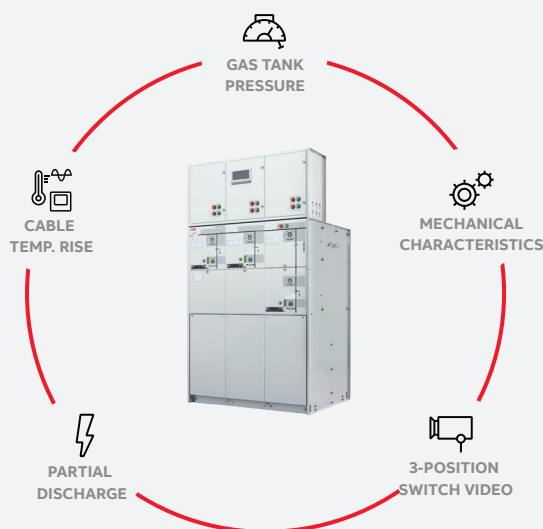


Safe Digital

Intelligent solution for secondary switchgear



ABB's medium-voltage secondary switchgear platform Safe serial RMU is well established around the world. The design is based on the fundamental principle of safety, reliability, modularity and scalability. With the increasing demand of digital transformation, the platform is evolving further with Safe Digital including latest digital technologies, communication and data analytic.

Safe Digital takes full advantage of new technologies such as temperature sensor, gas pressure sensor, hall current sensor, angular rotation sensor and UHF partial discharge monitoring technique. Online condition monitoring and diagnostics provide a new way of working with the electric system.

The solution is available for the latest SafeRing/ SafePlus family with wide coverage of rating:

- SafeRing/ SafePlus 12/24 kV
- SafeRing/ SafePlus 40.5 kV
- SafeRing/ SafePlus Air 12 kV

The condition monitoring system allows secure access to condition and operation data. Data analysis on-site ensure optimal switchgear operation and minimized maintenance costs.

Safe Digital is ready for cloud connectivity to ABB Ability™, offering further data analysis and predictive maintenance.



Higher reliability and fewer fault causing service downtime

Monitoring and diagnosis the real-time status of the temperature, gas pressure, mechanical characteristics, switch position and partial discharge, preventing potential risks and avoids unexpected power outages.



Higher safety using digital

Sensor technology for current and voltage measurement are safe and passive which ensures safer working environment for personnel.

Interlocking monitoring warns operators if safety interlocks are broken, and remote monitoring eliminates exposure time in live and hazardous switchgear rooms.



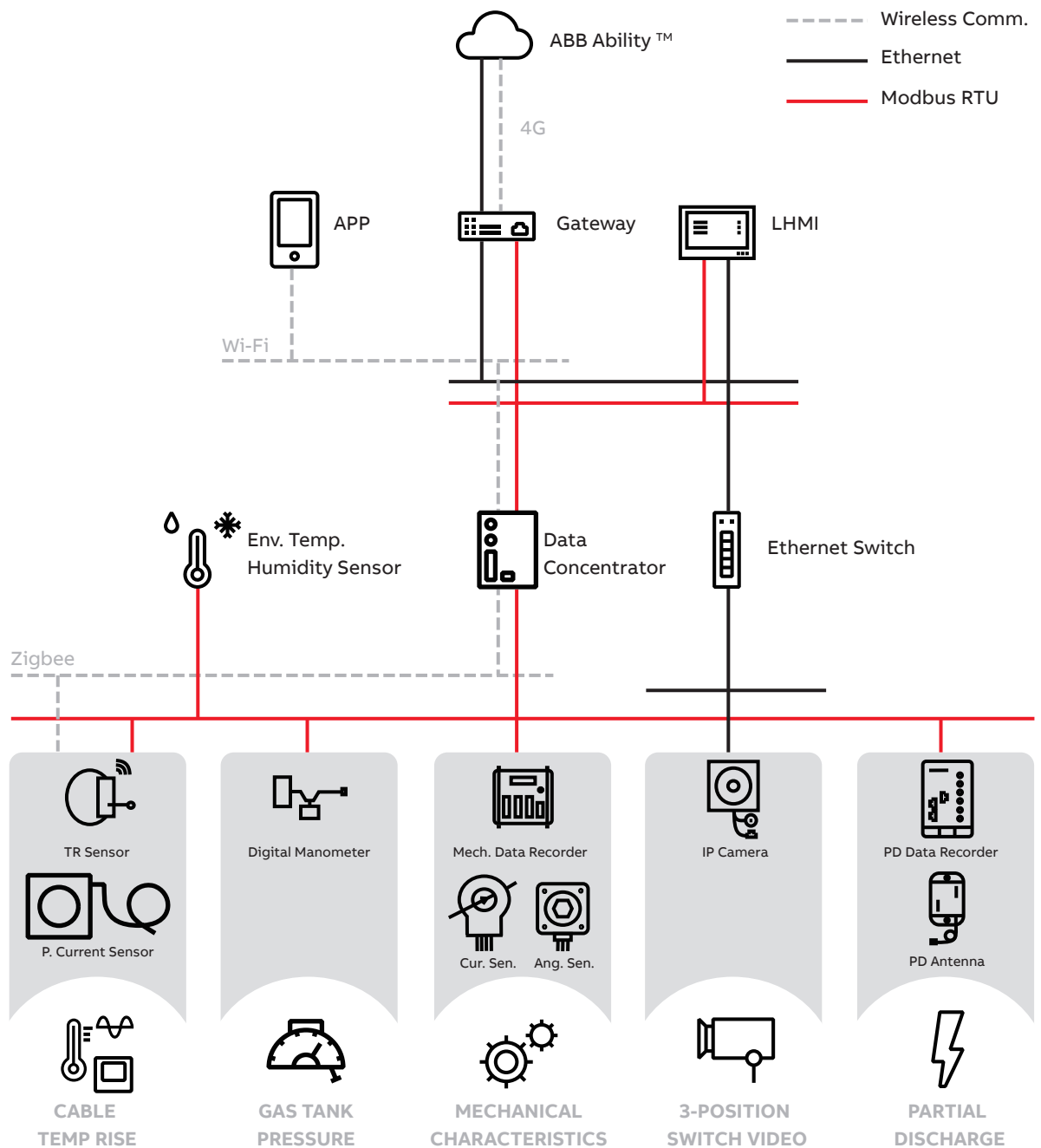
Lower operation and maintenance costs

Achieve a leap forward from passive maintenance to active predictive maintenance, make operation and maintenance easier.



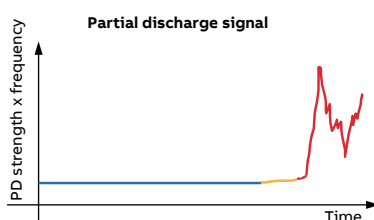
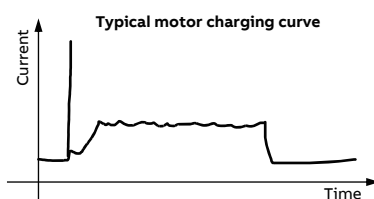
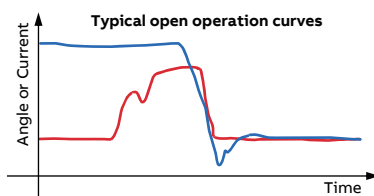
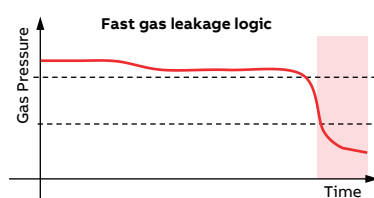
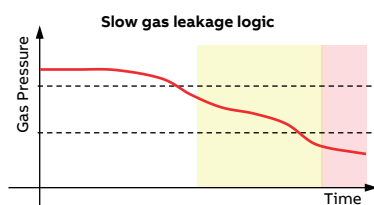
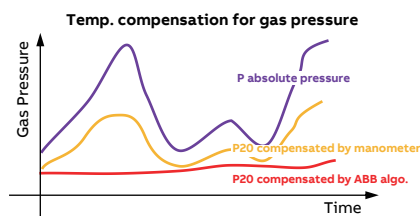
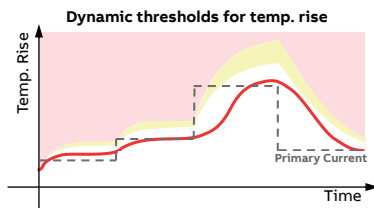
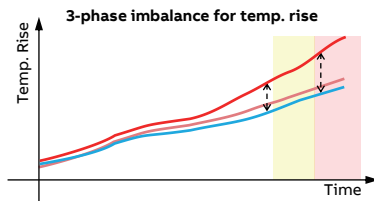
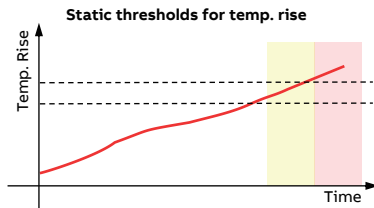
Long life cycle of secondary switchgear

Through the monitoring and diagnosis algorithms, the service life-time of secondary switchgear can be extended and guarantee customer's benefits.



Note:

- * The picture shows various options, while actual implementation depends on the selected features.
- * The APP only work on site connecting to the WIFI of the data concentrator.



Cable temperature rise monitoring

- Temperature rise value is calculated with environment temperature in real-time which is more sensible for condition monitoring.
- Static temperature rise algorithm is used for basic condition monitoring.
- Three-phase temperature imbalance algorithm can provide more reliable fault detection.
- Dynamic temperature rise algorithm is the state-of-the-art condition monitoring technique using dynamic warning/alarm thresholds with real-time primary load current values.
- Self-powered temperature sensor, maintenance-free, IP 54.



Gas pressure monitoring

- Real-time gas status monitoring.
- Early warning and alarm for abnormal gas leakage and low gas pressure fault.
- Temperature calibration algorithm accurately.
- Reflects the P20 state of the insulating gas, fully adapting to different environment.
- Effective on-line monitoring and management of insulating gas density, pressure and leakage rate.



Mechanical characteristics monitoring

Intelligent sensors are used to obtain key parameters of mechanical characteristics, and the diagnosis algorithm based on experimental data are used to conduct real-time analysis and calculation, identify potential faults, and monitor health status of RMU.

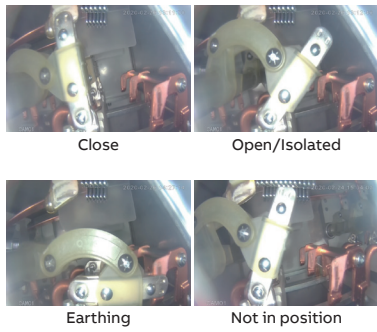
- Intelligent monitoring
Combining the information derived from operation coils, charging motor, rotation angles of mechanism using hall current and angular sensors. The operation parameters of the mechanism are calculated in real-time including:
 - Open/close travel (Overall stroke),
 - Open/close speed,
 - Open/close time,
 - Open/close overshoot,
 - Open rebound,
 - Open/close coil current,
 - Motor charging current and
 - Motor charging time.
- Predict potential failures
Extract characteristics from mechanical operation curves to identify early failure of RMU to ensure its safe operation.



Partial discharge monitoring

Monitor the ultra-high frequency (UHF) radiation signal from 300 MHz to 1.2 GHz, which can accurately locate the panel where discharge occurs. Efficient and convenient installation, debugging and calibration.

- Real-time monitoring of PD characteristics and progression during electrical aging of RMU.
- Dual-judgement mechanism for both PD intensity and occurrence frequency.
- High reliable fault monitoring and diagnosis algorithm.



Video surveillance of 3-position switch

On-site video monitoring of 3-position switch.

- Improve operation efficiency by replacing of traditional model.
- Video visualization for remote monitoring and remote control to ensure operator safety.
- 3-Position switch state verification algorithm based on artificial intelligence cross-validation to ensure reliable operation of RMU.



Local HMI Display

Real-time display for all condition monitoring parameters and health status including temperature rise monitoring, gas pressure monitoring, mechanical characteristics monitoring and partial discharge monitoring.

ABB Beijing Switchgear Limited
Building No. 2, No.12 Jingyuan Street,
Economic-Technological Development
Area, Beijing, 100176, P. R. China
Tel: +86 10 8709 9199

ABB (China) customer hotline
Tel: +86-21-3318 4688
Mail: contact.center@cn.abb.com

www.abb.com/cn

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