DISTRIBUTION SOLUTIONS

Lifecycle services for low and medium voltage equipments

ABB - partner of choice in world-class service

Table of contents

Installation and commissioning
On-site installation and commissioning by certified ABB experts

Ensure lower risk, faster start-up and optimum performance for your electrification system, from first operation through the entire lifecycle of the equipment.

ABB certified service engineers provide expert on-site installation, cold and hot commissioning for distribution automation products, switching, limiting, measuring and sensing devices, switchgear, modular substation packages and eHouses.

ABB service engineers go through rigorous product specific training before they are allowed to carry out service work at a customer site. Count on certified on-site installation and commissioning by ABB experts for high reliability and optimum life-cycle performance from first operation.

The correct installation and commissioning will ensure a high degree of operational reliability. To achieve a problem-free start up, it is required that installation and commissioning procedures are followed. The use of service personnel from ABB ensures that the equipment is installed and put into operation in a safe and correct way.

Installation services
Full installation services include:
- Site supervision
- Foundation alignment check
- Installation and erection of new equipment
- Main bus bars and cubicles connection
- Incoming / outgoing cable connections
- Insulation level testing
- Internal wiring check
- Switchgear earthing check
- Functional testing and site handover

Commissioning services
Full commissioning services include:
- On-site testing of the erected switchboard
- Conductivity test on the primary circuits
- Insulation test on primary and auxiliary circuits
- High-voltage test on primary circuits
- Primary tests on instrument transformers
- Polarity tests on instrument transformers

Benefits
- Reliable equipment from the first day of operation
- Lower risk for unexpected outages
- Faster start-up
- Optimum lifecycle performance

Training

Reach new levels of knowledge with dedicated training programs

Trained personnel with high expertise allows safe, correct and reliable operation and reduces downtime. Our training programs for your supervisors, engineers, technicians, operators and maintenance personnel provide comprehensive and up-to-date technical expertise for existing and new products, processes and technology. Learn on your own site, in the classroom or online.

Throughout the value chain, from pre-purchase to replacement and product recycling, ABB service offers general and product-related technical training. Courses typically cover safety procedures, correct product operation, routine maintenance and basic fault finding. We offer customized curricula to address the unique training requirements of your facility.

Classroom training
Formal training courses are provided by product or service specialists and conducted in ABB training centers. A training session typically comprises both theoretical presentations and hands-on exercises, focusing on the detailed understanding of the design criteria, the technology and the project specifics.

On-site training
Versatile on-site training services are also offered by ABB. It is usually more focused on hands-on training, concentrating on operating the equipment.

Benefits
With ABB products and systems training, your benefits are:

- Enhanced personnel and plant safety
- Improved productivity
- Reduced downtime
- More motivated and qualified employees

Training centre facilities

- Demo room with operating models
- Product benches for hands-on training
- Sophisticated learning aids such as simulations, product cut-outs and multimedia presentation
- Well-equipped classrooms

Spare parts and repair service
Guaranteed functionality of installations with original ABB components

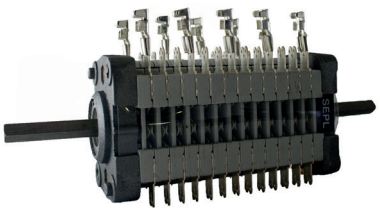
Guaranteed functionality of your installations by using original ABB components, spare parts and kits available for current and legacy products, including acquired brands. ABB's channel partner network is strategically positioned to provide spare parts and repair service throughout India. Use of standardized processes, tools and metrics ensures that components are delivered quickly and efficiently to your site.

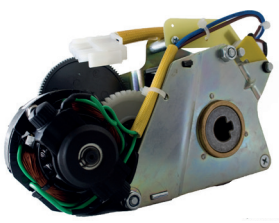
Spare parts
Spare parts availability is crucial for on-going operations. We maintain a complete stock of strategic spare parts, guaranteeing availability. For emergency requirement of spare parts, our service team personnel and partners are ready to provide immediate response to your emergency needs.

Legacy support
Our legacy support provides replacement parts and repairs for previous generations of ABB products including AIS, GIS, RMU, indoor / outdoor circuit breakers and auto reclosers. Spare parts and repair services for ABB legacy products are available as long as they are technically and commercially feasible.

Benefits
- Optimum lifecycle performance of equipment
- Reliable and safe operation with original parts
- Reduced downtime with fast and guaranteed delivery

ABB offers repair services for low and medium voltage switchgear, vacuum / SF6 circuit breaker & poles and protection relays. These repair services are designed to deliver trouble-free operations and extended product lifetime. Our service organization has an extensive experience in switchgear and the applications where they operate. This experience enables us to deliver improved availability and lifecycle performance of equipment to our customers.






Maintenance

Maintain efficiency, availability and safety with the right maintenance program

By inspecting and analyzing your equipment, we are able to program maintenance in a targeted and economically advantageous way. Interventions can be brought forward or delayed according to your priorities.

ABB has supplied various low and medium voltage equipment from its manufacturing locations. On completion of commissioning, the equipment is at the peak of its performance. To maintain this condition, it is essential to adopt a service and maintenance program for this asset. An appropriate maintenance program reduces the risk of failures and / or unexpected shutdowns and extends the lifetime of the equipment, thus lowering the overall operational costs.
The maintenance strategy is the key for reduced maintenance cost and optimized plant operation. ABB service team fully supports maintenance: from inspection, mechanical and operational checks and troubleshooting to continuous monitoring for proactive maintenance planning. Our certified experts are there to support your maintenance strategy, according to initial specifications and expected asset lifetime.

Why ABB?

- High level of professionalism guaranteed by a continuous training process and refresher courses
- Reduction of plant downtime, thanks to rapid diagnosis using specific testing instruments and fault identification
- Numerous solutions for increasing safety of operators, devices and process, preventing the principal risks
- Reduction in maintenance costs (direct costs of emergencies, indirect costs of production losses)

Extensions
Extension of any kind of switchgear

Extension of any kind of switchgear with either original legacy equipment or panels of the active product lines. All discontinued switchgear of the active and legacy ABB brands, and also non-ABB equipment can be extended by adding new panels.

—
01 VHE12S
—
02 VHA12S
—
03 UniSafe
—
04 VHA36

Key features
- Same original panels or new active products
- Directly or using an adaptation, integrated into the bus bar compartment, with a dedicated transition panel

Key benefits
- Increased capacity of the network
- Overall switchgear life time extension

We support following range of legacy switchgear panels:
- VHE12S - 12kV, 40kA for 3 sec, VCB switchgear
- UniSafe - 12kV, 26.3kA for 3 sec, VCB switchgear
- VHA12S - 12kV, 40kA for 3 sec, SF6 CB switchgear
- VHA36 - 36kV, 31.5kA for 3 sec, SF6 CB switchgear

—
01

—
02

—
03

—
04

Upgrades
Remote racking of circuit breaker / contactor for operator safety

A safer operating environment for electrical substation personnel through the proven method of adding distance between the operator and arc flash incident energy at the switchgear site.

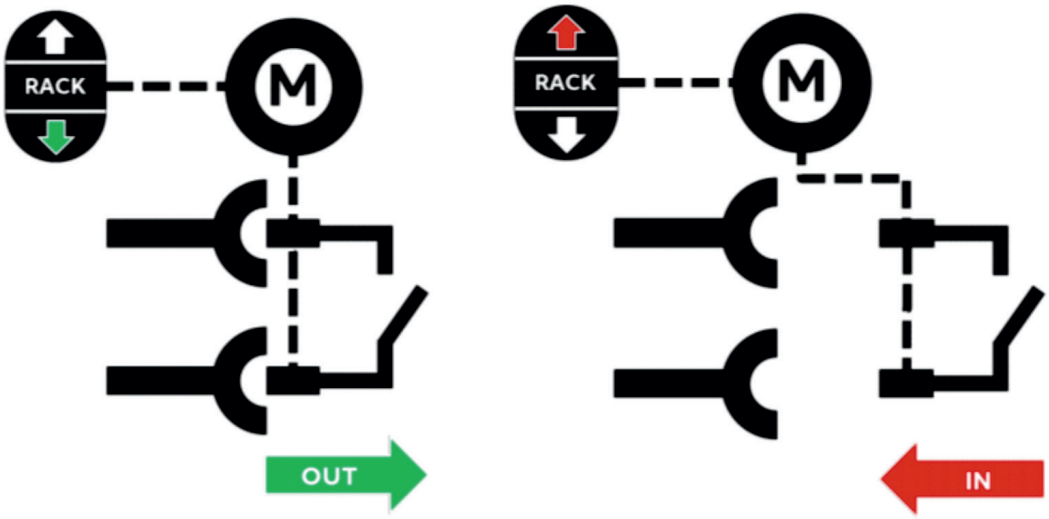
The process of racking a circuit breaker / contactor into and out of the connected position is one of the most frequent exercises that expose an operator to risk. A malfunction during this operation has the potential for catastrophic consequences to personnel and equipment. Increased focus on operator safety has caused owners to question the adequacy of prior switchgear designs that require a manual racking of circuit breaker / contactor.

Maintaining a safe distance between personnel and equipment during critical operations such as rack-in / rack-out of circuit breaker / contactor provides the most effective means of avoiding injury by keeping people out of harm's way.

ABB can offer integrated remote racking solutions implementing the remote control of racking in and out operations of the circuit breakers / contactors.

Benefits

- Increased personnel safety, thanks to the distance between the circuit breaker / contactor and the operator
- Enhanced switchgear operability prevents human errors due to manual operations
- Racking operations are performed by applying the recommended force, thereby preventing damage to the mechanism and interlocks
- Racking operation possible through SCADA



Upgrades

UFES solutions - switchgear upgrades for rapid arc fault extinguishing

Innovative arc flash mitigation in less than 4 ms, the highest possible level of arc flash protection for personnel and equipment, maintenance of secure power supply and the reduction of production stoppages.

—
01 Ultra Fast Earthing Switch
—
02 Draw-out unit

In the event of an internal arc fault, the temperature might go up to 20000 degrees Celsius during which the metal burns & vaporizes, hot gases are released and heavy damages occur to the equipment and personnel in vicinity.
In such cases, the losses are very huge.

The latest technology -
Ultra Fast Earthing Switch(UFES) provides:

- Active internal arc protection in addition to available passive protection, applicable for short-circuit proof, air-insulated switchgear
- Highest possible protection for switchgear in regard to the hazardous impacts caused by an internal arc

The Ultra Fast Earthing Switch (UFES) device has :

- Electronic tripping unit for fast & reliable interface to external arc detection systems and tripping of UFES primary switching elements
- 3 primary switching elements for ultra-fast initiation of 3-phase short circuit earthing after detection of a fault by the electronic and thereby eliminating the arc by resulting the breakdown of internal arc voltages

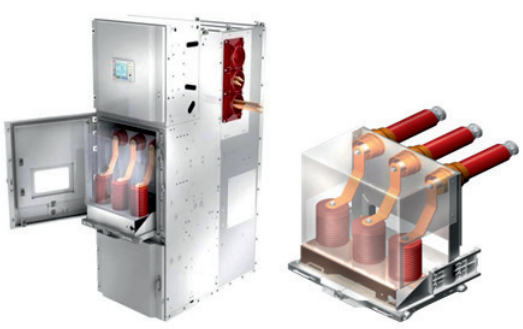
It has an extremely short tripping time of <4 ms (after detection)

Benefits
Speed - Nearly immediate extinction of an internal arc by fastest intervention of the Ultra Fast Earthing Switch.

Safety - Greatly enhanced protection for personnel, switchgear and the environment. Drastically reduced internal arc duration ensures minimized pressure and temperature rise.
This leads, as a consequence, to minimal impacts at the fault location.

Savings - Greatly increases system and process availability in combination with drastically reduced repair costs.

—
01



—
02

Upgrades
Fault current limiter I_s-limiter™

Customized fault current limiter solution that meets the highest requirements for critical and complex applications resolving all possible short-circuit challenges. ABB's fault current limiters disconnect the fault affected part of the system extremely fast so that the short-circuit withstand capability of the system is not violated.

Why are short-circuit fault levels increasing?
A growing energy demand and the need for stable power are two of the largest challenges faced by consumers, power producers and network operators.

With this rising worldwide energy demand, existing power distribution systems and power grids are being expanded and increasingly meshed. This causes short-circuit fault levels to increase, resulting in yet another challenge.

Why must short-circuit currents be limited?
Each equipment in an electrical network has a certain permissible short-circuit withstand capability, which if exceeded will have hazardous consequences for equipment, personnel and environment. If electrical equipment like switch- boards, switches, transformers or cables are subjected to short-circuit currents higher than their withstand capability they can be destroyed by the dynamic and thermal stresses.

— 01 I_s-limiter ™ panel and insert

— 01

Does my equipment withstand a short-circuit fault?
Electrical equipment is usually tested according to the relevant standards to withstand the permissible short-circuit currents. Those are the rated peak withstand current, the short-time withstand current and the rated short-circuit duration. If one of these parameters is exceeded, the equipment will most probably face severe damage.

What do ABB's fault current limiters do?
The I_S-limiter™ limits the short-circuit current before the first current peak is reached such that the equipment rating is not exceeded. They isolate the fault affected part of the network within milliseconds (ms) and ensure that the short-circuit level is not exceeding the systems' withstand capability. They facilitate flexible power distribution, power system expansion, independent power production, reactor replacement and many more such applications without considering the equipment short-circuit withstand capability as a constraint.

Typical applications
The IS-limiter™ can be used in various applications providing very high and fast fault current breaking capability at high operating currents.
The most common applications are:
- Connecting two independent systems without exceeding equipment short-circuit rating
- Bypassing a reactor
- Connecting an additional power source (e.g. generator or grid connection)
- Interfacing public networks and consumer owned power supply systems

ABB will support you to identify the place of installation which provides most effective fault current limitation while maintaining operational reliability.

Optimizing your investments
- Eco- and cost-efficient fault current limiters
- Optimized load flow behavior
- Reduction of energy losses in the system

Maximizing your output
- Increase uptime and redundancy of the power distribution systems
- Flexible connection to new and existing switchboards
- Installation in greenfield and brownfield projects

Protecting your assets
- Type tested equipment
- Redundant control unit for additional safety
- World's fastest fault current limiters to protect systems and processes
- Fault current limitation in harsh environments
- More than 3,000 installations in more than 85 countries

Circuit breaker retrofit
Roll-in replacement

Circuit breaker retrofitting is a cost-effective alternative to complete switchgear replacement. ABB Service experts conduct site audits on existing installations to assess the condition of the equipment, recommend the most suitable solution and technically support the most appropriate investment.

Typically, retrofitting constitutes replacement of vital equipment having similar or advanced features, for life extension, reduced maintenance and improved functionality. This includes upgradation and modernization of basic equipment and allied parts. The retrofitted switchgear offers far greater system reliability, long-term availability of spares and increased safety to the operators with minimal investment and downtime.

ABB is a full system provider of roll-in retrofit solutions for ABB & non-ABB switchgears, from the proposal and design, through the manufacturing and testing, up to the installation and commissioning.

Roll-in replacement:
In roll-in replacement solution, the new circuit breaker is re-engineered in such a way that it fits into existing switchgear with no / minimum modifications in the panel.

- Replica of existing circuit breaker
- All parts are made with latest tools and designs to provide maximum reliability
- Retrofit circuit breaker is interchangeable with existing circuit breakers

Benefits

- Significant lifetime extension
- Lower maintenance requirements
- Long time availability of spare parts
- Latest generation apparatus
- No / minimum modifications in existing switchgear
- Short implementation time for replacement
- Minimum shutdown of the switchboard
- Smooth site activity
- Warranty on the conversion work

Circuit breaker retrofit
Universal module

Retrofill is one of the retrofit technical solution used by ABB. Universal module is the latest ABB retrofill design concept in order to easily connect the new breaker to a wide range of existing non-ABB panels.

—
01
36kV Universal module
—
02
12kV Universal module

Concept
Universal module comprises a cassette that hosts a standard circuit-breaker connected to the existing switchgear by an adaption system.

The adaptation system allows a completely standard ABB withdrawable apparatus to be fitted to the original switchgear. The result is a great improvement in reliability, safety, maintenance and performance.

Benefits
Maintenance and repair aspect
- The new apparatus mounts all standard spare parts with all the benefits in terms of delivery time and price
- Equipment and spare parts are interchangeable with new ABB extension panels (UniGear) and additional switchgear
- Same operational interface and maintenance approach for the equipment installed in universal module and new ABB panels

Modernization process
- The use of standard breakers makes them ready without any modification for future ABB replacement switchgear, providing an optimized investment for the next substation renewal

Ease of use and robust
- CB mechanical push buttons accessible from front door
- Single shot handle for the door
- Robust structure with Aluzinc sheets
- Inspection window of toughened glass
- Mechanically stiffened door with padlocking facility

Safety upgraded
- The original shutter system and all the relevant interlocking are replaced with new standard ones installed from the factory on the universal module
- Shutter and circuit breaker movement are interlocked to enable all necessary safety features
- Option for remote racking of apparatus
- Optionally integrated with temperature monitoring sensors near apparatus spouts

Technology
- Universal module solutions are fully type tested according to IEC standards

—
01

—
02

Relay retrofit

Replacement of any old protection relay with innovative, modern relay

Targeting reliable and smooth relay retrofits, ABB offers different relay retrofit solutions for replacement of protection and control relays.

ABB's relay retrofit solutions offer smooth and controlled replacement of existing protection relays with the latest protection and control technology. The result is extended switchgear lifetime, full availability of relay life cycle services, and the possibility to adapt the power protection system to meet new requirements.

The offering is typically based on the use of protection and control relays from the Relion® product family as replacement devices.

ABB offers following to meet your needs:

- Replacement of complete metering box or metering door with latest design
- New comprehensive numerical relays with latest technology
- New switches, meters & indication lamps along with new wiring

Benefits

- Extended switchgear lifetime with new protection relay and technology
- Assured, future availability of lifecycle services
- Enhanced personnel safety with access to the latest protection and control functionality
- Offers substantial savings in time and resources with a very fast and structured replacement process
- Optional built-in arc fault protection enhances personnel safety

		Module A	Module B	Module C
	Description	**Relay retrofit with replicated metering box**	**Relay retrofit with replicated door**	**Relay retrofit with cover plates**
1	Latest ABB make protection relays suitable for SCADA application	Yes	Yes	Yes
2	Replacement of auxiliary relays, meters, Indication lamps, TTB etc	Yes	Yes for auxiliary relays & devices mounted on door	No
3	Replacement of terminal block, AC / DC switches, fuses, PVC channels, toggle switches, MCBs etc.	Yes	No	No
4	Aesthetic	Best	Best	Good
5	Installation time (approx)	6 hours	6-8 hours	8-10 hours

—
01
Before retrofitting
—
02
After retrofitting

—
01

—
02

Replacement
Lifecycle management

Replace your low / medium voltage equipment and keep your business running. We help to replace obsolete equipment entirely, partially or step-by-step with minimized impact on your primary processes.

— 01 Old indoor switchgear
— 02 New indoor switchgear

Whenever there is a need to replace an entire low / medium voltage product or system - from ABB or any other manufacturer - we can offer the widest portfolio for every need. Our experts will help select an optimal replacement product with correct features for the application: protection & control relays, replacement breakers, switching, limiting, measuring and sensing devices, switchgear or modular substation packages.

ABB offers replacement of low / medium voltage equipments in indoor & outdoor substations. Complete turn key packages offered by us includes design, engineering, supply, unloading, shifting, dismantling, storage, installation and commissioning of equipments.

Replacement activities includes:

- Dismantling of existing equipment
- Removal of power and control cables
- Supply of new equipment
- Dismantling of exiting base frames and modification of civil foundation work
- Modification of power and control cables trench
- Installation and commissioning of new equipment
- Laying & termination of power and control cables
- We also offer decommissioning, disposal and recycling of material and SF6 gas management

—
01

—
02

—
03
Old outdoor substation
—
04
New outdoor substation

—
03

—
04

Switchgear temperature monitoring
Early hotspot detection effectively reducing risk of internal arc fault

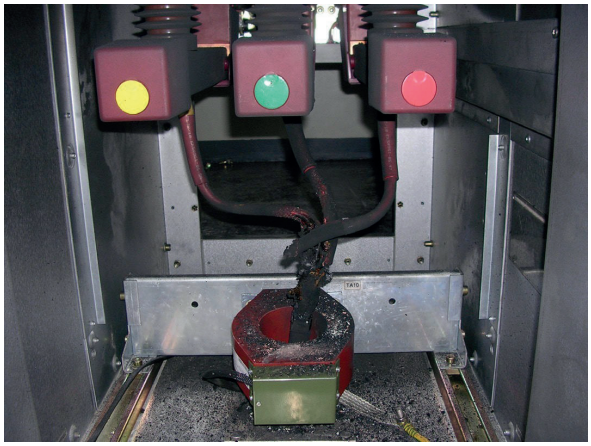
—
01 ABB temperature monitoring solution with SAW sensors
—
02 Overheated cable termination after flashover
—
03 Arc-fault effect on substation

The hotspot detection in medium voltage switchgears is one of the most crucial condition monitoring functionalities. ABB temperature monitoring solution gives very high-level performances if compared with other equipment available in the market (e.g. IR windows with IR cameras). It allows for early fault detection, preventing insulation deterioration and lowering risks of insulation faults.

Overheating effects:
The temperature of the primary circuits has a dominant influence on the switchgear insulation life. If a loose joint within the switchgear creates a hotspot on the primary circuit, the insulation close to the hotspot can suffer serious deterioration due to excessive heating.
The lifetime of the insulation decreases rapidly resulting in weak areas sensitive to dielectric stressing during subsequent operation. As a rule of-thumb, we can say the insulation lifetime is reduced by half for each rise of 10°c in insulation average temperatures. An aged insulator increases dramatically the switchgear probability of failure in form of an internal arc fault, which can result in long-term power supply outage and huge consequential damages.

Since periodical visual inspections might not accurately estimate the remaining life of insulators, the detection of primary circuit hotspots becomes one of the crucial health condition monitoring tasks, and a key input to implement condition-based maintenance.

—
01



—
02

—
03

—
04 Areas of interest
for hotspot detection

Failure causes:
A hotspot in the switchgear can develop as result of different operational situations, such as:

- Loose joints due to vibrations, unusual operating shocks
- Power cable loose connections as result of severe short-circuits and aged clamping arrangement
- Mechanical damage of sliding power contacts during equipment handling outside the panels
- Ablation of contact surface of sliding power contacts due to excess of racking operations above the prescribed limits
- Contacts resistance increase caused by oxidation or corrosion due to unfavorable environmental conditions (humidity, marine ambient, air chemical pollution, etc.)
- Long maintenance intervals due to equipment utilization in continuous process plants.

The points of interest are therefore temperatures on or close to the bolted joints and sliding contacts on primary circuits (see fig. 4).

Benefits:
Reliability

- Maximize uptime - continuous temperature monitoring providing alarms before system fails
- Avoid unplanned outages which directly affect revenue generation

Safety

- Reducing catastrophic failures which impact human & asset life
- Improved operator protection - no more thermography needed in close proximity of live switchgear

Technology

- Sensor's performance proven in HT environment - Type tested in AIS for LIV (Up to 170kVp) & STC (Up to 40kA)
- SAW technology sensors with piezoelectric substrate quartz - No power circuit charging needed for sensors operation
- Suitable for both green and brown field applications up to 36kV

Project

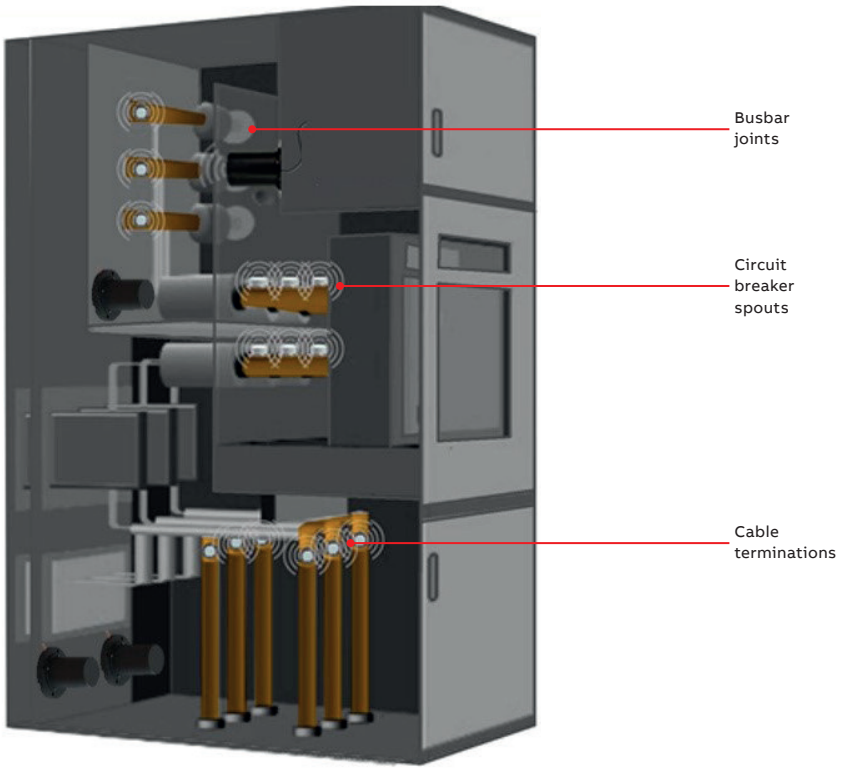
- Short implementation time
- Minimum shutdown of the switchboard
- Smooth site activity

Investment

- Optimized maintenance schedule
- Reduce operational costs

Key technical features:

- Wireless & battery less SAW sensors
- Measuring temperature range of - 25°C to 150°C
- Connectivity of electronics (transceivers) on Modbus-RTU protocol (Over RS 485 through RJ45) for measurement on touch HMI or SCADA



For more information please contact:

ABB India Ltd
Plot No 79, Street No.17,
MIDC Estate, Satpur,
Nashik – 422 007
Maharashtra, India
Phone: +91-253- 2201200
Email: ppmvsupport@in.abb.com

Doc. ID: 1VYN401890-102 © 2020 ABB. All rights reserved.