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

The hot spot 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 hot spot on the primary circuit, the insulation close to the hot spot 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 hot spots becomes one of the crucial health condition monitoring tasks, and a key input to implement condition-based maintenance.
**Failure causes:**
A hot spot 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 affects 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

**Options**
- **SWICOM** ABB Ability™ Condition Monitoring for switchgear
- **MyRemoteCare** ABB Ability™ Asset Health for electrical systems
- **PowerCare** customer support agreement

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**ABB India Limited**
ELDS-Service
Plot No. 79, Street No.17, MIDC Estate
Satpur, Nashik - 422 007
Maharashtra, India
Tel: +91 253-2201200
Email: ppmvsupport@in.abb.com

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**Note:**
Data and instructions are not binding.
We reserve the right to make changes in the course of technical development.