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PRODUCTS AND SERVICES OVERVIEW

# ABB medium voltage apparatus

## Control and protection products



ABB Ability™

Digital substation products

Outdoor products

Indoor products

Indoor and Outdoor instrument transformers and sensors

Indoor instrument transformers and sensors

Outdoor instrument transformers, sensors and indicators



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**Why choose ABB as your preferred supplier of electrification control and protection products?**

**The most extensive product ranges from only one supplier. ABB delivers a wide portfolio of medium voltage distribution solutions products for applications, ranging from full-fledged substation breakers for outdoor and indoor installations to fuse cutouts, instrument transformers and sensors through digital substation products and solutions to support the different needs of the smart grid of tomorrow.**

**Built to withstand the rigors of the most demanding environments for outdoor and indoor applications, ABB medium voltage products provide value to our customers and partners by allowing energy to flow into their lives and businesses in a safer, smarter, sustainable and more reliable way.**



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# ABB Ability

## Empowering insight

Insight. It's the power to see and understand how something works in a new way, to unravel complexity and take action. It comes from visibility, intelligence and experience. It's what makes transformation possible.



### Discover ABB Ability™

ABB Ability™ solutions combine ABB's deep domain expertise with connectivity and software innovation to empower real-time, data-driven decisions for safer, smarter operations that maximize resource efficiency and contribute to a low-carbon future.

Going beyond simple connectivity, ABB Ability™ integrates our capabilities for maximum customer value, including software, hardware and services. Our solutions help you assess, automate, optimize and collaborate to ultimately turn raw data into analytical insights and direct action, with faster, flexible deployment and smarter maintenance.

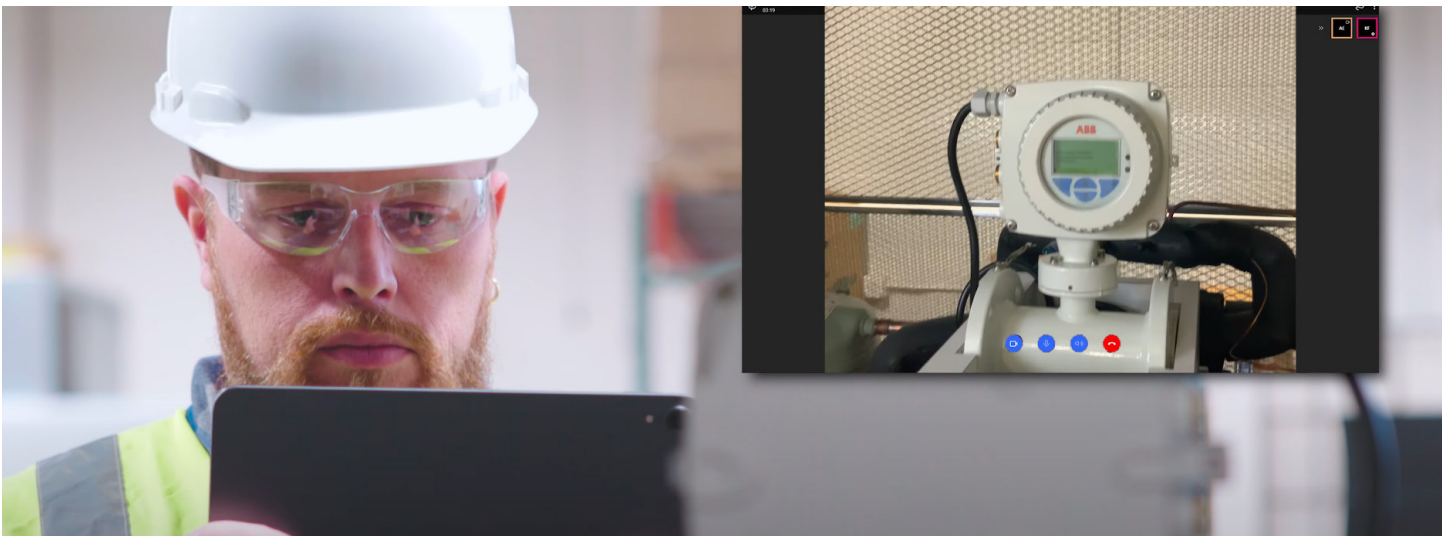
ABB Ability™ solutions deliver value safely, securely and sustainably – for your employees, your data and our planet.





## Remote Insights for service

ABB Ability™ Remote Insights for service is a collaborative application that improves interaction between remote experts and field personnel by enabling live instruction and guidance that can be overlaid on live video using augmented reality technology. This new solution will simplify maintenance, reduce downtime, increase equipment effectiveness and improve safety.



### Key benefits:

- Reduce downtime and costs by resolving issues more quickly
- Connect instantly to the right expert and information
- Improve safety and awareness
- Enhance quality of repairs and associated asset life
- Increase knowledge base through access to previously solved problems

## Digital Substation Products

### Relion protection relays

#### Relion REX610



REX610 is a freely configurable all-in-one protection relay that covers the full range of basic power distribution applications, without forgoing simplicity. The small number of variants translates into easy ordering, set up, use and maintenance. Rich in functionality, with a fully modular hardware unlocking all available functionality, REX610 represents both a flexible and cost-effective choice.

- Rich in functionality – covering the full range of basic utility applications
- Modular and scalable design for easy customization with easy addition, removal and replacement of modules
- Pure plug-and-play solution with modular hardware unlocking all available functionality
- IEC 61850-compliant communication and interoperability between substation automation devices
- New functionality continuously accessible via firmware updates
- Modifications possible throughout the product life cycle with modular and scalable design
- Tailor-made retrofit adapter for smooth replacement of SPACOM with REX610 relays
- Web-based data-sharing and backup service with access to firmware updates as optional add-on–ABB Ability™ Backup Management for electrical systems, Data Care

#### Relion 601 Series



601 provides basic protection and control for feeder and motor applications. It is very compact, easy to install and engineer, having a built-in test function. It has a very wide auxiliary voltage range with a universal power supply module, reducing the variants needed. 603 is a current transformer powered numerical feeder protection relay including overcurrent and ground-fault protection.

- Overcurrent, ground-fault, phase-discontinuity, negative-phase sequence and thermal-overload protections, inrush current detection, circuit-breaker control, reclosing and measurement
- Preconfigured functionality facilitates easy and fast commissioning
- Universal power supply 24-265 V AC/DC
- Configurable binary inputs/outputs using local HMI or communication interface
- Specific variant with site selectable CT selection (1 or 5A), Boolean logic and timers
- Site selectable Modbus and IEC 60870-5-103 protocols

#### Relion 615 Series



The protection relay line provides protection and control for a complete range of applications including feeder, line differential, transformer, voltage, busbar, capacitor bank, motor, generator and interconnection protection as well as automatic voltage regulation for on-load tap changers. The 615 series offers a high functionality level in a compact format.

- Ethernet and serial communication
- Drawout design
- Web-browser base user interface
- Arc flash detection (AFD)
- Large graphical display for showing customizable Single Line Diagrams, accessible either locally or through a web browser-based HMI
- Supports native IEC 61850 Editions 1 and 2, including redundancy HSR and PRP, GOOSE messaging and IEC 61850-9-2 LE for less wiring and supervised communication
- Supports Modbus and DNP3 communication protocols and for different time synchronization methods, including high-accuracy time synchronization via IEEE 1588 V2 Precision Time Protocol
- Advanced ground fault protection, including transient protection to detect faults in any cable and overhead network
- Ring-lug terminals for all inputs and outputs
- Cable fault detection
- Extensive life cycle services, including training, customer support, maintenance and modernization



## Digital Substation Products

### Relion protection relays and Digital Substation Products

#### Relion 620 Series



The protection relay line provides protection and control for a complete range of applications including feeder protection, transformer protection including automatic voltage regulation for an on-load tap changer, voltage protection, busbar protection and motor protection including motor differential protection. The wider case of the relay enables a high number of binary inputs and outputs and control of several circuit breakers.

- Ethernet and serial communication
- Drawout design
- Web-browser base user interface
- Arc flash detection (AFD)
- Programmable push buttons
- Large graphical display for showing customizable Single Line Diagrams, accessible either locally or through a web browser-based HMI
- Supports native IEC 61850 Editions 1 and 2, including redundancy HSR and PRP, GOOSE messaging and IEC 61850-9-2 LE for less wiring and supervised communication
- Supports Modbus and DNP3 communication protocols and for different time synchronization methods, including high-accuracy time synchronization via IEEE 1588 V2 Precision Time Protocol
- Advanced ground fault protection, including transient protection to detect faults in any cable and overhead network
- Ring-lug terminals for all inputs and outputs
- Cable fault detection
- Extensive life cycle services, including training, customer support, maintenance and modernization

#### Relion REX640



REX640 is a powerful all-in-one protection and control relay for use in advanced power distribution and generation applications with unmatched flexibility available during the complete life cycle of the device. The detached local HMI, introducing color touch screen, offers an innovative user interface providing information about the process status in an unseen clear and user-friendly manner. The pages in the local HMI can be fully customized for the specific needs at hand.

- Freely configurable relay for flexible tailoring to application-specific requirements
- IEC 61850 Edition 1 and Edition 2 - certified by DNV/GL (KEMA) – with redundancy support based on HSR and PRP
- Ability to receive four streams of sampled measured values (SMVs) and send one via IEC 61850-9-2 LE-based process bus communication
- Synchronizer functionality for both generator and non-generator breakers
- Four supervised arc sensor inputs, either loop or lens-type
- Centralized account management with role-based access control
- Relative humidity in installation location up to 95%, non-condensing
- Extensive life cycle services, including training, customer support, maintenance and modernization

#### SSC600, Centralized protection and control



ABB Ability™ Smart Substation Control and Protection for electrical systems SSC600 centralizes all protection and control functionality into one single device on distribution substation level for minimal engineering, station-wide visibility and optimal process management. Combining SSC600 with merging units creates an IEC 61850-compliant centralized protection and control solution. The modular software can be flexibly modified for the entire lifetime of the digital substation and allows SSC600 to change with the evolving grid. SSC600 builds on ABB's solid and proven technological foundation manifested in the renowned Relion® protection and control family of relays.

- Easy and efficient process management with station-wide process visibility
- Extensive application coverage with one device for flexibility and optimal cost-effectiveness
- IEC 61850-compliant communication and interoperability between substation automation devices
- Centralized protection and control in one single device for up to 30 feeder, motor and transformer bays
- Comprehensive Web HMI (human-machine interface) including station-wide HMI functionalities
- Disturbance recordings for the entire substation
- IEC 61850-3-certified with inbuilt redundancy and self-supervision
- Extensive digital services throughout the substation's entire lifecycle

## Digital Substation Products

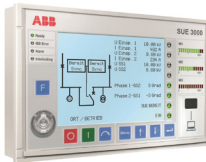
### SMU615



SMU615 is a dedicated substation merging unit intended for measuring current and voltage signals from the instrument transformers and merging them into the standard digital output format that other devices can further use for various power system protection application purposes. Dedicated merging unit for IEC 61850 process bus applications

- Communication capabilities with redundant Ethernet solutions - HSR and PRP
- Innovative, safe, cost and energy-saving measuring technology option with a digital interface, making it possible to connect ABB sensors to the IEC 61850-9-2 LE-based process bus
- IEEE 1588 V2 for high-accuracy time synchronization and maximum benefit of substation-level Ethernet communication
- Simplicity with no excess functions included – ready configured for acting as a merging unit in the power system
- Easy-to-use web browser-based HMI
- Compact size and withdrawable plug-in unit design for swift installation and testing

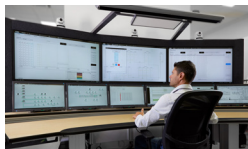
### SUE 3000



The SUE 3000 High Speed Transfer Device guarantees an optimum safeguarding of energy supply. The device ensures the continued supply to the consumer through automatic transferring to a stand-by feeder and protects the subsidiary process from expensive stoppage times. Can be supplied as a High-Speed Transfer System (30ms HSTS) incl. initiation units REF542plus and vacuum circuit breakers VM1-T.

- Configuration with two or three circuit-breakers
- Four different configurable motor bus transfer modes
- Permanent supervision of involved incomers, busbars and circuit breakers
- Integrated disturbance recorder and watchdog self-monitoring

### ABB ZEE600



The ABB Ability™ Electrification Monitoring and Control for distribution networks, ABB zenon Electrification Edition - ZEE600 fulfills the role of a seamless integrator of diverse devices such as ABB and 3rd party make protection relays, meters, substation equipment condition monitoring units, Programmable Logic Controllers (PLC) and Remote Terminal Units (RTUs), deployed in digital electrification solutions.

- Collects, analyzes, visualizes and manages data
- Provides valuable process insights for better decisions
- Minimizes downtime
- Optimizes energy efficiency
- Fast, dependable, agile automation
- Maximum data security and powerful reporting
- Easy and seamless integration
- Global service and support
- Fully supports communication standards and protocols such as IEC 61850, Modbus, Profinet, Profibus and other open / proprietary protocols.
- Supports IEC 62349 Parallel-Redundancy Protocol (PRP) to handle and resolve identical communication messages from two separate LAN networks.

### FT switches



ABB Flexitest™ switches, types FT-1 (10 pole, rear connected), FT-1F (10 pole, front connected), FT-1X (10 pole, extended terminals, rear connected), FT-14 (14 pole, rear connected), and associated Test Plugs, provide a safe, simple, fast and reliable method to isolate, test, and service installed equipment without disturbing the system.

- Safe and convenient, as all measurements and tests can be performed at the front of the switchboard
- Fast and reliable — when test plugs are used, any number of circuits may be tested in rapid succession
- Test switches can be assembled in a variety of different arrangements to match customer requirements, ensuring maximum flexibility
- Unauthorized access is prevented, ensuring security
- Proven quality with over 50 years of reliable field application
- 24/7 technical and application engineering support
- Integrated safety features such as coil supervision function and decoupling function
- Flexible bus protocol communication concept (IEC 61850-8-1, IEC 60870-5-103, Ethernet interface, ModBUS TCP, ModBUS RTU, Profibus DP, SPA)



## Digital Substation Products

### REA system



A fast and selectively operating arc fault mitigation system for air-insulated low voltage and medium voltage switchgears to protect human lives, prevent or reduce asset damage and allow smooth power restoration. REA arc fault protection is based on optical detection of the intense light of an arc fault or on detection of light secured with detection of simultaneous phase or neutral overcurrent.

- Enables redundant, instantaneous and fail-safe arc fault protection
- On detection of an arc fault, the REA system trips via high speed trip outputs in less than 2.5 ms all circuit breakers that feed the fault zone.
- Arc flash detection (AFD) based on fiber-optic light sensors
- Integrated fast overcurrent detection to secure nuisance-free trip decision
- Fiber-optic sensors can be used as supervised fiber loops or radial fibers, also lens type sensors available

### RIO600



RIO600 Remote I/O unit is designed to expand the digital and analog I/O of ABB's Relion® protection relays. The unit allows maximum I/O flexibility and provides seamless IEC 61850 connectivity between the substation binary and analogue signals. Compared to a traditional fully hard-wired substation, a solution using RIO600 helps in simplifying and decreasing the wiring inside the substation by digitizing the hardwired signals.

- Web-browser-based human machine interface (HMI) for access to substation devices.
- IEC 61850 and Modbus TCP station bus to extend the protection and control applications
- Fast real-time communication between protection and control relays and physical inputs/outputs
- Wide set of different I/O options
- Flexible applications with Fault Passage Indication (FPI) functionality for grid automation applications
- State-of-the-art directional ground fault indication reaching high sensitivity required in compensated networks
- Fulfills IEC 61850 communication performance requirement (Type 1A, class P1)

### ARG600



The wireless gateway ARG600 provides monitoring and control of field devices over a wireless cellular network from a central location. The gateway offers industrial quality connectivity for DNP3.0 protocol and Modbus-based protocols, in addition to TCP/IP-based protocols.

- Industrial grade TCP/IP router: Several serial and TCP/IP based field devices can be integrated into a central supervisory and control system (SCADA)
- Ideal for retrofitting – allows the user to extend the life cycle of existing serial-based substation devices
- Remote access to field devices means less site visits for operations and maintenance
- Optimizing the cost of communication by using public cellular networks
- Possibility to upgrade from existing legacy private radio system to a high bandwidth cellular network-based solution. This allows you to fully maximize usage of the existing application. For example, video surveillance traffic can now be integrated into the same system.

## Outdoor Products

### R-MAG® Dead Tank Breaker



The ABB R-MAG® combines the unique benefits of vacuum interrupter technology with a state-of-the-art magnetic actuator with limited moving parts. This field-proven design leads to higher operational safety, reliability, and availability, eliminating maintenance activities on springs or motors in the operating mechanism.

- 15/27/38 kV
- Up to 200 kV BIL
- Up to 3700 A continuous current for 15.5 kV
- Up to 2,000 A continuous current for 27-38 kV
- Up to 40 kA Interrupting current for 38 kV
- Operating temperature -50°C to +70°C
- Rated for 10,000 operations
- ABB best in class vacuum interrupters rated for 30,000 operations
- Easy installation and integration
- Full five years warranty
- Enclosures: painted mild steel, stainless steel, NEMA 3R, NEMA 4, Arc-Resistant

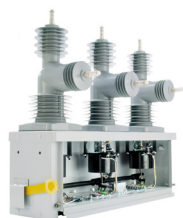
### OVB-SDB and OVB-VBF Live Tank Breakers



ABB live tank circuit breakers are designed to bring together the superiority of vacuum interruption inside “sealed for life” poles, with the reliability of a long-life spring mechanism inside a weather-proof cabinet. Product robustness combined with simple design ensures high performance in stressful environments.

- Up to 40.5 kV
- Up to 195 kV BIL
- Up to 2,500 A continuous current
- Up to 31.5 kA Interrupting current
- Operating temperature -40°C to +45°C
- Rated for 10,000 operations
- ABB best in class vacuum interrupters rated for 30,000 operations
- C2 class capacitor current switching back-to-back up to 750 A
- Easy installation and integration

### GridShield® Triple-Single Phase Recloser



Performance of the high voltage unit is guaranteed even in heavy-polluted environment, thanks to the highest creepage distance on the market and the Hydrophobic Cycloaliphatic Epoxy (HCEP), the best available on the market insulating material of the poles, shedding water, and reducing the probability of flashover. Modular design as single tank or as individual tank with various mounting options.

- 15/27/38 kV
- Up to 170 kV BIL
- Up to 1,200 A continuous current
- Up to 16 kA Interrupting Current
- Current measurement accuracy  $\pm 1\%$
- 10,000 operations
- ABB best in class vacuum interrupters rated for 30,000 operations
- Mean time to failure (MTTF) 10,000 years
- Rigorous environmental testing at KIPTS lab
- Highest creepage distance on the market
- HCEP material – best in class for outdoor use
- Single and three-phase tripping capability
- Multiple recloser controller compatibility (ABB, SEL, Beckwith, GE)
- Easy installation and integration



## Outdoor Products

### OVR Three Phase Recloser



Simple, reliable yet intelligent solution for most advanced customer needs. Equipped with ABB Relion® RER615 state of the art intelligent electronic controller, providing high-end relay features and offering IEC61850 native communication with GOOSE messaging capabilities and backward compatibility with Modbus, IEC60870-104 and DNP3.0 communication to connect to SCADA. Equipped with advanced smart grid features and future proof design.

- 15/27/38 kV
- Up to 170 kV BIL
- Up to 1200 A continuous current
- Up to 16 kA Interrupting Current
- 10,000 operations
- ABB best in class vacuum interrupters rated for 30,000 operations
- Highest creepage distance on the market
- HCEP material – best in class for outdoor use
- Easy installation and integration

### Eagle – Self-Powered Single-Phase Vacuum Recloser

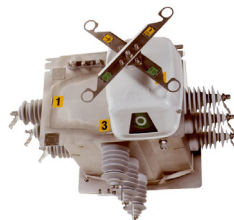


Safe, smart and reliable solution for most advanced customer needs. Design can be especially suitable for high vegetation areas with fire mitigation needs. To increase reliability and savings from momentary distribution system faults this recloser incorporates two main design concepts: 1) No Arcing Design and 2) Battery-Free Design. The Eagle considers no arcing during installation, closing, or opening. It utilizes self-powered and battery-free design. No need to have physical wire connection with the recloser, no special tools are required either, - all settings can be done through WiFi and web interface.

- 15/27 kV
- 125 kV BIL
- 200 A continuous current
- 8 kA Interrupting Current
- 3 reclosing shots
- Rated for 10,000 operations
- ABB best in class vacuum interrupters rated for 30,000 operations
- HCEP material – best in class for outdoor use
- Easy installation and integration
- Interruption in Vacuum
- Self-Powered
- No Battery – No Maintenance
- “No Arcing” Design
- Integrated Electronics
- Encrypted Wireless Communication
- Double Insulator Mounting
- Platform independent user interface
- Future SCADA communication option

## Outdoor Products

### Sectos SF6 Insulated Load Break Switch



The main active part is enclosed in a stainless steel SF6 tank and the state-of-the-art operating mechanism is sealed to guarantee reliable operation even in the most demanding climatic conditions including corrosive atmospheres, snow, and ice. It ranges from basic manual unit to a tele-controlled fully automated motorized version with ABB REC615 Relion® relay, current and voltage measurements, and SCADA integration.

- 12/24 kV
- 125 kV BIL
- 630 A continuous current
- 12.5 kA/s (3s) short time withstand current
- 31.5 kA peak withstand current
- 5,000 mechanical close/open operations for the switch
- 2,000 mechanical close/open operations for the grounding switch
- 400 load break operations under the rated current
- Manual or motorized operations
- Can be equipped with surge arresters, current and voltage transformers
- Corrosion protection design, stainless steel, and polyurethane coating
- Operating temperature -40°C to +60°C

### NPS Air Insulated Load Break Switch



Modular design minimizes logistics and storage costs, allowing late customization and integration, while ensuring simple and fast maintenance or replacement of parts, e.g. the arcing chamber. The NPS ranges from the basic manual unit to a fully automated motorized version with grounding switches, current measurement, SCADA integration and smart grid features. It provides visible break to disconnect or sectionalize feeders and branches.

- 24/36 kV
- Up to 200 kV BIL
- 630 A continuous current
- 16kA/s rated short circuit withstand current
- 31.5 kA peak withstand current
- 2,000 mechanical close/open operations for the switch
- 100 load break operations (C/O cycles) under the rated current
- Manual or motorized operations
- Can be equipped with grounding switches, surge arresters and current measurement

### ON Medium Voltage Outdoor Disconnectors



Simple and compact solution to provide reliable visual break for medium voltage networks. ABB ON switches can be operated either manually or by electric motor, which can be remotely controlled. Can be provided as one or three phase solutions for no-load isolation or sectionalizing of distribution networks. Optional ground switches can be provided on either side of ON switch for grounding of previously disconnected electrical network.

- Up to 36 kV
- Up to 195 kV BIL
- Up to 2,000 A continuous current
- Rated for 1,000 operations
- Compact design
- Single or three-phase operation
- Operation in both vertical and horizontal mounting positions
- Manual or motorized operation
- Available with grounding switches on both sides
- Vertical break opening
- Can work as sectionalizer
- Operating temperature -50°C to +40°C

## Outdoor Products

### AutoLink and WiAutolink Cutout Mount Electronic Sectionalizer



This smart device automatically isolates the faulted grid section when a permanent fault occurs; in such case, the units can be re-set without the need for special tools and quickly put back in service. In case of temporary fault, the electronic sectionalizer allows the upstream recloser or reclosing breaker to clear the fault without isolating the circuit. Electronic sectionalizer can be used as a single or three-phase solution.

- 15 kV, 27 kV, 38 kV
- Up to 170 kV BIL
- Up to 200A continuous current
- Actuating current 3 A to 215 A
- Resettable counter 1- 4 shots
- Works with upstream recloser
- Can operate as single or three phase unit
- Detects inrush to avoid incorrect trip
- Independent of the time-current curve
- WiFi communication
- Integrated Electronics
- Site resettable and programmable
- No need to replace the trip device after its operation
- Easy installation with flexible mounting options
- Mounted on cutout base
- Easily programmable

### ICX and NCX Fuse Cutouts and LBU-II Fuse Cutout with Load Break Capability

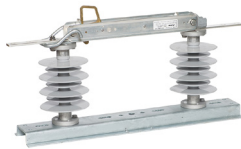


The full portfolio includes an interchangeable (ICX) design, a non-interchangeable (NCX) ABB proprietary design with double venting capability, and a load break version (LBU). ABB fuse cutouts are designed to perform without fail even in stressful environments, including extreme cold/hot, heavy pollution and coastal applications. Load break LBU-II cutout can switch currents as high as 300A at 15kV and 50A at 27kV.

- 7.8 kV, 15 kV, 15/27 kV, 38 kV
- Up to 180 kV BIL
- 100 A and 200 A continuous current
- 300 A disconnect blade
- Various types of insulators available: silicone rubber, polymer concrete, porcelain
- All ICX 100A and 200A fuse tubes are available with an optional kick-out spring
- LBU-II fault interrupting capability (not load break) up to 20,000 A RMS
- LBU-II can be also utilized at capacitor banks, transformer bank switching, sectionalizing, riser pole application
- ABB cutouts can be offered with arrester combinations

## Outdoor Products

### Single Phase Overhead Disconnect Switches



Lightweight, yet robust ABB switches provides ease and safety for transport and installation, as well as reliability over the product lifetime by not carrying current in the lower hinge. Hook stick operated, advanced design ensures the switch will open as needed, even after significant exposure in highly contaminated environments. Anti-corrosion materials ideal for the harshest environments.

#### DCD – single phase disconnect switch

- 15 kV, 27 kV, 38 kV
- Up to 150 kV BIL
- 600 A and 900 A continuous current
- 65 kA peak withstand current
- Blade stop: No stop/90°/160°



#### RBD – by-pass disconnect switch

- 15 kV, 27 kV, 38 kV
- Up to 150 kV BIL
- 600 A and 900 A continuous current
- 65 kA peak withstand current
- Blade stop: No stop/90°/160°



#### SID – single insulator disconnect switch

- 15kV, 27kV, 38kV
- Up to 170 kV BIL
- 600 A and 900 A continuous current
- 65 kA peak withstand current
- Blade stop: No stop/90°/160°



#### LSID – SID switch with self-contained load break chamber capable to interrupt up to 600A

- 15/27kV
- Up to 150 kV BIL
- 600 A and 900 A continuous current
- 65 kA peak withstand current
- Blade stop: No stop/90°/160°



#### ITD – inline tension disconnect switch

- 15 kV, 27 kV, 38 kV
- Up to 200 kV BIL
- 600 A and 900 A continuous current
- 65 kA peak withstand current
- Blade stop: 90°/160°



## Indoor Products

### Medium Voltage IEC Indoor Vacuum Breakers – VD4 and VM1



VD4 and VM1 medium voltage circuit breakers use vacuum interrupters embedded in poles. This construction method makes the poles particularly sturdy and protects the interrupter from shocks, dust and condensation. VM1's magnetic drive activates the moving contacts of the interrupters and integrates all the functions of a traditional drive.

#### **VD4: Modular spring-operated mechanical actuator ensuring easy operation even without auxiliary supply**

- 30,000 mechanical operations on most ratings
- Rated at up to up to 40.5 kV, 4,000 A, 63 kA.

#### **VM1: Medium voltage circuit breakers with a magnetic actuating mechanism for primary distribution up to 24 kV, 3150 A (4,000\*), 50 kA.**

- Magnetic actuator controlled by electronic board and storing capacitors
- 30,000 mechanical operations on all the ratings

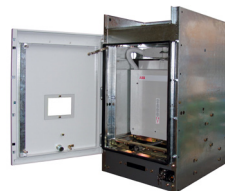
### Medium Voltage IEC Indoor SF6 Gas Breakers – HD4



HD4 breakers are used in electrical distribution for control and protection of cables, overhead lines, transformer and distribution substations, motors, transformers, generators and capacitor banks. Thanks to the SF6 autopuffer breaking technique, the HD4 circuit breakers do not generate operating overvoltages, and are therefore also highly suitable for retrofitting, upgrading and enlarging older installations where the insulating materials for the motor, cable, etc. may be particularly sensitive to dielectric stresses.

- Rated at up to 40.5 kV, 3600 A, 50 kA
- Unique ABB quenching technique to ensure smooth switching operations
- Ideal for all applications (eg, capacitor bank switching, marine, GOST)
- Fully interchangeable (both for overall dimensions and electrical diagrams) with ABB VD4 circuit breaker
- Sealed-for-life SF6 poles with the unique ABB auto-puffer quenching technique joining the advantages of "puffer" and "self-blast"
- Spring-operated mechanical actuator ensuring easy operation even without auxiliary supply
- Pressure switch on request to continuously monitor the status of the interrupting device

### Medium Voltage IEC Indoor Cassettes and Frames – PowerCube



Medium voltage preassembled units to be used as components for primary distribution air-insulated switchgear, cassettes to modules with complete apparatus and cable access compartments.

- Rated at up to 36 kV, 4,000 A, 50 kA
- Arc proof doors up to 50kA, and pretested and assembled interlocks between apparatus and PowerCube units
- Variety of units available, from circuit breakers to contactors (including contactors with a reduced footprint of 400 mm) or measurement with one or two VT trucks to risers and service truck solutions

### Medium Voltage ANSI Indoor Vacuum Breakers – ADVAC and AMVAC



The ADVAC and AMVAC series is a complete line of ANSI-rated vacuum circuit breakers with a spring-charged and magnetic actuated mechanisms offering power distribution system customers the advantages of the latest technology with a modular design that is easily maintainable.

#### **ADVAC**

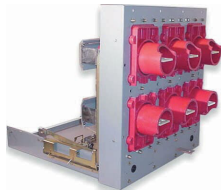
- 5 kV to 15 kV heavy duty breaker rated at 1,200 A to 3,000 A continuous current and 25 kA to 63 kA interrupting current
- 38 kV class breaker rated for 2,000A continuous current, 31.5 kA with 10,000 M2 Class mechanical operations

#### **AMVAC**

- Rated at up to 15 kV, 3,000 A, 50 kA and 27 kV, 2,000 A, 25 kA
- Low-maintenance magnetic actuator mechanism and electronic controller
- Standard five-year warranty available on AMVAC breakers

## Indoor Products

### Medium Voltage Indoor ANSI L-Frames



OEM switchgear components are manufactured to meet current medium voltage industry standards. The designs are UL recognized, providing a modular building block approach for installation into new and existing switchgear configurations. They are used with ADVAC and AMVAC circuit breakers.

#### Ratings up to:

- 15 kV, 3,000 A, and 63 kA
- 27 kV, 2,000A, and 25 kA
- 38 kV, 2,000 A, and 31.5 kA

### DC High Speed Circuit Breakers – Gerapid



Gerapid high speed DC circuit breakers are single-pole circuit breakers designed for use in high energy, high reliability DC power distribution systems. They are suitable for protection of mains and semiconductors (converters/rectifiers) in railway and industrial applications. Feeder circuit breakers and rectifier circuit breakers are available with operating currents up to 8,000 ADC and operating voltages up to 3,600 VDC. They have a very high interruption capacity combined with a current limiting characteristic.

Innovative materials, superior circuit breaking capacity and outstanding dielectric performance ensure service continuity and protection during adverse system events. The technology and quality of these circuit breakers produce high reliability, extended maintenance intervals and uncomplicated serviceability for all fixed installations.

- Ratings up to 8,000 A and 3,600 Vdc (800 Vdc, ANSI)
- IEC 60947-2, EN50123-2, and ANSI C37.14 Certifications
- Solenoid drive (integral control unit, mechanically latched, no auxiliary power required to keep contacts closed)

### Medium Voltage Generator Circuit Breakers – VD4G and ADVAC G

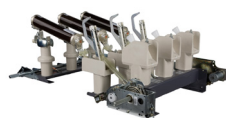


Based on the well-proven and highly reliable VD4 and ADVAC platforms with over 1,000,000 installations since 1986, the VD4G and ADVAC G product families are tested to meet the most stringent IEEE and IEC requirements for generator applications as per IEC/IEEE 62271-37-013.

VD4G and ADVAC G are capable of interrupting currents with delayed zero crossings that may occur in the event of faults that are fed from the generator, or faults during synchronization with the high voltage grid. Their interrupting technology enables the withstanding of severe transient recovery voltages (TRV) to protect critical equipment. They have excellent duty in terms of maximum number of switching operations and require little maintenance for maximum uptime.

- Ratings up to 15 kV, 4,000 A, and 63 kA for generators up to 100 MVA
- Vacuum interrupters embedded in poles for protection against humidity, shock and dust
- Completely type-tested in accordance to the latest IEEE/IEC 62271-37-013 standards

### Medium Voltage IEC/CSA Indoor Air Insulated Switches – NAL/NALF



The NAL switches and NALF switches with fuse bases have a compact, modular design and broad functionality. The rated voltages are up to 38.5 kV, rated currents up to 1,250 A and rated short-circuit withstand up to 40 kA.

- High number of breaking operations at rated current value
- Available Earthing switch with making capacity
- Wide range of operating temperatures
- Available with CSA certification directly from the factory

## Indoor Products

### Medium Voltage ANSI Indoor Load Break Switches – VersaRupter



The VersaRupter switch-disconnector uses a puffer and nozzle system to efficiently extinguish the arc of full-load interruptions, voltage up to 38 kV, current up to 1200 A.

- High number (100 c/o) of breaking operations at rated current value
- Fault-closing rated current asymmetrical up to 61 kA
- Rated short-circuit withstand current up to 40 kA
- Earthing switch with making capacity

### Medium Voltage SF6 Gas Insulated Load Break Switch – GSec



Three-position gas insulated switch disconnector for: secondary distribution switchgear, feeders, transformer protection and ring networks. Incoming/outgoing panels with CBs or in combination with fuses.

- Ratings up to 24 kV, 800 A, and 25 kA
- High number (100 c/o) of breaking operations at rated current 630A value
- Tested for use at low temperatures and type-approved for naval applications
- May be installed in narrow 375 mm panels
- Three positions in one structure: LINE – OPEN – EARTH

### Ultra-Fast Earthing Switch – UFES



The Ultra-Fast Earthing Switch UFES is a safe and effective combination of specific arc detection relays and an associated arc quenching device consisting of the so-called primary switching elements (PSE). In case of an internal arc fault the arc detection relay trips the UFES PSE, which initiate a three-phase earthing to break the arc voltage immediately.

- Arc flash extinction in less than 4 ms, 20 times faster compared to standard arc protection
- Arc detection by means of optical sensors and current measurement
- Available for switchgear ratings up to 40.5 kV and 100 kA
- Easy integration into new and existing low- and medium-voltage systems

### Medium Voltage IEC Indoor Fuses



Medium voltage IEC current limiting and expulsion fuses suitable for the protection of distribution transformers, voltage transformers, capacitor banks, motor circuits and installations with other switching apparatus.

- Special design optimized for type of application
- Two fuse housing materials are applicable – porcelain and resin-fiberglass
- Application: indoor and outdoor

### Medium Voltage IEC Indoor Contactors



ConVac vacuum contactors are suitable to switch motors and to control electrical circuits, for a wide variety of applications where high number of operations are required. They are suitable to operate motors, transformers, capacitor banks and fitted with proper fuses, for circuits with fault levels up to 50kA.

- Lower chopping current, increasing motors and transformers lifetime and lowering costs
- Rated at up to 12 kV, 400 A to 800 A, 6 kA to 12.5 kV unfused; 50 kA with SCPD (normal fuses)
- One multi-standard free-standing product for 12 kV: suitable for IEC62271-106, UL347 and CSA C22.2 standards

## Indoor Products

### Fault Current Limiter (FCL)



ABB's fault current limiters, Is-Limiter and FC-Protector are the efficient solution for short-circuit current challenges in newly installed and existing electrical networks.

- Increase uptime and redundancy of power distribution systems
- Solving short circuit challenges by minimal integration cost in green and brownfield projects
- Plug and play installation for indoor and outdoor applications
- Available as loose components or a panel solution with minimal footprint
- Available for standard to complex applications (e.g. extended tripping criteria coordination of several FCLs in one system)
- FCL portfolio covering low-and medium-voltage ratings up to 40.5 kV

### Medium Voltage DS1 Capacitor Switch



DS1 is the first synchronous switch isolated in dry air specifically devised and designed for capacitor banks. The perfect combination, regulated by the electronic control unit, between the semiconductors and synchronism with the network allows to increase reliability and efficiency and prolongs the life of components.

- Up to 17.5 kV, 630 A, 20 kA
- Up to 50,000 close-open operations
- Integrated control unit for synchronization and switch diagnostics

### Medium Voltage Arc Furnace Breakers – VD4-AF1



New vacuum circuit breaker with servomotor actuation and controlled switching technology.

- Rated up to 38 kV, 2500 A, 31.5 kA and up to 150,000 operations with extremely low inrush
- Enables increased lifespan of transformers by more than 10% in
- Reduction of hazards due to improved protection range
- Up to 5-to-10-times higher endurance performance than the market standard
- Eliminated compensation losses up to 10% to increase power quality
- Cost saving by as much as 20%
- Designed for transformers protection
- Elimination of inrush limiting reactors and resistances, leading to significant cost and space savings

### Medium Voltage Capacitor Switching Breaker – VD4-CS



VD4-CS is the unique solution based on new vacuum interrupter technology to support reactive power compensation applications.

- Up to 5-times higher performance than the market standard with 10,000 operations
- Cost saving by as much as 20%
- Enables increased lifespan of capacitors by more than 10% in thanks to predictive health indication
- Designed for capacitor banks
- Rated up to 38 kV, 1250 A, 31.5 kA and 10,000 maintenance-free operations
- Noise-free operations
- Embedded advanced diagnostics



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## Indoor and Outdoor Instrument Transformers and Sensors

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### Outdoor Instrument Transformers and Sensors



ABB has one of the widest global portfolios of instrument transformers and sensors to be used for revenue and non-revenue measurement applications, control and protection applications and for auxiliary power when needed. The hydrophobic surface properties of HCEP (Hydrophobic Cycloaliphatic Epoxy) insulators ensure highly reliable performance in highly polluted, wet or humid environments. All the instrument transformers and sensors are designed and manufactured to achieve superior performances.

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### Medium Voltage Indoor Sensors



ABB sensors offer a state-of-the-art way of providing the current and voltage signals which are needed for the protection and measurement of medium-voltage power systems. The output signal is linear over the whole measuring range. ABB sensors open-up numerous advantages and benefits for their users such as fast and easy design process, quick delivery time, minimized cost during the life cycle, flexibility, safety, and reliability. ABB sensors product portfolio has more than 17 product families and 52 different product variants, including UL certified sensor solutions covering various applications from primary to secondary air and gas insulated switchgear.

ABB MV sensors are compatible with ABB Relion relays and select third party relays which support voltage sensors according to IEC 61869-11 standards.

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## Indoor Instrument Transformers and Sensors

### Medium Voltage Indoor Combined Sensors



ABB's medium voltage combined sensors integrate current and voltage measurements into one compact device. Current measurements are based on the principle of Rogowski coil and voltage measurements are based on resistive or capacitive dividers. These sensors are non-saturable and linear over the whole measuring range. ABB's combined sensors are suitable for both measuring and protection purposes. Ratings are available up to 3200 A and 40.5 kV.

#### Applications

- Primary and secondary air insulated switchgear
- Secondary gas insulated switchgear
- Suitable for new installations

### Medium Voltage Indoor Instrument Transformers



Traditional Instrument transformers with typical applications in medium voltage circuit breakers and power transformers complying to IEEE standards.

- Offering a broad selection of instrument transformers ranging from 600 V to 48 kV
- Designed for service in medium voltage metal-clad switchgear and used for metering, relaying, or control power.
- Single, double, and tapped secondary designs with two accuracy and thermal rating options.

### Medium Voltage Indoor Current Sensors



ABB's current sensors are based on the principle of Rogowski coil. The sensor consists of an air-core winding and immune to any risk of saturation as it has no ferromagnetic core. It is linear over the whole measuring range. The output signal is a voltage, which is proportional to the derivative of the current. A digital integration of this voltage is carried out by protection relay and gives the measured current. Current sensors are suitable for both measuring and protection purposes. Ratings are available up to 4,000A and accuracy class up to 0.5/5P630.

#### Applications

- Primary and secondary air insulated switchgear
- Primary and secondary gas insulated switchgear
- Suitable for new installations as well as for retrofit purposes

### Medium Voltage Indoor Voltage Sensors



ABB's MV voltage sensors are based on resistive or capacitive divider technology. These sensors are non-saturable and linear over the whole measuring range. The output signal is a voltage, which is proportional to the primary voltage. These voltage sensors are suitable for both measuring and protection purposes. Ratings are available up to 24 kV and accuracy class 0.5/3P.

#### Applications

- Primary and secondary air insulated switchgear
- Primary and secondary gas insulated switchgear
- Suitable for new installations as well as for retrofit purposes

## Outdoor Instrument Transformers, Sensors and Indicators

### Outdoor Instrument Transformers and Sensors

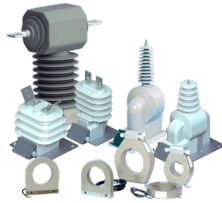


ABB has one of the widest global portfolios of instrument transformers and sensors to be used for revenue and non-revenue measurement applications, control, and protection applications and for auxiliary power when needed. The hydrophobic surface properties of Hydrophobic Cycloaliphatic Epoxy (HCEP) ensures highly reliable performance in wet, humid, as well as highly polluted environments. Benefits of HCEP:

- Less wetting of surface
- Better reliability due to lower leakage currents
- Lower flash-over probability
- Superior arc track, ozone and ultraviolet-resistive properties while maintaining physical strength
- Improved life expectancy due to less erosion
- Self-cleaning with superior performance in polluted or coastal environments.
- Water runs off the sheds and mitigates the potential to form ice

All instrument transformers and sensors are designed and manufactured to achieve superior performance.

### Outdoor Current, Voltage and Combined Transformers



ABB outdoor instrument transformers has wide family of products covering various voltage levels and includes KOR, KON and CTR current transformers, VOG, VOY, VOZ, TJO, VOL and TDO voltage transformers, as well as combined current and voltage instrument transformers type CVC. All types of transformers are cast with best-in-class HCEP insulating material. Instrument transformers fulfill requirements of many global standards including: IEEE, IEC and CSA.

- ABB offers a broad selection of instrument transformers ranging from 6 kV to 52 kV and current ratings from 5 A up to 3,000 A.
- Transformers are designed for service for medium voltage protection and metering or combined applications.
- Available, single, double, and tapped secondary designs with two accuracy and thermal rating options.

Voltage transformer are available with ABB ResiVolt™ technology designed to withstand challenging environments where very fast transient (VFT) overvoltages are present.

Current transformers are available with AccuRange® high accuracy and extended range technology for metering applications to provide higher accuracy performance over a much wider range than standard current transformers.

## Outdoor Instrument Transformers, Sensors and Indicators

### Outdoor Current, Voltage and Combined Sensors



ABB offers a variety of sensors for grid modernization applications, providing utilities and other customers with increased reliability and efficiency. Sensors, also known as electronic instrument transformers or low-power passive instrument transformers, provide many key benefits over traditional instrument transformers. Some of these benefits include the following:

- Reduced chances of failure
- Reduced weight and footprint
- More linear response, including when harmonics are present
- Simplified installation, combination sensors can even be live mounted
- Maintains accuracy over a wide range providing flexibility toward varying load flow
- Can often be retrofitted in existing structures with new relays
- Standardization of sensor selection (one sensor covering wide range of ratings)
- Improved inventory management
- Change-out flexibility

Our portfolio includes current KLS and VKS sensors current sensors, VLS voltage sensors, and WLS and VCS combination sensors from DistribuSense™ sensor portfolio.

ABB also offers a compact Rogowski coil indoor sensors for use over bushing or bus, and indoor voltage sensors designed for use as line post insulators or for standalone use.

### Outdoor/Indoor Passive Voltage Indicator



The VisiVolt™ Passive voltage indicator can be used in outdoor and indoor applications to reliably indicate voltage presence in medium voltage systems from 3kV to 36kV. VisiVolt™ indicators are equipped with LCD technology that has the advantage of being able to operate at a very broad temperature range -40° C to +85° C. Innovative passive voltage indicating technology represents cost effective solution to broadly introduce indicators with an active warning of voltage presence in the systems where they were not available up to now. This will greatly increase safety and considerably reduce potential of serious accidents.



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## Outdoor Instrument Transformers for AC Railway, Heavy Duty and Utilities Application

Outdoor Instrument Transformers for AC Railway Applications



ABB family of CTR current transformers are designed to work in outdoor conditions in highest voltage for equipment up to 52 kV and rated primary currents up to 3,000 A. To comply with higher short circuit level in the AC railway applications It is designed to withstand 60kA for 1 second short circuit thermal currents. Below are listed other benefits that contribute to the reliable operation of CTR transformers in extreme conditions:

- Wide range options with creepage distance
  - Solid dielectric design with best-in-class HCEP insulation material
  - Epoxy terminal block provided with lead seal lock to ensure IP55 protection
  - Same design covers single- and two-phase applications
  - Easy to install and commission
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