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POWER GRIDS

# Distribution Automation.

Enabling you to see inside your grid.



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**ABB Distribution Automation improve grid reliability and efficiency, and enable complete grid control anywhere, anytime. Our technology helps you see inside the grid, and is backed by more than a century of experience in substation automation, communication and protection. Our comprehensive range of automation products, solutions and systems is for basic to advanced power distribution networks, renewable power integration and battery storage systems.**





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Distribution Automation saves time, money and resources.

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# Distribution Automation.

## Basic to advanced distribution automation applications.

ABB's portfolio delivers solutions for a range of systems, from basic to advanced distribution automation networks, to renewable integration and battery storage schemes. In addition to designing and building innovative new systems, ABB can modernize existing installations in the most cost efficient way.

Our offering includes complete engineered systems, ready-to-use engineered packages and high-quality single products. ABB automation can be applied at the field level for existing pole-mounted reclosers, disconnectors and breakers; at the substation level for secondary switchgear and ring main units (RMU); or at the SCADA level in the network control center.

ABB Distribution Automation improve grid reliability and efficiency, and give you control of the grid, anywhere, any time. We help you see inside your grid, with technology backed by more than a century of experience in substation automation, communication and protection.






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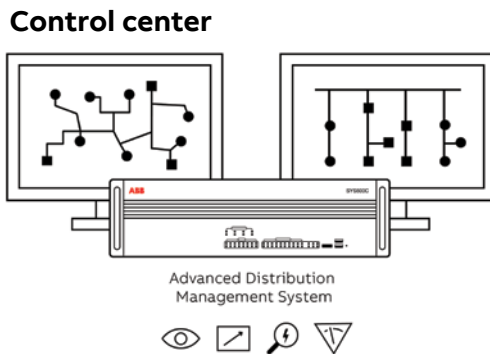


# Remote Monitoring, Control and Measurement.

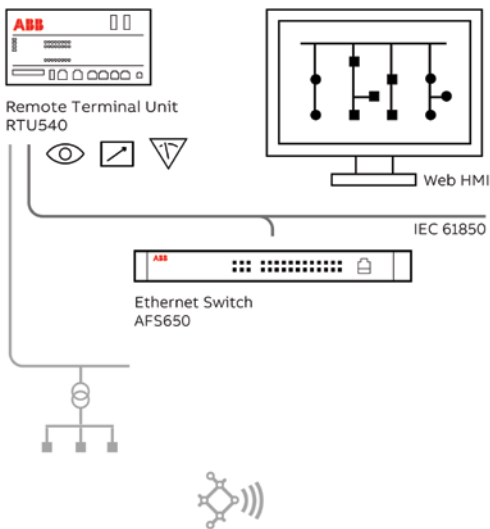
The foundation of network automation.

**Legend**

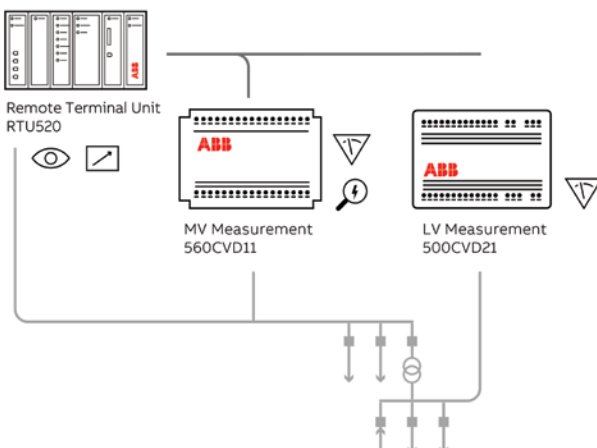
-  Communication
-  Measurement
-  Fault Detection
-  Monitoring
-  Control



**Primary distribution substation**



**Secondary distribution substation**



Monitoring, control and measurement solutions are the foundation of automated networks. They enable you to see what is happening inside your network, and ensure reliable, uninterrupted operation, anywhere and anytime.

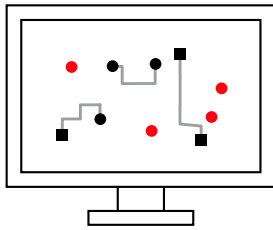
Our proven distribution automation solutions use advanced fault detection equipment to deliver accurate energy measurements. This detailed information is considered the basis of Fault Detection Isolation and Restoration (FDIR) and Fault Location Isolation and Service Restoration (FLISR) functionality.

ABB's solution using sensors and measurement devices in MV and LV applications, including smart meter integration, enables detailed power flow analysis. Improving grid visibility provides the control you need to make the right decisions at the right time, and keep the power flowing.

**Functions**

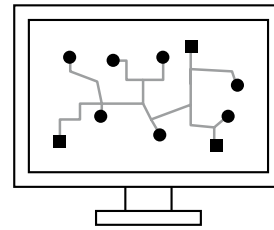
- Remote monitoring and control
- Fault detection information
- Power quality
- Low voltage and medium voltage energy measurements
- Detailed power flow analysis
- Central management of security events and user accounts

### No automation



**Increased  
grid visibility  
for better  
performance**

### Distribution automation



#### Benefits

- Fault Detection, Isolation and Restoration of power (FDIR)
- Utilizing existing infrastructure to its full potential
- Accurate situational awareness within the distribution network
- Improved operational efficiency
- Reduced SAIDI (System Average Interruption Duration Index)
- Reduced SAIFI (System Average Interruption Frequency Index)
- Minimized outage time
- Reduction of non-technical losses

#### ABB solution

- RTU520 Remote Terminal Units
- Integration of protection IED's with RS-485 communication (IEC 60870-5-103)
- Ethernet switch for the IEC 60870-5-104 communication to the control system
- Binary input card for common alarms
- Wall mounted cabinet

#### Customer benefit

- Future-proof system with easy and fast extension options for further projects
- Increased grid visibility enabling AEW to make the right decision at the right time
- The solution allows for operational cost reductions, as the transformer can be monitored and controlled remotely
- Cost effective solution thanks to the small and compact RTU520

#### Reference

### Monitoring and Control for substations - Switzerland

#### Customer challenge

- Monitoring for a secondary transformer station.
- Price competitive
- Future-proof, and the basis for future transformer station refurbishments.









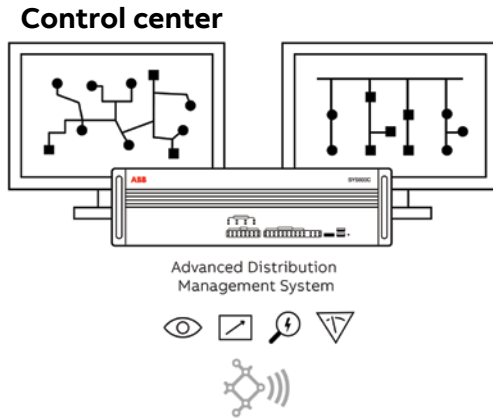


# System Protection.

Ensuring power flow is interrupted only when absolutely necessary.

**Legend**

-  Communication
-  Measurement
-  Fault Detection
-  Monitoring
-  Control
-  Protection

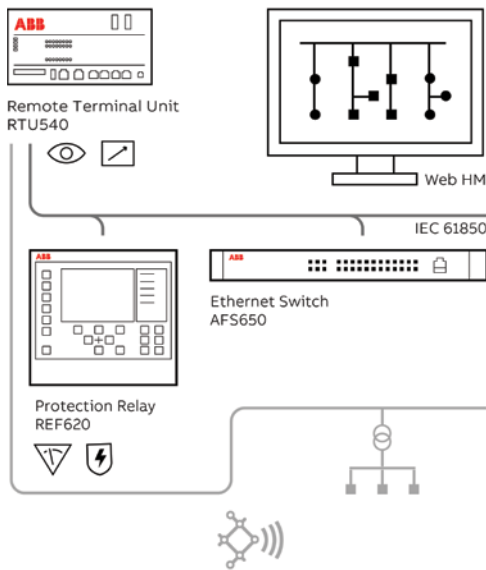


Standard monitoring, control and measurement functionality provides a perfect overview of the status of the distribution network. Adding protection applications ensures power is only interrupted when absolutely necessary, to provide the highest reliability and quality of service for customers.

As the grid integrates increasing amounts of renewable energy, the need for accurate selectivity has never been higher, making ABB's distribution automation protection system a perfect fit for renewable integration applications.

Profit from the unseen reliability, selectivity and simplicity of your grid.

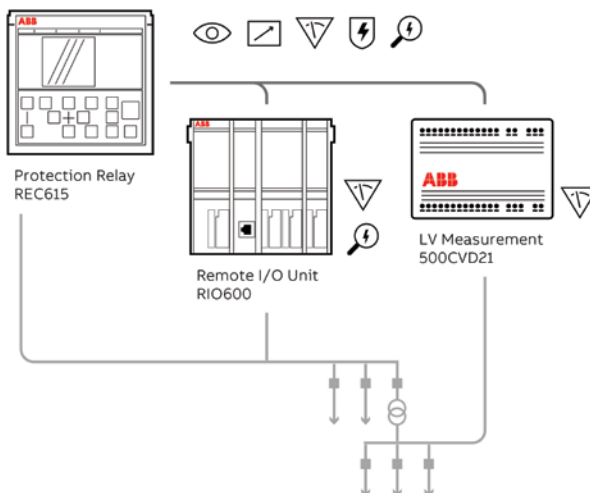
**Primary distribution substation**



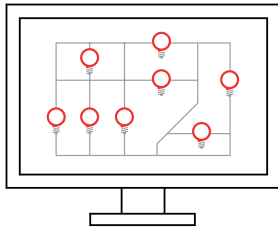
**Functions**

- Remote monitoring, control, measurement and protection
- Fault Detection, Isolation and Restoration of Power (FDIR)
- Low and medium voltage energy measurements with highest accuracy
- Advances fault location information for system restoration and verification

**Secondary distribution substation**

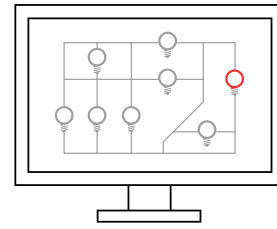


### No automation



**Selectivity  
leads to  
Reliability**

### Distribution automation



#### Benefits

- Transfer-trip to prevent unwanted islanding
- Utilizing existing infrastructure to its full potential
- Accurate situational awareness within the distribution network
- Improved operational efficiency by reducing SAIDI (System Average Interruption Index) and SAIFI (System Average Interruption Frequency Index)
- Minimized outage time
- Reduce non-technical losses

#### Reference

Enhance reliability of overhead lines with grid automation  
Finland

#### Customer challenge

- Enable integration of renewable sources
- Enhance distribution reliability and efficiency
- Reduce the need for infrastructure investments

#### ABB solution

- Automatic FDIR with fast reclosing shortens average fault duration and frequency
- Reclosers protect cable networks from faults in overhead lines

#### Customer benefit









- Fewer outages
- Shorter outage duration
- Increased customers satisfaction
- Fewer penalties



# Fault and Outage Management.

## Enabling efficient fault detection and isolation.

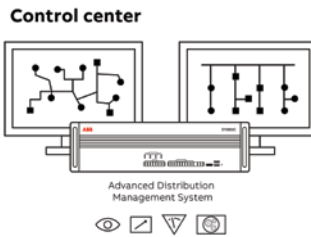
**Legend**

-  Communication
-  Measurement
-  Fault Detection
-  Monitoring
-  Control
-  Voltage Control
-  Algorithm Logic Control
-  Protection

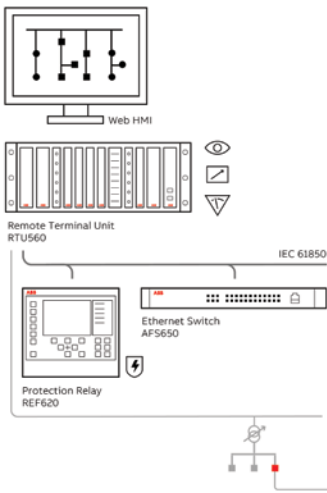
To enhance observability and provide complete fault awareness in power distribution networks, ABB provides advanced fault and outage management systems that efficiently detect and isolate faults, and restore power and service. By integrating IT and OT systems, field crews can be effectively scheduled and dispatched to help physically restore power in the event of an outage. Fault and outage management functionality can reduce outage times by up to 81%, delivering significant economic advantage.

**Functions:**

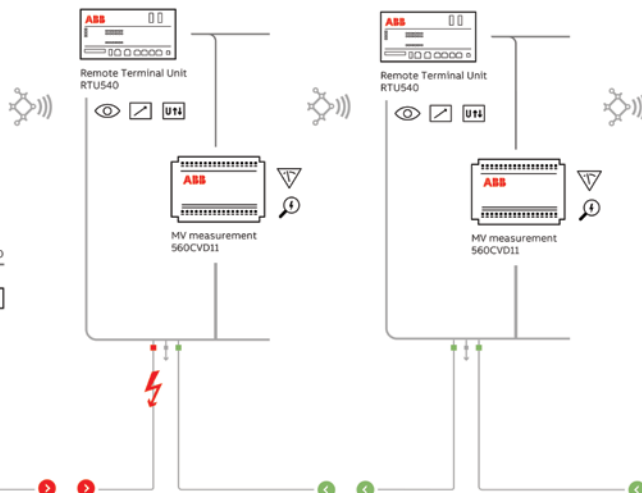
- Decentralized Fault Detection, Isolation and Restoration (FDIR)
- Centralized Fault Location, Isolation and Service Restoration (FLISR)
- Real-time location of earth and overcurrent faults in distribution networks
- Work force management
- User-friendly central management of security events and user accounts
- Peer-to-peer communication over 61850 GOOSE messaging
- Advanced data analysis and reporting



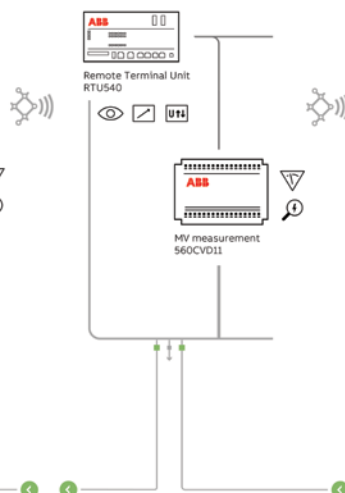
**Primary distribution substation**



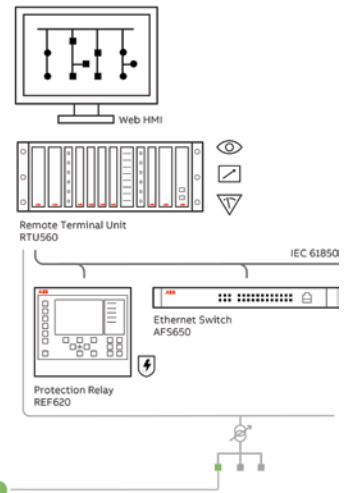
**Ring main unit**



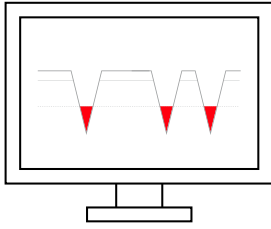
**Ring main unit**



**Primary distribution substation**

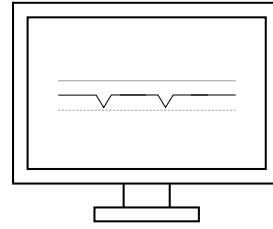


## No automation



Up to  
**81%**  
reduced  
outage time

## Distribution automation



### Benefits

- Increase safety for the utility personnel by reducing travel times and exact fault location
- Improved service quality for end user
- Improved operational efficiency through better tools for operators and field crew
- Use existing infrastructure at full potential
- Ensures regulatory reporting compliance and utilizes best practises at all levels of the organization, period and work types.
- Reduce SAIDI (System Average Interruption Duration Index)
- Reduce SAIFI (System Average Interruption Frequency Index)
- Single solution for fast restoration of the entire grid

### Reference

Most effective fault management for distribution grid - China

#### Customer challenge

- Flexible power delivery
- Possible future system expansion
- Nearly automatic response when things go wrong
- 99.999% reliability
- Centralized management

#### ABB solution

- RTU540 and multi-meter 500CVD21
- Senses fault occurrences
- Detects, isolates and restores without human intervention
- Line fault trips the protection IED








#### Customer benefit

- Effective fault management of the distribution network
- Minimizes power not supplied
- Minimizing network losses results in more efficient utilization of the distribution network
- Better tool for operators and field crew improve operational efficiency
- enhances power supply quality with fewer and shorter outages, limited to a restricted part of the distribution network
- Least number of outages in the event of faults

# Volt-VAr Management.

## Reducing energy losses.

**Legend**

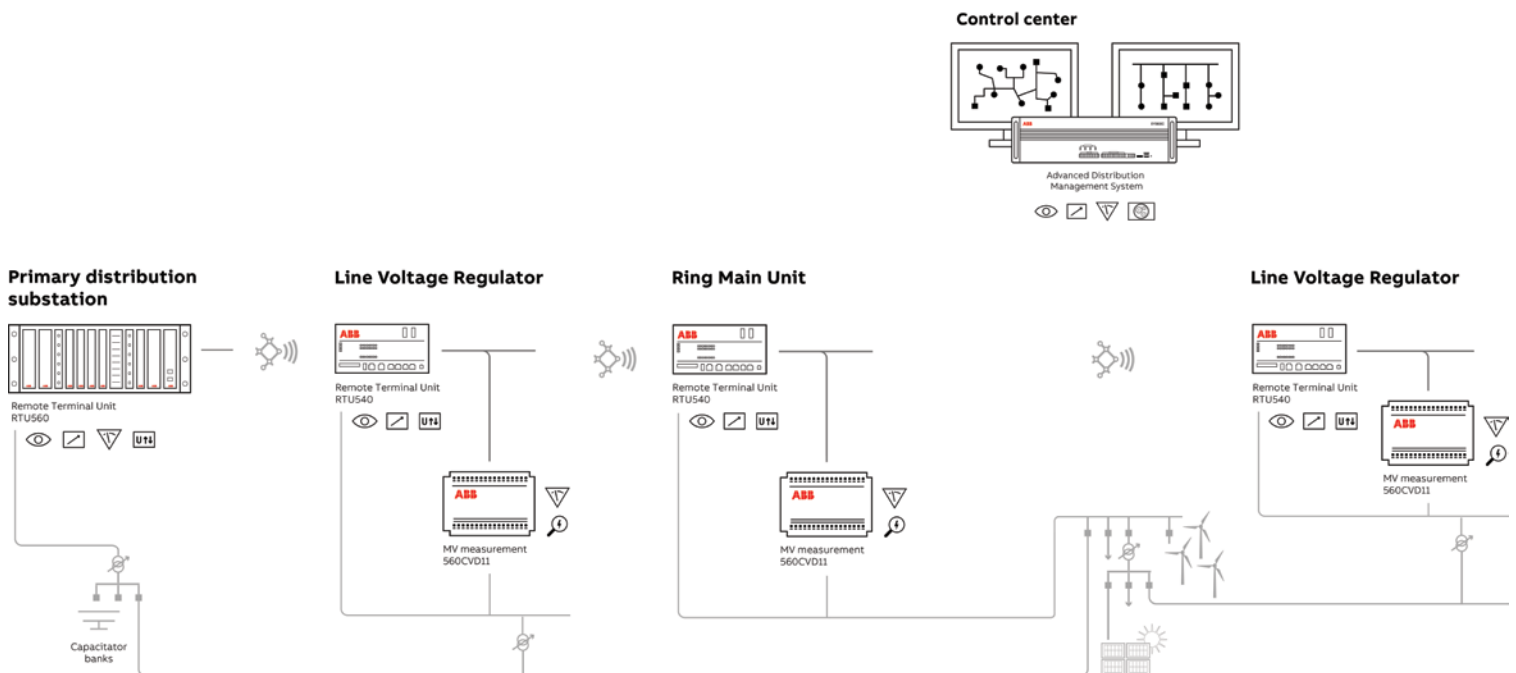
-  Communication
-  Measurement
-  Fault Detection
-  Monitoring
-  Control
-  Voltage Control
-  Algorithm Logic Control

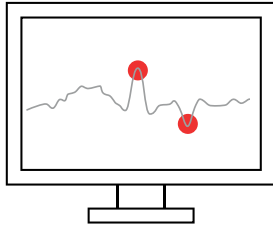
ABB's Volt-VAr management solution reduces energy losses by minimizing reactive power flows, keeping voltages within limits and reducing peak power by voltage reduction. Enhanced observability and fault awareness in medium- and low-voltage grids is the first step towards advanced grid automation.

ABB's proven basic solution in distribution automation combined with advanced grid automation applications can significantly reduce the frequency and duration of interruptions. Keeping voltages within limits reduces power losses and increases grid efficiency.

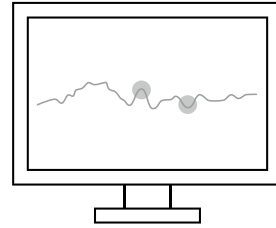
**Functions**

- Enhanced voltage control
- Network reconfiguration
- Integration of grid storage
- Integration of Distributed Energy Resources (DER) and renewables
- Conservation Voltage Reduction (CVR)



**No automation**

**Significant  
reduction of  
power losses**

**Distribution  
automation**

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**Benefits**

- Improved quality of power supply through better voltage profiles
- Reduced energy losses
- Increased network hosting capacity
- Significant voltage control improvement
- More efficient utilization of the distribution network

**ABB solution**

- Equipment for monitoring, voltage control and fault detection
- Predictive Load Flow based on forecasts of DER's
- Topology change by remote controllable RMU via MicroSCADA Pro/ DMS600

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**Reference**

## Implementation of intelligent grid control - Germany

**Customer challenge**

- New challenges caused by high share of distributed energy resources (DER)
- Voltage control and optimization
- Implementation of automation equipment in secondary substations

**Customer benefit**

- Modular, scalable solutions
- Detection of bottlenecks and voltage problems in advance

## Enabling products and software.

A complete portfolio of robust and proven products and solutions.

From control center to primary equipment, ABB delivers a comprehensive portfolio of products for distribution automation that are future-proof, equipped with the latest cyber security features, compliant with international standards and robust enough to perform well in the harshest environments.



### ABB Asset Performance Management (APM)

APM collects, integrates and leverages your data to create predictive and prescriptive analytics and optimize the performance, maintenance scheduling, and cost of mission-critical assets.



### ABB Ellipse EAM

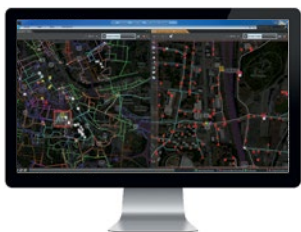
Ellipse is an EAM/ERP solution for asset-intensive organizations that provides enterprise-wide visibility and asset management capability to improve asset availability, performance and efficiency.



### ABB Workforce Management (WFM)

A highly-scalable mobile application designed to manage complex field inspection, maintenance and repair in asset-intensive environments. Advanced speech-to-text and heads-up display capabilities enable hands-free operation, enhancing worker safety.

## Control Center



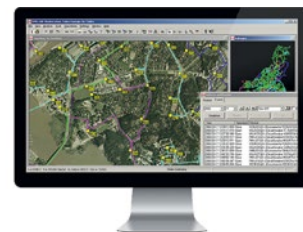
### Network Manager ADMS

ADMS is a real-time distribution operations platform that integrates distribution SCADA, Outage Management System (OMS), Distribution Management System (DMS), and Distributed Energy Resource Management (DERM) applications.



### MicroSCADA Pro DMS600

DMS 600 is a distribution network management system (DMS), which extends traditional MicroSCADA capabilities by providing geographically based network views and advanced distribution management functions over the entire medium-voltage network.



### MicroSCADA Pro SYS600

The compact SYS600 system delivers proven MicroSCADA Pro functionality for real-time monitoring and control of primary and secondary equipment.

# Enabling products and software.

A complete portfolio of robust and proven products and solutions.

## Automation Equipment



### MV Protection and Control relays Relion® family

Relion relays are designed for remote control and monitoring, protection, fault indication, power quality analysis and automation in medium-voltage secondary distribution systems.



### Remote Terminal Units RTU500 series

The RTU500 series brings the information from the physical power grid to the SCADA system. Their design includes strong and resilient cyber security features to secure communications in all types of networks - providing peace-of-mind and confidence in the network.

## Primary Equipment



### MV Outdoor vacuum recloser

Reclosers are mostly located on the distribution feeder, although as continuous and interrupting current ratings increase, they are also found in substations where traditionally a circuit breaker would be located.



### Gas Insulated Switchgear

ABB provides a climate-friendly alternative with Air-Plus for end users with a green focus - maintaining the same compact switchgear dimensions, safety and reliability.



### Air insulated Switchgear

Power distribution solutions for utility and industry customers as well as demanding applications like data centers, oil and gas, mining, marine and nuclear power.



## Enabling products and software.

A complete portfolio of robust and proven products and solutions.

### Communication Wireless



#### Mesh Router Tropos 6420

The Tropos 6420 outdoor mesh router is a cost-effective, easy-to-deploy, high-performance networking solution for outdoor environments.



#### Mesh Router Tropos 2410

The Tropos 2410 wireless mesh router incorporates a managed four-port Ethernet switch, voltage monitoring and contact closure monitoring, enabling cost-effective and highly secure IP communications for field automation endpoints such as intelligent electrical devices and SCADA controllers.



#### Wireless Cellular Gateway ARG600

ARG600 provides wireless monitoring and control of field devices via cellular network from a central site or control center. The devices offer industrial quality connectivity for TCP/IP-based protocols.

### Communication Wired



#### Ethernet Switch AFS670

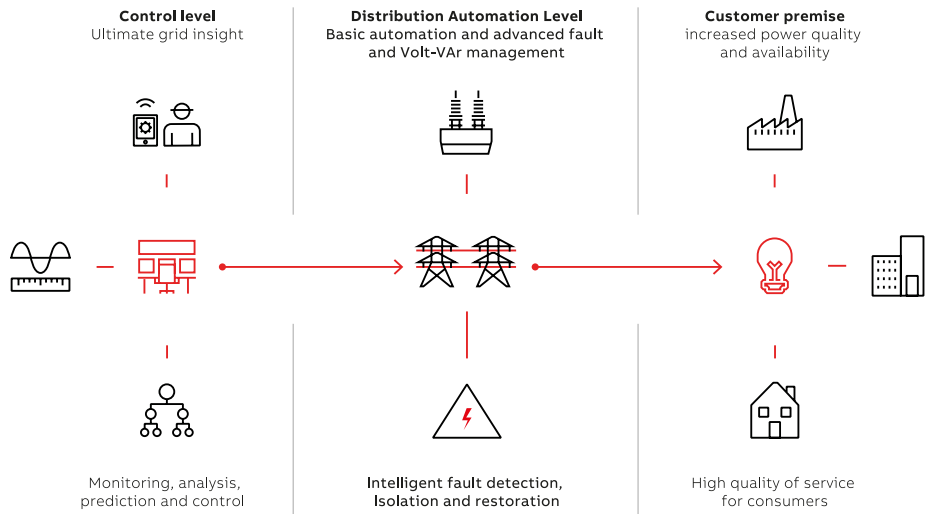
Ethernet switches remove the uncertainty from packet networks, preventing packet collision through network division and ensuring unimpeded message delivery.



#### Utility Access Multiplexer FOX605

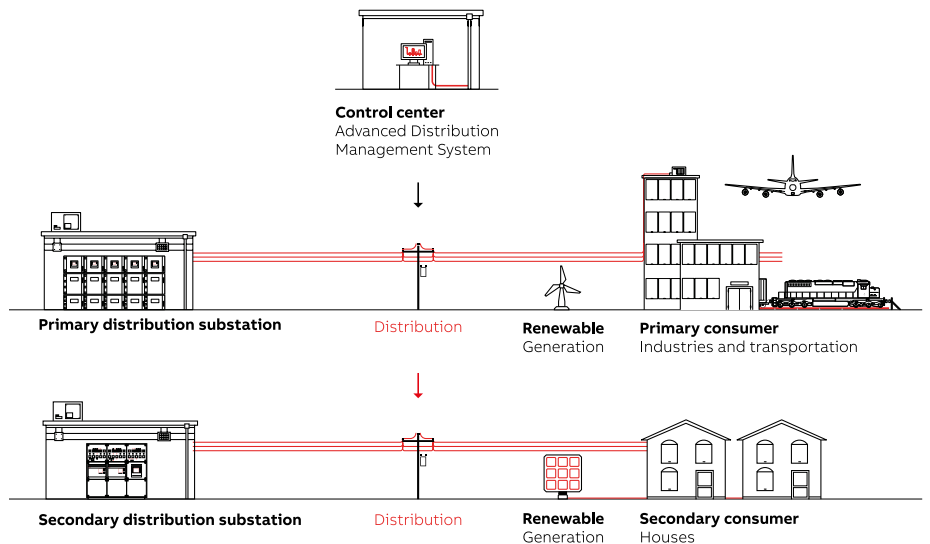
ABB's FOX605, a member of ABB's world-leading FOX family of fiber optic communication solutions, provides a cost-efficient communication solution for electrical utilities.

# Distribution Automation – at a glance.



# Connection and forming the grid.

From control center to secondary consumers.

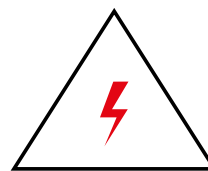


# Benefits of Distribution Automation

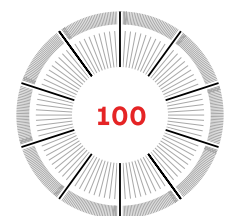
Saving time, money and resources.



**81%**  
Reduction in outages times\*



**100%**  
Almost 100% probability of detecting and locating faults\*\*

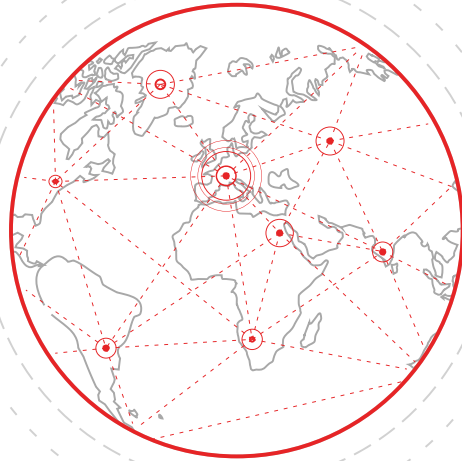


**100 Years**  
of know-how in power automation, communication and protection

\*ABB analysis of the effect of 3-phase reclosing  
\*\*Based on ABB field testing

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**Power Automation,  
Communication  
and Protection**  
installed in over  
100 countries.



—  
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