 25 \mathrm{~mm}^{2}$ |
| Flexible | $16 \mathrm{~mm}^{2} / 16 \mathrm{~mm}^{2}$ |
| Cross-section of busbars (top / bottom) | $10 \mathrm{~mm}^{2}$ |
| Tightening torque | 2 Nm |
| Screwdriver | No. 2 Pozidrive |
| Mounting | On DIN-Rail 35 mm acc. to EN 60715 by fast clip |
| Mounting position | Any |
| Supply | Any |
| Dimensions and weight |  |
| Mounting dimensions acc. to DIN 43880 | Mounting dimension 1 |
| Pole dimensions (H x D x W) | $85 \times 69 \times 17.5 \mathrm{~mm}$ |
| Pole weight | ca. 115 g |
| Combination with aux. elements |  |
| Auxiliary contact | yes |
| Signal contact | yes |
| Shunt trip | yes |
| Undervoltage release | yes |
| Overvoltage release | yes |
| Rotary handle | yes |
| Mechanical tripping device | yes |
| Padlock enabled | yes |
| Motor operating device | yes |
| Approvals | yes |
| SI approved | yes |

## Command and signaling

## E 200 switches

Technical data E200 80... 125 A

| Electrical Data |  |
| :---: | :---: |
| Standards | DIN EN 60947-3 (VDE0660-107); IEC/EN 60947-3 |
| Number of poles | 1P, 2P, 3P, 4P |
| Rated current ${ }_{\text {e }}$ | 80... 125 A |
| Rated voltage $\mathrm{U}_{\mathrm{e}}$ | 240/415 V AC; 60 V DC |
| Rated frequency f | 50/60 Hz; DC |
| Utilization category | $\mathrm{I}_{\mathrm{e}} 80 . .125 \mathrm{~A}$ A AC-22A (1..4-pole) |
|  | DC-21B (1/2-pole) |
|  | Acc. to DIN EN 60947-3 (VDE0660-107); IEC/EN 60947-3 |
| Protection fuse | NH $00 \mathrm{gG} \leq$ Rated current E200 |
| Positive opening | Acc. to DIN VDE 0113 |
| Rated conditional short-circuit current | $80 \ldots 100 \mathrm{~A}$ (1- to 4-pole): $25 \mathrm{kA}, 125 \mathrm{~A}$ (1- to 4-pole): 6 kA |
| Surge withstand capability $\mathrm{U}_{\text {imp }}$ | 4 kV (EN 60947-1) |
| Min. voltage $U_{\text {min }}$. | $12 \mathrm{~V} \mathrm{AC/DC} \mathrm{bei} \mathrm{0.1} \mathrm{VA}$ |
| Min. contact loading | $24 \mathrm{~V} \mathrm{AC} ; 4 \mathrm{~mA}$ |
| Mechanical Data |  |
| Housing | Grey, RAL 7035 |
| Toggle | Red (RAL 3000) / grey (RAL 7000), sealable |
| Contact position indication | On toggle (I ON / O OFF), on dome ( / 0) |
| Protection degree acc. to IEC/EN 60529 | IP10, IP40 in enclosure with cover |
| Electrical endurance | $80 . .100$ A: 1,500 ops., 125 A: 1,000 ops. |
| Mechanical endurance | 20,000 ops. |
| Environmental conditions acc. to IEC/EN 60068-2-30 | Constant climate 23/83, 40/93, 55/20 [ ${ }^{\circ} \mathrm{C} / \mathrm{RH}$ ] |
|  | Alternating climate 25/95-40/93 [ ${ }^{\circ} \mathrm{C} / \mathrm{RH}$ ] |
| Ambient temperature | $-25 \ldots+55^{\circ} \mathrm{C}$ |
| Storage temperature | $-40 \ldots+70^{\circ} \mathrm{C}$ |
| Installation |  |
| Terminal size | 2.5 to $50 \mathrm{~mm}^{2}$ |
| Cross-section busbar | $\geq 16 \mathrm{~mm}^{2}$ |
| Tigthening torque | 2.5 Nm |
| Screw driver | Nr. 2 Pozidriv |
| Mounting | On DIN rail 35 mm acc. to EN 60715 by fast clip |
| Mounting position | Any |
| Supply | Any |
| Dimensions and weight |  |
| Mounting dimensions acc. to DIN 43880 | Mounting dimension 1 |
| Pole dimensions ( $\mathrm{H} \times \mathrm{D} \times \mathrm{W}$ ) | $85 \times 70 \times 17.5 \mathrm{~mm}$ |
| Pole weight | Ca. 95 g |
| Accessories |  |
| Auxiliary contact | Max. 3x S2C-H 6R |
| Approvals | CE and RoHS conform |
|  | Approvals: VDE, CCC, KEMA, EAC |

## Residual Current Circuit Breaker FB200 A range designed to ensure efficiency and protection.

Test push-button to verify the correct functioning of the device.

Information on the device is laser printed to make it clearly visible and long lasting.



## ISI and CE marking

In addition to international standards and markings IEC, the product is certified as per latest Indian Standards (ISI).


High performance

- Rated breaking capacity and rated residual breaking capacity laser printed on the device: Im=I $\Delta \mathrm{m}=1000 \mathrm{~mA}$
- Co-ordination with a 63 A rated current with conditional shortcircuit capacity $\operatorname{Inc}=10000 \mathrm{~A}$.



## Auto reclosing

The FB200 can be coupled with the auto reclosing unit F2C-ARH in order to ensure continuity of service for the whole installation of your home, avoiding lack of supply.


## Accessories mountable

Wide a range of add-on accessories having 30 different types of accessories. Max. possibility of mounting: 4 different accessories on the right side and 1 on the left side ensures highest flexibility of functions. Universal contact, motorised unique accessory like mechanical tripping devices available only with ABB.


## Dual termination

Two terminals are available, the fore one for cables up to $25 \mathrm{~mm}^{2}$, the back one for cables up to $10 \mathrm{~mm}^{2}$ or for busbars.

## RCCB FB200

Technical data


| General data |  |
| :---: | :---: |
| Standards | IEC 61008; IS 12640-1: 2008 |
| Poles | $2 \mathrm{P}, 4 \mathrm{P}$ |
| Rated current In | $25 \mathrm{~A}, 40 \mathrm{~A}, 63 \mathrm{~A}$ |
| Rated residual operating current $1 \Delta n$ | $30 \mathrm{~mA}, 100 \mathrm{~mA}, 300 \mathrm{~mA}$ |
| Type (wave form of the earth leakage sensed) | AC |
| Rated voltage Ue | 240 / 415 V AC |
| Rated insulation voltage Ui acc. to IEC/EN 60664-1 | 500 V AC |
| Max. operating voltage of circuit test | 254 V AC |
| Min. operating voltage of circuit test | 110 V AC |
| Rated frequency | 50 Hz |
| Rated conditional short-circuit current Inc=I $\triangle \mathrm{c}$ | 10 kA (with a SCPD) |
| Rated residual breaking capacity $\mathrm{I} \Delta \mathrm{m}=\mathrm{Im}$ | 1 kA |
| Rated impulse withstand voltage (1.2/50) Uimp | 4 kV |
| Dielectric test voltage | $2,5 \mathrm{kV}$ |
| Surge current resistance (wave 8/20) | 250 A |
| Electrical endurance | 10.000 ops. |
| Mechanical Data |  |
| Toggle | Black, sealable in ON-OFF position |
| Contact position indication | White Marking on toggle ( I ON / O OFF ) |
| Protection degree acc. to EN 60529 | IP20, IP40 in enclosure with cover |
| Mechanical endurance | 20.000 ops. |
| Environmental conditions (damp heat) acc. to IEC/EN 60068-2-30 | Humid heat: 28 cycles with $55^{\circ} \mathrm{C} / 95 \ldots 100 \%$; constant climate conditions: $23^{\circ} \mathrm{C} / 83 \%$ $-40^{\circ} \mathrm{C} / 93 \%-55^{\circ} \mathrm{C} / 20 \%$; variable climate conditions: $25^{\circ} \mathrm{C} / 95 \%-40^{\circ} \mathrm{C} / 95 \%$ |
| Ambient temperature | $-5 . .+40^{\circ} \mathrm{C}$ |
| Storage temperature | $-40 . . .+70^{\circ} \mathrm{C}$ |
| Installation |  |
| Terminal | Failsafe bi-directional cylinder-lift terminal at top and bottom (shock protected) |
| Cross-section of conductors (top / bottom) Solid, Stranded | $25 \mathrm{~mm}^{2} / 25 \mathrm{~mm}^{2}$ |
| Cross-section of busbars (top / bottom) | $10 \mathrm{~mm}^{2} / 10 \mathrm{~mm}^{2}$ |
| Tightening Torque | 2,8 Nm |
| Screwdriver | No. 2 Pozidrive |
| Mounting | On DIN-Rail 35 mm acc. to EN 60715 by fast clip |
| Mounting position | Any |
| Supply | Optional |
| Dimensions and weight |  |
| Pole dimensions ( $\mathrm{H} \times \mathrm{D} \times \mathrm{W}$ ) | 2P: $85 \times 69 \times 35 \mathrm{~mm}$; $4 \mathrm{P}: 85 \times 69 \times 70 \mathrm{~mm}$ |
| Pole weight | 2P. $200 \mathrm{~g}: 4 \mathrm{P}: 350 \mathrm{~g}$ |
| Combination with aux. elements |  |
| Auxiliary contact | yes |
| Signal contact | yes |
| Shunt trip | yes |
| Undervoltage release | yes |
| Overvoltage release | yes |
| Padlock enabled | yes |
| Auto reclosing unit | yes |
| Motor operating device | yes |
| Approvals |  |
| ISI approved | yes |

## RCCB F 200. <br> The details make the difference <br> A range designed to ensure efficiency and protection




Two terminals are available, the fore one for cables up to $25 \mathrm{~mm}^{2}$, the back one for cables up to $10 \mathrm{~mm}^{2}$ or for busbars.


RCCBs F200 can be used in ambient conditions where the temperature of the surrounding atmosphere has values between $-25^{\circ} \mathrm{C}$ (snowflake laser printed on the front of the device) and $+55^{\circ} \mathrm{C}$.


High performances:

- rated breaking capacity and rated residual breaking capacity laser printed on the device: Im $=1 \Delta \mathrm{~m}=1000 \mathrm{~A}$
- coordination with a 100 A rated current SCPD (short-circuit protective device) $=10000 \mathrm{~A}$.


The availability of two terminals offers different connection solutions thanks to the possibility to connect two independent cables in the same device: the second terminal can be used for an auxiliary circuit or for the supply of devices with small section cables without connecting them together with the main circuit.


The F 202 can be coupled with the autoreclosing unit F2C-ARH in order to ensure continuity of service for the whole installation of your home avoiding lack of supply.

## RCCBs

## F200 technical features



| Standards |  |  |
| :---: | :---: | :---: |
| Electrical features | Type (wave form of the earth leakage sensed) |  |
|  | Number of poles |  |
|  | Rated current In | A |
|  | Rated sensitivity I $\\|$ n | A |
|  | Rated voltage Ue IEC | V |
|  | UL/CSA | V |
|  | Insulation voltage Ui | V |
|  | Row Operating voltace of circuit test UL/CSA |  |
|  | Operating voltage of circuit test Ut IEC | V |


|  |  | UL/CSA | v |
| :---: | :---: | :---: | :---: |
|  | Rated frequency |  | Hz |
|  | Rated conditional short-circuit current $\text { Inc=I } \Delta(3$ | SCPD - fuse gG 100 A | kA |
|  | Rated residual breaking capacity $1 \Delta \mathrm{~m}=$ |  | kA |
|  | Rated impulse withstand voltage (1.2/50) |  | kV |
|  | Dielectric test voltage at ind. freq. for 1 |  | kV |
|  | Overvoltage category |  |  |
|  | Pollution degree |  |  |
|  | Surge current resistance (wave 8/20) |  | A |
| Mechanical features | Housing |  |  |
|  | Toggle |  |  |
|  | Contact position indicator (CPI) |  |  |
|  | Electrical life |  |  |
|  | Mechanical life |  |  |
|  | Protection degree | housing |  |
|  |  | terminals |  |
|  | Environmental conditions (damp heat) | IEC/EN 60068-2-30 | ${ }^{\circ} \mathrm{C} / \mathrm{RH}$ |
|  | Shock resistance acc. to IEC/EN 60068-2 |  |  |
|  | Vibration resistance acc. to IEC/EN 600 |  |  |
|  | Ambient temperature (with daily average $\leq+35^{\circ} \mathrm{C}$ ) | IEC | ${ }^{\circ} \mathrm{C}$ |
|  | Storage temperature |  | ${ }^{\circ} \mathrm{C}$ |
| Installation | Terminal type |  |  |
|  | Terminal size top/bottom for cable | IEC | $\mathrm{mm}^{2}$ |
|  |  | UL/CSA | AWG |
|  | Terminal size top/bottom for busbar | IEC | $\mathrm{mm}^{2}$ |
|  |  | UL/CSA | AWG |
|  | Tightening torque | IEC | Nm |
|  |  | UL/CSA | in-lbs. |
|  | Stripping length of the cable |  |  |
|  | Tool |  |  |
|  | Mounting |  |  |
|  | Mounting position |  |  |
|  | Supply from |  |  |
|  | Withdrawal from busbar |  |  |
| Dimensions and weight | Dimensions ( $\mathrm{H} \times \mathrm{D} \times \mathrm{W}$ ) | 2P | mm |
|  |  | 4P | mm |
|  | Weight | 2P | g |
|  |  | 4P | g |
| Combination with auxiliary elements | Combinable with: | auxiliary contact |  |
|  |  | signal contact/auxilia |  |
|  |  | shunt trip |  |
|  |  | undervoltage release |  |

## RCCBs

## F200 technical features

| F200 AC | F200 A | F200 A AP-R | F200 A S | F200 A 110V | F200 A 400 Hz | F200 A 16 2/3 Hz | F200 F |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| IEC/EN 6 | ; IEC/EN 61 | -1, UL 1053 (1) |  | $\begin{aligned} & \text { IEC 61008-1; IEC } \\ & 61008-2-1 \text {; UL } 1053 \end{aligned}$ | IEC/EN 61008-1; IEC/EN 61008-2-1 | IEC/EN 61008-1; <br> IEC/EN 61008-2-1 | $\begin{aligned} & \text { IEC/EN } 61008, \text { IEC/ } \\ & \text { EN } 624232^{\text {nd }} \text { ed } \end{aligned}$ |
| AC | A | A | A | A | A | A | F |
| 2P (6), 4P | 5 A only 4P) |  |  | 2P, 4P | 4P | 2P, 4P | 2P, 4P |
| 16, 25, 40 | , 100, 125 | $\begin{aligned} & 25,40,63,80, \\ & 100,125 \end{aligned}$ | $\begin{aligned} & 40,63,80,100 \text {, } \\ & 125 \end{aligned}$ | 25, 40, 63, 80, 100 | 25,40 | 63 | 25, 40, 63 |
| 0.01-0.03 | 3-0.5 | 0.03 | 0.1-0.3-0.5-1 | 0.03 | 0.03 | 0.03-0.3-0.5 | 0.03 |
| 230/400-240/415 |  |  |  |  |  |  |  |
| 480Y/277 | 100 A) |  |  | - | - |  | - |
| 500 |  |  |  |  |  |  |  |
| 110-277 |  |  |  |  |  |  |  |
| In $\leq 100$; Right neutral: 110 (170 for 30mA)-254 (5); <br> Left neutral: 195 ( 300 for 30 mA ) - 440 (5) <br> In = 125 A; Right neutral: 100 (150 for 30 mA ) - 250 (5); <br> Left neutral: 200 ( 250 for 30 mA ) - 440 |  |  |  |  | 170-254 | 110 (170 for $30 \mathrm{~mA})-254$ | 170/259 |
| In $\leq 100$; Right neutral: 110-277; Left neutral: 195-480 (4) |  |  |  |  | - |  | - |
| 50/60 |  |  |  |  | 50/400 | $162 / 3$ | 50/60 |
| 10 (for 125 A fuse is gG 125 A ) |  |  |  |  |  |  | 10 |
| 1 (1.25 for 125 A) |  |  |  |  |  |  | 1 |
| 4 |  |  |  |  |  |  |  |
| 2.5 |  |  |  |  |  |  |  |
| III, disconnector abilities |  |  |  |  |  |  | - |
| 2 |  |  |  |  |  |  |  |
| NA |  | 3000 | 5000 | NA | NA | NA | 3000 |
| RAL 7035 |  |  |  |  |  |  |  |
| RAL 5015 |  |  |  |  |  |  |  |
| yes |  |  |  |  |  |  |  |
| 10000 (2000 for 125 A) |  |  |  | 10000 | 10000 | 10000 | 10000 |
| 20000 (5000 for 125 A) |  |  |  | 20000 | 20000 | 20000 | 20000 |
| IP4X |  |  |  |  |  |  |  |
| IP2X |  |  |  |  |  |  |  |
| 28 cycles with $55^{\circ} \mathrm{C} / 90-96 \%$ and $25^{\circ} \mathrm{C} / 95-100 \%$ |  |  |  |  |  |  |  |
| $25 \mathrm{~g}-2$ shocks -13 ms |  |  |  |  |  |  |  |
| $0,1 \mathrm{~mm}$ o $1 \mathrm{~g}-20$ cicli a $5 \ldots . .150 \ldots 5 \mathrm{~Hz}$ |  |  |  |  |  |  |  |
| $-25 \ldots+55(-25 \ldots+40$ for 125 A$)$ |  |  |  | $-25 . . .+55$ | $-25 \ldots+55$ | $-25 \ldots+55$ | $-25 \ldots+55$ |
| -40...+70 |  |  |  |  |  |  |  |
| failsafe bi-directional cylinder-lift terminal at top and bottom (shock protected) (cage for $\mathrm{In}>63 \mathrm{~A}$ ) (2) |  |  |  |  |  |  |  |
| 25/25 (35/35 single slot terminal for $\mathrm{In}>63 \mathrm{~A}$ ) |  |  |  |  | 25/25 | 25/25 | 25/25 |
| 18-4 (up to 63 A ) |  |  |  | - | - | - | - |
| 10/10 (not for $\mathrm{In}=80-100 \mathrm{~A}$ ) |  |  |  |  | 10/10 | 10/10 | 10/10 |
| 18-8 (up to 63 A ) |  |  |  | - | - | - | - |
| 2.8 (3 for $\ln =125 \mathrm{~A}$ ) |  |  |  | 2.8 | 2.8 | 2.8 | 2.8 |
| 25 (up to 63 A) |  |  |  | - | - | - | - |

25 (up to 63 A ) 12 mm (for $\mathrm{In}=80-100 \mathrm{~A} 12,7 \mathrm{~mm}$ Top terminals and $14,9 \mathrm{~mm}$ Bottom terminals)
Nr. 2 Pozidriv
on DIN rail EN 60715 ( 35 mm ) by means of fast clip device
Any
from top and bottom

| it is possible without using any tools only from the bott |  |  | - |
| :---: | :---: | :---: | :---: |
| $85 \times 69 \times 35$ | - | - | $85 \times 69 \times 35$ |
| $85 \times 69 \times 70$ ( $85 \times 69.5 \times 72$ for 125 A) | $85 \times 69 \times 70$ | $85 \times 69 \times 70$ | $85 \times 69 \times 70$ |
| 200 | - | - | 225 |
| 360 (380 for $\mathrm{In}=80$ and 100 A and 500 for $\mathrm{In}=125 \mathrm{~A}$ ) | 360 | 360 | 375 |
| yes (no for 125 A) | yes | yes | yes |
| yes | yes | yes | yes |
| yes (no for 125 A ) | yes | yes | yes |
| yes (no for 125 A) | yes | yes | yes |

## DDA 200 <br> The details make the difference A range designed to ensure efficiency and protection



DDA200 RCD block mounted with S200 MCB.



## Flexibility

DDA200 is suitable for mounting with S200 extensive range of MCBs, covering applications up to 63 A with breaking capacity up to 25 kA .


Possibility to connect a remote test button for 63A versions.


RCD block DDA200 can be used in ambient conditions where the temperature of the surrounding atmosphere has values between $-25^{\circ} \mathrm{C}$ (snowflake laser printed on the front of the device) and $+55^{\circ} \mathrm{C}$.


## No misuse

Mistakes in assembling the MCB on the DDA200 are avoided thanks to a mechanical key that avoids mounting an MCB with higher rated current than the RCD block.

## RCD-blocks

DDA 200 technical features


DDA 200
(1) All RCD-blocks DDA 200 with rated current 63 A are provided with two additional terminals for remote tripping.
(2) DDA200 A AE is provided with two additional terminals for remote release in positive safety.
A remote control circuit should be connected to those terminals where circuit breakers or push buttons with normally closed contacts should be inserted.

| Standards |  |  |
| :---: | :---: | :---: |
| Type (wave form of the earth leakage sensed) |  |  |
| Rated current $\mathrm{In}_{n}$ |  | [A] |
| Number of poles |  |  |
| Rated voltage $U_{\text {e }}$ | 2 P | [V] |
|  | 3P |  |
|  | 4 P |  |
| Insulation voltage $\mathrm{U}_{\mathrm{i}}$ |  | [V] |
| Pollution degree |  |  |
| Operating voltage of circuit test $U_{t}$ | 2 P | [V] |
|  | $3 P$ |  |
|  | 4 P |  |
| Rated frequency |  | [ Hz ] |
| Rated breaking capacity according to | IEC EN 61009 | [A] |
| Rated breaking capacity according to | IEC EN 60947-2 | [A] |
| Rated residual breaking capacity $\mathrm{I}_{\Delta m}$ |  | [kA] |
| Rated inpulse withstand capacity ( $1,2 / 50$ ) $\mathrm{U}_{\text {imp }}$ |  | [kV] |
| Dielectric test voltage at ind. freq. for 1 min . |  | [kV] |
| Surge current resistance (wave 8/20) |  | [A] |
| Rated sensitivity $\mathrm{I}_{\Delta n}$ |  | [A] |
| Housing ${ }^{\text {an }}$ |  |  |
| Toggle |  |  |
| Electrical life |  |  |
| Mechanical life |  |  |
| Protection degree | housing |  |
|  | terminals |  |
| Environmental conditions (damp heat) acc. to IEC/EN 60068-2-30 |  | [ ${ }^{\circ} \mathrm{C} / \mathrm{RH}$ ] |
| Shock resistance acc. to IEC/EN 60068-2-27 |  |  |
| Vibration resistance acc. to IEC/EN 60068-2-6 |  |  |
| Ambient temperature (with daily average $\leq+35^{\circ} \mathrm{C}$ ) |  | [ ${ }^{\circ} \mathrm{C}$ ] |
| Storage temperature |  | [ ${ }^{\circ} \mathrm{C}$ ] |
| Terminal type | 2 P |  |


|  | $3 \mathrm{P} / 4 \mathrm{P} \mathrm{I}_{\mathrm{n}}=25$ and 40 A |  |
| :---: | :---: | :---: |
|  | $3 \mathrm{P} / 4 \mathrm{P} \mathrm{I}_{\mathrm{n}}=63 \mathrm{~A}$ |  |
| Terminal size | 2P | [ $\mathrm{mm}^{2}$ ] |
|  | $3 \mathrm{P} / 4 \mathrm{P} \mathrm{I}_{\mathrm{n}}=25$ and 40 A | [ $\mathrm{mm}^{2}$ ] |
|  | $3 \mathrm{P} / 4 \mathrm{P} \mathrm{I}_{\mathrm{n}}=63 \mathrm{~A}$ | [ $\mathrm{mm}^{2}$ ] |
| Tightening torque | 2P | [ Nm ] |
|  | $3 \mathrm{P} / 4 \mathrm{P} \mathrm{I}_{\mathrm{n}}=25$ and 40 A | [ Nm ] |
|  | $3 \mathrm{P} / 4 \mathrm{P} \mathrm{I}_{\mathrm{n}}=63 \mathrm{~A}$ | [ Nm ] |
| Stripping length of the cable |  |  |
| Mounting |  |  |
| Mounting position |  |  |
| Dimensions | 2P | [mm] |
| H $\times$ P $\times \mathrm{L}$ | $3 \mathrm{P} / 4 \mathrm{P} \mathrm{I}_{\mathrm{n}}=25$ and 40 A | [mm] |
|  | $3 \mathrm{P} / 4 \mathrm{P} \mathrm{I}_{\mathrm{n}}=63 \mathrm{~A}$ | [mm] |
| Weight | 2P | [g] |
|  | $3 \mathrm{P} / 4 \mathrm{P} \mathrm{I}_{\mathrm{n}}=25$ and 40 A | [g] |
|  | $3 \mathrm{P} / 4 \mathrm{P} \mathrm{I}_{\mathrm{n}}=63 \mathrm{~A}$ | [g] |
| Combinable with | S200L |  |
|  | S 200 |  |
|  | S 200M |  |
|  | S 200 P |  |

## RCD-blocks

## DDA 200 technical features

| DDA 200 AC | DDA 200 A | DDA 200 A AP-R | DDA 200 A AE | DDA 200 A S | DDA 200 F | DDA 200 B |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| IEC/EN 6100 | nn. G; IEC/EN | 1009-2-1 |  |  | $\begin{aligned} & \text { IEC/EN } 61009 \text { App.G, IEC/EN } \\ & 624232^{\text {nd }} \text { ed } \end{aligned}$ | IEC/EN 61009-1 Ann. G; IEC/EN 61009-2-1, IEC EN 62423 |
| AC | A | A | A | A | F | B |
| 25, 40, 63 (1) |  | 25, 40, 63 (1) | 63 (2) | 63 (1) | 40, 63 A1 (to mount with MCB with $\ln =0,5 \ldots 63 \mathrm{~A}$ ) | 25-40-63 |
| 2P, 3P, 4P |  |  |  |  | 2P | 2P, 3P, 4P |
| 230 (400 for | ial execution | 400 V ) | 230 | 230 | 230 | 230 |
| 230/400 |  |  | 400 | 400 | - | 400 |
| 230/400 |  |  | 230/400 | 230/400 | - | 230/400 |
| 500 |  |  |  |  |  |  |
| 2 |  |  |  |  |  |  |
| 110-254 for 195-254 (170 execution @ | al execution for 30 mA ; V) | 10 V ; <br> for special | 184-264 | $\begin{aligned} & 195-254 \\ & (170-254 \text { for } 30 \\ & \mathrm{mA}) \end{aligned}$ | 254/170 | $\begin{aligned} & 195-254 \\ & (170-254 \text { for } 30 \mathrm{~mA}) \end{aligned}$ |
| $195-440$ <br> execution @ | 0 for 30 mA ; v) | -254 for special | 310-440 | $\begin{aligned} & 195-440 \\ & (300-440 \text { for } 30 \\ & \mathrm{mA}) \end{aligned}$ | - | $\begin{aligned} & 310-440 \\ & (300-440 \text { for } 30 \mathrm{~mA}) \end{aligned}$ |
| $195-440$ execution @ | $0 \text { for } 30 \mathrm{~mA} \text {; }$ | -254 for special | 184-264 | $\begin{aligned} & 195-440(300- \\ & 440 \text { for } 30 \mathrm{~mA}) \end{aligned}$ | - | $\begin{aligned} & 195-254 \\ & (300-440 \text { for } 30 \mathrm{~mA}) \end{aligned}$ |
| 50/60 |  |  |  |  |  |  |
| same of the coupled MCB |  |  |  |  |  |  |
| same of the coupled MCB |  |  |  |  |  |  |
| same of the coupled MCB |  |  |  |  |  |  |
| 4 |  |  |  |  |  |  |
| 2,5 |  |  |  |  |  |  |
| NA |  | 3000 | NA | 5000 | 3000 | 3000 (5000 for selective types) |
| 0.01-0.03-0.1-0. | -0.5-1 | 0.03 | 0.03-0.3-0.5-1 | 0.1-0.3-0.5-1 | - | 0.03-0.3-0.5 |
| RAL 7035 |  |  |  |  |  |  |
| RAL 7035 |  |  |  |  |  |  |
| 10000 |  |  |  |  |  |  |
| 20000 |  |  |  |  |  |  |
| IP4X |  |  |  |  |  |  |
| IP2X |  |  |  |  |  |  |
| 28 cycles with $55^{\circ} \mathrm{C} / 90-96 \%$ and $25^{\circ} \mathrm{C} / 95-100 \%$ |  |  |  |  |  |  |
| $25 \mathrm{~g}-2$ shocks -13 ms |  |  |  |  |  |  |
| 0.1 mm or $1 \mathrm{~g}-20$ cycles at $5 . . .150 . . .5 \mathrm{~Hz}$ |  |  |  |  |  |  |
| -25...+55 |  |  |  |  |  |  |
| -40...+70 |  |  |  |  |  |  |
| bi-directional cylinder-lift |  |  |  |  | Top: failsafe bi-directional cylinder-lift terminal (shock protected) Bottom: failsafe cylinder-lift terminal (shock protected) | bi-directional cylinder-lift |
| cage type |  |  |  |  | - | - |
| bi-directional cylinder-lift |  |  |  |  | - | bi-directional |
| (rigid or flexible) up to 25 |  |  |  |  |  | cylinder-lift |
| (rigid or flexible) up to 16 |  |  |  |  | - | - |
| (rigid or flexible) up to 25 |  |  |  |  | - | (rigid or flexible) up to 25 |
| 2.8 |  |  |  |  |  |  |
| 1.2 |  |  |  |  | - | - |
| 2.8 |  |  |  |  | - | 2.8 |
| $12,5 \mathrm{~mm}$ ( $10,2 \mathrm{~mm}$ for the additional terminals for remote tripping, only for $\mathrm{ln}=63 \mathrm{~A}$ ) |  |  |  |  |  |  |
| on DIN rail EN 60715 ( 35 mm ) by means of fast clip device |  |  |  |  |  |  |
| Any |  |  |  |  |  |  |
| $85 \times 69 \times 35$ |  |  |  |  | $93 \times 69 \times 69,5$ | $85 \times 69 \times 70$ |
| $85 \times 69 \times 35$ |  |  |  |  | - | $85 \times 69 \times 70$ |
| $85 \times 69 \times 70$ |  |  |  |  | - | $85 \times 69 \times 70$ |
| 175 |  |  |  |  | 180 | 350 |
| 175 |  |  |  |  | - | 375 |
| 325 |  |  |  |  | - | 395 |
| yes |  |  |  |  | - | yes |
| yes |  |  |  |  | - | yes |
| yes |  |  |  |  | - | yes |
| yes |  |  |  |  | $-\square$ | yes |

## RCD-blocks

## DDA 800 technical features



|  | Standards |  |  |
| :---: | :---: | :---: | :---: |
| Electrical features | Type (wave form of the earth leakage sensed) |  |  |
|  | Poles |  |  |
|  | Rated current In |  | A |
|  | Rated sensitivity I $\Delta$ n |  | A |
|  | Rated voltage Ue |  | V |
|  | Insulation voltage Ui |  | V |
|  | Operating voltage of circuit test Ut |  | V |
|  | Rated frequency |  | Hz |
|  | Rated breaking capacity (Icn) acc. to IEC /EN 60947-2 |  | A |
|  | Rated residual breaking capacity $1 \Delta \mathrm{~m}$ | with S 800 C | kA |
|  |  | with S 800 N | kA |
|  |  | with S 800 S | kA |
|  | Rated impulse withstand voltage (1.2/50) Uimp |  | kV |
|  | Dielectric test voltage at ind. freq. for 1 min . |  | kV |
|  | Surge current resistance (wave 8/20) |  | A |
| Mechanical features | Toggle |  |  |
|  | Electrical life |  |  |
|  | Mechanical life |  |  |
|  | Protection degree | housing |  |
|  |  | terminals |  |
|  | Environmental conditions (damp heat) acc. to IEC/EN 60068-2-30 |  | ${ }^{\circ} \mathrm{C} / \mathrm{RH}$ |
|  | Ambient temperature (with daily average $\leq+35^{\circ} \mathrm{C}$ ) |  | ${ }^{\circ} \mathrm{C}$ |
|  | Storage temperature |  | ${ }^{\circ} \mathrm{C}$ |
|  | Terminal size for cables | flexible | $\mathrm{mm}^{2}$ |
|  |  | rigid | $\mathrm{mm}^{2}$ |
|  | Tightening torque |  | Nm |
|  | Mounting |  |  |
| Dimensions and weight | Dimensions ( $\mathrm{H} \times \mathrm{D} \times \mathrm{W}$ ) | 2P | mm |
|  |  | 3P | mm |
|  |  | 4 P | mm |
|  | Weight | 2P | g |
|  |  | 3P | 9 |
|  |  | 4 P | g |
| Combination with MCBs | Combinable with: | S800 N |  |
|  |  | S 800 S |  |

[^34]
## RCD-blocks

## DDA 800 technical features

| DDA 800 AC | DDA 800 A |  | DDA 800 A AP-R | DDA 800 A S |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| IEC/EN 60947-2 Ann. B |  |  |  |  |  |
| AC | A |  | A | A |  |
| 2P, 3P, 4P |  |  |  |  |  |
| 63 | 63 | 100 | 63-100 | 63 | 100 |
| 0.03-0.3 | 0.03-0.3-0.5 | 0.3-0.5 | 0.03 | 0.3-1 | 0.3-0.5*-1 |
| 230/400-240/415-400/690 |  |  |  |  |  |
| 690 |  |  |  |  |  |
| 195-690 |  |  |  |  |  |
| 50... 60 |  |  |  |  |  |
| according to the breaking capacity of the associated MCB |  |  |  |  |  |
| according to the Icu of the associated MCB |  |  |  |  |  |
| according to the Icu of the associated MCB |  |  |  |  |  |
| according to the Icu of the associated MCB |  |  |  |  |  |
| 6 |  |  |  |  |  |
| 2.5 |  |  |  |  |  |
| NA |  |  | 3000 | 5000 |  |
| blue operating just from OFF position |  |  |  |  |  |
| 10000 |  |  |  |  |  |
| 20000 |  |  |  |  |  |
| IP4X |  |  |  |  |  |
| IP2X |  |  |  |  |  |
| 28 cycles with $55^{\circ} \mathrm{C} / 90-96 \%$ and $25^{\circ} \mathrm{C} / 95-100 \%$ |  |  |  |  |  |
| -25...+60 |  |  |  |  |  |
| -40...+70 |  |  |  |  |  |
| 6... 50 |  |  |  |  |  |
| 6...70 |  |  |  |  |  |
| min. 3 / max. 4 |  |  |  |  |  |
| on DIN rail EN 60715 ( 35 mm ) by means of rapid fixing device |  |  |  |  |  |
| $108.2 \times 82.3 \times 81$ |  |  |  |  |  |
| $108.2 \times 82.3 \times 117$ |  |  |  |  |  |
| $108.2 \times 82.3 \times 117$ |  |  |  |  |  |
| 300 for 63 A - 415 for 100 A |  |  |  |  |  |
| 400 for 63 A - 640 for 100 A |  |  |  |  |  |
| 460 for 63 A - 765 for 100 A |  |  |  |  |  |
| yes |  |  |  |  |  |
| yes |  |  |  |  |  |

## RCBO DS201 <br> Compact solutions for a complete protection




## Easy installation

The terminals available on DS201 make easier the supply operation in parallel with cables and busbars as they are composed by two different seats: a front seat for $25 \mathrm{~mm}^{2}$ cables and a back seat for $10 \mathrm{~mm}^{2}$ busbars. Supply is possible either from top or bottom side.


## Display the operational status

Easy troubleshooting and reduced downtime for maintenance operations thanks to both the blue indicator, that signals the differential tripping to immediately identify any earth fault (it cannot be activated in case of manual operation on the toggle) and the contact position indicator (CPI) that helps to always know the status of the contacts (red: closed contacts; green: open contacts).


## Additional laser printing

Additional information are laser printed on the lateral side of the device, including also the wiring diagram and the EAN code respectively for an easier installation and for an easier stock management.


## Mounting clip

Stable fixing on DIN rail, easy and fast mounting and dismounting operations thanks to the standard mounting clip.


## Reliable in extreme conditions

RCBO DS201 can be used in ambient conditions where the temperature of the surrounding atmosphere has values between $-25^{\circ} \mathrm{C}$ (snowflake laser printed on the front of the device) and $+55^{\circ} \mathrm{C}$.


## RFid

Product Made in Italy, with RFid tag on the product side containing a unique serial number assigned to ABB according to the standard ISO/ IEC FCD 15693-3 in order to authenticate the product.

## RCBOs

## DS201 technical features

|  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
|  |  |  | DS201L | DS201 |
|  | Standards |  | IEC/EN 61009-1; IEC/EN 61009-2-1 | IEC/EN 61009-1; IEC/EN 61009-2-1 |
| Electrical features | Type (wave form of the earth leakage sensed) |  | A - AC - APR | A - AC - APR |
|  | Number of poles |  | $1 \mathrm{P}+\mathrm{N}$ | $1 \mathrm{P}+\mathrm{N}$ |
|  | Rated current In | A | $6 \leq \ln \leq 32$ | $1 \leq \ln \leq 40$ |
|  | Rated sensitivity IDn | A | 0.01-0.03-0.3 | 0.01-0.03-0.1-0.3 |
|  | Rated voltage Ue | V | 230-240 | 230-240 |
|  | Insulation voltage Ui | v | 500 V AC | 500 V AC |
|  | Overvoltage category |  | III | III |
|  | Pollution degree |  | 2 | 2 |
|  | Operating voltage of circuit test Ut | v | 110 (170 for 30mA) - 264 | 110 (170 for 30mA) - 264 |
|  | Rated frequency | Hz | 50/60 | 50/60 |
|  | Rated breaking capacity Icn acc. to IEC/EN 61009-1 | A | 4500 | 6000 |
|  | Rated breaking capacity ultimate Icu | kA | 6 | 10 |
|  | acc. to IEC/EN 60947-2 (only referring to short circuit test) | kA | 4.5 | 7.5 |
|  | Rated residual breaking capacity $1 \Delta \mathrm{~m}$ $1 \Delta \mathrm{~m}$ according to EN 61009-1 | A | 4500 | 6000 |
|  | Rated residual breaking capacity $1 \Delta \mathrm{~m}$ I $\Delta \mathrm{m}$ according to IEC 61009-1 | A | 4500 | 6000 up to 25 A; 4500 for 32A and 40A |
|  | Rated impulse withstand voltage (1.2/50) Uimp | kV | 4 kV | 4 kV |
|  | Dielectric test voltage at ind. freq. for 1 min . | kV | 2 kV ( $50 / 60 \mathrm{~Hz}, 1 \mathrm{~min}$. | 2 kV ( $50 / 60 \mathrm{~Hz}, 1 \mathrm{~min}$. |
|  | Thermomagnetic release - B: $3 \ln \leq \ln \leq 5 \ln$ |  |  | ■ |
|  | characteristic $\mathrm{C}: 5 \mathrm{ln} \leq \ln \leq 10$ In |  | ■ | ■ |
|  | $\begin{aligned} & \text { K: } 10 \ln \leq \ln \leq 14 \\ & \text { In } \end{aligned}$ |  |  | ■ |
|  | Energy limiting class acc. to EN 61009-1 |  | 3 | 3 |
|  | Surge current resistance (wave 8/20) | A | NA for A, AC versions; 3000 for APR version | NA for A, AC versions; 3000 for APR version |
| Mechanical features | Housing |  | Insulation group I- II, RAL 7035 | Insulation group I-II, RAL 7035 |
|  | Toggle |  | Insulation group II, Black RAL 9005, sealable in ON-OFF positions | Insulation group II, Black RAL 9005, sealable in ON-OFF positions |
|  | Contact position indication |  | Green/Red Window | Green/Red Window |
|  | Earth fault trip indication |  | Blue flag on toggle | Blue flag on toggle |
|  | Electrical life | operations | 10000 | 10000 |
|  | Mechanical life | operations | 20000 | 20000 |
|  | Protection degree acc. to EN housing |  | IP4X | IP4X |
|  | 60529 terminals |  | IP2X | IP2X |
|  | Shock resistance acc. to IEC/EN 60068-2-27 |  | 25g-2 shocks - 13 ms | 25g-2 shocks - 13 ms |
|  | Vibration resistance acc. to IEC/EN 60068-2-6 |  | 0.1 mm or $1 \mathrm{~g}-20$ cycles at <br> 5... $150 . . .5 \mathrm{~Hz}$ | 0.1 mm or $1 \mathrm{~g}-20$ cycles at <br> 5...150... 5 Hz |
|  | Environmental conditions (damp heat) acc. to IEC/EN 60068-2-30 | ${ }^{\circ} \mathrm{C} / \mathrm{RH}$ | 28 cycles with $55^{\circ} \mathrm{C} / 90-96 \%$ and $25^{\circ} \mathrm{C} / 95-100 \%$ | 28 cycles with $55^{\circ} \mathrm{C} / 90-96 \%$ and $25^{\circ} \mathrm{C} / 95-100 \%$ |
|  | Reference temperature for setting of thermal element | ${ }^{\circ} \mathrm{C}$ | 30 | 30 (20 for K tripping char) |
|  | Ambient temperature (with daily average $\leq+35^{\circ} \mathrm{C}$ ) | ${ }^{\circ} \mathrm{C}$ | -25...+55 | -25...+55 |
|  | Storage temperature | ${ }^{\circ} \mathrm{C}$ | -40...+70 | -40...+70 |

## RCBOs

## DS201 technical features

|  |  |  |
| :---: | :---: | :---: |
| DS201 M | DS201 M 110V | DS201 T |
| IEC/EN 61009-1; IEC/EN 61009-2-1 | IEC 61009-1; IEC 61009-2-1 | IEC/EN 61009-1; IEC/EN 61009-2-1 |
| A - AC - APR - F | A | A - APR |
| $1 \mathrm{P}+\mathrm{N}$ | $1 \mathrm{P}+\mathrm{N}$ | $1 \mathrm{P}+\mathrm{N}$ |
| $4 \leq \ln \leq 40$ | $6 \leq \ln \leq 40$ | $6 \leq \ln \leq 40$ |
| 0.01-0.03-0.1-0.3 | 0.03 | 0.03 |
| 230-240 | 230-240 | 230-240 |
| 500 V AC | 500 V AC | 500 V AC |
| III | III | III |
| 2 | 2 | 2 |
| 110 (170 for 30 mA$)-264$ | 110-264 | 170-264 |
| 50/60 | 50/60 | 50/60 |
| 10000 | 10000 | 6000 |
| 15 | 15 | 10 |
| 11.2 | 11.2 | 7.5 |
| 6000 | 6000 | 6000 |
| 6000 up to 25 A; 4500 for 32A and 40A | 6000 up to 25 A; 4500 for 32A and 40A | 6000 up to 25 A; 4500 for 32A and 40A |
| 4 kV | 4 kV | 4 kV |
| $2 \mathrm{kV}(50 / 60 \mathrm{~Hz}, 1 \mathrm{~min}$. | $2 \mathrm{kV}(50 / 60 \mathrm{~Hz}, 1 \mathrm{~min}$. | $2 \mathrm{kV}(50 / 60 \mathrm{~Hz}, 1 \mathrm{~min}$. |
| $\square$ | $\square$ |  |
| $\square$ | $\square$ | $\square$ |
| $\square$ |  |  |
| 3 | NA | 3 |
| NA for A, AC versions; 3000 for APR and $F$ version | NA | NA for A; 3000 for APR version |
| Insulation group I- II, RAL 7035 | Insulation group I - II, RAL 7035 | Insulation group I- II, RAL 7035 |
| Insulation group II, Black RAL 9005, sealable in ON-OFF positions | Insulation group II, Black RAL 9005, sealable in ON-OFF positions | Insulation group II, Black RAL 9005, sealable in ON-OFF positions |
| Green/Red Window | Green/Red Window | Green/Red Window |
| Blue flag on toggle | Blue flag on toggle | Blue flag on toggle |
| 10000 | 10000 | 10000 |
| 20000 | 20000 | 20000 |
| IP4X | IP4X | IP4X |
| IP2X | IP2X | IP2X |
| $25 \mathrm{~g}-2$ shocks -13 ms | $25 \mathrm{~g}-2$ shocks -13 ms | 25g-2 shocks - 13 ms |
| 0.1 mm or $1 \mathrm{~g}-20$ cycles at $5 \ldots .150 \ldots 5 \mathrm{~Hz}$ | 0.1 mm or $1 \mathrm{~g}-20$ cycles at $5 \ldots .150 \ldots 5 \mathrm{~Hz}$ | 0.1 mm or $1 \mathrm{~g}-20$ cycles at $5 \ldots 150 \ldots 5 \mathrm{~Hz}$ |
| 28 cycles with $55^{\circ} \mathrm{C} / 90-96 \%$ and $25^{\circ} \mathrm{C} / 95-100 \%$ | 28 cycles with $55^{\circ} \mathrm{C} / 90-96 \%$ and $25^{\circ} \mathrm{C} / 95-100 \%$ | 28 cycles with $55^{\circ} \mathrm{C} / 90-96 \%$ and $25^{\circ} \mathrm{C} / 95-100 \%$ |
| 30 (20 for K tripping char) | 30 | 30 |
| $-25 \ldots+55$ | $-25 \ldots+55$ | $-25 \ldots+55$ |
| $-40 \ldots+70$ | $-40 \ldots+70$ | $-40 \ldots+70$ |

## RCBOs

DS201 technical features

|  |  |  |  |
| :--- | :--- | :--- | :--- | :--- |

## RCBOs

DS201 technical features

|  |  |  |
| :---: | :---: | :---: |
| DS201 M | DS201 M 110V | DS201 T |
| failsafe bi-directional cylinder-lift terminal (shock protected) | failsafe bi-directional cylinder-lift terminal (shock protected) | failsafe bi-directional cylinder-lift terminal (shock protected) |
| 25/25 | 25/25 | 25/25 |
| 10/10 | 10/10 | 10.X |
| 2.8 | 2.8 | 02.VIII |
| 12 | 12 | 12 |
| on DIN rail EN 60715 ( 35 mm ) by means of mounting clip | on DIN rail EN 60715 ( 35 mm ) by means of mounting clip | on DIN rail EN 60715 ( 35 mm ) by means of mounting clip |
| Any | Any | Any |
| Top/Bottom terminals | Top/Bottom terminals | Top/Bottom terminals |
| $85 \times 69 \times 35$ | $85 \times 69 \times 35$ | $85 \times 69 \times 35$ |
| 200 | 200 | 200 |
| yes | yes | yes |
| yes | yes | yes |
| yes | yes | yes |
| yes | yes | yes |
| yes | yes | yes |
| yes | yes | yes |
| yes | yes | yes |

## RCBOs

## DS202C technical features

|  |  |  |  | DS202C | DS202C M | DS202C M |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- |

## RCBO DS203NC. The effective choice The benefits of a product with the highest quality standards




Use with cables and with busbars
Terminals with two slots allow to use different types of conductors: one housing is designed for cables up to $25 \mathrm{~mm}^{2}$, the other for busbars or cables up to $10 \mathrm{~mm}^{2}$.


## Laser print information

All the necessary technical and installation information are laser printed on the front and side of units ensuring visibility along the time, including order code on front of device for future orders.


## RFid

Radio frequency tracking via a radio frequency tag to facilitate logistics and to be assured of the originality of the product.


## Mounting clip

The mounting clip eases the installation and removal from the DIN rail, even when used in a battery of devices with busbars on bottom terminals (without need of remove other devices).


Differential trip indicator
In case of tripping due to earth fault, a blue flag appears on the toggle thus immediate showing the cause of trip of the device. This feature helps in troubleshooting on the network and reduces the downtime for maintenance.


## Approval stamps

DS203NC residual current circuit breakers with overcurrent protection can meet the different installation habits in the various countries and are approved by the most important certification bodies like IMQ, VDE, EAC, KEMA.

## RCBOs

## DS203NC technical features

|  |  |  | DS203NC L | DS203NC |
| :---: | :---: | :---: | :---: | :---: |
| Standards |  |  | IEC/EN 61009-1; IEC/EN 61009-2-1 | IEC/EN 61009-1; IEC/EN 61009-2-1 |
| Electrical features |  |  |  |  |
| Type (wave form of the earth leakage sensed) |  |  | AC, A, APR | AC, A, APR, S |
| Number of poles |  |  | $3 P+N$ | $3 \mathrm{P}+\mathrm{N}$ |
| Rated current In |  | A | $6 \leq \ln \leq 32 \mathrm{~A}$ | $6 \leq \ln \leq 32 \mathrm{~A}$ |
| Rated sensitivity I $\triangle$ n |  | mA | 30-300 | 30-100-300 |
| Rated voltage Ue |  | V | $400-415 \mathrm{~V}$ | $400-415 \mathrm{~V}$ |
| Insulation voltage Ui |  | v | 500 V AC | 500 V AC |
| Overvoltage category |  |  | III | III |
| Pollution degree |  |  | 2 | 2 |
| Operating voltage of circuit test Ut |  | V | 195 (300 for 30 mA$)-440$ |  |
| Rated frequency |  | Hz | 50/60 | 50/60 |
| Rated breaking capacity acc. to IEC/ EN 61009 | ultimate Icn | A | 4500 | 6000 |
| Rated breaking capacity acc. to IEC/EN 60947-2 | ultimate Icu | kA | 6 | 10 |
|  | service Ics | kA | 4.5 | 5 |
| Rated residual breaking capacity IDm acc. To EN 61009 |  | kA | 4.5 | 6 |
| Rated residual breaking capacity IDm acc. to IEC 61009 |  | kA | 4.5 | 4.5 |
| Rated impulse withstand voltage (1.2/50) Uimp |  | kV | 4 | 4 |
| Dielectric test voltage at ind. freq. for 1 min . |  | kV | 2.5 | 2.5 |
| Thermomagnetic release characteristic | B: $3 \ln \leq \operatorname{lm} \leq 5 \mathrm{In}$ |  |  | $\square$ |
|  | C: $5 \ln \leq \operatorname{lm} \leq 10$ In |  | ■ | $\square$ |
|  | K: $10 \mathrm{ln} \leq \mathrm{Im} \leq 14 \mathrm{In}$ |  |  | $\square$ |
| Surge current resistance (wave 8/20) |  | A | NA for A, AC versions; 3000 for APR version | NA for A, AC versions; 3000 for APR version; 5000 for $S$ version |
| Mechanical features |  |  |  |  |
| Housing |  |  | Insulation group II, RAL 7035 | Insulation group II, RAL 7035 |
| Toggle |  |  | black, sealable in ON-OFF positions | black, sealable in ON-OFF positions |
| Flag indicator |  |  | Differential trip indicator: blue on toggle | Differential trip indicator: blue on toggle |
| Contact position indication |  |  | CPI on window | CPI on window |
| Electrical life |  | operations | 10000 | 10000 |
| Mechanical life |  | operations | 20000 | 20000 |
| Protection degree | housing |  | IP4X | IP4X |
|  | terminals |  | IP2X | IP2X |
| Shock resistance acc. to IEC/EN 60068-2-27 |  |  | 30g-2 shocks - 13 ms | 30g-2 shocks - 13ms |
| Vibration resistance acc. to IEC/ EN 60068-2-6 |  |  | $0,35 \mathrm{~mm}$ or $5 \mathrm{~g}-20$ cycles at <br> 5...150... 5 Hz without load | $0,35 \mathrm{~mm}$ or $5 \mathrm{~g}-20$ cycles at <br> $5 . .150 . . .5 \mathrm{~Hz}$ without load |
| Environmental conditions (damp heat) acc. to IEC/EN$60068-2-30$ |  | ${ }^{\circ} \mathrm{C} / \mathrm{RH}$ | 28 cycles with $55^{\circ} \mathrm{C} / 90-96 \%$ and $25^{\circ} \mathrm{C} / 95-100 \%$ | 28 cycles with $55^{\circ} \mathrm{C} / 90-96 \%$ and $25^{\circ} \mathrm{C} / 95-100 \%$ |
| Reference temperature for setting of thermal element |  | ${ }^{\circ} \mathrm{C}$ | 30 | 30 |
| Ambient temperature (with daily average $\leq+35^{\circ} \mathrm{C}$ ) |  | ${ }^{\circ} \mathrm{C}$ | $-25 \ldots+55$ | $-25 \ldots+55$ |
| Storage temperature |  | ${ }^{\circ} \mathrm{C}$ | -40...+70 | -40...+70 |

## RCBOs

DS203NC technical features


## RCBOs

## DS800 technical features



|  | Standards |  |  |
| :---: | :---: | :---: | :---: |
| Electrical features | Operating characteristic: type (wave form of the earth leakage sensed) |  |  |
|  | Poles |  |  |
|  | Rated sensitivity $1 \Delta n$ |  | A |
|  | Rated current In |  | A |
|  | Rated voltage Ue |  | V |
|  | Insulation voltage Ui |  | V |
|  | Operating voltage of circuit test Ut |  | V |
|  | Rated frequency |  | Hz |
|  | Rated ultimate short-circuit breaking capacity Icu | 240/415 V AC | kA |
|  |  | 254/440 V AC | kA |
|  |  | 289/500 V AC | kA |
|  |  | 400/690 V AC | kA |
|  | Rated service short-circuit breaking capacity Ics | 240/415 V AC | kA |
|  |  | 254/440 V AC | kA |
|  |  | 289/500 V AC | kA |
|  |  | 400/690 V AC | kA |
|  | Rated impulse withstand voltage (1.2/50) Uimp |  | kV |
|  | Dielectric test voltage at ind. freq. for 1 min . |  | kV |
|  | Thermomagnetic release characteristic | B: $3 \mathrm{ln} \leq \mathrm{Im} \leq 5 \mathrm{In}$ |  |
|  |  | C: $5 \mathrm{ln} \leq \operatorname{lm} \leq 10 \mathrm{ln}$ |  |
|  |  | D**: $10 \mathrm{ln} \leq \mathrm{lm} \leq 20 \mathrm{ln}$ |  |
|  |  | $\mathrm{K}^{* *}: 8 \mathrm{ln} \leq \mathrm{Im} \leq 14 \mathrm{In}$ |  |
|  | Surge current resistance acc. to VDE 0432 Part 2 (wave 8/20) |  | A |
| Mechanical features | Toggle |  |  |
|  | Electrical life |  |  |
|  | Mechanical life |  |  |
|  | Protection degree | housing |  |
|  |  | terminals |  |
|  | Environmental conditions (damp heat) acc. to IEC/EN 60068-2-30 |  | ${ }^{\circ} \mathrm{C} / \mathrm{RH}$ |
|  | Ambient temperature (with daily average $\leq+35^{\circ} \mathrm{C}$ ) |  | ${ }^{\circ} \mathrm{C}$ |
|  | Storage temperature |  | ${ }^{\circ} \mathrm{C}$ |
| Installation | Terminal size for cables | flexible | $\mathrm{mm}^{2}$ |
|  |  | rigid | $\mathrm{mm}^{2}$ |
|  | Tightening torque |  | Nm |
|  | Mounting |  |  |
| Dimensions and weight | Dimensions ( $\mathrm{H} \times \mathrm{D} \times \mathrm{W}$ ) | 2P | mm |
|  |  | 3P | mm |
|  |  | 4P | mm |
|  | Weight | 2P | g |
|  |  | 3P | g |
|  |  | 4 P | g |
| Combination with auxiliary elements | Combinable with: | auxiliary contact |  |
|  |  | signal contact/auxiliary switch |  |
|  |  | shunt trip |  |
|  |  | undervoltage release |  |

[^35]
## RCBOs

DS800 technical features

| DS800S A | DS800N A | DS800S A S | DS800N A S | DS800S A AP-R | DS800N A AP-R |
| :---: | :---: | :---: | :---: | :---: | :---: |
| IEC/EN 60947-2 |  |  |  |  |  |
| A |  | A |  | A |  |
| 2P, 3P, 4P |  | 2P,4P |  | 2P, 3P, 4P |  |
| 0.3 |  | 0.3-1(*) |  | 0.03 |  |
| 125 |  |  |  |  |  |
| 230/400-240/415-400/690 |  |  |  |  |  |
| 690 |  |  |  |  |  |
| 195-690 |  |  |  |  |  |
| 50... 60 |  |  |  |  |  |
| 50 | 36 | 50 | 36 | 50 | 36 |
| 30 | 20 | 30 | 20 | 30 | 20 |
| 10 | 10 | 10 | 10 | 10 | 10 |
| 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 |
| 40 | 30 | 40 | 30 | 40 | 30 |
| 15 | 10 | 15 | 10 | 15 | 10 |
| 5 | 5 | 5 | 5 | 5 | 5 |
| 3 | 3 | 3 | 3 | 3 | 3 |
| 6 |  |  |  |  |  |
| 2.5 |  |  |  |  |  |
| $\square$ | $\square$ | $\square$ | $\square$ | ■ | $\square$ |
| $\square$ | $\square$ | $\square$ | $\square$ | $\square$ | $\square$ |
| $\square$ | $\square$ | $\square$ | $\square$ | $\square$ | $\square$ |
| $\square$ |  | $\square$ |  | $\square$ |  |
| NA | NA | 5000 | 5000 | 3000 | 3000 |
| black (MCB) sealable in ON-OFF position + blue (RCD) operating just from OFF position |  |  |  |  |  |
| 10000 |  |  |  |  |  |
| 20000 |  |  |  |  |  |
| IP4X |  |  |  |  |  |
| IP2X |  |  |  |  |  |
| 28 cycles with $55^{\circ} \mathrm{C} / 90-96 \%$ and $25^{\circ} \mathrm{C} / 95-100 \%$ |  |  |  |  |  |
| -25...+60 |  |  |  |  |  |
| $-40 \ldots+70$ |  |  |  |  |  |
| 6... 50 |  |  |  |  |  |
| 6...70 |  |  |  |  |  |
| min. 3 / max. 4 |  |  |  |  |  |
| on DIN rail EN 60715 ( 35 mm ) by means of rapid fixing device |  |  |  |  |  |
| $108,2 \times 82,3 \times 133.5$ |  |  |  |  |  |
| $108,2 \times 82,3 \times 196$ |  |  |  |  |  |
| $108,2 \times 82,3 \times 223$ |  |  |  |  |  |
| 790 |  |  |  |  |  |
| 1140 |  |  |  |  |  |
| 1440 |  |  |  |  |  |
| yes |  |  |  |  |  |
| yes |  |  |  |  |  |
| yes |  |  |  |  |  |
| yes |  |  |  |  |  |

## eRCBO, the value of quality Made with attention to details



With its breaking capacity of 6 kA in only one module width and 100 mm height, the DSE2O1 series is the perfect solution for a complete protection in residential and light commercial applications. At home, in the office or in a shop,
these devices are essential for the safety of people, utilities and equipment, protecting not only against earth fault residual currents - due to loss of isolation or accidental contact with live parts - but also against overcurrents.


## Double slot terminal

On the line side, the availability of a terminal with two slots allows to use different types of conductors: one housing is designed for cables up to $25 \mathrm{~mm}^{2}$, the other for busbars or cables up to $10 \mathrm{~mm}^{2}$.


## Easy and flexible

The double clip eases dismounting even when the unit is installed in a high density system. A single device can be removed from the cluster without disconnecting other units. The same screwdriver used to tighten terminals can also be used to unlock the DIN rail fixing device of the unit.


## Environmentally friendly

The user manual is an integral part of the package. The information have been printed inside the box to make easy the reading and to reduce consumption of paper.

## DSE201

## Technical features and overall dimensions



## DSE201

## Technical features and overall dimensions

| Installation |  |  |  |
| :---: | :---: | :---: | :---: |
| Terminal type | top (load side) |  | failsafe cage (shock protected) |
|  | bottom (line side) |  | failsafe bi-directional cylinder-lift terminal (shock protected) |
| Terminal size for cables | load side (top) | $\mathrm{mm}^{2}$ | 16 |
|  | line side (bottom) | $\mathrm{mm}^{2}$ | 25 |
| Terminal size for busbars | load side (top) |  | only for wire connection |
|  | line side (bottom) | $\mathrm{mm}^{2}$ | 10 (Standard ABB busbar / distribution board system) |
| Tightening torque | top (load side) | Nm | 1.2 |
|  | bottom (line side) | Nm | 2.8 |
| Stripping length of the cable | top (load side) | mm | 11 |
|  | bottom (line side) | mm | 12.5 |
| Neutral load cable | Type |  | low smoke halogen free |
|  | Lenght | mm | 750 |
|  | Section | $\mathrm{mm}^{2}$ | $2.5 \mathrm{~mm}^{2}$ up to $20 \mathrm{~A} ; 4 \mathrm{~mm}^{2}$ up to 50 A |
|  | Color |  | blue (available also black) |
| Functional earth cable | Type |  | low smoke halogen free |
|  | Lenght | mm | 750 |
|  | Section | $\mathrm{mm}^{2}$ | 0.75 |
|  | Color |  | white |
| Mounting |  |  | on DIN rail EN 60715 ( 35 mm ) by means of fast clip device in consumer unit Type A according to IEC 61439-1\&3, BS EN 61439-1\&3, in distribution board Type B according to IEC 61439-1\&3, BS EN 61439-1\&3. |
| Supply from |  |  | bottom terminal |
| Dimensions and weight |  |  |  |
| Dimensions ( $\mathrm{H} \times \mathrm{D} \times \mathrm{W}$ ) |  | mm | $100 \times 68.9 \times 17.6$ |
| Weight |  | g | 180 |

Combination with auxiliary elements
Combinable with accessories and auxiliaries no

## AFDD S-ARC1:

Arc Fault Detection Device Integrated with MCB

Easy to install
Twin terminals for separate feeding with busbar and cables. Connection possible both from top and bottom side.

## Test pushbutton and self test

 Test pushbutton to verify the correct functioning of the arc fault detection device. Internal self test is also continuously running in order to check the arc detection circuit.LED for troubleshooting LED troubleshooting indicator to monitor the operation of the AFDD and give indication of the cause of the trip. Possibility to recall in memory the last tripping due to arc fault and overvoltage.

## Contact position indicator (CPI)

To always know the status of the contacts (red: closed; green: open) Independent from the toggle position


## Anti counterfeiting

RFid tag containing a unique serial number assigned to ABB in order to authenticate the product.

## Laser printed information

 Information on the device are laser printed to ensure readability over time.
## Combination with auxiliary

## elements

Platform suitable for combination with System pro M compact ${ }^{\circledR}$ accessories.

The S-ARC1 is the new 1P+N Arc Fault Detection Device (AFDD) with an integrated Miniature Circuit Breaker (MCB) in only two module width. Besides the overcurrent protection of the MCB, the S-ARC1 provides additional protection against series, parallel and earth arc faults. The series is perfectly integrated with ABB’s System pro M compact ${ }^{\circledR}$ range. Combined with a Residual Current Circuit Breaker (RCCB) as upstream device, the S-ARC1 provides the best solution for complete protection of electrical installations in buildings.


## LED for easy troubleshooting

LED to monitor the correct working conditions of the device and have an easier troubleshooting in case of trip. Consequently the downtime for maintenance can be reduced.

- Toggle ON: GREEN LED
- Toggle OFF: LED OFF
- Different indications after the trip, after reclosing the toggle
- Possibility to recall in memory the last tripping due to arc fault and overvoltage



## Double slot terminals

Fail-safe terminals to avoid improper connection. Two slots of different dimensions ( $25 \mathrm{~mm}^{2}$ and $10 \mathrm{~mm}^{2}$ ) available to allow the connection both with cables and busbars. Connection possible both from top and bottom side. Standard System pro M compact ${ }^{\oplus}$ clip ensures a stable fixing on DIN rail and easy and fast mounting and dismounting operations.


In case of internal self test failure, the led can switch off or start blinking green/red alternatively.


## Compatibility with busbars

A quick and easy installation is possible in one step using a standard ABB System pro M compact® ${ }^{\text {busbar: }}$ no additional cables required for the wiring.


## Dedicated sticker for LED

Dedicated sticker that summarizes the LED function is present in addition to the instructions sheet.


## All information on the device

Main technical information are laserprinted on the front and left side of product to ensure long readability.

## AFDD

Technical features and overall dimensions

|  |  |  |  | S-ARC1 | S-ARC1 M |
| :---: | :---: | :---: | :---: | :---: | :---: |
|  | Standards |  |  | IEC/EN 62606; IEC/EN 60898-1 |  |
| Electrical | Number of poles |  |  | $1 \mathrm{P}+\mathrm{N}$ |  |
|  | Rated current $\mathrm{I}_{\mathrm{n}}$ |  | A | $6 \leq \ln \leq 40$ |  |
|  | Rated voltage $U_{\text {e }}$ |  | v | 230-240 |  |
|  | Insulation voltage $\mathrm{U}_{\mathrm{i}}$ |  | v | 500 V AC |  |
|  | Overvoltage category |  |  | III |  |
|  | Pollution degree |  |  | 2 |  |
|  | Min. operating voltage |  | v | 170 |  |
|  | Threshold for protection against overvoltage |  | V | 275 |  |
|  | Rated frequency |  | Hz | 50/60 |  |
|  | Rated breaking capacity acc. to IEC/EN 60898-1 | ultimate $I_{\text {cn }}$ | A | 6000 | 10000 |
|  | Rated breaking capacity acc. to IEC/EN 60947-2 (only referring to short circuit test) | ultimate $I_{\text {cu }}$ | kA | 7.5 | 10 |
|  |  | service $\mathrm{I}_{\text {cs }}$ | kA | 6 | 7.5 |
|  | Rated making and breaking capacity of one individual pole $\mathrm{I}_{\mathrm{cn} 1}$ |  | A | 6000 |  |
|  | Rated impulse withstand voltage (1.2/50) $\mathrm{U}_{\text {imp }}$ |  | kV | 4 |  |
|  | Dielectric test voltage at ind. freq. for 1 min . |  | kV | 2.5 (50/60 Hz, 1 min.) |  |
|  | Thermomagnetic release - characteristic | B: $3 \mathrm{I}_{\mathrm{n}} \leq \mathrm{I}_{\mathrm{m}} \leq 5 \mathrm{I}_{\mathrm{n}}$ |  | $\square$ |  |
|  |  | $C: 5 I_{n} \leq I_{m} \leq 10 I_{n}$ |  | $\square$ |  |
|  | Energy limiting class |  |  | 3 |  |
| Mechanical main features | Housing |  |  | Insulation group I, RAL 7035 |  |
|  | Toggle |  |  | Insulation group II, Orange RAL 2004, sealable in ON-OFF-positions |  |
|  | Contact position indication |  |  | Green/red window |  |
|  | Electrical life |  |  | 10000 operations |  |
|  | Mechanical life |  |  | 20000 operations |  |
|  | Protection degree acc. to EN 60529 | housing |  | IP4X |  |
|  |  | terminals |  | IP2X |  |
|  | Shock resistance acc. to IEC/EN 60068-2-27 |  |  | $25 \mathrm{~g}-2$ shocks -13 ms |  |
|  | Vibration resistance acc. to IEC/EN 60068-2-6 |  |  | 0.2 mm or | 20 cycles at $5 \ldots 150 \ldots 5 \mathrm{~Hz}$ |
|  | Environmental conditions (damp heat) acc. to IEC/EN 60068-2-30 |  | $\begin{aligned} & { }^{\circ} \mathrm{C} / \\ & \mathrm{RH} \end{aligned}$ | 28 cycles with $55^{\circ} \mathrm{C} / 90-96 \%$ and $25^{\circ} \mathrm{C} / 95-100 \%$ |  |
|  | Reference temperature for setting of thermal element |  | ${ }^{\circ} \mathrm{C}$ | 30 |  |
|  | Ambient temperature (with daily average $\leq+35^{\circ} \mathrm{C}$ ) |  | ${ }^{\circ} \mathrm{C}$ | $-25 \ldots+55$ |  |
|  | Storage temperature |  | ${ }^{\circ} \mathrm{C}$ | $-40 \ldots+70$ |  |
| Assembly | Terminal type | top/bottom |  | failsafe bi-directional cylinder-lift terminal (shock-protected) |  |
|  | Terminal size for cables | top/bottom | $\mathrm{mm}^{2}$ | 25/25 |  |
|  | Terminal size for busbars | top/bottom | $\mathrm{mm}^{2}$ | 10/10 |  |
|  | Tightening torque | top/bottom | Nm | 2.8 |  |
|  | Stripping length of the cable |  | mm | 12 |  |
|  | Mounting |  |  | n DIN rail EN 60715 ( 35 mm ) by means of mounting clip |  |
|  | Mounting position |  |  | any |  |
|  | Supply from |  |  | Top/bottom terminals |  |
| Dimensions | Dimensions ( $\mathrm{H} \times \mathrm{D} \times \mathrm{W}$ ) |  | mm | $85 \times 69 \times 35$ |  |
| and weight | Weight |  | g | 180 |  |

## AFDD

Technical features and overall dimensions

| Installation |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| Terminal type | top / bottom |  | failsafe bi-directional cylinder-lift terminal (shock protected) | failsafe bi-directional cylinder-lift terminal (shock protected) |
| Terminal size for cables | top / bottom | $\mathrm{mm}^{2}$ | 25/25 | 25/25 |
| Terminal size for busbars | top / bottom | $\mathrm{mm}^{2}$ | 10/10 | 10/10 |
| Tightening torque | top / bottom | Nm | 2.8 | 2.8 |
| Stripping length of the cable |  | mm | 12,5 | 12,5 |
| Mounting |  |  | on DIN rail EN 60715 ( 35 mm ) by means of mounting clip | on DIN rail EN 60715 ( 35 mm ) by means of mounting clip |
| Mounting position |  |  | Any | Any |
| Supply from |  |  | Top/Bottom terminals | Top/Bottom terminals |
| Dimensions and weight |  |  |  |  |
| Dimensions ( $\mathrm{H} \times \mathrm{D} \times \mathrm{W}$ ) |  | mm | $85 \times 69 \times 35 \mathrm{~mm}$ | $85 \times 69 \times 35 \mathrm{~mm}$ |
| Weight |  | g | 180 | 180 |
| Combinable with accessories and auxiliaries | Auxiliary contact, signal contact/auxiliary switch, shunt trip, undervoltage release, overvoltage release |  |  |  |

## AFDD DS-ARC1:

## Arc Fault Detection Device

 Integrated with RCBOEasy to install
Twin terminals for separate feeding with busbar and cables. Connection possible both from top and bottom side.

Test pushbutton and self test White test pushbutton to verify the correct functioning of RCD. Orange test pushbutton to verify the correct functioning of AFDD.

Internal self test is also continuously running in order to check the arc detection circuit.

LED for troubleshooting LED troubleshooting indicator to monitor the operation of the AFDD and give indication of the cause of the trip. Possibility to
recall in memory the last
tripping due to arc fault and overvoltage.

Contact position indicator (CPI)
To always know the status of the contacts (red: closed; green: open) Independent from the toggle position


## Anti counterfeiting

The DS-ARC1 is the new 1P+N Arc Fault Detection Device (AFDD) with an integrated residual current circuit breaker with overcurrent protection (RCBO) in only three module width.
The series offers a complete protection against arc faults and overvoltage, reducing the risk of fire. The integrated RCBO is adding protection against overcurrent and earth fault currents: compact solution for a complete protection of people and valuable assets.


LED for easy troubleshooting
LED to monitor the correct working conditions of the device and have an easier troubleshooting in case of trip. Consequently the downtime for maintenance can be reduced.

- Toggle ON: GREEN LED
- Toggle OFF: LED OFF
- Different indications after the trip, after reclosing the toggle
- Possibility to recall in memory the last tripping due to arc fault and overvoltage



## Double slot terminals

Fail-safe terminals to avoid improper connection. Two slots of different dimensions ( $25 \mathrm{~mm}^{2}$ and $10 \mathrm{~mm}^{2}$ ) available to allow the connection both with cables and busbars. Connection possible both from top and bottom side.Standard System pro M compact ${ }^{\circledR}$ clip ensures a stable fixing on DIN rail and easy and fast mounting and dismounting operations.


In case of internal self test failure, the led can switch off or start blinking green/red alternatively.


## Compatibility with busbars

A quick and easy installation is possible in one step using dedicated busbars for DS-ARC1 installation no additional cables required for the wiring.


Dedicated sticker for LED
Dedicated sticker that summarizes the LED function is present in addition to the instructions sheet.


## Earth fault indicator

Blue flag on the toggle to identify earth fault trips, making the troubleshooting easier while reducing the downtime for maintenance operations. In case of earth fault trip, after reclosing the toggle, the LED becomes green.

## AFDD

DS-ARC1 arc fault detection device with integrated RCBO - technical data


## Earth Leakage Relay <br> Front panel mountable



## ELR front panel residual current relay

Front panel residual current relays are electronic devices used in combination with an external toroidal transformer. They are according to the protection standard IEC/EN 60947-2 Annex-M.
The sensitivity can be set from 0.03 A to 30 A , while the tripping time from 0 to 5 seconds. Residual current relays are available in versions $48 \times 48 \mathrm{~mm}, 72 \times 72 \mathrm{~mm}$, and $96 \times 96 \mathrm{~mm}$.
The Fail Safe function is available for versions ELR48P, ELR72P and ELR96P: the contacts switch when there is no auxiliary power. The ELR96PF version is equipped with Fail Safe function, fault memory LED, and a frequency filter, that ensure continuity of service in the presence of harmonics.
ELR96PD has (in addition to these functions) a digital display for an instantaneous view of the residual current I $\Delta \mathrm{n}$.

## Compliance to IEC/ EN 60947-2 Annex M

The new range of ELR products from ABB comply with IEC/ EN 60947-2 Annex M and is tested within a
 configuration that includes residual current relay, toroid, shunt-trip, MCCB/MCB available in ABB offer.

The new range of ELR front panel residual current relays has been tested in combination with miniature circuit breaker (S200 range) and moulded case circuit breakers (Tmax series up to T5 630 A) conforming with IEC/EN 60947-2 Annex M.

In order to ensure compliance to IEC/EN 60947-2 Annex M ABB has considered the following parameters:

Operational time: time that elapses between the occurrence of a fault and the intervention of the relay contacts.


Cumulative operational time: time that elapses between the occurrence of a fault and the intervention (opening) of the associated circuit breaker.

Non-operation time: delay, adjustable on the device, which defines how long the fault should last before the relay contacts switch. This value is important to ensure selectivity and resistance to unwanted tripping of the associated circuit breaker.
-
Technical features

|  |  | ELR48P | ELR72 | ELR72P | ELR96 | ELR96P | ELR96PF | ELR96PD |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Operating voltage | [V] | 24, 48, | 24, 48, | 24, 48, 110 | 24, 48, 110, | 24, 48, 110, | 110, | 110, |
|  |  | 110, 230 a.c./ | 110, 230 a.c./ | 230, 400 a.c./ | 230, 400 a.c./ | 230, 400 a.c./ | 230, 400 a.c. | 230, 400 a.c. |
|  |  | 24, 48,115 d.c. | 24, 48, 110 d.c. | 24, 48 d.c. | 24, 48 d.c. | 24, 48 d.c. | 24, 48 d.c. | 24, 48 d.c. |
| Frequency | [Hz] | 50-60 | 50-60 | 50-60 | 50-60 | 50-60 | 50-60 | 50-60 |
| Frequency filter |  | - | - | - | - | - | Yes | Yes |
| Type |  | A | A | A | A | A | A | A |
| Operating temperature | [ ${ }^{\circ} \mathrm{C}$ ] | -10... +60 | $-10 . . .+60$ | $-10 . .+60$ | $-10 . . .+60$ | $-10 . . .+60$ | $-10 . . .+60$ | $-10 . . .+60$ |
| Power consumption | [W] | <7 | <7 | <7 | <7 | <7 | <7 | <7 |
| Sensitivity setting I $\Delta \mathrm{n}$ | [A] | from 0,03 to 30 | from 0,03 to 30 | from 0,03 to 30 | from 0,03 to 30 | from 0,03 to 30 | from 0,03 to 30 | from 0,03 to 30 |
| Tripping time setting Dt | [s] | from 0 to 5 | from 0 to 5 | from 0 to 5 | from 0 to 5 | from 0 to 5 | from 0 to 5 | from 0 to 5 |
| Contacts | [no.] | 2 | 1 | 2 | 1 | 2 | 2 | 2 |
| Contact capacity | [A] |  |  |  | 5 (250 V a.c.) |  |  |  |
| Dimensions | [mm] | $48 \times 48$ | $72 \times 72$ | $72 \times 72$ | $96 \times 96$ | $96 \times 96$ | $96 \times 96$ | $96 \times 96$ |
| Digital display |  | - | - | - | - | - | - | Yes |
| Protection degree (with cover) |  | IP52 | IP52 | IP52 | IP52 | IP52 | IP52 | IP52 |
| Protection degree (without cover) |  | IP40 | IP40 | IP40 | IP40 | IP40 | IP40 | IP40 |
| Protection degree (terminals) |  | IP20 | IP20 | IP20 | IP20 | IP20 | IP20 | IP20 |
| Standards |  | IEC EN 60947-2 Annex M | IEC EN 60947-2 Annex M | IEC EN 60947-2 Annex M | IEC EN 60947-2 Annex M | IEC EN 60947-2 Annex M | $\begin{array}{r} \text { IEC EN } \\ 60947-2 \\ \text { Annex M } \end{array}$ | $\begin{array}{r} \text { IEC EN } \\ 60947-2 \\ \text { Annex M } \end{array}$ |

## Residual current relays

DIN rail mountable

-
Technical features

## RD3 residual current relays

The RD3 family of electronic residual current relays provides residual current protection and monitoring functions according to IEC/EN 609472:2006 annex $M$ and can be used in conjunction
with all S 200 automatic devices and Tmax range moulded case devices up to T5, for industrial installations.
The RD3 residual current relays can provide status indications through two output contacts.

|  | RD3/RD3-48 | RD3M/RD3M-48 | RD3P/RD3P-48 |
| :---: | :---: | :---: | :---: |
| Operating voltage | RD3: 230-400 Vac +10\% / -15\% | RD3M: 230-400 Vac +10\% / -15\% | RD3P: 230-400 Vac +10\% / -15\% |
|  | RD3-48: $12-48 \mathrm{Vac} / \mathrm{Vdc}+10 \%$ / | RD3M-48: 12-48 Vac/Vdc +10\% / | RD3P-48: 12-48 Vac/Vdc +10\% / |
|  | -15\% | -15\% | -15\% |
| Auxiliary supply frequency | $50-60 \mathrm{~Hz}$ | $50-60 \mathrm{~Hz}$ | $50-60 \mathrm{~Hz}$ |
| Network monitored frequency | $50-150 \mathrm{~Hz}$ a | $50-150 \mathrm{~Hz} \mathrm{a}$ | $50-150 \mathrm{Hza}$ |
| Frequency filter | - | Yes | Yes |
| Type | A (up to IDn=5 A) | A (up to IDn=5 ${ }^{\text {) }}$ | A (up to IDn=5 A) |
|  | AC (for higher current) | AC (for higher current) | AC (for higher current) |
| Operating temperature | $-25 . . .+70^{\circ} \mathrm{C}$ | $-25 . . .+70^{\circ} \mathrm{C}$ | $-25 . . .+70^{\circ} \mathrm{C}$ |
| Power consumption | <3.6 W (RD3, RD3M, RD3P), | <3.6 W (RD3, RD3M, RD3P), | <3.6 W (RD3, RD3M, RD3P), |
|  | $<600 \mathrm{~mW}$ RD3-48, RD3M-48, RD3P-48) | <600 mW RD3-48, RD3M-48, RD3P48) | <600 mW RD3-48, RD3M-48, RD3P48) |
| Sensitivity settings IDn | 0.03-0.1-0.3-0.5-1-2-3-5-10-30 A | 0.03-0.1-0.3-0.5-1-2-3-5-10-30 A | 0.03-0.1-0.3-0.5-1-2-3-5-10-30 A |
| Tripping time settings Dt | 0-0.06-0.2-0.3-0.5-1-2-3-5-10 s | 0-0.06-0.2-0.3-0.5-1-2-3-5-10 s | 0-0.06-0.2-0.3-0.5-1-2-3-5-10 s |
| Pre-alarm threshold | - | 60\% | 60\% |
| Max. resistance connection between toroidal transformer and relay | 3 W | 3 W | 3 W |
| Max. length connection of remote reset button | 15 m | 15 m | 15 m |
| Output Contact capacity $(7-8-9) ;(10-11-12)$ | $8 \mathrm{~A}, 250 \mathrm{~V}$ a.c. | $8 \mathrm{~A}, 250 \mathrm{~V}$ a.c. | $8 \mathrm{~A}, 250 \mathrm{~V}$ a.c. |
| Led bar indicator | - | - | Yes |
| Max. cable terminals section | $2.5 \mathrm{~mm}^{2}$ | $2.5 \mathrm{~mm}^{2}$ | $2.5 \mathrm{~mm}^{2}$ |
| Modules | 3 | 3 | 3 |
| Dimensions | $52.8 \times 85 \times 64.7 \mathrm{~mm}$ | $52.8 \times 85 \times 64.7 \mathrm{~mm}$ | $52.8 \times 85 \times 64.7 \mathrm{~mm}$ |
| Protection degree | IP20 | IP20 | IP20 |
| Standards | IEC/EN 60947-2 annex. M | IEC/EN 60947-2 annex. M | IEC/EN 60947-2 annex. M |

a RD3 can detect, as a monitor, sinusoidal earth fault currents in networks with frequencies between 50 Hz and 150 Hz .

## Toroidal Transformers

The choice of toroidal transformers is made according to the useful diameter and the minimum value of the leakage current to be detected.

| Type | Toroid useful <br> diameter [mm] | Max rated <br> current [A] | Min measurable <br> current [mA] |
| :--- | ---: | ---: | ---: |
| TRM | 29 | 65 | 1 |
| TR1 | 35 | 75 | 1 |
| TR2 | 60 | 85 | 1 |
| TR3 | 80 | 160 | 1 |
| TR4 | 110 | 250 | 1 |
| TR4/A | 110 | 250 | 1 |
| TR160 | 160 | 400 | 1 |
| TR160/A | 160 | 400 | 1 |
| TR5 | 210 | 630 | 1 |
| TR5/A | 210 | 630 | 1 |

Table 1 shows toroidal transformers selection for use with ELR according to IEC/ EN 60947-2 Annex M in combination with

| Type | Toroid useful <br> diameter [mm] | Min measurable <br> current [mA] | Maximum <br> capacity [A] |
| :--- | ---: | ---: | ---: |
| TRM | 29 | 30 | 160 |
| TR1 | 35 | 30 | 250 |
| TR2 | 60 | 30 | 400 |
| TR3 | 80 | 100 | 800 |
| TR4 | 110 | 100 | 1250 |
| TR4/A | 110 | 300 | 1250 |
| TR160 | 160 | 300 | 2000 |
| TR160/A | 160 | 500 | 2000 |
| TR5 | 210 | 300 | 3200 |
| TR5/A | 210 | 500 | 3200 |

Table 2 shows the technical features of the toroidal transformers.

## OPR - Optimized pulse pod External lightning protection



|  | LPL I | LPL II | LPL III | LPL IV |
| :--- | ---: | ---: | ---: | ---: |
| Rolling sphere radius $\mathrm{r}(\mathrm{m})$ | 20 | 30 | 45 | 60 |



## The OPR efficiency ( $\Delta T$ )

Lightning is one of the most spectacular meteorological phenomena. Generated by the interaction of clouds elements (water and ice), it can kill, injure and damage. The unique efficiency of the OPR Early streamer emission is based on the difference ( $\Delta T$ ), measured in a laboratory, in between the emission time of the OPR and the one from a simple rod. The OPR ESE air terminal is composed of a striking point connected to a down conductor to conduct the lightning to the ground.

## Complete autonomy

During a storm the ambient electric field may rise from 600 V to $10-20 \mathrm{kV} / \mathrm{m}$. When the electric field reach this level representing a minimum risk for a lightning, the OPR begins to get activated and generates high voltage pulses, helping to create and propagating an upward leader. After a strike on the OPR, the lightning current is driven to ground by the down conductor to the earth termination system.

## Radius of protection

The radius of protection ( $R \mathrm{R}$ ) of the OPR is calculated according to the NF C 17-102
(edition 2011). It depends on the OPR efficiency
( $\Delta \mathrm{T}$ ) expressed in micro-seconds.
The maximum value for $\Delta \mathrm{T}$ is $60 \mu \mathrm{~s}$.

The risk assessment shall be calculated according to the NF C 17-102 Annex A /
IEC 62305-2 and will define the protection level (LPL I, II, III or IV) which will be used in the determination of the OPR radius of protection.

## OPR radius of protection

| Protection level |  | $1(r=20 \mathrm{~m})$ |  |  | II ( $\mathrm{r}=30 \mathrm{~m}$ ) |  |  | III ( $\mathrm{r}=45 \mathrm{~m}$ ) |  |  | IV (r = 60 m ) |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| OPR | OPR 30 | OPR 45 | OPR 60 | OPR 30 | OPR 45 | OPR 60 | OPR 30 | OPR 45 | OPR 60 | OPR 30 | OPR 45 | OPR 60 |
| h (m) |  |  |  |  |  |  |  |  |  | Radius of protection Rp (m) |  |  |
| 2 | 19 | 25 | 31 | 22 | 28 | 35 | 25 | 32 | 39 | 28 | 36 | 43 |
| 3 | 29 | 38 | 47 | 33 | 42 | 52 | 38 | 48 | 58 | 43 | 57 | 64 |
| 4 | 38 | 51 | 63 | 44 | 57 | 69 | 51 | 65 | 78 | 57 | 72 | 85 |
| 5 | 48 | 63 | 79 | 55 | 71 | 86 | 63 | 81 | 97 | 71 | 89 | 107 |
| 6 | 48 | 63 | 79 | 55 | 71 | 87 | 64 | 81 | 97 | 72 | 90 | 107 |
| 8 | 49 | 64 | 79 | 56 | 72 | 87 | 65 | 82 | 98 | 73 | 91 | 108 |
| 10 | 49 | 64 | 79 | 57 | 72 | 88 | 66 | 83 | 99 | 75 | 92 | 109 |
| 15 | 50 | 65 | 80 | 58 | 73 | 89 | 69 | 85 | 101 | 78 | 95 | 111 |
| 20 | 50 | 65 | 80 | 59 | 74 | 89 | 71 | 86 | 102 | 81 | 97 | 113 |
| 45 | 43 | 65 | 76 | 58 | 75 | 89 | 75 | 90 | 105 | 89 | 104 | 119 |
| 50 | 40 | 65 | 74 | 57 | 75 | 88 | 75 | 90 | 105 | 89 | 104 | 120 |
| 55 | 36 | 65 | 72 | 55 | 75 | 86 | 74 | 90 | 105 | 90 | 105 | 120 |
| 60 | 30 | 65 | 69 | 52 | 75 | 85 | 73 | 90 | 104 | 90 | 105 | 120 |

## OVR T1-T2, T2 and T2-T3 ranges. The details make the difference

## A complete range for your surge protection



Safety Reserve system with
two varistors per line to
extend protection lifetime.


OVR T1-T2 12.5, T2 and T2-T3 ranges are using same terminal as Pro $M$ compact devices to guarantee a complete coordination and time saving in wiring operation.


The pluggable feature of ABB OVR T1-T2, T2 and T2-T3 surge protective devices (SPDs) facilitates maintenance. Should one or more worn cartridges need to be replaced, the wires do not have to be removed.


QuickSafe MOV technology extended to SPD dedicated to D.C photovoltaic applications, bringing seft-protected feature (no back-up needed) up to 10 kA PV short circuit current.


The end-of-life indicator of the SPD signals the status of the device. A mechanical indicator turns from green to red when the SPD reaches the end of its life, when the end-of-life indicator is fitted.

## Protection and safety

## OVR surge protective devices selection tables

$\left.\begin{array}{llllllllll}\hline \begin{array}{l}\text { Pro- } \\ \text { tected } \\ \text { lines }\end{array} & \begin{array}{l}\text { Impulse } \\ \text { current }\end{array} & \begin{array}{l}\text { Max. } \\ \text { dis- } \\ \text { charge } \\ \text { current }\end{array} & \begin{array}{l}\text { Nominal } \\ \text { current }\end{array} & \begin{array}{l}\text { Follow } \\ \text { current } \\ \text { interrupt- } \\ \text { ing rating }\end{array} & \begin{array}{l}\text { Voltage } \\ \text { protec- } \\ \text { tion level }\end{array} & \begin{array}{l}\text { Nominal } \\ \text { voltage }\end{array} & \begin{array}{l}\text { Max. } \\ \text { cont. op- } \\ \text { erating }\end{array} & \text { Order details } \\ \text { voltage }\end{array}\right]$

## Protection and safety

OVR surge protective devices selection tables

| Protected lines | Impulse current | Max. discharge current | Nominal current | Follow current interrupting rating | Voltage protection level | Nominal voltage | Max. cont. operating voltage | Order details |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | limp 10/350 | $\begin{aligned} & \text { Imax } \\ & 8 / 20 \end{aligned}$ | In | Ifi | Up | Un | Uc |  |  |
|  | kA | kA | kA | kA | kV | v | v | Type code | Order code |
| Type 2 OVR pluggable |  |  |  |  |  |  |  |  |  |
| Uc 275 V |  |  |  |  |  |  |  |  |  |
| 1 | 2 | 40 | 20 | - | 1.25 | 230 | 275 | OVR T2 40-275 P TS QS | 2CTB803871R1700 |
| 1+1 | 2 | 40 | 20 | - | 1.25 | 230 | 275 | OVR T2 1N 40-275 P TS QS | 2CTB803972R0500 |
| 3 | 2 | 40 | 20 | - | 1.25 | 230/400 | 275 | OVR T2 3L 40-275 P TS QS | 2CTB803873R2500 |
| 4 | 2 | 40 | 20 | - | 1.25 | 230/400 | 275 | OVR T2 4L 40-275 P TS QS | 2CTB803873R5200 |
| 1 | 2 | 40 | 20 | - | 1.25 | 230 | 275 | OVR T2 40-275 P QS | 2CTB803871R2300 |
| 1+1 | 2 | 40 | 20 | - | 1.25 | 230 | 275 | OVR T2 1N 40-275 P QS | 2CTB803972R1100 |
| 3 | 2 | 40 | 20 | - | 1.25 | 230/400 | 275 | OVR T2 3L 40-275 P QS | 2CTB803873R2400 |
| 4 | 2 | 40 | 20 | - | 1.25 | 230/400 | 275 | OVR T2 4L 40-275 P QS | 2CTB803873R5600 |
| 1 | 2 | 40 | 20 | - | 1.4 | 230 | 275 | OVR T2 40-275s P TS QS | 2CTB815704R0000 |
| 1+1 | 2 | 40 | 20 | - | 1.4 | 230 | 275 | OVR T2 1N 40-275s P TS QS | 2CTB815704R0200 |
| 3 | 2 | 40 | 20 | - | 1.4 | 230/400 | 275 | OVR T2 3L 40-275s P TS QS | 2CTB815704R0600 |
| 4 | 2 | 40 | 20 | - | 1.4 | 230/400 | 275 | OVR T2 4L 40-275s P TS QS | 2CTB815704R1100 |
| 1 | 2 | 40 | 20 | - | 1.4 | 230 | 275 | OVR T2 40-275s P QS | 2CTB815704R1200 |
| 1+1 | 2 | 40 | 20 | - | 1.4 | 230 | 275 | OVR T2 1N 40-275s P QS | 2CTB815704R1400 |
| 3 | 2 | 40 | 20 | - | 1.4 | 230/400 | 275 | OVR T2 3L 40-275s P QS | 2CTB815704R1800 |
| 4 | 2 | 40 | 20 | - | 1.4 | 230/400 | 275 | OVR T2 4L 40-275s P QS | 2CTB815704R2300 |
| 1 | 6.25 | 80 | 20 | - | 1.4 | 230 | 275 | OVR T2 80-275s P TS QS | 2CTB815708R0000 |
| 1+1 | 6.25 | 80 | 20 | - | 1.4 | 230 | 275 | OVR T2 1N 80-275s P TS QS | 2CTB815708R0200 |
| 3 | 6.25 | 80 | 20 | - | 1.4 | 230/400 | 275 | OVR T2 3L 80-275s P TS QS | 2CTB815708R0600 |
| 4 | 6.25 | 80 | 20 | - | 1.4 | 230/400 | 275 | OVR T2 4L 80-275s P TS QS | 2CTB815708R1100 |
| 1 | 6.25 | 80 | 20 | - | 1.4 | 230 | 275 | OVR T2 80-275s P QS | 2CTB815708R1200 |
| 1+1 | 6.25 | 80 | 20 | - | 1.4 | 230 | 275 | OVR T2 1N 80-275s P QS | 2CTB815708R1400 |
| 3 | 6.25 | 80 | 20 | - | 1.4 | 230/400 | 275 | OVR T2 3L 80-275s P QS | 2CTB815708R1800 |
| 4 | 6.25 | 80 | 20 | - | 1.4 | 230/400 | 275 | OVR T2 4L 80-275s P QS | 2CTB815708R2300 |

## Protection and safety

OVR surge protective devices selection tables
$\left.\begin{array}{llllllllll}\hline \begin{array}{l}\text { Pro- } \\ \text { tected } \\ \text { lines }\end{array} & \begin{array}{l}\text { Impulse } \\ \text { current }\end{array} & \begin{array}{l}\text { Max. } \\ \text { dis- } \\ \text { charge } \\ \text { current }\end{array} & \begin{array}{l}\text { Nominal } \\ \text { current }\end{array} & \begin{array}{l}\text { Follow } \\ \text { current } \\ \text { interrupt- } \\ \text { ing rating }\end{array} & \begin{array}{l}\text { Voltage } \\ \text { protec- } \\ \text { tion level }\end{array} & \begin{array}{l}\text { Nominal } \\ \text { voltage }\end{array} & \begin{array}{l}\text { Max. } \\ \text { cont. op- } \\ \text { erating }\end{array} & \text { Order details } \\ \text { voltage }\end{array}\right]$

## Protection and safety

OVR surge protective devices selection tables

| Protected lines | Impulse current | Max. discharge current | Nominal current | Follow current interrupting rating | Voltage protection level | Nominal voltage | Max. cont. operating voltage | Order details |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | limp | Imax |  |  |  |  |  |  |  |
|  | 10/350 | 8/20 | In | Ifi | Up | Un | Uc |  |  |
|  | kA | kA | kA | kA | kV | v | V | Type code | Order code |
| Neutral |  |  |  |  |  |  |  |  |  |
| 1 | 6.25 | 80 | 30 | 0.1 | 2 | 400 | 440 | OVR T2 N 80-440s P QS | 2CTB815708R5400 |
| 1 | 2 | 80 | 30 | 0.1 | 1.4 | 400 | 440 | OVR T2-T3 N 80-440 P QS | 2CTB803973R2000 |
| Cartridges |  |  |  |  |  |  |  |  |  |
| 1 | 2 | 80 | 20 | - | 1.8 | 400 | 440 | OVR T2 40-440 C QS | 2CTB803876R0400 |
| 1 | 2 | 40 | 20 | - | 1.8 | 400 | 440 | OVR T2-T3 40-440s C QS | 2CTB815704R5500 |
| 1 | 6.25 | 80 | 20 | - | 1.8 | 400 | 440 | OVRT2 80-440s C QS | 2CTB815708R5500 |
| 1 | 6.25 | 80 | 30 | - | 1.4 | 400 | 440 | OVR T2-T3 N 80-440 C QS | 2CTB803886R0100 |
| 1 | 6.25 | 80 | 30 | - | 2 | 400 | 440 | OVR T2 N 80-440s C QS | 2CTB815708R5700 |

Type T2-T3 OVR Pluggable

| Uc 275V |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 1 | 2 | 20 | 5 | - | 0.9 | 230 | 275 | OVR T2-T3 20-275 P QS | 2CTB803871R2400 |
| 1 | 2 | 20 | 5 | - | 0.9 | 230 | 275 | OVR T2-T3 20-275 P TS QS | 2CTB803871R2500 |
| 1+1 | 2 | 20 | 5 | - | 1.4 | 230 | 275 | OVR T2-T3 1N 20-275 P QS | 2CTB803972R1200 |
| 1+1 | 2 | 20 | 5 | - | 1.4 | 230 | 275 | OVR T2-T3 1N 20-275 P TS QS | 2CTB803972R1300 |
| 3 | 2 | 20 | 5 | - | 0.85 | 230/400 | 275 | OVR T2-T3 3L 20-275 P QS | 2CTB803873R3400 |
| 3 | 2 | 20 | 5 | - | 0.85 | 230/400 | 275 | OVR T2-T3 3L 20-275 P TS QS | 2CTB803873R3500 |
| 3+1 | 2 | 20 | 5 | - | 1.4 | 230/400 | 275 | OVR T2-T3 3N 20-275 P QS | 2CTB803973R1200 |
| 3+1 | 2 | 20 | 5 | - | 1.4 | 230/400 | 275 | OVR T2-T3 3N 20-275 P TS QS | 2CTB803973R1600 |
| Neutral |  |  |  |  |  |  |  |  |  |
| 1 | - | 80 | 30 | 0.1 | 1.4 | 230 | 275 | OVR T2-T3 N 80-275 P QS | 2CTB803973R1900 |
| Cartridges |  |  |  |  |  |  |  |  |  |
| 1 | - | 20 | 5 | - | 1.4 | 230 | 275 | OVR T2 20-275 C QS | 2CTB803876R1200 |
| 1 | - | 80 | 30 | - | 1.4 | 230 | 275 | OVR T2-T3 N 80-275 C QS | 2CTB803876R0000 |
| Uc 440V |  |  |  |  |  |  |  |  |  |
| 1 | 2 | 20 | 5 | - | 1.4 | 400 | 440 | OVR T2-T3 20-440 P QS | 2CTB803871R1100 |
| 1 | 2 | 20 | 5 | - | 1.4 | 400 | 440 | OVR T2-T3 20-440 P TS QS | 2CTB803871R1300 |
| 3+1 | 2 | 20 | 5 | - | 1.4 | 400/690 | 440 | OVR T2-T3 3N 20-440 P QS | 2CTB803973R1300 |
| Neutral |  |  |  |  |  |  |  |  |  |
| 1 |  | 80 | 30 | 0.1 | 1.4 | 400 | 440 | OVR T2-T3 N 80-440 P QS | 2CTB803973R2000 |
| Cartridges |  |  |  |  |  |  |  |  |  |
| 1 | - | 80 | 5 | - | 1.4 | 400 | 440 | OVR T2 20-440 C QS | 2CTB803876R0600 |
| 1 | - | 80 | 30 | - | 1.4 | 400 | 440 | OVR T2-T3 N 80-440 C QS | 2CTB803886R0100 |

## Protection and safety

OVR surge protective devices selection tables

| Protected lines | Total Discharge Current | Impulse current | Max. discharge current | Nominal current | Short-circuit current rating | Voltage protection level | Nominal voltage | Max. cont. operating voltage | Order details |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | Itotal | limp | Imax |  |  |  |  |  |  |  |
|  | 10/350 | 10/350 | 8/20 | In | Iscpv | Up | Un | Uc |  |  |
|  | kA | kA | kA | kA | A | kV | v | v | Type code | Order code |
| Type T1-T2 OVR pluggable PV application |  |  |  |  |  |  |  |  |  |  |
| Uc 1100 V DC |  |  |  |  |  |  |  |  |  |  |
| 1+1 DC | 5 | 5 | 40 | 20 | 11.000 | 3.8 | 1000 | 1100 | OVR PV T1-T2 5-1000 P QS | 2CTB812050R1000 |
| $1+1$ DC | 5 | 5 | 40 | 20 | 11.000 | 3.8 | 1000 | 1100 | OVR PV T1-T2 5-1000 P TS QS | 2CTB812051R1000 |
| $1+1 \mathrm{DC}$ | 6,25 | 12.5 | 40 | 20 | 11.000 | 3.8 | 1000 | 1100 | OVR PV T1-T2 12.5-1000 P QS | 2CTB812120R1000 |
| 1+1 DC | 6,25 | 12.5 | 40 | 20 | 11.000 | 3.8 | 1000 | 1100 | OVR PV T1-T2 12.5-1000 P TS QS | 2CTB812121R1000 |
| Cartridges |  |  |  |  |  |  |  |  |  |  |
| 1+1 DC | 5 | 5 | 40 | 20 | 11.000 | - | 1000 | 1100 | OVR PV T1-T2 5-1000 C QS | 2CTB812052R1000 |
| $1+1 \mathrm{DC}$ | 6,25 | 6,25 | 40 | 20 | 11.000 | - | 1000 | 1100 | OVR PV T1-T2 12.5-1000 C QS | 2CTB812122R1000 |
| 1+1 DC | 6,25 | 6,25 | 40 | 20 | 11.000 | - | 1000 | 1100 | OVR PV T1-T2 12.5-1000 M C QS | 2CTB812122R1001 |
| Uc 1500 V DC |  |  |  |  |  |  |  |  |  |  |
| $1+1$ DC | 5 | 5 | 30 | 20 | 11.000 | 5 | 1500 | 1500 | OVR PV T1-T2 5-1500 P QS | 2CTB812050R1500 |
| $1+1$ DC | 5 | 5 | 30 | 20 | 11.000 | 5 | 1500 | 1500 | OVR PV T1-T2 5-1500 P TS QS | 2CTB812051R1500 |
| $1+1$ DC | 5 | 10 | 30 | 20 | 11.000 | 5 | 1500 | 1500 | OVR PV T1-T2 10-1500 P QS | 2CTB812100R1500 |
| $1+1$ DC | 5 | 10 | 30 | 20 | 11.000 | 5 | 1500 | 1500 | OVR PV T1-T2 10-1500 P TS QS | 2CTB812101R1500 |
| Cartridges |  |  |  |  |  |  |  |  |  |  |
| $1+1$ DC | 5 | 5 | 30 | 20 | 11.000 | - | 1500 | 1500 | OVR PV T1-T2 5-1500 C QS | 2CTB812052R1500 |
| $1+1 \mathrm{DC}$ | 5 | 5 | 30 | 20 | 11.000 | - | 1500 | 1500 | OVR PV T1-T2 10-1500 C QS | 2CTB812102R1500 |
| $1+1 \mathrm{DC}$ | 5 | 5 | 30 | 20 | 11.000 | - | 1500 | 1500 | OVR PV T1-T2 10-1500 M C QS | 2CTB812102R1501 |

## Protection and safety

OVR surge protective devices selection tables

| Protected lines | Impulse current | Max. discharge current | Nominal current | Short-circuit current rating | Voltage protection level | Nominal voltage | Max. cont. operating voltage | Order details |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | limp | Imax |  |  |  |  |  |  |  |
|  | 10/350 | 8/20 | In | Iscpv | Up | Un | Uc |  |  |
|  | kA | kA | kA | A | kV | V | V | Type code | Order code |
| Type 2 OVR pluggable PV applications |  |  |  |  |  |  |  |  |  |
| Uc 1000 V DC |  |  |  |  |  |  |  |  |  |
| 1+1 DC | - | 40 | 20 | 10.000 | 4 | 1000 | 1000 | OVR PV T2 40-1000 P | 2CTB802400R1000 |
| 1+1 DC | - | 40 | 20 | 10.000 | 4 | 1000 | 1000 | OVR PV T2 40-1000 P TS | 2CTB802401R1000 |
| Cartridges |  |  |  |  |  |  |  |  |  |
| 1+1 DC | - | 40 | 20 | 10.000 | - | 1000 | 1000 | OVR PV T2 40-1000 C | 2CTB802402R1000 |
| Uc 1500 V DC |  |  |  |  |  |  |  |  |  |
| $1+1$ DC | - | 40 | 15 | 10.000 | 5 | 1500 | 1500 | OVR PV T2 40-1500 P | 2CTB802400R1500 |
| $1+1 \mathrm{DC}$ | - | 40 | 10 | 10.000 | 5 | 1500 | 1500 | OVR PV T2 40-1500 P TS | 2CTB802401R1500 |
| Cartridges |  |  |  |  |  |  |  |  |  |
| 1+1 DC | 2 | 40 | 10 | 10.000 | - | 1500 | 1500 | OVR PV T2 40-1500 C | 2CTB802402R1500 |



# The new ABB OVR data and telecom SPD range overview 

Protecting critical electronic systems

The new ABB OVR data/telecom range of SPDs are designed to protect equipment connected to data and telephone lines to complement the OVR power SPD products and offer a complete system protection solution (power \& data) against surges. The comprehensive range includes protection for twisted pair data lines (including hazardous environments), computer networks, telecom systems including PBX and ISDN, CCTV, TV and RF systems.

To protect the electronic equipment inside a building, all cables that enter or leave the building must be protected.
Cables leaving the building can also provide a route back into the building for transients.


WARNING Equipment is ONLY protected if all incoming lines have protection fitted

## Data \& measurement systems

- 2 wire (OVR SL series)
- 2 wire ATEX (OVR SLX series)
- 2 wire (OVR D/E/H series)
- 3 wire (OVR SL-3W series)
- 4-20 mA (OVR SL 4-20)


Mains power supply

- See OVR power SPD series

Telecom systems

- PBX (OVR KT series)
- RJ11 (OVR TN series)
- RJ45 (OVR ISDN series)
- 2 wire (OVR TN, OVR SLTN)
- 8 wire (OVR TNQ)

Transceiver/CCTV systems

- RF (OVR RF series)
- CCTV (OVR CCTV series with OVR 240-16A)
- TV (OVR TV series)


## Protection and safety

Short Selection Guide - Surge Protection Devices OVR


## ABB Energy Efficiency Portfolio <br> Metering solutions from basic to advanced




## Measurement made simple

Explore the new single function, multi-function and dual source meters range for basic monitoring applications inside both commercial buildings and industries.

## M1A M1V and M1M 11

The M1 series is a single phase and three-phase digital panel meter for reliable and accurate trueRMS measurement of electrical parameters - voltage, current and energy for building, commercial and industrial applications.


## M1A

M1A is a digital ammeter for current measurement, providing the measurement of the single-phase or three-phase electrical parameters and allowing easy replacement of different analogue meters.

M1V
M1V is a digital voltmeter for voltage (and frequency) measurement, providing the measurement of the single-phase or three-phase voltage as well as frequency (for 3Ph voltmeter) and allowing easy replacement of different analogue meters.


M1M 11
M1M11 is a digital kWH meter for energy measurement, providing the measurement of the single-phase or three-phase energy consumption. Enabled with Modbus RTU RS485 communication for remote monitoring.

## Measurement made simple

Easily replace the different analogue meters in sub-distribution
switchboards using a single M1M; making stand-alone metering simple.

M1M 10, M1M 12 and M1M DS
M1M 10, M1M 12 and M1M DS offer exactly what is basically needed to monitor in an electrical system. Thanks to True RMS measurement of the main parameters, both average and per phase measurement suitable for Star, Delta or 1-phase systems can be easily measured. M1M allow quick stand-alone metering of the 3 different phases, as well as statistical metering of active energy consumptions along with dual source monitoring.

## M1M 10

M1M 10 is a VAF meter for basic electrical system monitoring, providing the measurement of voltage, current, frequency and on hours.


M1M 12
M1M 12 is a multi-function meter for complete electrical system monitoring, providing the measurement of: active energy, active power, power factor, voltage, current, frequency, on hours and load hours. Enabled with Modbus RTU RS485 communication for remote monitoring.

## M1M DS

M1M DS is a dual source multi-function meter for complete electrical system monitoring, providing the measurement of: active energy, active power, apparent power, power factor, voltage, current, frequency. Enabled with Modbus RTU RS485 communication for remote monitoring.


## Measurement made simple

Making difference with M1M range of meters in sub-distribution switchboards.


-
Industrial plants

Public
buildings

## Measurement made simple

## Value proposition

## Simple to use

- Intuitive visualization of the parameters on the bright LED display
- Enhanced clarity in data reading and device configuration


## Easy choice

- Maximum 2 steps to select the correct product for your application


## Easy to install and stock

- Compact product design and optimized volumetric weight of packaging
- No tools required for product mounting thanks to mounting clips


## System integration

- Remote monitoring in any Modbus RTU supervision system, thanks to the optional RS485 port



## Your benefits



## For distributors

- Save space needed for internal stock
- Fast selection of the correct product for your orders
- Handle a minimum set of order codes



## For panel builders

- Reduce the time needed for meter installation on the panel
- Fast selection of the correct product for your application
- Increase the number of projects covered with the same product



## M1M Power Meters

Introducing the new ABB power meters ranges M1M 15, M1M 20B, M1M 30B, M1M 20 and M1M 30, an easy solution for any standard application in buildings and industry.

M1M 15, M1M 20B, M1M 30B, M1M 20 and M1M 30 are the new $A B B$ ranges of power meters, offering exactly what is needed to monitor the electrical system and analyze the power quality in a single device.

The new M1M power meters allow to easily and cost-effectively cover the main sub-metering and power quality monitoring requirements in commercial and industrial buildings, either small or mid/large-sized, e.g. inside power factor correction boards, motor control center or sub-distribution switchboards.

ABB's complete multi-function meters product line, now including M1M 15, M1M 20B, M1M 30B, M1M 20 and M1M 30 ranges, are capable to cover
all needs, from basic electrical parameters measurement to advanced power quality analysis.

ABB's power meters are simple to use, with a common and intuitive user experience from installation to operations, allowing to fully exploit the reliable, IEC-compliant measurements.

Thanks to their connectivity capabilities, M1M can get leverage on the integration in ABB scalable energy and asset management solutions to monitor, optimize and control the complete electrical system, such as System pro M compact ${ }^{\circledR}$ InSite and ABB Ability ${ }^{\text {TM }}$ Energy and Asset Manager cloud-computing platform.



M1M 15


M1M 20B


M1M 30B


M1M 20


M1M 30


## Explore the new ranges

Five new different M1M product families M1M 15, M1M 20B, M1M 30B, M1M 20 and M1M 30, have been commonly designed in order to perfectly fit in a scalable way any monitoring need, with high focus on intuitiveness, quality and common user experience. All M1M power meters are compliant to IEC 61557-12 power metering and monitoring devices (PMD) standard, ensuring reliability of all electrical parameters and power quality KPIs measurements.

## M1M 15

M1M 15 is a LED display complete multi-function meter for electrical system monitoring, mainly targeting measurement of basic electrical parameters and applications for cost allocation of energy consumptions.

## M1M 20B

M1M 20B is a LED display power meter including THD and import/ export
(4 quadrants) measurement for basic power quality analysis applications such as power factor management and local energy generation monitoring.


M1M 20B


M1M 30B
M1M 30B is a LED display power meter providing complete features in terms of power quality analysis such as measurement up to 40th harmonic and internal memory for datalogging, allowing to target e.g. demand management applications.

## M1M 20

M1M 20 is a LCD display power meter including THD and import/export (4 quadrants) measurement for basic power quality analysis applications such as power factor management and local energy generation monitoring.

M1M 30
M1M 30 is a LCD display power meter providing complete features in terms of power quality analysis such as measurement up to 40th harmonic and internal memory for datalogging, allowing to target e.g. demand management applications


## Measurement made simple

The complete M1M range, offering all the measurement features required for basic power quality monitoring and submetering in a single power meter; making measurement simple.


## ABB meters to cover all needs

Select in maximum two steps, the right and most competitive power meter to cover all basic electrical system measurement needs. Thanks to integrated functionalities and communication protocols, the same product version fits an increased number of projects and wide applications range.


Easy to use

## Common user experience

Common and intuitive menu structure all over the different ranges on clear and large backlit LCD/ LED displays, helping to reduce the time needed to operate the power meters. Feedback on correct operations and quick reactivity on the system events are ensured by alarms icons and frontal LEDs on all product versions.



## Easy to install

## Optimized installation process

Compact power meters, ensuring a very limited footprint inside the panel, provide a common, vertical disposition of the terminals for easy wiring of cables directly from the sides. No special tool is required for product mounting thanks to mounting clips.


## Energy Efficiency

## Reliable and accurate measurement

Complete set of measurement functionalities, from multi-function meters to intermediate power meters, compliant with accuracy standard IEC 61557-12 to allow improving energy efficiency of the electrical system. Remote communication on main communication protocol, Modbus RTU and Modbus TCP/IP.

## Your benefits

## For distributors

- Reduce selection time of the correct product thanks to reduced range complexity
- Manage a limited number of order codes from
- A single supplier
- Save space needed for internal stock
- Have the product on stock when needed and reduce delivery time


## For panel builders

- One supplier only for all measurement products covering wide range of projects
- Increase competitiveness in projects
- Reduce time needed for product selection thanks to simple range composition
- Reduce time for installation and operations
- Minimum space requirements in the panel


## M4M Network Analyzers Discover the benefits

M4M as a stand-alone network analyzer guarantees all power monitoring needs in the energy distribution system: from high-accuracy energy efficiency monitoring of electrical parameters to complete power quality analysis. Thanks to its connectivity capabilities, M4M can get leverage on the integration in ABB scalable energy and asset management solutions. Thanks to MID certification, M4M allows now to fulfill all legal requirements for accounting and energy acquisition.


## -50\% Time for integration <br> in the ABB turnkey solution

## Full connectivity

Natively integrated in sub-distribution management System pro M compact ${ }^{\circledR}$ InSite and ABB Ability ${ }^{\text {M }}$ Energy and Asset Manager cloudsolution, M4M benefits from the scalability of the ABB digital solutions: from stand-alone visualization and commissioning to monitoring, optimization and control of the complete electrical system.

-40\% Time for installation and commissioning

## Simple and Intuitive

M4M makes configuration and operations simple and fast, from easy installation and wiring thanks to compact dimensions, all-removable terminals and Rogowski coils, to intuitive use and data access thanks to touchscreen color display, mobile APP and desktop software.


## Reliable and accurate power monitoring

## Energy efficiency

ABB's M4M range of network analyzers gathers data from the electrical system and provides a complete power quality analysis and high accuracy energy monitoring.
MID certification available to ensure certified and tamper-proof measurement for billing applications and fulfilment of legal requirements for accounting and energy acquisition.


## Improve reactivity and reduce uncoordinated maintenance

## Realtime supervision

M4M network analyzers make information easy to access from any area of the system, providing a comprehensive range of accurate data and notifications that enhance reactivity to the events on the electrical system and allowing to avoid overloads, outages and Un-Un-coordinated maintenance.


## Full Connectivity <br> Cloud-based power monitoring

Connectivity-based solutions increase awareness of resources and process behaviors: asset management can then be optimized through the control and monitoring of operations and costs.

M4M network analyzers ranges allow full connectivity and easy integration of sub-metering and power quality monitoring features, thanks to a complete set of communication protocols, matching
$C_{i}$
Propose a single solution to optimize costs and energy needs, thanks to M4M, which is automatically integrated in System pro M compact ${ }^{\circledR}$ InSite and ABB Ability ${ }^{\top M}$ Energy and Asset Manager cloud-solution, enabling realtime monitoring widgets, historical trend

analysis and power quality reporting. Propose projects compliant with energy efficiency regulations. High-accuracy network analyzers class 0,5 according to IEC 61557-12, connecting to the cloud complete set of electrical parameters and power quality KPIs: from THD to individual harmonics.


Rogowski coil acceptance to integrate measurement functionalities and power quality analysis in any existing installation, easily transmitted to the cloud also in brownfield projects.
high-accuracy standard requirements. M4M exploits the scalability of the ABB solution, from stand-alone visualization and commissioning via HMI or EPiC mobile APP and desktop software, to monitoring, optimization and control of the complete electrical system via ABB Ability ${ }^{\text {™ }}$.

At $A B B$, we leverage internet of things' devices to drive digital transformation of buildings, by providing a scalable portfolio for energy and asset management.

Scalable, fully connected, unique $A B B$ solution


Revamping of any existing installation

Complete integration in the ABB's scalable solutions for energy and asset management, to protect assets and optimize costs and energy needs


## Simple and intuitive <br> Setting up a new benchmark

Thanks to its great user experience design, every user can become familiar with and competent in using the device at the very first contact.

M4M network analyzers reduce installation and commissioning time by up to $40 \%$, thanks to easier configuration and simpler operations.

Easy installation and wiring are ensured by compact dimensions, all-removable terminals and Rogowski coils, while touchscreen color display and mobile APP integration increase the intuitiveness of use.


Smart commissioning both locally and remotely, via mobile app and desktop software, thanks to Bluetooth and embedded communication protocols, allowing to copy-paste the configuration of several devices and to simply integrate products in the system.


Touchscreen color graphic display and easy-to access app-structured menu make network analyzers' configuration and operation simple and quick, with interactive pop-ups and complete notifications.


All-removable terminals with vertical disposition allow fast installation and wiring of the compact 57mm-wide M4M, suitable for installation in any panel. Rogowski coils enable faster CT cabling with zero downtime.

## M4M network analyzers

 represent the new benchmark in terms of easiness of use and intuitiveness, throughout the whole device lifecycle.Easy to configure and integrate


Fast installation and wiring

Smart commissioning and intuitive visualization and data access, making configuration and operations simple and fast.


# Energy efficiency Power from data 

Buildings are responsible for $36 \%$ of global final energy consumption and nearly $40 \%$ of total direct and indirect CO2 emissions, as reported by International Energy Agency.

Building owners and engineers need to re-design electrical network of their facilities and buildings in order to considerably reduce unnecessary


Get a turnkey solution with System pro M compact ${ }^{\circledR}$ InSite for sub-distribution managment and ABB Ability ${ }^{\text {TM }}$ Energy and Asset Manager cloud-solution, enabling access to data collected from electrical distribution system, including power metering data from M4M, for

straightforward benchmark analysis. Increase efficiency by avoiding penalties from utility, thanks to the high reliability of measurement, compliant with main IEC accuracy standard. Datalogging of 1-year historical data, including max demand, load profiles and energy.


MID certification, allowing fiscal billing and ensuring certified and tamper-proof measurement for fulfilment of legal requirements for accounting and energy acquisition. Reduce time needed to understand data, from intuitive stand-alone product interface to the complete energy management system.
energy use and achieve better efficiency. M4M can easily be integrated in the System pro M compact ${ }^{\circledR}$ InSite for sub-distribution management and ABB Ability ${ }^{\text {TM }}$ Energy and Asset Manager cloud-solution, providing a unique, turnkey solution for monitoring, optimization and control of the electrical system, from protection to measurement, from field measurements to services.

## M4M network analyzers provide a complete set of measurements and KPIs needed to set up a high-quality and effective energy management strategy.



Monitor, optimize and control

Quick access to energy
efficiency data



Reduce energy wastage

Complete set of high-accuracy data, improving the energy efficiency of the electrical system and troubleshooting power quality problems

## §Improve energy

 efficiency......thanks to power monitoring $]$

## Real-time supervision Taking informed actions

From 5 to 20\% of production inefficiency is caused by downtime. A research conducted by Aberdeen reported the cost per hour of an unplanned downtime can cost up to $\$ 8,600$.

M4M allows you to improve reactivity to any event on the electrical system in order to avoid overloads, outages and un-coordinated maintenance.


Alarms can be linked with user-defined logics to a complete set of power quality KPIs, acting on the system via embedded programmable I/O. Measurement of neutral line and calculation of ground current to avoid overloads and outages.


Remote and quick access to measured parameters, notifications and user-defined alarms from any area of the system through a smartphone, a tablet or a PC thanks to Bluetooth and embedded communication protocols, making maintenance faster.


Remote FW upgrade of M4M can be easily done via Ekip Connect software without any impact on operations, guaranteeing to have the most updated and the most secure device, at any time.

Collected data and user-defined alarms can flow into a remote system via embedded communication protocols (Modbus RTU, Modbus TCP/IP, Profibus DP-V0, BACnet/IP), making them easy to access from any area of the system.

> M4M network analyzers support facility managers and building owners to keep under control the electrical system performances.


Improve reactivity to power
quality events


Have the most updated and secure product

Enhanced reactivity to the events on the electrical system, improving operations and allowing faster maintenance, at any time

## Explore the M4M ranges

M4M network analyzers are available in different versions, which ensure all power monitoring needs, from basic to more complete power quality analysis.


EQUIPPED WITH GRAPHIC COLOR DISPLAY AND 5 PUSHBUTTONS KEYBOARD, M4M 20 RANGE ALLOWS COMPLETE MONITORING AND BASIC POWER QUALITY ANALYSIS.


EQUIPPED WITH TOUCHSCREEN COLOR DISPLAY, M4M 30 RANGE ALLOWS COMPLETE POWER QUALITY ANALYSIS AND ENERGY EFFICIENCY EVALUATIONS.


M4M 2X ON DIN-RAIL WITHOUT DISPLAY, ENSURING HIGH FLEXIBILITY TO PROJECT SPECIFICATIONS, COMPARED TO STANDARD NETWORK ANALYZERS.

## MID-certification

Availability of MID approval to ensure certified and tamper-proof measurement for billing applications.

## Graphic color display

M4M 20 and M4M 30 are equipped with a graphic color display and common app-based menu for an intuitive visualization.

## Bluetooth-enabled

All M4M network analyzers are equipped with Bluetooth module for smart commissioning via mobile app.

## Full communication

A complete set of embedded communication protocols, including Modbus RTU, Modbus TCP/IP, Profibus DP-VO and BACnet/IP

## Input/Output

Control on the system thanks to I/O options including digital outputs, programmable I/O or programmable analogue outputs.

$\overline{03}$

$\overline{-}$

## Datalogger

Data logging features are available, from complete notification logs to flash memory and RTC for 1-year data
logging of trends.

## Rogowski version

M4M Rogowski versions are compatible with ABB's R4M
01 M4M Homepage
$-$
02 Trending graphs of load profiles
-
O3 R4M Rogowski coils

04 M4M with MID certification

## Access to M4M network analyzers

M4M network analyzers offer the strongest scalability to access the measurement data, from color graphic display to smartphone app and desktop software, up to webserver and cloud-platform when integrated in the ABB digital solutions.


## Explore the EQ meters Information is the key

Energy consumption awareness is key to reduce energy costs and improve energy efficiency on your machines and electrical assets. Energy meters allow to identify areas for improvement and to generate benefits for owners, facility managers and users. They enable to run smarter buildings in a more energy and cost-efficient manner.

With Energy Meters, you can also split the bill received from the utility within different household thanks to the MID certification.

Sub-metering provides a detailed picture of the energy consumption and the specific areas where energy is used.

EQ meters have the following instrumentation values as a minimum:

- Active power
- Voltage
- Current
- Power factor

Discover the full range of ABB products designed to monitor energy consumption and energy costs in residential, commercial and industrial buildings.


The A series
Is an advanced meter product range for installations up to 80 A direct connected or transformer connected both for current and voltage (CT/VT).


## The B series

Is a basic meter product range for installations up to 65 A direct connected or transformer connected (CT).


## The C series

Are products, without communication, intended for stand-alone energy measurement up to 40 A direct connected.

## Explore the EQ meters Information is the key

STEEL

- Active energy
- Class 1
- Pulse Output
- Alarm
BRONZE
STEEL +
- Reactive energy
- Apparent energy
- Import/Export
energy
- Alarm

| SILVER | GOLD |
| :--- | :--- |
| BRONZE + | GOL <br> - Class 0.5 or 1 <br> - Tariff Control <br> - Previous Value <br> - Max/min <br> demand |
| - Resettable energy |  |
| register | - Event log |

## PLATINUM

## GOLO

- Harmonics
- Configurable I/O
- Advanced clock
funcitons (load profiles)


## Functionalities



Reliable in harsh conditions

Wide operating conditions:

- $-25^{\circ}$ and $+70^{\circ}$ for C series
- $-40^{\circ}$ and $+70^{\circ}$ for B and A Series
- B21/B23 112-100 can work without derating at 4.000 meter altitude (AC Voltage test)



## Optimum interface

New versions can be integrated into ABB Ability ${ }^{T M}$ EDCS thanks to plug \& play technology.

Mbus and Modbus communication protocols are available


## Complete offer

## A vast offer of

functionalities, such as:

- Apparent Energy

Measurement

- Tariff Control, Import / Export energy...and many more!



## Global availability

EQ meters meet different international standards:

- MID approval
- IEC approval for worldwide
- GOST standards for Russia
- METAS certification on reactive energy for Switzerland


## Environmental

classification to MID:

- M2 for mechanical environment
- E2 for electromagnetic sification environment


## Beyond connected

## Scalable and connected solutions

## $\overline{0}$

Connected sub
distribution board installed in an office

## $\overline{02}$

Sub distribution solutions architecture scheme

Digitalization is changing the world of energy distribution making it safer, smarter and more sustainable.

A fundamental aspect of this is that technology is making it easier to collect useful data and to use it for analysis.

Connectivity based solutions increase awareness of resources and process behaviors: asset management can then be optimized through the control and monitoring of operations and costs.

It fosters a more conscious utilization of resources that improves energy efficiency and ali gns with challenging sustainability targets.

ABB's solutions for sub distribution protect, monitor, measure and eventually make your installation smart and fully connected.

With our scalable solutions any size of public, commercial or industrial building can easily be connected to the cloud or data can be acc essed via the web server.

Thanks to its flexibility, also existing installations can be easily revamped within a day and without replacing any existing components, reducing installation and configuration time nearly to zero, and in turn, minimizing operational downtime costs.

Once the system is installed and connected, the data collected on the intuitive web user interface can be used for a variety of needs, from reducing energy consumption to identifying potential risks for operational continuity.
Receiving customized alerts and config uring automatic actions are just some of the functionalities to optimize the management of energy and assets. Constant diagnostics an d real time notifications ensure total transparency over how the electrical system is performing.

Compliance with highest energy efficiency standards and complete control over the total facility consumptions to save up to $20 \%$ of energy and reduce CO2 emissions by 15\%. All that is guaranteed with ABB's safe, smart and sustainable solutions for sub distr ibu tion that go beyond connectivity.

$\overline{01}$


## Beyond connected System overview



InSite web server
Cloud ABB Ability ${ }^{\text {™ }}$
Easily access real time data on the InSite web server or via the cloud using ABB Ability ${ }^{\text {™ }}$ Energy Manager cloud solution. Monitor and analyze data gathered from the electrical system in the applications or even on multiple sites. Control your sub distribution remotely, for instance by creating automated actions.


## Energy \& power meters

To perform full energy management in the electrical distribution, knowing the energy flow in the system is key. ABB's extensive portfolio of energy efficiency devices, including energy meters \& network analyzers, is designed for every type of residential, commercial and industrial application. All the data can be gathered by System pro M compact InSite ${ }^{\circledR}$ automatically, connecting it to their embedded communication protocols.

DIN rail protection devices \& accessories
Complete protection can be achieved by the comprehensive ABB DIN rail protection portfolio including MCBs, RCDs, SPDs, AFDDs.

The offer is completed with a wide range of accessories: auxiliary and signal contacts, shunt trips, motor operating devices, and many more.

All the information coming from protection devices can be gathered in System Pro M compact ${ }^{\circledR}$ InSite through the digital input module, while through the digital output module it is possible to control the devices on the filed manually or through automated logics


# Safe and reliable energy distribution <br> Find the perfect fit for every application 

ABB's safe, smart and sustainable solutions for sub distribution are designed to improve energy and facility management in all types and sizes of commercial and industrial buildings.

Thanks to their scalability, our flexible and connected solutions can be tailored to businesses' specific requirements.

- Small commercial buildings

Existing installations of small shops, hotels, offices and restaurants with few panels can be easily upgraded with plug and play assembly.

Total transparency over the complete energy distribution system and utility consumption like gas and water improves energy management and reduces operational costs significantly.

## - Large commercial buildings

Office towers, mixed use commercial buildings, airports, shopping malls, hospitals or large hotels can be managed more efficiently.

Sub-metering and energy costs allocation of different occupiers, for instance single stores in a shopping mall, can be integrated with the collected sub distribution data into the local webserver or cloud platform that manages the overall site.

- Industrial Buildings

Our scalable solutions ensure service continuity and predictive maintenance for forecasts developments, particularly in industrial areas where it is important to reduce or prevent unplanned outages and related costs, for example in food and beverage production lines.

Supervision systems or more complex installations that are already in place such as SCADA or BMS can easily be complemented.


## Small commercial

 buildings

Industrial buildings


## Beyond connected, no matter the project stage

> Whether you're retrofitting an old building, adding a new installation or any stage in between - we offer flexible and scalable solutions to save time in all stages of the design process.

Meet your needs for improving energy impact, reducing supervision costs and adding value to the structure.

Using safe, smart and sustainable solutions for sub distribution that go beyond connectivity.

- Scalable, fully connected solutions that can be implemented across all project stages
- Increased efficiency of electrical systems and compliance to highest energy efficiency standards to save up to 20\% of energy and to cut CO2 emissions by $15 \%$
- Replicable and easy configuration to save time comparing product features and select the right solution
- Updated and secured system thanks to FW update to ensure data security guaranteed by encrypted SNMP V3 and SSL certificate



## Beyond connected, with simple and intuitive commissioning

Flexible assembly of sub distribution boards, optimized wiring and smooth coupling of devices to speed up the installation process.

Whether you're installing new systems, integrating electrical plants, or revamping pre-existing electrical systems - we offer scalable solutions that improve installation efficiency and save on time and costs without impacting the existing design configuration.

Discover how easy and effortless installation can be with ABB's safe, smart and sustainable solutions for sub distribution that go beyond connectivity.


- Retrofit existing installations within one day with zero component replacement
- Quick assembly and easy installation
- Fast and error-free configuration thanks automatic recognition of installed devices, directly communicated to the system access pointc
- Connect the system to the cloud in only 10 minutes
- Configurations of similar systems can be transferred between one another



# Beyond connected, always one step ahead of maintenance 

> Easily access data from wherever you are and effectively manage the consumption of your facility.

> Whether it's an old building, a new building or at any stage in between - we offer simple solutions to save on time and costs through configurable automatic control to optimize facility and energy management.

> Improve energy efficiency and increase the value of the facility by up to $5 \%$ while lowering maintenance and operational costs with ABB's safe, smart and sustainable solutions for sub distribution that go beyond connectivity.


- Monitor and check real-time or historical data from both protection and measurement devices online
- Customized alerts, automatic actions and easy access to data enabling early detection of potential issues and allowing fast reactions
- Guarantee continuous operations by proactively planning maintenance interventions to avoid unexpected downtime costs and improve the facility value by up to $5 \%$
- Configure and program automatic actions to promptly react to selected events with no need of manual interventions and hence, optimize facility management
- Manage the consumption of the facility to reduce operational costs save up to $20 \%$ of energy


## ABB Connect Partner Hub

Far more than a conventional website, with ABB Connect Partner Hub you can interact with ABB, improve your knowledge and collaborate with other professionals.

It helps to find product information, connects you directly to an online network of expert contacts and a range of digital services such as online training, project and plant management.


## Design and develop your solution, in one place

Create your own applications for the platform by making the development process simpler, produce tailored apps for each customer and integrate new features and provide added value for your clients.

## Create, design and collaborate in real time

Build a project to bring your designs to life with your partners and clients. Share documents with fellow collaborators, import BOM, view activities in real time and fast track your plans to implementation.

## Share your feedback and ideas with us

We are curious to know your ideas. Leave your feedback and suggestions and help us improve our products and solutions.


## InSite web server

Once you made your sub distribution board smart by installing System pro M compact® InSite you can connect it to the local network so data gathered by its control unit, digital I/O modules and current sensors can be accessed via the web server. Access to several pre-configured pages is provided automatically.

These allow you to monitor, compare and structure your real-time and historical data. Also, automatic actions can be set to react promptly to selected events.

In the InSite web server you will find the following structure:

## Monitor

Access real-time data of all the devices available in the system (Control Unit, I/O modules, meters, etc.)


## Analytics

Analyze data, access historical values, access alarms, export data of selected periods and compare products.



## Control

Rename channels or switch them on or off remotely.


## Configuration

Change the hierachy of the devices, set alarms, create automated actions using if-then logics and thresholds.


# ABB Energy Management ABB Ability ${ }^{\text {™ }}$ Energy Manager 

ABB Ability ${ }^{T M}$ Energy and Asset Manager is the state-of-the-art cloud solution for monitoring, supervising and analyzing site equipment, as well as the site's electrical distribution system, resulting in improved performance, efficiency and safety. Through its scalable and flexible approach, ABB Ability ${ }^{\text {™ }}$ Energy and Asset Manager ensures full-range integration of main electrical low- and medium-voltage equipment installed in the distribution and sub-distribution switchboards. With a single easy-touse interface, ABB Ability ${ }^{\text {TM }}$ Energy and Asset Manager assists the user by means of a cloud computing or hybrid platform, enabling analysis of relevant data and optimization of installation.

A new approach to energy and asset management With an intuitive web app interface accessible via smartphone, tablet or PC, ABB Ability ${ }^{\top M}$ Energy and Asset Manager makes it simple to:


## Monitor

Oversee site performance, supervise the electrical system and allocate costs.


## Analyze

Schedule and analyze automatic data exports, improve the use of assets and make the right business decision.


## Explore

Visualize the system structure, verify assets health and get actionable insights following predictions and prescriptions.


ABB Ability ${ }^{\text {TM }}$ Energy and Asset Manager also provides access on a multi-site level, allowing you to monitor and compare the performance of different facilities at the same time. It allows profiling of users according to the level of access they require.

In addition, upgrades and changes can be organized at any time via the ABB Ability ${ }^{\top M}$ Marketplace. With just a click, the customer can customize their solution according to their needs anytime, anywhere.


## Act

Set up alerts to notify key personnel while remotely implementing an effective efficiency strategy, managing maintenance activities and scheduling next actions.


## CMS System overview <br> Designed down to the finest detail

The quality of a measurement and monitoring system dependens on the strengths of the individual components and how well they interact. ABB's new CMS sets new and high standards.

Compactness, technology, measurement results, user friendliness and flexibility - every component and every feature of the CMS has been fully optimized in terms of practicality and functionality.

CMS-700 control unit in combination with open core CMS sensors.

## CMS bus interface

Each bus interface allows up to 32 sensors connected to the Control Unit:
CMS-700: up to 96 sensors ( $3 \times 32$ )
CMS-600: up to 64 sensors ( $2 x 32$ )


## Serial interfaces

Depending on the selected control unit, the following communication interfaces are available: RS485 (Modbus RTU), LAN (TCP/IP and Modbus TCP) , SNMP v1/v2 and v3 encrypted.

The web server integrated in the CMS-700 makes it possible to display the values via any Internet browser and to automatically export the files (via e-mail or FTP server).

# CMS-700 Control Unit Plug \& play energy monitoring 

The CMS-700 control unit is the reliable solution for maximum transparency of energy consumption.

Using CMS-700 it is possible to measure and calculate electrical parameters from both the mains and the branches, in order to provide the most comprehensive set of information on the system.

A maximum of $3 \times 32$ sensors can be connected to the CMS-700, allowing to simultaneously obtain AC and DC current as well as active energy from up to 96 branches.
At the mains side, the control unit allows to access the complete set of measurement data.

Complete set of embedded communication protocols is available to ensure smooth network
implementation: Modbus RTU, Modbus TCP/IP and SNMP, including encrypted SNMP v3 for utmost data security.

As well as helping in the identification of potential savings related to energy consumption, CMS-700 allows to detect risky situations before they lead to service interruptions or load failures, improving system reliability and supporting continuous operations.

Smart commissioning of the system is guaranteed thanks to the CMS-700 integrated webserver, with no need of any external software to put into operation the CMS system.

Energy monitoring using the CMS-700 web server interface



## Access to CMS-700 Integrated web server

Thanks to the CMS-700 built-in web server, any web browser can be used to carry out the smart commissioning of the system, as well as easy visualization of online and historical measurement data.

Every parameter from both mains and branches can be visualized as instantaneous or historical value, with intuitive graphs that allow the user to quick analyze the measurement data. Data export to CSV files, mail or FTP is possible, according to user requirements.

The integrated alarm function can be fully managed via the webserver ensuring quick notification, via email or FTP, to unusual system status. This improves reactivity to potential issues and supports continuous operations. The whole commissioning phase of the CMS system can be carried out via the CMS-700 WebUI, from the sensor identification to the automatic data export settings. Moreover, the WebUI enables the FW update of the control unit at any time, ensuring to have the most advanced functionalities and the most secure device.



## Access to CMS-700 <br> ABB Ability ${ }^{\text {™ }}$ Energy and Asset Manager

CMS-700 is automatically recognized in the ABB Ability ${ }^{\top M}$ Energy and Asset Manager, allowing the easy integration of its functionalities via the $A B B$ Ability ${ }^{T M}$ cloud.

To set up the network and cloud connectivity in a new installation - or to upgrade existing facilities just "plug \& play" modules or devices are needed. The cloud connection for the whole switchboard can be established via Emax 2 , Tmax XT or Ekip UP equipped with Ekip Com Hub, or through EL Gateway with DIN-rail mounting module.

The ABB Ability ${ }^{\text {TM }}$ Energy and Asset Manager is an innovative cloud-computing platform designed to make asset monitoring, control and optimization simple, gathering data from the devices installed in the power distribution system, including CMS-700.

The cloud-based platform also provides access on a multi-site level, simultaneously monitoring and comparing the performance of different facilities, as well as collecting and exporting data and historical trend analysis with on-demand queries or scheduled automatic reports.

Architecture with an ABB Ability ${ }^{\text {TM }}$ Edge Industrial Gateway


Architecture using the Ekip Com Hub internal module
$\overline{02}$


# CMS-600 Control Unit Compact current monitoring 

## The CMS-600 control unit is the compact solution for professional monitoring of the currents of each individual line.

The CMS-600 is able to measure AC and DC currents of up to 64 branches. Up to 64 sensors can be installed on 2 independent lines to each control unit.
For quick and easy use, the control unit is equipped with an illuminated touch display that simplifies the parameterization and control of the sensors. RS485 Modbus RTU interface allows users to remotely query and process measurement data, making the CMS-600 control unit easy to be integrated into an existing Modbus architecture.

Easy navigation of CMS-600 is ensured by the highly intuitive touch screen display. It takes just a few clicks to access al the desired functions and menus. User does not require any special training neither for system commissioning nor for operation.

Ideal in simple monitoring applications, CMS-600 can be used to monitor current level of individual lines in order to easily detect load level and overload conditions.


1 Measurement | 2 Configuration | 3 Display of current measurement values | 4 Display of max./min. values and threshold | 5 Initialization/parameterization of the sensors \| 6 Modbus configuration | 7 Display settings

## CMS sensors

## High-level performance in a tiny space

## Available in 18 or 25 mm versions, CMS sensors guarantee maximum performance with ultimate compactness.

Reduced size, high performance: alternating (AC), continuous (DC) or mixed (TRMS) currents - CMS sensors detect and measure all types of currents up to 160A (TRMS).

Since each sensor is equipped with its own microprocessor for signal processing, the
measurement data is transmitted in digital format to the control unit via the bus interface. This minimizes the amount of cables required in the switchboards and maximizes the reliability of the measured value transmission.
A

Alternate Current (AC)
A

Direct Current (DC)
A

Mixed current

Open- core sensor

-
Solid-core sensor

## Open-core sensors

The special U-shape form of the open-core sensors allows the retrofitting of existing installation, making sensors easy to adapt to different applications while keeping continuity of service. AC accuracy* of $\leq \pm 1,0 \%$ allows open-core sensors to be used in various monitoring applications.

## Solid-core sensors

Available in 18 mm and 25 mm types, solid-core sensors offer AC measurement accuracy* of $\leq \pm 0.5$ $\%$. This accuracy makes solid-core sensors suitable for all applications where high measurement precision is needed.

## Maximum compatibility <br> Mounting flexibility for simple integration

Depending on the application, you can choose between two sets of sensors - one specifically designed for ABB installation devices, the other with an universal design to be installed on cables or DIN-rail.

## Sensors for ABB devices



## System pro M installation, SMISSLINE

The sensors of the CMS-120LA and CMS-120FH series can be used for easy retrofit installation on S200 MCBs, SMISSLINE devices and E90 fuseholders (1000VDC).


Mounting on S800 devices

The sensors of the CMS-100S8 and CMS-200S8 series can be mounted on all S800 highperformance switches with cage terminals.

## Universal sensors



## Mounting on

 DIN-RailThe sensors of the CMS-120DR, CMS-100DR and CMS-200DR
series are installed directly on a DIN rail using an enclosed adapter.


Clamp mounting on the cable If space is a problem, the sensors of the CMS-120CA series, CMS-CMS100CA and 200CA can be fixed directly on the cable to be measured using clamps (not supplied).

## System pro M compact ${ }^{\circledR}$ InSite Connected solution for sub-distribution

System pro M compact ${ }^{\circledR}$ InSite is a range of connected devices to support energy and asset management in electrical distribution.

The solution delivers highest data security standards (encrypted SNMP V3 and SSL certificate) as well as continuous upgrades thanks to regular firmware updates. Central to the System pro M® InSite range is the SCU100 control unit, that has been specifically developed to allow users to better manage energy and assets in sub distribution boards. It can gather data from up to 16 energy and power meters, as well current sensors for branch measurement.

ABB's ready-made, pre-assembled InSite kit packages are designed to make sub and final electrical distribution smarter with minimal effort. Any size of installation in commercial or industrial application can easily be upgraded,
reducing installation and configuration time to nearly zero, and in turn, minimize costly operational downtime.

To enable monitoring and control of the complete energy distribution system, the range is completed with a flexible choice of input and output modules, which can be easily connected to ABB's System pro M compact® accessories of MCBs and RCDs, as well as other DIN-Rail products with digital inputs or outputs. They can also be connected to pulse meters - such as gas or water - to collect utilities consumption.

Based on a wide set of data, available functionalities range from simple monitoring of the installation to analysis of historical data, customized alarms and implementation of automated actions to reduce energy consumption, identify potential risks and ensure operational continuity.



## What to include in the panel:

## (1) Control Unit

(2) Digital I/O modules
(3) Current sensors
(4) Flat cable

(2) Digital Input/Output modules DM00, DM10, DM11

- Connect in the connectivity system classic accessories from existing and future $A B B$ ranges and 3rd party ranges.
- Compatibility with water/gas/heat meters with pulse outputs
- Input to receive data fromhard wired connecte devices (accessories, meters)
- Output to act on connected accessories



## System pro M compact ${ }^{\circledR}$ InSite Main benefits for customers



Save up to $\mathbf{2 0 \%}$ on energy bill
Energy bills can be reduced by removing inefficiencies and wisely managing consumption of the facility

Alerts and warnings Be always informed and early detect potential issues to limit negative consequences



Automatic control Promptly react to selected events with no need of manual interventions


Easy access to data
Monitor, consult and export every type of data by accessing the User Interface



## Updated and secured system

FW update via webserver and data secured thanks to encrypted SNMP V3 and SSL certificate


## Automatic recognition

Error-free configuration thanks to automatic
recognition of installed devices

## Applications <br> Flexibility and modularity

## The CMS range offers users a simple and compact solution to guarantee energy efficiency and up-to-date system status, responding to the specific needs of different customers.

The design of the CMS system is based on extreme flexibility and modularity, making it suitable for applications in different sectors.

In data centers, CMS system can be installed to get clear visibility of energy consumption and detect risky situations before they lead to service interruptions or load failures.

Retrofitting at single branch level allows to carry out brownfield extension in existing installations at any time.

Commercial and public buildings can also leverage the CMS system to achieve higher energy efficiency and to have more detailed monitoring of their facility.

Offices, shopping malls, hotels, retail or chain stores can increase their awareness of energy consumption to improve performance.

Public facilities, such as schools, sport centers and healthcare facilities, can secure service continuity and develop predictive maintenance forecasts.


Chain stores


Healthcare facilities



# Applications <br> Current and power monitoring in data centers 

Within critical power applications such as data centers, CMS-700 provides a reliable solution for measuring individual branch load circuits and presenting energy and power dashboards. In addition, it protects data centers against current-related system outages with an integrated alarm function.

In this example the busbar trunking system, mounted overhead or under the raised floor of the server racks, is equipped with master and slave plug-in tap-off units. The proposed solution, suitable for new and existing installations, includes CMS-700 control unit in the
master tap-off unit to measure the incoming side. Open-core CMS sensors are integrated into daisy-chained slave tap-off units to carry out energy monitoring of every single phase to the rack PDU.

The integrated webserver ensures an easy configuration and allows you to remotely check realtime online values as well as historical data without any additional external software. On the other hand, Modbus and SNMP communication protocols allow the easy integration into higher level systems like DCIM or SCADA.


## Design and Specification

Through this solution, the customer can simply and easily ensure optimal load distribution and efficient energy consumption


## Installation

I can easily extend the solution when expanding the busbar trunking system, as well as retrofit into existing installations.


## Operation

I can reduce downtime and improve system reliability by early detecting potential issues.

## Applications <br> Multi-site supervision for chain stores

Stores can be situated as single locations or as a shop in a shopping mall.

Current solutions gather data from all the different stores in order to analyze energy management, monitor energy consumption and improve energy efficiency. To aggregate and compare data from multiple locations, a cloudbased solution is essential.

Monitoring any store requires only an analogue installation. Water and gas consumption data
are gathered from dedicated meters and sent digitally to the E-Hub.
Electrical data and measurements are collected from energy meters, breakers and CMS-700 devices and transmitted to the E-Hub via Modbus RTU. At the core of the solution, the Ekip E-Hub mounted on the DIN rail gathers all the incoming data.

Data from all the stores then goes to the cloud via Ethernet or wireless connections for further analysis.


## Design and Specification

While guaranteeing fast payback, this solution can ensure compliance or higher class on efficiency standards.


## Installation

Deploying a multi-site monitoring solution, I can reduce installation time and components.


## Operation

Introducing a single intuitive digital solution, I can guarantee continuous operation and allocate effectively energy consumptions.


STORE 2


## Applications Retrofitting and upgrading public buildings

For public buildings such as schools, a retrofit solution can bring rapid benefits without replacing existing components.

With accurate performance monitoring of the installation, devices can be managed more efficiently, producing savings in maintenance and energy costs.

In this scenario, the Ekip UP and the Ekip E-Hub collect data from field devices.

The Ekip UP is connected to the breakers and, via an Ethernet switch, to the Ekip Signalling.

The breakers measure energy and power quality, while Ekip Signalling modules send information about status, alarms and the number of operations.

The CMS-700 in the panel is responsible for branch monitoring and is connected to the Ekip UP via Modbus TCP/IP. In order to monitor consumption, another panel is provided with the Ekip E-Hub to gather data from gas, water and energy meters and from breakers.

This data, together with information collected by the Ekip UP, then goes to the cloud and is made available on ABB Ability EDCS for further analysis.


## Design and Specification

I will easily upgrade the existing facilities, ensuring a very fast payback.


## Installation

Through plug\&play components and commissioning, I can upgrade the existing distribution and panel boards. I don't have to replace anything.


## Operation

With this solution I can start saving on operating costs, also on multi-site, through an intuitive and simple solution while catching up with efficiency standards and regulations.


## Current transformers and shunts

## $A B B$ offers a wide range of current transformers for alternating current and shunts for direct current.

If current in a circuit is too high to be applied directly to a measuring instrument, a current transformer is used to reduce the current accurately proportional to the current in the circuit, which can be conveniently connected to measuring and recording instruments.

Explore the full range and discover the most suitable current transformers or shunts for your needs.


## CT and CTA

- Used to transform primary currents into .../5A low secondary currents
- Available both with wound (CTA) and through primary (CT)
- CT PRO XT and CT MAX guarantee maximum safety against overvoltage and overheating
- From 20A to 100A primary



## CTO split core

- Split core measurement CT through primary
- Easy installation, time and space saving, avoiding bar disconnection
- Terminal caps and fastening accessories, both on bar and on wall
- From 20A to 6,000A


## Current transformers and shunts

## Performance and flexibility.

The new CT PRO XT and CT MAX range of current transformers has been specially designed for easy and safe switchboard installation, testing and maintenance operations, thanks to the compact size of the products and their flexible assembly system. Moreover, the integrated electronic protection circuit in the CT PRO XT SELV and CT MAX SELV versions guarantee protection against risks deriving from no-load operation of the secondary.


## TRF M modular

- Modular current transformers with Ø 29 mm through primary, secondary .../5A
- Easy installation and quick DIN-Rail plug, thanks to the compact size
- From 20A to 600A




## Rogowski coils

- Retrofit in existing installations, with zero downtime, ideal for critical power applications
- Save up to 70\% time for current transformers cabling compared to standard CTs
- Minimum space requirements: 8 mm diameter coil
- Measurement up to 10,000A with same product code, ensuring optimized logistics



## Shunts

- Shunts have 60 mV voltage and must be used with a maximum load of $0.25 \Omega$ in combination with measuring instruments in d.c.
- Both horizontal and vertical mounting are possible
- From 10A to 1,000A


## ITUS <br> Distribution Enclosures

## A fresh look

Advances in building design and building methods mean making considerable improvements in utility systems that match the requirements of residential, commercial and industrial infrastructure.

Thanks to its simple, compact design, customization capabilities and multiple protection provisions, the ABB ITUS series with its seamless form, new finish and improved space provisions offers the maximum flexibility for your domain requirements.

Blending in seamlessly to your interiors, keeping pace with new innovative enclosure aspects is what ABB ITUS helps to achieve.
$\square$


## A collaborative effort Meeting the right requirements.

ABB ITUS series Distribution Enclosures put no limits to your imagination. Gone are the days when enclosures were meant only for archaic needs. With the ABB ITUS series enclosures, you can be rest assured that it will not only perform at its peak, but also blend in with the rest of your interiors. Using ABB's innovative designs, domain expertise and standards, ABB ITUS is ready to help you to be today's trendsetter.

ymats



## Aesthetics

At ABB, we strive to push the barriers of thought with our new line of Distribution Enclosures that cater to the needs of every utility, be it domestic, commercial or industrial. ABB ITUS reflects our abilities not just purely on performance, but also with a revolutionary design that perfectly blends with every wall along any corner.


## Tried and proven

Moving with the times

As new interiors use advanced construction procedures and methods, ABB ITUS Distribution Enclosures have been redesigned to meet MIVAN type of construction. It is developed using thicker $L$ bends that ensure enhanced strength and is able to maintain form factor, thus withstanding internal pressures making it adaptable to all framework structure scenarios.

Set under the total type tested assembly standards of safety and quality. ABB ITUS meets all compliance measures of IEC61439-3, which covers short-circuit, temperature rise, ingress protection (IP) and mechanical strength (IK) test conditions. To avoid corrosion, the Distribution Enclosure is powder coated and exposed to humidity factors and thermal shocks ranging from $-40^{\circ} \mathrm{C}$ up to $150^{\circ} \mathrm{C}$. This ensures that the Distribution Enclosure meets our quality standards and fulfills your high expectations from ABB.


New L bend gland plate welded with backbox ensures capability to withstand higher mechanical impact.


- Non-projection bolts
- Sealing caps provided to prevent concrete entry during construction phase
- IP 30 single door, IK 08 with
- IP 43, IP 43 arc, IK 54 double door IK 09 certified



## Open for customisation

ABB ITUS Distribution Enclosures with flexibility for customisation enables synergy between different applications.


## SPD

## Safety simplified



To ensure optimum protection, ABB ITUS provides a dedicated SPD provision for added protection from the elements. SPDs protect your appliances from over voltage.


## Features and benefits

ABB ITUS Distribution Enclosures with its innovative design and technical features ensures complete fulfillment of all customer needs.



## Features and benefits

Flexibility
ABB ITUS has undergone several improvements over its predecessors in order to address the continuous changes in customer dynamics.




Air vented busbar pan assembly for VTPN, MCCB and MCB incomer ensures better temperature rise and short-circuit capacity

## ITUS distribution enclosures <br> Complete range




| Vertical TPN DB |  |  | Segment DB | Special purpose DBs | Plug \& Socket | oneway enclosure |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| MCB/Isolator/ RCD incomer | XT1 | XT3 | 8 Segment DB | Phase Selector DB | - | - |
| 4P/8M (MCB/ <br> Isolator/RCD) | 4 pole MCCB (T-max XT1) up to 160A | 4 pole MCCB <br> (T-max XT3) up to 250A | $4 P+8 M$ incomer (MCB/ <br> Isolator/RCD) \& 4 pole subincomer (MCB/Isolator/RCD) | 4P / 8M MCB/ Isolator/RCD | - | - |
| - | - | - | - | - | $\begin{aligned} & 2 M 20 A 2 P+E \\ & 4 M 30 A 3 P+E \end{aligned}$ | 2,4,6,8 |
| 4,6,8,12 | 4,6,8,12 | 4,6,8,12 | 4,6,8,12 | 4,6,8,12 | - | - |
| - | - | - | - | - | - | - |
| - | - | - | - | - | - | - |

## Distribution boards <br> Elegance series





Cement spill protector


Insulated busbar


Door earthing


Anti insertion marking

| Vertical TPN DB |  | Segment DB | Special purpose DBs | Plug \& Socket | oneway enclosure |
| :---: | :---: | :---: | :---: | :---: | :---: |
| XT1 | XT3 | 8 Segment DB | Phase Selector DB | - | - |
| 4 pole MCCB <br> (T-max XT1) up to 160A | 4 pole MCCB (T-max XT3) up to 250A | $4 \mathrm{P}+8 \mathrm{P}$ incomer (MCB/ Isolator/RCD) \& 4 pole Sub-incomer (MCB/ Isolator/RCD) | 4P / 8M MCB/ Isolator/RCD | - | - |
| - | - | - | - | $\begin{aligned} & 1 \mathrm{M} 20 \mathrm{~A} 2 \mathrm{P}+\mathrm{E} \\ & 3 \mathrm{M} 30 \mathrm{~A} 3 \mathrm{P}+\mathrm{E} \\ & 4 \mathrm{M} 60 \mathrm{~A} 3 \mathrm{P}+\mathrm{E} \end{aligned}$ | 2,4,6,8 |
| 4,6,8,12 | 4,6,8,12 | $4,6,8,12$ (optional RAL 9003) | 4,6,8,12 |  |  |
| - | - | - | - |  |  |
| - | - | - | - |  |  |

## Distribution boards

## Classic series




| Vertical TPN DB |  | Segment DB | Special purpose DBs | Plug \& Socket | oneway enclosure |
| :---: | :---: | :---: | :---: | :---: | :---: |
| XT1 | XT3 | 7 Segment DB | Phase Selector DB | - | - |
| 4 pole МССВ (T-max XT1) up to 160A | 4 pole MCCB (T-max XT3) up to 250A | $4 \mathrm{P}+8 \mathrm{P}$ incomer (MCB/ Isolator/RCD) \& 4 pole Sub-incomer (MCB/Isolator/RCD) | 4P / 8M MCB/ Isolator/RCD | - | - |
| - | - | - | - | $\begin{aligned} & 1 M 20 A 2 P+E \\ & 3 M 30 A 3 P+E \\ & 4 M 60 A 3 P+E \end{aligned}$ | 2,4,6,8 |
| 4,6,8,12 | 4,6,8,12 | $\begin{array}{r} 4,6,8,12 \\ \text { (optional RAL 9003) } \end{array}$ | 4,6,8,12 | - | - |
| - | - | - | - | - | - |
| - | - | - | - | - | - |

## MISTRAL65 <br> A versatile range suitable for every application

Efficiency, safety, integration: the new MISTRAL65 series rests on the strengths which have consolidated ABB's image over the years for its expertise and reliability in the area of products for protection, control, monitoring, measurement, safety and energy efficiency. These innovative IP65 rated consumer units complete ABB's wide product range for the residential, commercial and industrial sector.

The range includes solutions with transparent or opaque doors which open up to $180^{\circ}$, and a choice of between 4 and 72 modules, meeting the most recent regulatory requirements and ensuring an enormous variety of application types.




## Designed for harsh environments

The MISTRAL65 consumer units come with IP65 protection degree, providing a dust-tight and resistant to jetting water resistance.

Mechanical strength of the MISTRAL65 consumer units are IK09 (10 joule) and IK08 for the precut parts.


## Eco-compatible materials

Innovating today does not just mean looking for functional and technologically advanced solutions. For ABB, being innovative means embracing a longer-term perspective by using eco-compatible materials for our products which respect the environment even at the end of their life cycle. For this reason, $100 \%$ recyclable, in case of MISTRAL65 even halogen-free, thermoplastics have been used for the consumer units.

Their environmental compatibility has been assessed using the Life Cycle Assessment (LCA) method, an objective tool for analysing energy and environmental impact which analyses the energy and materials used and the emissions released during production.

## MISTRAL65H: <br> Consumer units and switchboards for smarter outdoor installations

Resistance to salt, dust or UV rays is an essential feature in outdoor applications. Saline environments, chemical industries, sandy/dusty or PV applications require specifically robust products to guarantee reliable distribution of energy to where it is required.



Made for harsh environments and outdoor installations The MISTRAL65H consumer units and switchboards are selfextinguishing and resistant to abnormal heat and fire up to $750^{\circ} \mathrm{C}$ (GWT). They provide shock resistance IK10 (20 Joules) and IP65 degree of protection.

Available in 4 sizes and with a wide range of accessories the MISTRAL65H enclosures have been specifically designed for heavy duty environments.



## MISTRAL65 / 65H Fast and easy installation of consumer units

The project design also aimed to optimise cabling, assembly and installation times of the consumer units. Everything has been designed to make the installer's job quicker and easier, allowing them to implement functional and tidy consumer units.


## MISTRAL65 / 65H <br> Fast and easy installation of consumer units

In the multi-row versions, the centre distance of the DIN rails can be varied from 150 mm to 125 mm , further increasing the versatility of the product and using the same standard accessories. The frame is extractable for quick and easy bench cabling.

The ample internal space makes the cables more accessible, facilitating cabling and giving the possibility to anchor the cable-ties to special eyeholes on the frame.

The consumer units are designed to house optional dedicated terminal blocks in two different color schemes to allow quick and tidy cabling, and making separate power supplies easily recognisable, when used.

The range is completely coordinated with $A B B$ MCBs and MCCBs, all of which can be easily installed simply by moving the rail provided for their housing.

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03

## MISTRAL65 / 65H Design and simplicity "all in one".

The refined design is marked by some particular characteristics, for example the perfect symmetry, which allows either the whole consumer unit or just the front panel to be rotated, easily changing the door opening side.


## MISTRAL65 / 65H <br> Design and simplicity "all in one".

MISTRAL65 is equipped with smooth surfaces on top and bottom sides.
Knockouts are available on
both sides of the enclosure.


Mistral65H is equipped on one side with knockouts for cable glands, the other side with a smooth surface.

Interior slots allow the consumer unit to be fixed to the wall in points which are not visible from the outside, thus contributing to an aesthetically clean installation. Special snap-in closure plugs guarantee protection class II (double insulated).


The standard door with ergonomic handle and snap-on closure can be equipped with a lock and key on request, ensuring only authorised persons have access and avoiding tampering or incorrect operations.

The possibility to add an additional module by removing two pre-trimmed elements is an extremely useful solution which allows additions to be managed easily and tidily when unforeseen installation requirements are called for.


An accessory for trunking entry can be positioned at the top or bottom of the consumer unit, connecting and protecting the conductor bundles. A series of internal knockouts allows it to house any type of trunking.

## MISTRAL65 / 65H <br> For simplicity and effectiveness



## MISTRAL65 / 65H <br> For simplicity and effectiveness

The extractable frame simplifies and speeds up bench cabling operations. The slotted holes in the frame allow it to be quickly fixed inside the enclosure.


3 different terminal systems available The MISTRAL range of consumer units is supplied with a wide range of terminal systems: Terminal bars with screws and the two versions of terminal blocks offering screw or screwless couplings.

Spaces have been created inside the consumer units to make cabling even easier, with cable clips and holes for fastening the conductors to the frame with simple cable-ties.


The accessories include blind panels and base plates allowing installation of other types of devices aside from modular DIN rail products such as contactors, manual motor starters or devices on the front of the panel.

## MISTRAL65/65H <br> Endless installation possibilities

Our product development was inspired by the objective of allowing a wide range of products and solutions with different functions and dimensions to be installed in a single IP65 consumer unit, thus meeting the widest range of needs even in small commercial or industrial applications.

MCBs, MCCBs and devices installed in the front of the panel in an integrated, rational and functionally appropriate position.


## MISTRAL65 /65H

## Endless installation possibilities

The frame allows for two different DIN rail positions. This allows products with different depths to be installed, for example MCCBs which, thanks to this solution, are perfectly aligned with other devices in the panel


The first depth level allows standard products to be housed; these include most modular products currently available on the market.

Among these components with greater depth dimensions which can benefit from this flexibility of the frame, we must remember high-performance MCBs with greater than standard depth.


Among the accessories, the availability of blank panels and base plates allows non-modular equipment to be installed on the front of the consumer unit, such as control buttons and indicator lights.

## MISTRAL65 / 65H All details at a glance

The simplicity of the consumer units makes adapting them to various system requirements easy.

Optional terminal blocks which can be installed in the top or bottom of the consumer unit allow the cabling to be performed in a tidy manner and their different colors facilitate recognition of any separate circuits.


[^36]6. Wall fastening brackets
7. Plugs, protection class II
8. Terminal block carriers
9. Terminal blocks with screw coupling
10. Terminal blocks with screwless

## 11. Module cover

12. Finish or closure elements (lock and key optional)
13. Reversible panels

## MISTRAL65H Switchboard All details at a glance

The switchboards consist of an empty box and a door to integrate all your interior fittings. A full closing panel is available (snap mounting), which works as an inner door in a typical automation application.

Specific metal plates designed to host Tmax XT MCCBs are available for all the enclosure sizes.


1. Box for wall mounting
2. Metal plate
3. Reversible front panel
4. Inner door
5. RAL 7035 opaque door

## MISTRAL65H Switchboard Harsh environment series



## MISTRAL65H Switchboard Harsh environment series

Resistance to salt, dust and UV rays


MISTRAL65H switchboards offer a wide, safe space to integrate all your interior fittings.

MISTRAL65H Switchboard is equipped on one side with knockouts for cable glands, the other side with a smooth surface.


Wide range of accessories.

Tmax XT kits are available to install XT1 and XT2 breakers.


Inner doors allow integration of signaling devices and push buttons for automation applications.

# Gemini: the improved range Robust and flexible thermoplastic enclosures 



High resistance: flexible and extremely sturdy. Resistant to harsh environments, chemical and atmospheric agents.


## Easy to install

Ready-to-use solutions are available to quickly install all the devices without using tools.


## High degree of protection

Extremely sturdy, even against 20 joules impact, dust and water jets (IK10 and IP66 degree of protection), able to operate in a wide range of temperatures ( 25 up to $100^{\circ} \mathrm{C}$ ), exceptionally resistant to UV and chemical agents and compliant with IEC 62208 and UL 508A standards.


Adaptable to customers' requirements
Available in 6 sizes and with transparent or blind door, with full metal and plastic base plates. Gemini can be used even in very difficult application circumstances and extreme weather conditions.


Eco-friendly
Thanks to co-injection technology, Gemini's thermoplastic not only ensures sturdiness, mechanical features and resistance to oils but it also reduces at the same time the environmental impact at the end of its useful life since it's $100 \%$ recyclable.

## The thermoplastic co-injection molding process

It's like a "sandwich" of two materials: a compact external covering and an expanded core. This technology ensures the highest level of mechanical protection against impacts (IK10).


## Easy to install <br> Versatile and simple. To meet any application.

Offering the best technology for more reliable energy distribution solutions, by protecting people, equipments and resources.

ABB's Gemini enclosures provide a real system of integrated and complementary functions making them configurable into different applications: for automation, distribution and combined automation and distribution.

Gemini is designed to be perfectly compatible with ABB components for low voltage control and monitoring. In mixed applications, the Gemini enclosure is designed to be fitted with System pro M modular devices and Tmax XT mouldedcase circuit breakers. To respect safety standards, all the enclosure components are easy to fit and can be fixed to the base plate or to the box frame without using any tools. Wiring operations are carried out from the front followed by snapping the base plate or the distribution frame onto the box.
The patented frame is fitted with the cable duct incorporated in the uprights.

Gemini is also flexible thanks to six different box sizes and internal
space to accommodate from
24 to 216 DIN modules.

For control and command applications, three typologies of base plates are available: standard metal, perforated metal and insulated.

Lightweight thermoplastic material makes handling operation easier compared to traditional enclosure, for easier handling.


- Few parts: snap-on fixing, no tools needed
- Pre-assembled hinges
- Door with 180 degree rotation
- Frame with integrated vertical wiring duct
- Frontal cabling: comfort in the wiring process
- A wide range of accessories for automation and distribution applications

01 Gemini doors open at an angle of more than $180^{\circ}$ giving easy access to the devices installed inside the switchboard.

02 No tools are needed for installation. The doors hook onto the hinges with special hinge pins and are reversible.

03 The frame can be extracted to make wiring operations easier at the workbench.

04 The fixing hooks supplied in the standard versions are applied without having to use tools.

05 Fixing hooks and feet allow the frame to be snap-mounted inside the box.

01


02



04

$\overline{05}$

# High degree of protection <br> Designed to operate in harsh environments 


#### Abstract

Gemini is developed and designed by ABB together with the direct collaboration of panel builders, installers and designers in order to create insulating enclosures to better face extreme weather conditions.


Gemini represents the best solution for both distribution and automation (control and command) applications.

For a valid enclosure, the degree of protection is an important factor. Gemini thermoplastic enclosures are totally protected against the infiltration of solid bodies thanks to an IP66 degree of protection (IP30 with the door open and with the appropriate components installed) and a double insulation, even in the event of indirect contact.

They are suitable for environments with extreme temperatures, in outdoor applications and severe conditions.

Thermoplastic material retains its characteristics for a long time since it's not subject to corrosion from chemical and atmospheric agents such as dust and sand. In Mining or Construction applications as well as manufacturing plants, Gemini withstands harsh chemicals with high levels of performance.

Typical examples of some Gemini applications can be seen in Manufacturing sites, Solar power plants, greenhouses, chemical plants and in any other environments where distribution and automation demand specific safety requirements and service continuity.

It is particularly recommended in photovoltaic and greenhouse applications, also because of its strong resistance to UV rays.


- IP66 degree of protection (IP30 with the door open and with the appropriate components installed)
- Double insulation from dust and water jets, even in the event of indirect contact
- Adaptation to environments with extremely high or low temperatures $\left(-25^{\circ} \mathrm{C}\right.$ to $\left.100^{\circ} \mathrm{C}\right)$, in outdoor applications and in severe conditions
- Resistance to aggressive chemical agents and UV radiation
- Resistance to fire and abnormal heat
(GWT up to $750^{\circ} \mathrm{C}$ ).
- Insulation Voltage: 1000 Vac; 1500 Vdc
- UL Type 1, 3R, 4, 4X, 12


## Additional tests completed

- Dust/sand resistance (factory internal tested)
- Saline environments (according to IEC 60068-2-52)
- Weathering (according to IEC 60068-2-5)
- Permanent sun exposure (IEC 60068-2-5)



## Photovoltaic

In a typical photovoltaic plant the direct current section comprises a generator consisting of strings composed of photovoltaic modules connected in series. The Gemini series of IP66 enclosures are ideal for use as field combiners or as parallel switchboards, i.e. for outdoor installation near the modules. ABB has a range which is currently unique on the market, and has developed a family of plug \& operate solutions, i.e. a series of finished, wired and certified switchboards to meet the needs of a huge range of plant types: from single string for residential applications to large-scale solar fields (for more information see specific documentation on abb.com).

# Adaptable to customers' requirements Widest range and numerous accessories for a complete solution 

With Gemini, you can benefit from a wide range of enclosures with different dimensions and the possibility to arrange the devices into the DIN-Rail as you need. Moreover, Gemini enclosures have a wide range of accessories for both automation and distribution applications, ensuring maximum versatility and integration.


## Accessories

- Various locking systems can be installed (triangular, squared, with handles and ciphered type
- Ventilation and anti-condensation kits: protecting devices from the effects of heat and humidity
- Wall brackets, pole mounting kit and
- pedestal make it easier to install the enclosures in any context.
- Kit for installing Tmax XT circuit-breakers
- The universal drill bit can be used to create the holes to install the cable glands for cable derivations
- Doors with single central handle (as per picture beside) can be fitted with half cylinder locking systems and/or padlock

01 Doors with central single handle are also available.

02 Wall-mounted installation is possible using the special mounting brackets.
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03

$\overline{04}$

$\overline{05}$

04 Pole-mounted or mounted on a special pedestal installation is also possible.
-
05 The standard doublebit locks supplied can be replaced by the version with ciphered key and handle or with square or triangular impression.
03 ABB logo with its minimal graphic design fits well to hinged doors . -

## General purpose enclosures

## Basic configuration - Gemini switchboards

In the basic configuration, Gemini switchboards are composed of boxes in six different sizes ranging from $335 \times 400 \times 210 \mathrm{~mm}$ to $840 \times 1005 \times 360 \mathrm{~mm}$ (WxHxD, external measurements) and with opaque or transparent doors. In both versions, the doors are reversible and clip onto the hinges without the need to use tools; the fact that they open at an angle of more than $180^{\circ}$ means that it is easy to work on the components installed inside the switchboard. The seal applied by extrusion along the sides of the doors guarantees IP66 degree of protection. Access to the inside of the switchboard is protected by a standard double bit
lock that can be replaced by locks of another type available in the accessories. Boxes and doors can be requested either separately or as combined "box + door" codes, to make filling out the order form more flexible. Inside the packages, the door is always wrapped separately and inserted inside a pocket that protects it from accidental damage until wiring is completed and the switchboard is installed. Hole-cover plugs to guarantee IP protection and double insulation for wall mounting are also supplied with the pack together with the instruction sheet.

| Specifications |  |
| :---: | :---: |
| Protection | IP66 (IEC EN 60529) |
|  | Class II insulation |
| Strength | Thermoplastic material moulded in co-injection |
|  | Resistance to abnormal heat and fire up to a temperature of $750{ }^{\circ} \mathrm{C}$ (IEC EN 60695-2-11) |
|  | IK10 (IEC EN 50102) degree of resistance to impacts |
|  | Protection against chemical and atmospheric agents (water, saline solutions, acids, basic agents, mineral oils, UV rays) |
|  | Operating temperature $-25^{\circ} \mathrm{C} \div+100^{\circ} \mathrm{C}$ |
| Performances | Rated service voltage up to 1000 V |
|  | Rated insulating DC voltage up to 1000 V |
|  | Rated insulating AC voltage up to 1500 V |
| Flexibility of use | 6 sizes from $335 \times 400 \times 210 \mathrm{~mm}$ to $840 \times 1005 \times 360 \mathrm{~mm}$ (W×H×D, external dimensions) |
|  | DIN 24 to 216 modules |
| Installation | Snap-on mounting of all components in compliance with safety Standards |
| Quality and environment | Compliance with CEI EN 62208 international reference Standard, qualification for the requirements of CEI EN 61439-1 Standard, IMQ mark according to EN 62208 Standard. 100\% recyclable |
|  | EN 60068-2-52 resistance to marine environments |
|  | EN60068-2-5 resistance direct sun exposure |
|  | UL Listed: UL508A, UL50, UL50E |
|  | Nema: Types 1, 3R, 4, 4X, 12 |



Gemini doors open at angle of more than $180^{\circ}$ giving easy access to the devices installed inside the switchboard.


No tools are needed for installation. The doors hook onto the hinges with special hinge pins and are reversible.


The special structure of the inner perimeter of the box ensures further protection against the penetration of water. The box is supplied with a spirit level.

# General purpose enclosures <br> General characteristics of SR2 Enclosures 

The range of SR2 enclosures is a complete offer of monobloc enclosures for constructing small and medium-sized electric automation, switching and control switchboards.

The SR2 enclosures come from the experience ABB has gained over the years in building IP65 metal structures (in accordance with the IEC 60529 Standard), together with the innovative new production process used for construction and patented by ABB.
The typical use of SR2 Enclosures is to make switchgear and controlgear switchboards for a very wide variety of industrial machines: from large machinery with automated production lines or parts of these, down to the typical installations of on-board machine switchboards, boilers, heating plants and so on.

They conform to the EN 62208 Standard "Empty enclosures for low voltage protection switchgear and controlgear assemblies" and allow realization of electrical equipment conforming to the prescriptions of the IEC 60204-1 Standard "Safety of machinery. Electrical equipment of machines" and of the EN 60439-1 Standard and the new EN 61439-1-2 Standard "Low voltage protection switchgear and controlgear for assemblies". The degree of protection, in accordance with the IEC 60529 Standard "Degrees of protection of enclosures (IP Code)", is IP65.


The SR2 enclosures have also passed the control required to obtain the UL (Underwriters Laboratories) and CSA (Canadian Standards Association) Type 12 marks.

The SR2 enclosures also allow secondary distribution switchboards to be made, thanks to the possibility, in the 400,600 and 800 mm widths, of installing the whole range of apparatus and modular circuit-breakers on DIN rails combined with special pre-drilled and hinged modular front panels, thereby allowing construction of AS/ANS type electrical switchgear conforming to the IEC 60439-1 Standard and the new EN
61439-1-2 Standard. A single line of metalwork structures therefore allows construction of automation and secondary and end distribution electrical switchboards thanks to the availability of a series of accessories (modular panels, DIN rails) and to the possibility of stacking the enclosures.


## General purpose enclosures General characteristics of SR2 Enclosures

The SR2 enclosures are available in two versions (blind door or glazed door) and in 23 different dimensions, as well as a further 19 combinations obtained by stacking the enclosures, up to a maximum height of 2000 mm , which guarantee ample selection possibilities for the various end applications.

The SR2 enclosures have been designed to fulfil all the typical needs of the builder or installer of switchgear in the best way possible and the user is presented with a unique ensemble of functional characteristics:

- wide dimensional range
- certified IP65 degree of protection
- internal galvanised sheet mounting plate with 20/10 thickness (made to allow threaded holes to be made easily), adjustable in depth by using a special accessory
- fairlead plate screwed on (at top and bottom) made of 15/10 thick galvanised sheet, with a sealing gasket applied inside
- complete reversibility of the enclosure, so the door can open either on the right or on the lefthand side
- possibility of installing all the apparatus and modular cir-cuit-breakers on a DIN rail combined with a hinged modular panel

The standard colour is RAL 7035 orange peel. On request, the SR2 enclosures can be ordered in a wide range of RAL colours (see page 24/143).

Both the enclosures with glazed door or blind door can be stacked:
stacking is done simply by removing the fairlead plates and inserting the IP65 sealing gasket (GZ....), made of neoprene with closed cells.

Assembly of the stacked enclosures is carried out by means of the same holes used for the fairlead plates.
The door is supplied with the enclosure (single code) so as to reduce the number of articles and assembly times.


## Millenium <br> Ultra slim design in different finishes

Thanks to a combined system, the switches of the Millenium
series provide a comprehensive range of solutions for single
rooms or whole building
concepts. The square and ultra
slim switches do not only add
quality and style to the overall
building, but are also easy
to install.



01 Stainless Steel
02 Silk Black *

03 Antique Gold
04 Matt Gold

- 05 Stainless Steel and Silk Black

06 Silk Black and Stainless Steel

- 07 Antique Gold and Stainless Steel

08 Matt Gold and Silk Black

* Silk Black not suitable to installation outdoors
** Cover frame made of real glass


# Features and benefits Innovation, design and technology 

## Millenium's design and functionality convert into numerous technical and installation advantages

Modern and contemporary 4 finishes made in real stainless steel material AISI 304 and 2 finishes made in glass to complete the elegant finishes of Millenium: Stainless Steel, Silk Black, Antique Gold and Matt Gold.

Designed by the famous European designer Josep LLuscá.


Slim line design, only 4 mm high with straight and square lines at the forefront. Rocker with attractive chrome profile that gives a distinctive glance. Range with wide rocker and metal finish. Screwless front plate ultra slim design.

Range with wide rocker and metal finish. Screwless front plate ultra slim design.



ABB warranty policy for Millenium collection:

- 10 years for mechanical switches and socket outlets
- 1 year for electronic devices

Switches as per BIS standards and with ISI marking.

## Sustainability and maximum respect for the planet

Nowadays it is not enough to simply design on the basis of aesthetics. The responsibility of manufacturers towards the environment means that they have to think about ecological designs.

At $A B B$, we are convinced that the intelligent use of technology makes sustainability and maximum respect for the planet possible. So our products care for both people and the world around them.

These are some of the environmental improvements offered by Millenium:

- Millenium light signals are based on LED technology, leading to a saving in energy consumption of $50 \%$, and extending their life to up to 10 years.

- All our products comply with ROHS. EED-0008/2007 EGODESIGN

Millenium range has been designed following the requirements of norm ISO 14006 Environmental management systems / guidelines for incorporating Ecodesign certificate.

## Features and benefits

Full range of ABB i-bus ${ }^{\circledR}$ KNX, ABB-free@home ${ }^{\circledR}$ sensors, innovative, intuitive and visually elegant. Millenium gives the answer to the future by providing comfort, safety, and energy saving.


Millenium collection is a grid type system enabling combination of colours and products of different dimensions and functionality. The three type of switch dimensions together with the ABB i-bus ${ }^{\circledR}$ KNX, ABB-free@home ${ }^{\circledR}$ sensors and other functions, have to be composed with the required frame, in order to have the right assortment of functionality and design. In ABB i-bus ${ }^{\circledR}$ KNX sensors, we have the possibility to adjoin to the frame the special metal mounting plate that allows to reduce the height so as to maintain the ultra slim line for KNX functionalities.


Mounting plate


Premium rocker switch


01 KNX 6gang sensor
-
02 KNX 6gang with IR sensor
$03 \mathrm{KNX} 180^{\circ}$ movement detector
-
04 KNX room temperature controller


## Access control: the right choice for hotels applications



01 Transponder reader
-
02 Transponder holder
03 Set of 10 MIFARE transponder cards
-
04 MiniMAC 4.1 software

ABB's access control KNX-based solutions are perfectly adaptable not only to the needs of hotel industry operators, but also to the hospitality sector in general (apartment hotels, B\&Bs, holiday apartments, and resorts).

## Advantages

ABB access control is based on MIFARE transponder technology, exploiting its flexibility and security:

- Simplified and centralized management of all hotel functions from the front desk via the supervision software.
- Energy efficiency and cost savings (activation of the room's electrical devices only when occupied by the guest).
- Safety, thanks to room access via transponder card.
- Additional guest services integrated, managing access to every hotel common area.

| an |
| :--- |
|  |



## Freedom is a wonderful feeling

With Millenium collection ABB-
free@home ${ }^{\circledR}$ all functions in the
home can be managed automatically according to time schedule, temperature and movement detector - or be called up at the touch of a button. Every combination of the various functions is possible. More comfortable living. ABB-free@home® makes daily life easier.


(1) Blind (8) Air- $\begin{aligned} & \text { Aronditioning } \\ & \text { con } \\ & \text { (ㅇ) Light } \\ & \text { Door } \\ & \text { communication }\end{aligned}$
(8SS) Heating


Now scan the QR code to find
out more about the advantages
of ABB-free@home ${ }^{\circledR}$
abb.com/freeathome

## Zenit <br> The highlight of modular series

Zenit is the most comprehensive modular range for all kind of homes and commercial buildings. A number of appreciated designs and beautiful finishes that add value to the facility, with advanced features that provide greater comfort and performance level. With Zenit you can make any type of installation, can enjoy benefit of technical advantages that make it easier and faster. This range has the guarantee of a brand renowned for its quality such as ABB.


# The top in design and performance For its aesthetics and details 

Simple, elegant, the top in design.

Zenit is born with a high-rise design. With rectilinear lines, very trendy finishes and full of details that enhance its aesthetics. It reaches the highest levels in quality and infinite values.



## Eco-design

The Zenit switch range has been designed following the Product
Design and Development Environmental Management

Switches as per BIS standards and with ISI marking.

## Wide range



Multi-standard
Fitting in
European,
American and
Italian boxes
Italian boxes


## Frames with

## two shapes

Floating effect
frame. Solid

- effect frame.


Display and styling trim
Lighting in green styling trim in Chrome, Anthracite, White and Champagne

High-quality and
durable finishes.
Noble materials in frames

More than
100 functions

- in four finishes


## Symbols

with backlight


## Functions for all spaces

Zenit can be installed everywhere, in spaces that require new solutions, with new applications and all installation facilities.


Up to 40\% savings

- Contacts with an automatic connection terminal providing ease and up to $40 \%$ savings in installation time.
- The Zenit rocker mechanisms are 16A and they offer top quality with a reduced number of reference to stock.
- More robust and compact mechanisms to be inserted from the front.
- Designed to hold the switches firmly, avoiding balancing problems.
- They have reduced depth, only 21 mm , which allows more connection space for wires.
- With larger press clamps and smoother to make the automatic connection more comfortable and safer.
- They have been manufactured with high quality and recyclable material.



## More benefits

- Galvanized steel mounting plates with unique anti-corrosion treatment with top and bottom nerves for a rigid positioning of the mechanism.
- The mounting plate is supplied separately from the frame in order to create the atmosphere you want.
- Zenit mechanisms are designed so they can be removed from the front.
- Galvanized steel metal mounting plate to ensure the durability of the installation.



## Less consumption

- The covers are easily removed to change the lighting pilot facilitating the installation from the front.
- In Zenit, we have replaced our traditional neon pilot for a LED located in the horizontal display that emits a diffused light; it looks more attractive; it consumes less energy and lasts 10 years.


2. Press the push button and insert the cable.
3. Release the push button and check fixation. To disconnect the cord, press press the push button again on top and bottom.

## Zenit \& ABB-free@home ${ }^{\circledR}$

Making home automation easier than ever. Simply smart. Zenit and ABB-free@home ${ }^{\oplus}$ transform the house or the apartment into an intelligent home. Whether it's blinds, lights, heating, air-conditioning, door communication or scenes. Easy to remote control via a switch on the wall, with the laptop or with the smartphone. Very convenient.
Extremely comfortable. Very energy efficient. Especially attractive: Only minimal costs are involved when compared with conventional electrical installations.


## Zenit \& ABB i-bus ${ }^{\circledR}$ KNX


#### Abstract

Perfect climate. A perfect hotel room is never too warm, never too cool and always filled with fresh air - it stimulates all of your senses. The invisible technology, ABB i-bus ${ }^{\circledR}$ KNX, makes this possible. Everyone can get to grips with it straightaway thanks to the room temperature controller with its clear design. As a result, you can control the heating, ventilation and air-conditioning with the touch of a finger and a glance at the display - it's as simple and clear as that.


Measurable efficiency, all costs under control
Comfortable cost reductions. You don't always have the same number of people staying in a hotel room. This is why it is important to adjust the resources to the use in order to increase efficiency. Intelligent presence detectors with a direct KNX connection adjust the indoor climate and light sensitively. With their extensive coverage and discreet design, they blend seamlessly into the architecture - almost invisible but highly effective.

Maximum safety for guests and investments
More than a feeling. Intelligent technology is behind all that is safe. Only a fully networked building creates an environment which protects the people and values. The ABB i-bus ${ }^{\circledR}$ KNX brings everything together. By integrating all applications, the result is stability for everyone.


## Zenit

Frames for European square boxes


1 to 5gang cover frame for horizontal and vertical installation
01 Side view, $7,5 \times 85 \mathrm{~mm}$
02 Frame 1-gang, 2 modules
03 Frame 2-gang, $2+2$ modules
04 Frame 3-gang, $2+2+2$ modules horizontal
05 Frame 3-gang, $2+2+2$ modules vertical
06 Frame 4-gang, $2+2+2+2$ modules
07 Frame 5-gang, $2+2+2+2+2$ modules
05

03


04


06

## Basic

frame

07


## Zenit

Frames for European square boxes


# Easy and intuitive installation system, providing maximum values in performance, comfort and functionality 

## Switch composition in square box



Switch composition in rectangular box


Schuko socket outlet composition in square box


KNX and free@home sensor composition in square box


NEMA socket outlet composition in rectangular box

Mounting plate


KNX and free@home sensor composition in rectangular box


Mounting plate for vertical installation

## IVIE

Sleek and convex design in different finishes

Thanks to the complete system, The Ivie series provides a comprehensive range of solutions for building concepts. The convex and sleek design not only provides quality and style to the overall building, but is easy to install.

${ }_{01}$

${ }_{0}$


Different finishes and combinations:
01 Anthracite grey mechanisms in Silver plate
02 Silver mechanisms in Anthracite Grey plate
03 Anthracite grey mechanisms in White plate

## Flexibility in design which provides total control

The IVIE range is the first Indian range to incorporate wired and wireless home automation systems together. This range can be integrated with ABB-free@home ${ }^{\circledR}$ home automation system, which is the most intelligent way of managing spaces with energy saving.


Great comfort, safety and energy efficiency for buildings
ABB-free@home ${ }^{\circledR}$ sensor for switching control,
blind control, dimming and scene control.


## Features and benefits Innovation, design and technology range with real international concepts

IVIE's design and functionality convert into numerous technical and installation advantages.


Modern and latest finishes in white, silver, anthracite and colours of your choice.


Double shrouded internal mechanism under the rocker, totally preventing visibility of sparks.


Large variety of sockets, equipped with shutters for increased safety. Compatible for 6/16A two pin plug.


Convex profile plate with less projected sleek design is a perfect match for any architecture. Dust-free surface and a slim design, not only add to the quality, but also provide a stylish look.


Terminal screws with Combihead for star/flat screw drivers.


Universal regulator with 360 degree rotation.


## Features and benefits



IP20 Finger Proof for total safety, user friendly terminal design-easy terminal accessibility by top entry to load connection.


Visual signs provided in inner grids to guide proper fitment of easy installation and easy removal during fitment of mechanism with inner grid.


Resin frame with extra ribs provides better mechanical strength, insulation resistance and corrosive proof.


ISI marking on switch socket and fan regulator.


Independent shutter for earth and phase+neutral for child safety and easy connection.

## Features and benefits



Mounting screws press fitted in back side screw holder to prevent losing of the same.


Laser marking and arrow showing the correct orientation of the mechanism.


Suitable design for a variety of plug tops no overlapping on the mechanism fitted next to the socket.


Two module partition is provided for sturdiness with extra ribs to ensure better strength of the frame.


IVIE incorporates full range of ABB-free@home ${ }^{\circledR}$ home automation and gives answers to the future by providing comfort, safety and energy savings.


ABB warranty policy for IVIE range:

- 10 years for mechanical switches and sockets
- One year for electronic devices


## IVIE installation system

IVIE series is a grid type system enabling combination of colours and products of different dimensions and functionalities, together with ABB-free@home ${ }^{\circledR}$ sensors that have to be composed with the required frame, in order to have the right assortment of functionality and design.


Euro White


Anthracite Grey


Silver

## ABB Tvisha <br> Key features



- Plastic parts which hold current carrying parts are made of PA6 20\% glass filled rating upto 16A
- All switches are marked with IS 3854:1997
- Terminals are designed in such a way that wire is tightened without damage
- Bi-metal silver contact tips for less spark and longer life
- 6 A \& 6/16A marked with IS 1293, up to 16 A
- Non-flammable thermoplastic resin parts and a very high insulating resistance after humidity test



## ABB Tvisha

Features and benefits


Internal arc shield provided in switch mechanism


Easy terminal accessibility by top entry to load connection.


Laser marking and arrow showing the correct orientation of the mechanism.


Terminal screws with Combihead for star /flat screw drivers.


ISI marking on switch socket and fan regulator and laser marked.


20A DP switch in one module (space optimisation)

## ABB Tvisha

Features and benefits


Large variety of sockets, equipped with shutters for increased safety.


6/16A sockets are equipped with dual shutters which can take two pin plugs.


Universal regulator with 360 degree rotation.


HDMI moduler ports equipped with female connector for easy termination.


Communication mechanisms - RJ-11, RJ-45 cat6. Self-moving shutter to screen the jack when it is not in use.

## ABB Tvisha

Features and benefits


Mounting screws press fitted on the screw holder on inner frame to avoid losing the screws.


Visual signs provided in inner grids to guide proper fitment for easy installation and easy removal during fitment of mechanism with inner grid.


Two module partition is provided for sturdiness with extra ribs to ensure better strength of the frame and overlap of plugs.


Resin frame with extra ribs provides better mechanical strength, insulation resistance and corrosion proof.

WARRANTY POLICY
10
YEARS

## ABB warranty policy for Tvisha range:

- 10 years for mechanical switches and sockets
- Two year for electronic devices


## ABB Tvisha Anti-bacterial range



## ABB Tvisha

- Anti-bacterial products are tested and confirmed as per stringent guidelines of ISO 22196.
- All front touchable parts are having anti-bacterial features.


To help combat the spread of germs, ABB has developed anti-bacterial treated ABB Tvisha range of wiring devices, to keep the surfaces of our switches and cover frames safer.
By incorporating anti-bacterial additive compounds based on silver ions into the product material, we can help inhibit the growth of bacteria on frequently touched switches and cover frames.
When used, they provide a complete antibacterial solution.

Some of the key benefits of the additives are:

- Non-migratory in nature
- Non-toxic in nature
- Imparts bacteria controlling properties to Plastic surfaces
- Food grade and ecologically safe




## Snieo series <br> The complete range



## Snieo

Snieo combines modern design with high-performance materials such as premium thermoplastic resin. Our switches are made of fire retardant substances with superior electrical properties. Chamfered edges prevent dust accumulation and well-crafted sockets provide an enduring grip for a variety of plugs.


Snieo caters to all electrical needs of today's modern buildings. This comprehensive range offers a variety of mounting plates and a broad selection of functionalities to create a perfect fit for any type of building - from living room to office space.


## Switches

- All metal parts are independent and the completely revertless design increases durability
- Silver tip contacts for better conductivity
- All plastic parts are made of premium thermoplastic resin
- Up to 20A marked with fluorescent lamp load


## Sockets

- Specially designed sockets, which perfectly match two and three-pin plug tops
- Specially designed shutter which slides smoothly even with two-pin plugs
- Conducting parts of copper, phosphorous, bronze and brass
- All sockets are equipped with child safety shutter


## Formula DIN-Rail portfolio A solution you can rely on



## Formula DIN-Rail portfolio The right choice for you

Formula DIN-Rail range offers the right solutions for a lot of electrical installations without losing the ABB quality standards. So we provide tangible benefits and concrete values for your daily installation business.


## Completeness

Formula DIN-Rail range is a complete system solution, including MCBs, RCCBs and Isolators dedicated for residential and similar applications.

## Easy wiring

Mounting and installation of all Formula DIN-Rail range products is possible with the same tools, thanks to harmonized terminals, tightening torque and wire stripping length.


## Easy installation

Thanks to bottom-side terminals equipped to accommodate the Fork-Type Busbar, enabling easy and hassle-free installations


## Easy selection

The technical information on the website enables you to make the right choice from the Formula DIN-Rail range


## Environment-friendly

By using the state-of-the-art housing material, ABB is taking care of the environment. 100\% halogen-free, without environmental pollution.

Formula DIN-Rail range is the right solution for electrical professionals who are looking to provide optimum protections in residential applications without compromises. With the Formula DIN-Rail range of MCBs, RCCBs and Isolators, we help you to improve safety and performance according to the necessary requirements.


## Residential applications

Safety


- The range complies to the standards of residential applications and local regulations
- Perfect choice for your protection of the installation and safety of the user

- Longer electrical life and higher breaking capacity will ensure the long running, uncompromised performance

Performance


- Guaranteed safety and reliability, thanks to multiple automated testing of each single product
- The warranty period for MCBs is 7 years from the date of ABB's invoice, if the components are used in ABB's enclosure.


## Formula DIN-Rail portfolio Portfolio features



## MCB - Miniature circuit breaker

- Protect installations against overloads and short-circuit, guaranteeing reliability and safety of operations
- SW200 M MCBs with breaking capacity of 10 kA in $B / C$ characteristics and $1 / 2 / 3 / 4 \mathrm{P}$ configurations up to 63A


## RCCB - Residual current circuit breaker

- RCCB is the safety device to detect earth leakage current and trip the circuit
- Sensitive only to earth fault current, therefore they have to be connected in series with a MCB or a fuse to protect them against over-currents and short-circuits
- FW200 RCCBs with sensitivity 30/100/300mA in AC type and 2/4P configuration up to 63A, corresponding to all requirements in residential applications


## Isolators

- Opening a disconnector ensures isolation of downstream circuit
- SDW200 with 2/3/4P configurations in 40/63A


## Formula DIN-Rail portfolio Benefits



Dual termination
Fork-type busbars for easy mounting and installation


Wiring diagram
Wiring diagram for easy reference


Space for a better circulation
Perfectly designed breathing channels
between the poles for proper heat
dissipation and better thermal performance


## Line load reversibility

Freedom for connecting incomer at the top or bottom


## Positive contact indication

Ergonomically designed knob for smooth operation. Clear visibility of ON /OFF marking on the toggle


## IP20 protection

Additional protrusion to ensure safety and avoid any accidents

## Formula - simplified ordering code for easy reference



## Formula SW200 M

Miniature circuit breakers

## Technical details

|  | Standard product | IS/IEC 60898-1 |
| :---: | :---: | :---: |
|  | Poles | 1P, 2P, 3P, 4P |
|  | Tripping characteristic | B, C |
|  | Rated current In | $6 . . .63 \mathrm{~A}$ |
|  | Rated frequency | 50 Hz |
| $(4)+8$ | Rated voltage Ue | 1P : 240/415 V AC <br> 2... $4 \mathrm{P}: 415 \mathrm{~V}$ AC |
|  | Breaking capacity Icn | 10 kA |
| (8) | Terminal size for cable | Solid, Stranded - $35 \mathrm{~mm}^{2}$ Flexible - $25 \mathrm{~mm}^{2}$ |
|  | Electrical life | In < 32A: 20,000 ops., In $\geq 32 \mathrm{~A}: 10,000$ ops. |
|  | Mechanical life | $\mathrm{ln}<32 \mathrm{~A}: 20.000$ ops, $\mathrm{In} \geq 32 \mathrm{~A}: 10.000$ ops. |
| 10 | Ambient temperature | --25... $+55^{\circ} \mathrm{C}$ |
|  | Storage temperature | $-40 . . .+70^{\circ} \mathrm{C}$ |
|  | Protection degree | IP20 |
|  | Approval | ISI |
|  | Tightening torque | 2.0 Nm |
|  | Cable length | 12.5 mm |
|  | Screw driver | No. 2 pozidrive |



## Formula DIN-Rail portfolio RCCB assures protection of people and installations against earth fault currents.



A residual current circuit-breaker is an amperometric protection device which trips when there is a leakage of current to earth.

Placing RCCB in the installation will help you to meet Govt. regulations which is mandatory to protect loads above 2 kW and also safeguard the installation and user from electric shock and unwanted energy waste

- Protect persons against electric shock by direct contact ( 30 mA )
- Protect persons against electric shock by indirect contact ( 100 mA or 300 mA )
- Protect installations against the risk of fire ( 300 mA )



## Formula FW200

## Residual current circuit breakers

## $\overline{\text { Technical details }}$

| RCCB | Standard product | IS 12640-1(2016); IEC 61008-1 |
| :---: | :---: | :---: |
|  | Poles | 2P, 4P |
|  | Type | AC |
|  | Rated current In | $25 \mathrm{~A}, 40 \mathrm{~A}, 63 \mathrm{~A}$ |
| $x-$ | Rated sensitivity I $\Delta$ n | $30 \mathrm{~mA}, 100 \mathrm{~mA}, 300 \mathrm{~mA}$ |
| - 0 | Rated frequency | 50 Hz |
|  | Rated voltage Ue | 2P: 240VAC, 4P : 240/415VAC |
|  | Rated conditional short-circuit current Inc | 10 kA (with a SCPD same rated In) |
|  | Terminal size for cable | Solid, Stranded - $35 \mathrm{~mm}^{2}$ Flexible-25 mm ${ }^{2}$ |
|  | Electrical life | 10,000 operations |
|  | Mechanical life | 10,000 operations |
|  | Ambient temperature | -25... $+55^{\circ} \mathrm{C}$ |
|  | Storage temperature | $-40 \ldots+70^{\circ} \mathrm{C}$ |
| 10 | Protection degree | IP20 |
|  | Approval | ISI |
|  | Tightening torque | 2.0 Nm |
|  | Cable length | 12.5 mm |
|  | Screw driver | No. 2 pozidrive |

## Formula SDW200

Isolators

## Technical details

|  | Standard product | IS/IEC 60947-3 |
| :---: | :---: | :---: |
|  | Poles | 2P, 3P, 4P |
|  | Rated current In | $40 \mathrm{~A}, 63 \mathrm{~A}$ |
|  | Utilization category | AC-22A |
|  | Rated frequency | 50 Hz |
|  | Rated voltage Ue | 240 / 415 V AC |
|  | Insulation voltage Ui | 250 V AC (phase to ground), 440 V AC (phase to phase) |
|  | Max. power frequency recovery voltage (Umax) | 2...4P : 457 V AC |
|  | Suitable for isolation | Yes |
|  | Electrical life | 10,000 cycles |
|  | Mechanical life | 20,000 cycles |
|  | Ambient temperature | $-25 . .+55^{\circ} \mathrm{C}$ |
|  | Storage temperature | $-40 . . .+70^{\circ} \mathrm{C}$ |
|  | Protection degree | IP20 |
|  | Approval | ISI |
|  | Tightening torque | 2.0 Nm |
|  | Cable length | 12.5 mm |
|  | Screw driver | No. 2 pozidrive |

## Adiya <br> Switch on life

The Adiya switch range combines simple design with high quality materials for reliable performance and adds an elegant look to your living spaces.


## Long-term reliability and safety with high quality materials



Enhanced safety features with unique dual shutter design, heat and impact resistant polycarbonate as well as UV-resistant materials combine durability with a stylish look. High specification electrical contacts material ensure long-term reliability.

## Adiya

## Features and benefits



## Switches

- $240 \mathrm{~V}, \mathrm{AC}$, normal gap constructions, flush type, screw type terminal
- Available with and without indicator light
- Non-flammable thermoplastic resin parts and very high insulating resistance after humidity test
- Up to 16AX rated (suitable for fluorescent lamp load)
- Marked with IS 3854
- Snap fit with modular plates, very easy to install
- Improved design - can be easily wired in square plates
- Bi-metal silver contact tips for less spark and longer life
- Terminals are designed in such a way that wire is tightened without damage
- Available in 6A, 16A, 20A and 32A



## Sockets

- 240V, AC, flush type, screw type terminal, shuttered
- Non-flammable thermoplastic resin parts and very high insulating resistance after humidity test
- Marked with IS 1293, up to 16A
- Snap fit with modular plates, very easy to install
- Brass current carrying parts
- Terminals are designed in such a way that wire is tightened without damage
- All sockets designed to match 2-pin plug tops
- Available in 6A, 6/16A, 6/20A, 6/25A and 6/13A international socket


## Adiya

## Features and benefits

## Fan regulator

- Step fan regulator capacitance type regulates speed of fan in 4 step 1 module and 5 step 2 module
- Polycarbonate material varies between 1.5 mm and 2.5 mm
- Capacitor power loss is approximately NIL, so there is no power consumption of fan regulator
- Improves the power factor
- Long life: more than 10000 cycles
- Conforms to IS 11037
- $360^{\circ}$ rotation - no lock failure


## Communication mechanisms - RJ-11, RJ-45 cat6

- Rugged jack locking mechanism
- Polycarbonate material varies between 1.5 mm and 2.5 mm
- Self-moving shutter to screen the jack when it is not in use; additional for RJ-45 jacks
- Centered jack with shutter, aesthetically matches with other products, cat6 jacks on par with latest networking data transfer systems (gigabytes)



## USB charger, HDMI mechanisms

- Current rating 1A and 2 A
- Visible LED indication
- HDMI 2.0 female connector
- Back connectivity with pre-terminated female connector



## Plates

- Extra slim plates but strong and flexible which match perfectly with any surface
- Plastic resin material varies between 1.5 mm and 2.5 mm
- Made of thermoplastic resin having very good mechanical strength and insulation resistance
- Glossy and dust-free surface
- Available from 1M, 2M, 3M power, $4 \mathrm{M}, 6 \mathrm{M}, 8 \mathrm{M}, 12 \mathrm{M}, 16 \mathrm{M}$ and 18 modules


## ABB Honora Distribution enclosure

## Features and benefits

ABB Honora distribution enclosures. Glossy white finish will be blending with your interiors as per the new trends in wall color.

This series is available in glossy white finish (RAL9016) universal mounting type can be mounted flush or wall. These are provided with top and bottom removable gland plates with adequate amount of knock outs which enables easy installation and connection of conduits. Offers two types of protection IP30 without door and IP43 with metal.



Removable
gland plates

## Light switches

## Modern light management

Saving costs with innovation
-
01 Busch-Watchdog Presence tech

02 Busch-Watchdog
Presence tech BasicLINE Corridor

03 Busch-Watchdog Presence tech BasicLINE

04 Busch-Presence detector

05 Busch-Watchdog
Presence tech BasicLINE mini

## For pass-through and large areas

Lights in corridors and large areas where people only pass-by should be only switched on when a person is detected and switched off as soon as they leave the area or after a selected delay time. The persons do not need to actuate a button or switch. Switch off of the lighting is assured. This saves both energy and costs.

With only one Busch-Watchdog Presence tech BasicLINE Corridor a detection range of 24 m detection area at 3 m installation height is possible. The use of a special housing makes the Busch-Watchdog suitable also for use in outdoor areas.


Corridors


Large areas outdoor

The choice of the right model depends on the height of the ceiling, the size of the room, the installation situation and the type of movement to be detected. ABB offers the right solution for each situation:

## For toilets and small rooms

Lighting control depending on the occupancy in toilets, cabinets and other small rooms can avoid unnecessary expenses and alert about remained people after hours. In internal toilets the ventilation is comfortable to implement with an on/off delay.

The Busch-Watchdog Presence tech BasicLINE mini and the new Busch-Presence detector mini KNX are extremely flat and easy to install in the false ceiling.

Toilets


Cabinets
small rooms


KNX


04


03


## ABB Welcome

Door entry system

## A holistic concept.

Already today Busch-Jaeger fulfils the desire for harmoniously matching indoor concepts and holistic installation solutions. As standard. This allows all indoor stations of door communication to be integrated into every style of living.

That is why the ABB-WelcomeTouch and the ABBWelcome indoor station with handset is available in studio white matt, aluminium silver and anthracite matt. And the ABB-Welcome indoor audio station with display is available in studio white, aluminium silver, anthracite, alpine white and white.


01


02


05


09

08



06


07


10

## Mobile door communication.

As supplement to the permanently installed indoor stations, up to four additional participants can be connected to the ABB-Welcome system via the IP gateway. These devices can be smartphones, tablet PCs or a Busch-ComfortTouch ${ }^{\circledR}$. The devices can be mixed.

There is only one system controller irrespective of whether audio or video systems are set up. Starting from a specific number of participants, additional power supplies are necessary. Detailed information on the system setup is available in the ABBWelcome system manual (0001-01292). The system controller already has connections for the door opener and for one outdoor light. Both are switched via the indoor station.


| System controller | Auxiliary power supply | Switch actuator, door/light | Bell transformer, <br> 12 V AC 1.3 A | IP gateway |
| :--- | :--- | :--- | :--- | :--- |
| $83300-500$ |  |  | $83315-500$ | $83341-500$ |


| Supply device and controller <br> of the ABB-Welcome <br> system. | Additional supply device <br> of the ABB-Welcome | For connecting an <br> electronic door <br> opener, switching the light, <br> or connecting <br> a light relay (floating output <br> $230 \mathrm{~V}, 3 \mathrm{~A})$. | Power supply for an electric <br> door opener. | Makes communication <br> possible between the <br> ABB-Welcome door <br> communication <br> and the local |
| :--- | :--- | :--- | :--- | :--- | :--- |
| IP network. |  |  |  |  |

## ABB Welcome

Door entry system

01 One-family house
02 Multi-family house
03 Apartment building
-
04 High rise building
05 Residential Complex

No matter in single family house, multi-family house, highrise building with more than 200 apartments or in residential complex with higher security requirement to screen incoming calls, Welcome $M$ provide solution for all the requirements.



## Free@home

The door opener to your customers


Making home automation easier than ever. ABBfree@home ${ }^{\circledR}$ sets new standards for easy installation, commissioning and operation.


## Comfortable

Complete scenes are easy to adjust and also easy to be changed later by electricians and end customers alike.

$\iint S$ Heating


## Commissioning

Intuitive commissioning with all conventional Internet browsers as well as an app for iOS and Android.

## Free@home

## Adjusting everything via an app



- Easy to operate
- Business segment with an assured future
- Competitive advantage


First step - the house
First, the floor plan with floors and rooms is created.


Third step - linking
And finally, the elements can be combined as needed.

The entire system can be individually configured with the free app (iOS/Android) via smartphones or tablets as well as via browser on the computer.


Second step - the allocation
The sensors are integrated in the app in the floor plan and allocated in the system. This simultaneously allocates the devices to the floors and rooms, as basis for later operation by the customer.

## Free@home

Two possibilities central or decentralized

Central control with DIN rail mounting actuator
The installation of central DIN rail mounting actuators in the switch cabinet makes the installation of the sensors even easier - as only the bus line is located in the flush-mounted box. With this method, the costs for each channel can be reduced.

Sensor/actuator unit for decentralized control All in one. To save space the sensor and actuator are located in one flush-mounted box of the switch combination. The function of both components is preconfigured. This makes programming of the basic functions unnecessary - but possible if required. This enables the lights and blinds to be controlled even before project planning of the system has been carried out. The 230-Volt line is wired as usual.


## KNX and ABB i-bus KNX

 Intelligent Building ControlIn many areas of our private and working lifes, the increasing level of automation is a trend that confronts us on a daily basis without actually being noticed.

Automation in buildings aims to combine individual room functions with one another and to simplify the implementation of individual customer preferences.

KNX is the logical development for implementing traditional and new requirements in electrical
building installations and thus replacing conventional installation techniques. The intelligent installation bus system efficiently performs the conventional functions and offers an additional broad range of expanded features, which could not be realized without a bus system. ABB offers consultants, system integrators and electrical installers a comprehensive product range with ABB i-bus ${ }^{\circledR} \mathrm{KNX}$, in order to meet the challenges posed to electrical building installations both today and in the future.

The conventional solution: Many separate cables, separate functionality, little flexibility


The intelligent solution: KNX - a system, a standard, many interoperable functions for maximum flexibility


## What does KNX stand for?

KNX - The standard

The KNX system is the leading intelligent control system for buildings world-wide.

KNX resulted from the merger of major bus systems, including the well-known EIB (European Installation Bus) that has been successfully on the market since 1992.

What does KNX stand for?

- KNX is the first globally standardized system for the automation of residential and nonresidential buildings in accordance with the international standard (ISO/IEC 14543-3), the European standard (CENELEC EN 50090, CEN EN 13321-1 and 13321-2), the Chinese standard (GB/Z 20965) and the US standard (ANSI/ ASHRAE 135).
- KNX has established a clearly defined system platform where the KNX products of different manufacturers can be operated with one another.
- Both the data protocol and the devices are certified compliant to the KNX standard.
- KNX thus guarantees the networkability, interoperability, is both upward and downward compatible and thus future-proof.
- Just one common software tool is required for planning, engineering and commissioning of all KNX installations.
- Both the manufacturers and the KNX Association support professionals during planning, commissioning and maintenance world-wide.
- Comprehensive training opportunities are available for beginners and experienced users in certified training centres.
- More than 170 internationally certified manufacturers are members of the KNX association.
- More than 22,000 qualified KNX partners plan, install and integrate KNX systems worldwide.
- Thousands of buildings, ranging from private houses to airport complexes around the world, are equipped with more than 10 million KNX products.


What does KNX do?
Application

The use of new materials and the application of renewable energies are considered as the most significant innovations in the building industry over the last few years. The growing desire for comfort and functionality simultaneously with the limited availability of resources and increasing energy costs provide the basis for intelligent building control in modern constructions.

KNX interconnects all the components in the electrical installation to form a networked system and thus guarantees the transparency and utilization of information across the installation. In this system, all users "communicate" via a single bus cable. Thus it is possible to integrate all the different fuctional subsystems within the building into a seamless solution.

KNX bus systems can be used both in residential and non-residential buildings.

## Applications:

- Lighting
- Climate control
- Sun protection
- Security
- Energy management
- Operation
- Automation
- Communication



## ABB i-bus ${ }^{\circledR}$ KNX <br> What links $A B B$ and KNX?

ABB is represented in over 100 countries with more than 100,000 employees. Our company benefits from over 25 years of experience in intelligent building control systems.

ABB develops, produces and sells a complete range of innovative products for building installation.

ABB plays a leading role in the KNX Association. ABB i-bus ${ }^{\circledR} \mathrm{KNX}$ conforms to the international KNX standards and thus belongs to the leading technology worldwide for intelligent building control.


## How does ABB i-bus ${ }^{\circledR}$ KNX work?

Intelligent building control in detail

Within the KNX bus system, all sensors (e.g. buttons or motion detectors) are interconnected to the actuators (e.g. dimming actuators, roller shutter actuators) via a data cable as opposed to directly wired switches and consumers (conventional installation). The actuators control the power circuit to the consumer.
sensors send commands, actuators "listen in" and execute a defined function as soon as they are addressed.

A broad range of functions can be parameterized with ABB i-bus ${ }^{\circledR}$ KNX, such as group commands, logical sequences, control and regulation tasks.

Communication for all devices is implemented using data telegrams on the same bus cable. The




## ABB India Helpline

Technical Telephone support for customers and channel partners.
Toll Free: (BSNL) +91 18004200707

Email: Ip.contactcenter@in.abb.com
www.abb.co.in/lowvoltage


[^0]:    Service continuity Reliable and simple to service, offering up to $36 \%$ less

[^1]:    * Main busbar and ACB feeder

[^2]:    1) $\mathrm{E} 4.2 \mathrm{H} / \mathrm{MS} 3200 \mathrm{~A}: 66 \mathrm{kA} \mathrm{Icw}$ (3s)
[^3]:    1) with regular ordinary maintenance prescribed by the manufacturer.
[^4]:    $\begin{array}{llll}\text { (1) Not suitable for } I T \text { distribution systems }>440 \mathrm{Vac} & \text { (2) } \mathrm{Ics}=75 \% \mathrm{In}>500 \mathrm{~A} & \text { (3) } \mathrm{Ics}=50 \% \mathrm{In}>500 \mathrm{~A} & \text { (4) Category } \mathrm{B} \text { : only when equipped with an electronic trip unit }\end{array}$

[^5]:    1) 16 A and 20 A for $\mathrm{N}, \mathrm{S}, \mathrm{H}$ have the TMF trip unit
[^6]:    (1) Power supply only from the top
    (2) Icw 5 kA
    (3) Icw $=7.6 \mathrm{kA}(630 \mathrm{~A})-10 \mathrm{kA}(800 \mathrm{~A})$
    (4) Tmax T5 630 is only available in the fixed version
    (5) For $T 6$ in the withdrawable version, please ask ABB SACE

    * Ordering extracodes
    **Ordering standard 1SDAO codes

[^7]:    * only for Ek 2

[^8]:    ${ }^{1)}$ Some fuselinks limit these figures further, starting current characteristics must be considered separately
    ${ }^{2}$ ) Utilization category $B$
    ${ }^{3)}$ Ambient temperature $60^{\circ} \mathrm{C}$ : derating $20 \%$. Mounting on "ceiling": derating $10 \%$. Mounting on wall, horizontal fuses: derating $8 \%$.
    4) Utilization category B
    ${ }^{5}$ ) Some fuse links limit these figures further. Starting current characteristics must be considered separately.
    ${ }^{6)}$ OESA Mini, use 4-pole switches with $2+2$ parallel contacts in series.
    ${ }^{7}$ ) Maximum fuse body diameter < 55 mm

[^9]:    ${ }^{1)}$ Below 48 V , two poles in parallel up to OT80 are recommended particularly in polluted atmosphere. ${ }^{2)}$ Acc. to IEC 60947-1, § 6.1.1.

[^10]:    ${ }^{1)}$ Acc. to IEC60947-1, § 6.1.1.
    ${ }^{2}$ ) IEC 947-3, utilization category B, infrequent operation.
    ${ }^{3)}$ Phase barriers or terminal shrouds must be used on both sides of the switch at voltages $\geq 500 \mathrm{~V}$.
    ${ }^{4)}$ The value is 92 kA for 4-pole switch-disconnectors.
    ${ }^{5}$ ) OT4000E_W8

[^11]:    ${ }^{1)}$ ) Below 48 V , two poles in parallel up to OTM80 are recommended particularly in polluted atmosphere
    ${ }^{2)}$ Acc. to IEC 60947-1, § 6.1.1.

[^12]:    ${ }^{1)}$ Further ratings on request

[^13]:    ${ }^{1)}$ Acc. to IEC60947-1, § 6.1.1.

[^14]:    ${ }^{1}$ ) Under nominal conditions

[^15]:    ${ }^{1)}$ For more detailed derating, please consult us. Installation condition may have an influence on the derating by increasing the possible rated
    current. The given deratings are references based on specific test setup.
    ${ }^{\text {2) }}$ Normal conditions defined in IEC 60947-1, section 6.1.
    ${ }^{3)}$ For DC-22B utilization category ratings, please consult us.

[^16]:    ${ }^{1)}$ For more detailed derating please consult us. Installation condition may have an influence on the derating by increasing the possible rated current. The given deratings are a reference based on specific test setup.
    ${ }^{2}$ 2) Normal conditions defined in IEC 60947-1, section 6.1.
    ${ }^{3)}$ Fuse manufacturer, size and type: ETI, 250A, Cat.no 004110 followed by 567,598 or 613 . More details from the fuse manufacturer catalog.
    ${ }^{4)}$ Any fuse which does not exceed stated values can be used
    ${ }^{5)}$ For DC-22B utilization category ratings, please consult us.

[^17]:    ${ }^{1)}$ Below 48 V , two poles in parallel up to OT80 are recommended particularly in polluted atmosphere
    ${ }^{\text {2) }}$ These values are given for guidance and may vary according to the motor manufacturer
    ${ }^{3}$ ) Short circuit duration $>50 \mathrm{~ms}$, without fuse protection
    ${ }^{4}$ ) Operating cycle: O-I-O-II-O

[^18]:    ${ }^{1)}$ These values are given for guidance and may vary according to the motor manufacturer
    ${ }^{\text {2) }}$ Short circuit duration $>50 \mathrm{~ms}$, without fuse protection
    ${ }^{3}$ ) Operating cycle: O-I-O-II-O

[^19]:    ${ }^{1)}$ These values are given for guidance and may vary acc. to the motor manufacturer
    ${ }^{\text {2) }}$ Short circuit duration $>50 \mathrm{~ms}$, without fuse protection
    ${ }^{3)}$ Max. distance from switch frame to nearest busbar / cable support 150 mm
    ${ }^{4)}$ Operating cycle: O-I-O-II-O
    ${ }^{5)}$ Category AC-21B, up to 415 V

[^20]:    ${ }^{1}$ ) Under nominal conditions

[^21]:    ${ }^{1)}$ Further ratings on request
    These values are given for guidance and may vary acc. to the motor manufacturer
    ${ }^{3}$ ) Short circuit duration $>50 \mathrm{~ms}$, without fuse protection

[^22]:    ${ }^{1)}$ OX_B bottom entry versions only
    ${ }^{\text {2) }}$ Short circuit duration $>50 \mathrm{~ms}$, without fuse protection
    ${ }^{3}$ ) Operating cycle: O-I-O-II-O
    ${ }^{4)}$ Contact ABB for applications with smaller than 20kVA gensets
    ${ }^{5)}$ Cut-off current îc (peak) value. The cut-off current îc refers to values listed by fuse manufacturers (single phase test acc. to IEC60269).
    ${ }^{5)}$ AC-33iA according to GB/T 14048.11

[^23]:    ${ }^{1)}$ OX_B bottom entry versions only
    ${ }^{2)}$ Short circuit duration $>50 \mathrm{~ms}$, without fuse protection
    ${ }^{3)}$ Operating cycle: O-I-O-II-O
    ${ }^{4)}$ Contact ABB for applications with smaller than 20kVA gensets
    ${ }^{5)}$ Cut-off current îc (peak) value. The cut-off current îc refers to values listed by fuse manufacturers (single phase test acc. to IEC60269).
    ${ }^{6)} \mathrm{AC}-33 \mathrm{i}$ according to $\mathrm{GB} / \mathrm{T} 14048.11$
    ${ }^{\text {7) }}$ OX_B bottom entry type rating / OX_T top entry type rating

[^24]:    Type tested according to EN/IEC 60947-3

[^25]:    (4) BEA65-4 suitable for MS165 and MO165 only.

[^26]:    MO165 (42-65A)
    Ics up to 50 kA
    MO165 (73-80A)
    Ics up to 30 kA

[^27]:    (1) 1000 V IEC ratings available for AX260 ... AX370 contactors.

[^28]:    ${ }^{1}$ For 220 V and 380 V , multiple by 0.9 the rated values at 230 V and 400 V respectively.
    Example : $50 \mathrm{kvar} / 400 \mathrm{~V}$ corresponding to $0.9 \times 50=45 \mathrm{kvar} / 380 \mathrm{~V}$
    ${ }^{2}$ The fuse ratings given represent the maximum ratings ensuring type 1 coordination according to the definition of standard IEC 60947-4-1.

[^29]:    Graphical user interface

[^30]:    *) Disclaimer: This bill of material shows one possible combination of devices. It should not be used in real projects without taking technical and other guidelines into account. Please select the size of devices including power supplies according to the specific requirements of the application.

[^31]:    ${ }^{1)}$ buffering time $\approx \frac{\text { energy storage } \times 0.9}{\text { current } \times \text { output voltage }}$

[^32]:    ${ }^{*}$. only up to $40 \mathrm{~A} ; 10 \mathrm{kA}$ up to 50/63 A
    *2 only for "D" characteristic
    ${ }^{3}$ values are not for all rated currents
    4600 V DC for $100,125 \mathrm{~A}$
    ${ }^{5} 51000 \mathrm{~V}$ DC for $100,125 \mathrm{~A}$

    * 63 poles
    ${ }^{* 7} 4$ poles

[^33]:    *8 max. values. Detailed values on page 2/12
    *9 relevant product standard: E DIN VDE 0645
    (based on IEC/EN 60898-1 and IEC/EN 60947-2)
    ${ }^{*} 10$ by 250 V DC 1-pole, 600 V 3 - and 4 -pole
    *11 by 600 V DC 2-pole
    ${ }^{*} 12 \leq 25 \mathrm{~A}$
    ${ }^{*} 13>25 \mathrm{~A} \quad-{ }^{20} \leq 35 \mathrm{~A}-80$

[^34]:    * only on $3 P$ and $4 P$ versions.

[^35]:    * 1 A on 2 P and 4 P versions, while 0.3 A only on 4 P ones.
    ** as specified in standard IEC/EN 60947-2 the device withstands Im $5 \ln$ with guaranteed non intervention.

[^36]:    1. Box for wall mounting
    2. Reversible front panel
    3. RAL 7035 opaque door
    4. Fixed support for DIN rail
    5. DIN rail
