



The future of food & beverage electrification

Digital transformation: ABB Ability™ applications and success cases



ABB digital values



People and equipment protection

We are committed to world-class products, systems and services with health and safety as our key priority.



Efficiency and production continuity

We enable energy efficiency and energy flow control. Pluggable power management solutions to maximize production continuity.



Asset performance and optimization

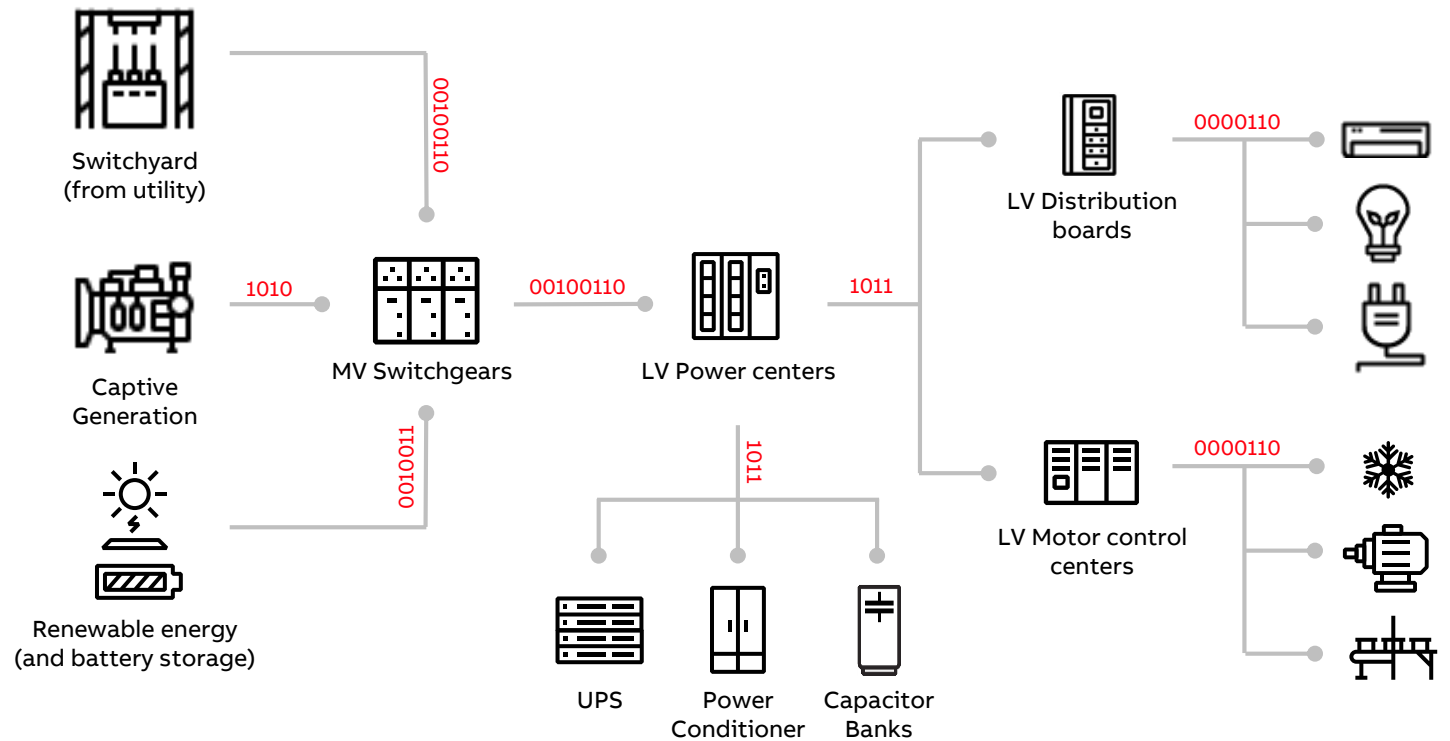
We monitor the reliability and efficiency of your assets to optimize the operation and maintenance processes.



Flexibility and sustainability

We provide flexible, scalable and modular digital solutions, which allow also an efficient integration of renewables and e-mobility.

Discover how to digitalize your electrification system



Example of a Food & Beverage electrification system

1

People and equipment protection

- Passive people protection
- Active protection

2

Efficiency and production continuity

3

Asset performance and optimization

4

Flexibility and sustainability



Active people and equipment protection

Why?

The occurrence of an arc fault is the most serious fault within a power system. The destructive impacts of an arc flash event can lead to severe injuries of the operating personnel, to costly equipment damages and long outages.

How?

ABB digital solution detects the intense light of an arc flash, with fiber optic sensors (loop or radial schema), comparing with overcurrent condition, sending a trip signal in less than 2.5ms. The arc extinction is achieved by means of innovative and dedicated switch or by circuit breakers.

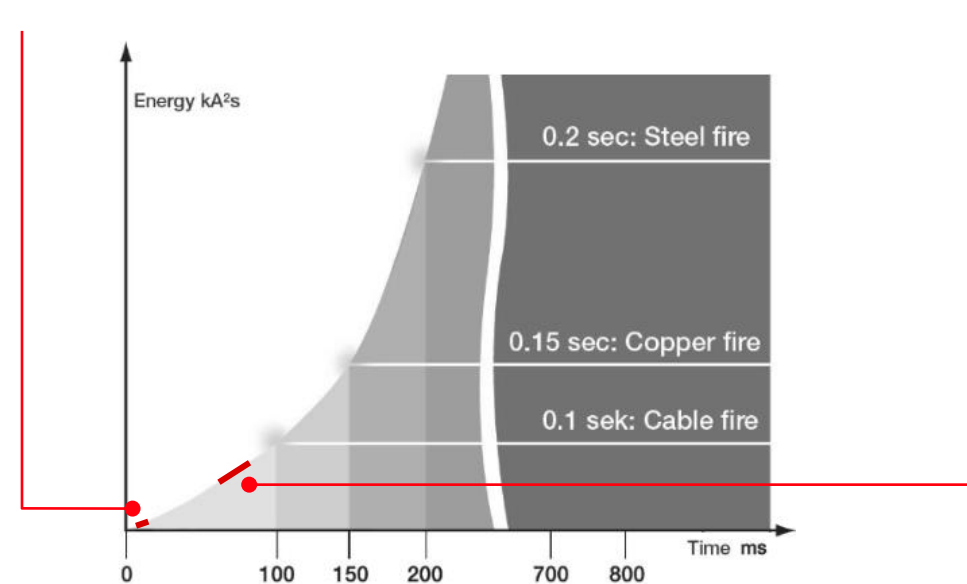


UFES Ultra-Fast Earthing Switch offers arc-fault detection and extinction in **less than 4ms**. It includes primary switching elements. It can be used **up to 40.5kV and 100kA**, and easily extended for both MV and LV with other arc detecting devices (REA, TVOC, etc).



REA solution and Relion® relays with arc protection offer fast arc-fault detection on **MV switchgear** and extinction in **60-80ms**.

TVOC 2 offer fast arc-fault detection on **LV switchgear** and extinction in **60-80ms**.



People and equipment protection



Passive people protection

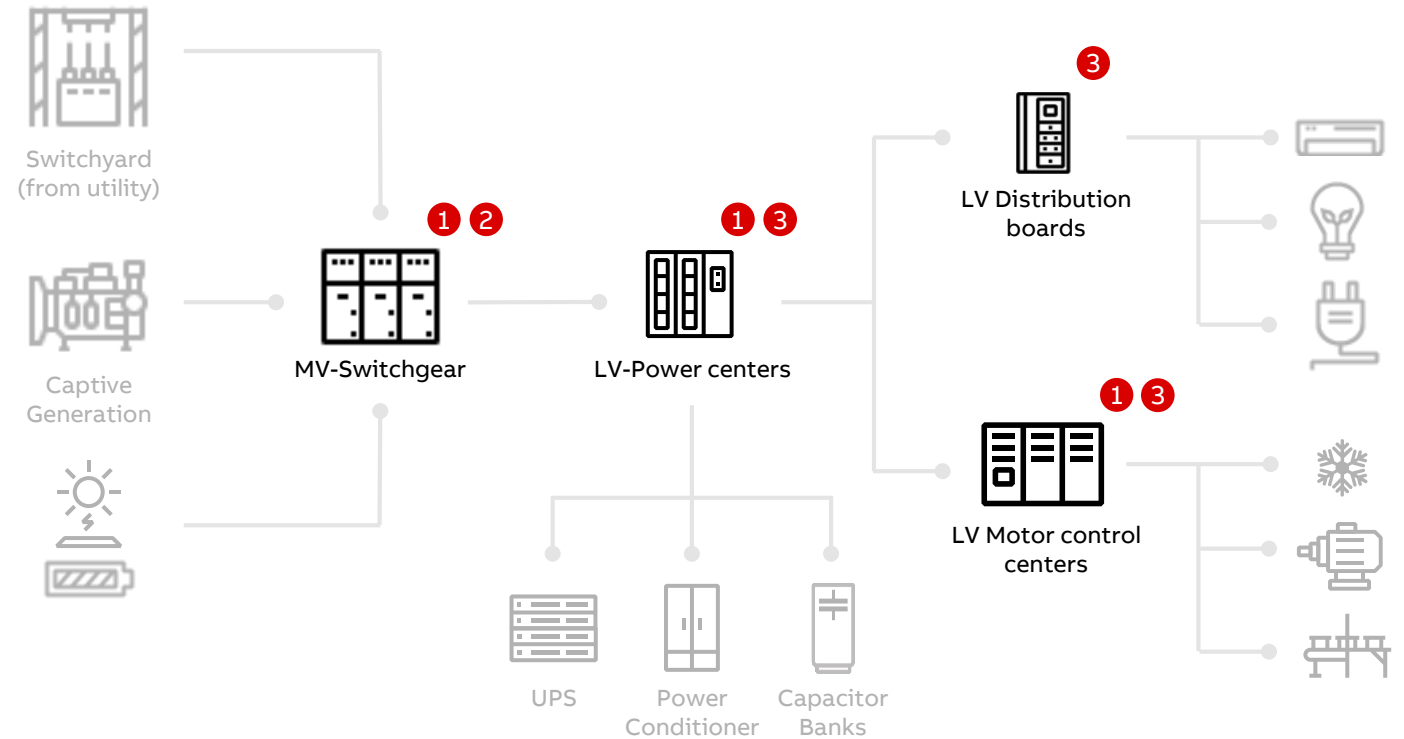
MV and LV certified switchgears against internal electrical arc fault.



Active people and equipment protection

Fast acting and coordinated arc protection systems applicable on and MV and LV systems, and on new and existing switchgear, to increase safety and minimize downtime.

- 1 UFES Ultra Fast Earthing Switch
- 2 Relion® MV relays with integrated arc protection
REA Arc fault protection system
- 3 TVOC Arc Guard system



Arc protection success case



Plant

Soybean production, Brazil.



Customer needs

Improving safety of existing switchgears, minimizing downtime and meeting insurance and risk certification companies requirements.



Digital offering

REA arc-protection solution

“

REA arc-protection solution allows detection of an arc sending trip signal within 2.5 ms.

”

- ✓ Improved protection for maintenance staff and avoid larger damage inside the panel, in case of an arc-fault, reducing downtime and restoration costs.
- ✓ Quick installation of the arc-protection system without breaker or relay retrofit.
- ✓ Modular and scalable for MV and LV.
- ✓ Regular self-supervision of the arc protection system and sensor fiber loops.



Ultra-fast earthing switch success case



Plant

Steel production, with ABB and non-ABB medium voltage switchgears.



Customer needs

After a severe failure on site, which caused a long downtime, customer asked for the highest possible protection for people and equipment for the MV network.



Digital offering

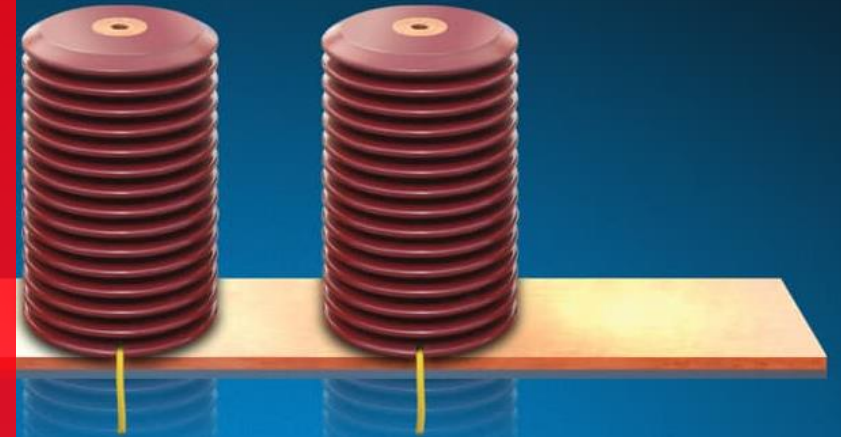
UFES ultra-fast earthing switch

“

After verifying the UFES advantages on ABB 10kV switchgear, the customer added the innovative solution also on non-ABB switchgear.

”

- ✓ Proven easy applicability on new and existing switchgears.
- ✓ Highest possible protection for operating personal on non-ABB and ABB switchgear.
- ✓ Drastic reduction of downtimes and repair costs in case of an internal arc



1

People and equipment protection

2

Efficiency and production continuity

- Power quality and stability
- Energy management
- Power availability
- Power restoration

3

Asset performance and optimization

4

Flexibility and sustainability



Power quality and stability

Why?

A poor power factor can increase the costs of energy and utility penalties. And electrical network disturbances, like sag and swell events, can impact the automation systems causing costly production interruptions.

How?

ABB can offer a broad portfolio of solutions to maximize the power quality and stability. In particular the reactive power and harmonics can be optimized with capacitor banks and filters. And the power stability is maximized with UPS (Uninterruptable Power Supply) as well as with AVC (Active Voltage Conditioner), which removes immediately the disturbances.

A **power and voltage conditioner** attempts to keep the line voltage in a given range, eliminating sag and swell, with a very high energy efficiency, small footprint and low maintenance, since it does not require batteries.



The PCS100 family provides active Voltage Conditioner for voltage regulation and sag correction in commercial and industrial applications.

An **UPS** provides backup electrical power for a period of time to critical equipment in the event of brownouts or total power failure. It requires a battery storage.



UPS portfolio covers applications from LV single-phase and three-phase, up to MV, and from few KVA up to 50+ MVA, with standalone installations.

Capacitor banks helps factories to reduce costs of reactive power. Typically associated to an automatic system to correct the power factor.



MNS platform offers LV solution from power distribution to motor control centers, and in the same cubicles it can embed modular plug-in UPS and capacitor banks, saving costs and footprint.

Moreover ABB offers solutions to efficiently control MV capacitor banks.

Efficiency and production continuity

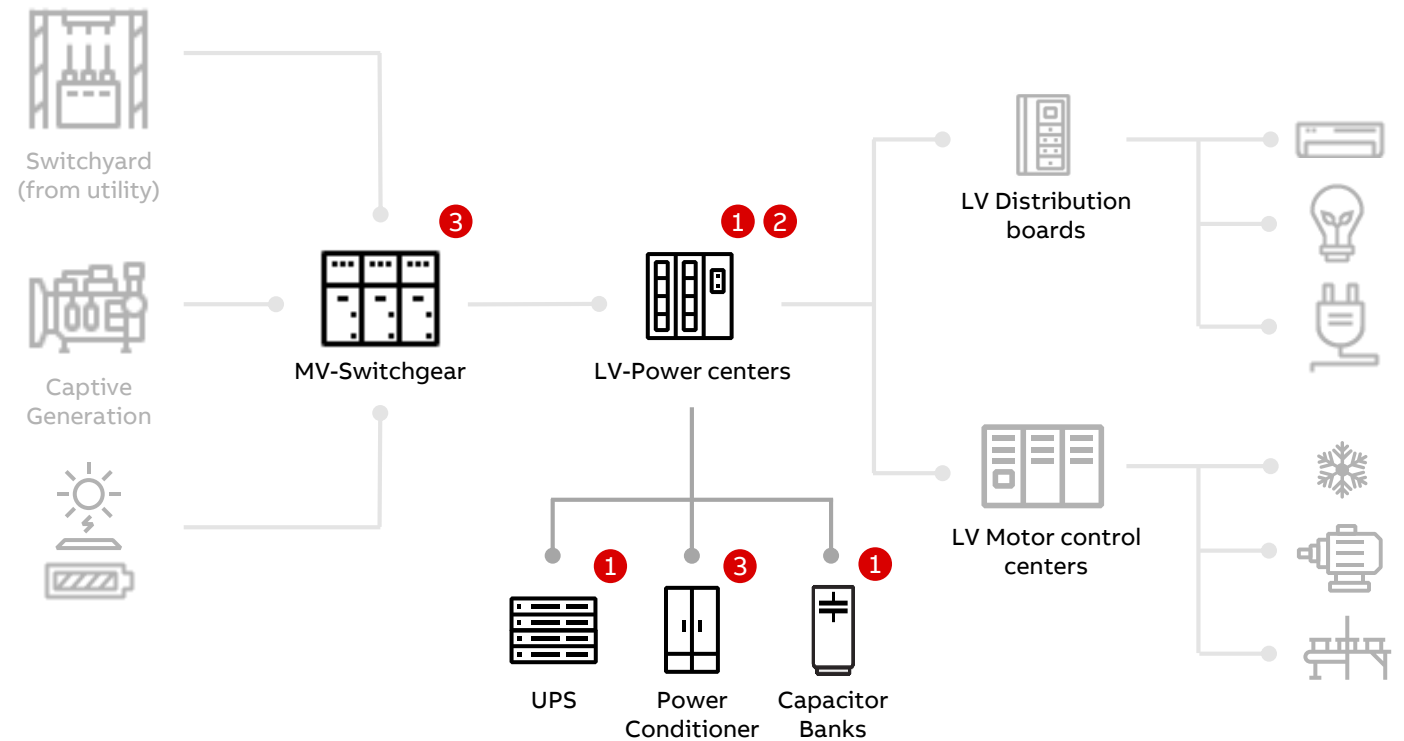


Power quality and stability

Full visibility on power quality issues, also on brown fields.

Capacitor banks, UPS and Power conditioner solution, modular and integrated in the digital LV switchgear

- ① MNS platform for integrated UPS and capacitor banks
- ② Ekip UP, M2M for power quality and metering
- ③ PCS100 portfolio for UPS and voltage conditioning



Power quality success case



Plant

Water production and bottling, USA.



Customer needs

Improve power quality with a factory greater than 92%, in order to reduce energy costs and utility penalties.



Offering

Analysis, engineering and commissioning of capacitor bank solution on MV.

“

Thanks to a reduction of reactive power we can save monthly approximately 1500 USD, with a return on investment in less than 5 years.

”

- ✓ ABB can offer online power metering and quality analysis on MV & LV
- ✓ ABB MNS low voltage switchgear can include integrated modular and withdrawable capacitors banks, as well as UPS modules



Power stability success case



Plant

Fonterra's Takanini facility, milk production, New Zealand.
22B liters/year, 6.4 bottles/sec,
40MW plant



Customer needs

Avoid power disturbances that cause 6-8 production interruption per year. At every event the product lines requires sterilization and costs more than 28 hours.



Digital offering

PCS100 AVC-40

“

After commissioning, the solution avoided the production line interruptions, with an investment pay back of just 4 months.

”

- ✓ Sag and swell correction (-40%), with a response in 250us and correction in less than 5ms
- ✓ Small footprint, low maintenance, and faster return on investment due to low operation costs.
- ✓ Continuity of power supply in case of downstream fault, high current, or internal fault.



Energy management

Why?

It is nowadays crucial to keep under control the energy consumptions and achieve relevant savings, running a sustainable business.

How?

Energy management is the process of monitoring, controlling, and conserving energy in a plant. It includes activities like: metering, collecting and monitoring aggregated and detailed data, comparison reporting by time period, amid loads, production lines, and different sites. Let find opportunities to save energy, track improvements, replicate best practices and innovative solutions.

Energy consumption is a relevant portion of production and facility costs.

Existing digital protection devices as well as easy-to-retrofit and plug digital meters enables site consumption monitoring, up to every single load.

Full **awareness** of consumption, of every production or facility area.

Configurable logical **groups** to aggregate the equipment. Allows easy costs allocation.

Energy **peaks** monitoring and alert.

Power factor and harmonics analysis.

Multi-site analysis.

Application specific analysis: solar production efficiency, data center efficiency, etc.

Electrical Control System, for real time monitoring and control of energy flows.

Scalable from a single substation to a complete plant and more.

Fully **customizable** user interface and logics to match needs of every application.

Integrating all the data sources, with more than 300 communication protocols.

Open and extensible to achieve **IT/OT convergence** (OPC UA, automation system, ERP connection, cloud, etc).

Energy Metering



M2M, CMS, Ekip Up, Relion® and others intelligent devices collect current, voltages measures and run power quality analysis, transferred on standard protocols

Energy efficiency



ABB Ability™ EDCS provides easy-to-install and use, cost-effective energy monitoring cloud platform, from a single load to multi-site consumption analysis.

Energy flow control and plant integration



ABB Ability™ Zenon allows real-time control of electrification system, from energy monitoring to full power management.

COM600 offers pre-engineered standard solution for a small electrical system.

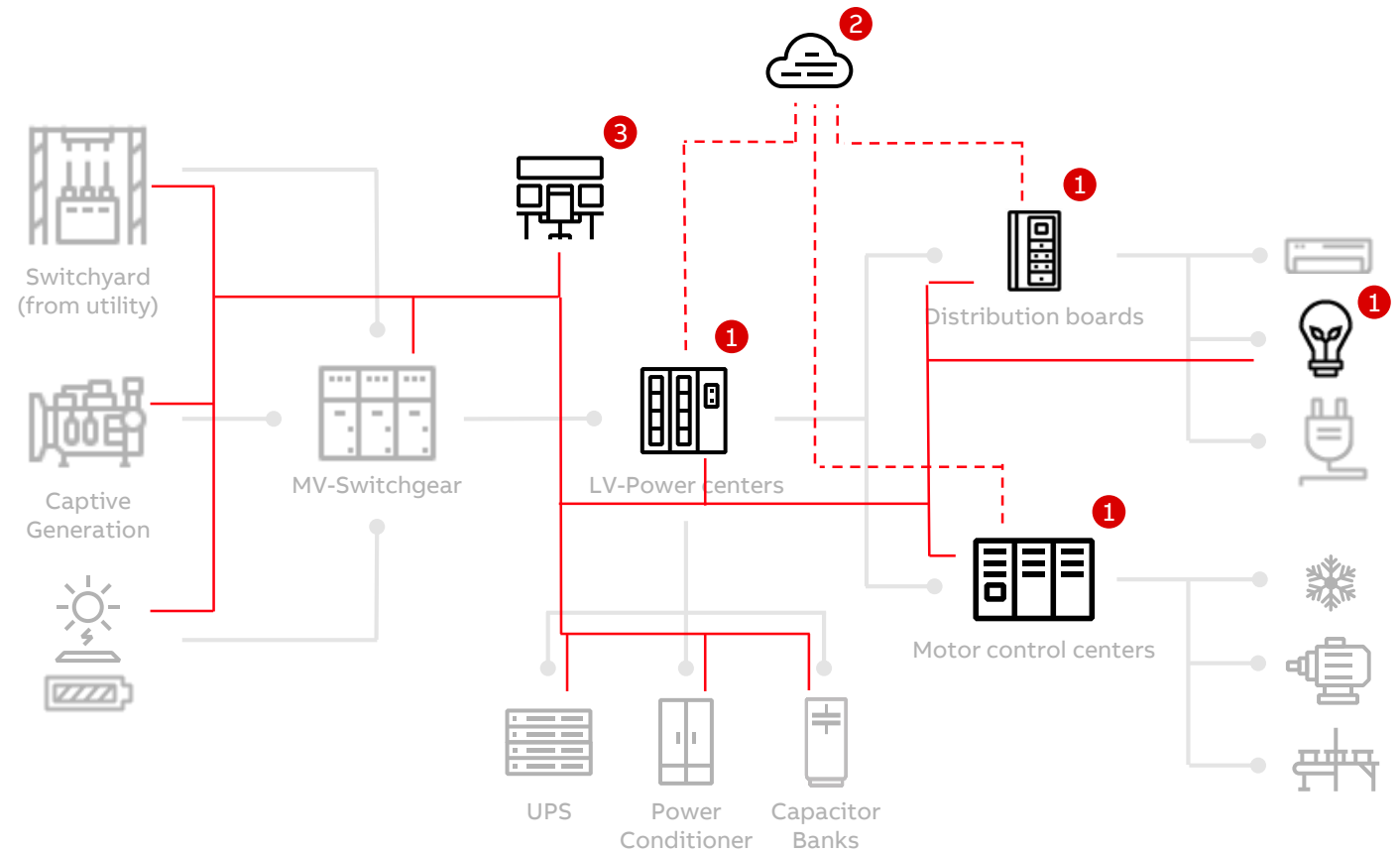
Efficiency and production continuity



Energy management

Energy monitoring and reporting to evaluate and compare consumption.
Full control of energy flow, integrating utility, renewables and production.

- 1 Ekip Up, M2M, CMS-700, EQMatic for energy metering
- 2 ABB Ability™ EDCS energy monitoring cloud platform
- 3 COM600, ABB Ability Zenon, electrical control system



— Local communication, real-time protocols, redundancy possible

- - - Remote communication, cost effective, mobile or landline

Energy monitoring success case



Plant

La Riseria part of Migros group, largest rice mill in Switzerland



Customer needs

Customer is renewing its production facility pursuing a sustainability program. They want to monitor energy consumption of every load in the facility.



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Digital offering

Emax 2, Tmax, CMS-700, EDCS

“

With the new production lines monitored by EDCS, we will be able to maximize the energy savings. We can see now the energy consumption of main loads.

”

- ✓ Extermely easy to connect meters and smart breakers to ABB Ability
- ✓ ABB Ability EDCS energy management dashboard is easy to customize and use
- ✓ User can compare consumptions on loads or group of loads.
- ✓ User can set custom notification alert thresholds



Energy control success case



Plant

Dairy, milk production
Brazil



Customer needs

Supervision, control and data integration of MV and LV electrical systems, via IEC 61850 and Modbus.



Digital offering

COM600 featuring remote monitoring and control, disturbance recording analysis, IEDs configuration (Relion® 615 Series, Emax2, RIO600, etc)

“

ABB offered a easy to use and effective supervision and control solution, integrating entire electrification system. Operators can now remotely check the conditions, maximizing safety, and visibility on the plant.

”

- ✓ Scalability form switchgear to substation supervision
- ✓ Easy to integrate existing equipment
- ✓ Easy to customize dashboards and reports.
- ✓ Soft PLC capability



Power availability

Why?

Power management solutions guarantee power availability and therefore process continuity of critical loads and production lines. It avoids extra energy costs (e.g. utility fines) due to peaks consumption. Moreover, prevents damages to motors and captive local generation sizing can be optimized.

How?

Power management solution includes functions like load-shedding, peak-shaving, load restoration, load sharing and generators control. Depending on requirements it can be enabled at LV and/or MV level, and it scales from one substation up to several substations. The real-time functionality and easy integration is guaranteed by IEC 61850.

LV installation

LV loads management and microgrid LV islanding.



Emax2 can feature embedded load shedding logics for LV loads and supports islanding microgrids.

MV/LV network

Medium plant with few substations, power management requirements, and integration with MV/LV protection systems.



PML630 is MV/LV compact power management controller manages, up to 60 feeders, 20 load priorities and 6 busbars, up to 6 generators and 4 subnetworks (islands)

Complex network

Large plant with several substations, full power management requirements, and even integration with process automation.



800xA offers MV/LV complete power management solution, for unlimited feeders, up to 100 load priorities and 80 busbars, up to 31 generators and 15 subnetworks (islands)

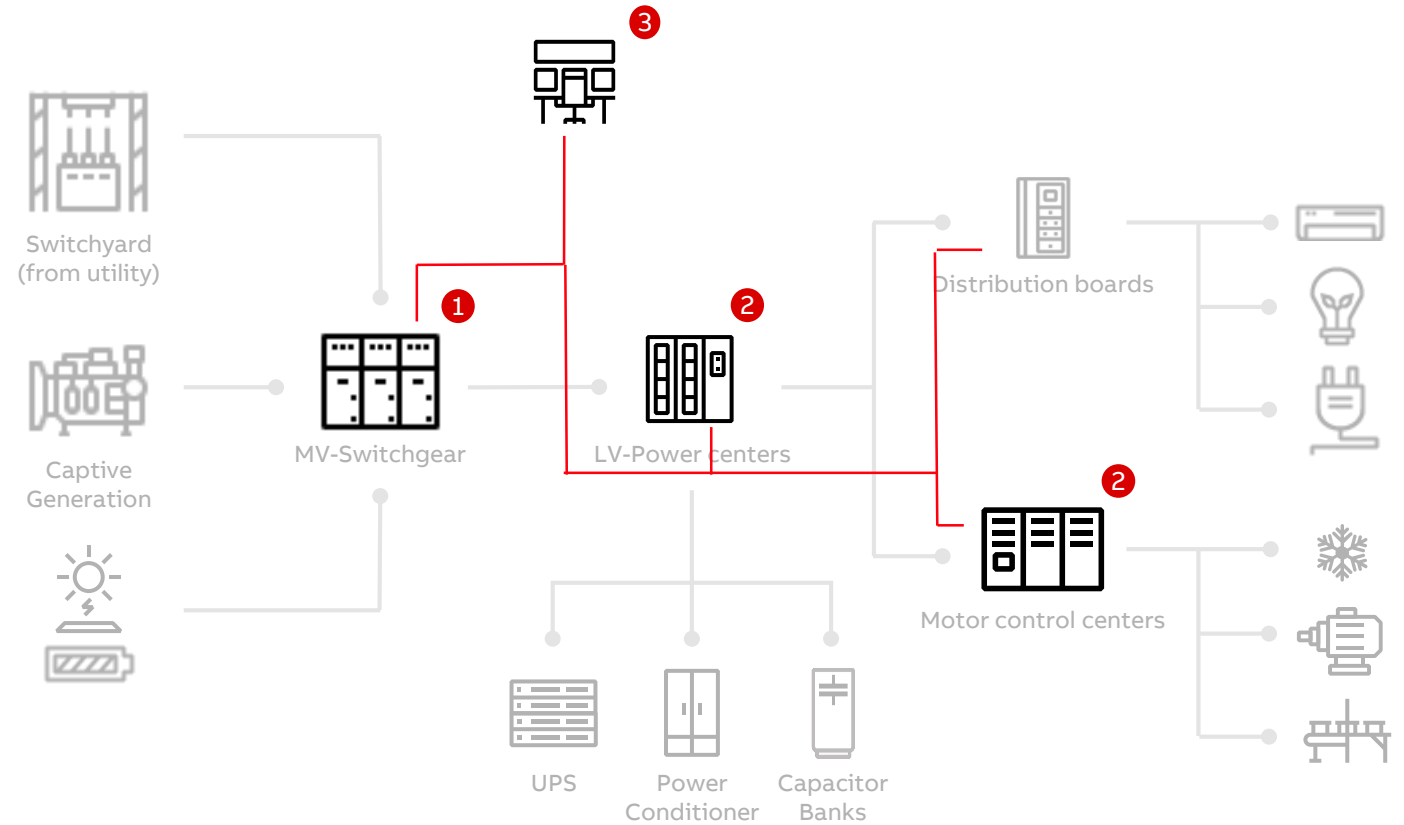
Efficiency and production continuity



Power availability

Load-shedding and peak-shaving to keep up a running critical loads and avoid extra-costs
Automatic transfer switch ensuring power supply
Full power management for critical processes

- ① cPMS Compact Power management, PML630
- ② Emax 2 with load shedding
- ③ 800xA Power Management module



Peak-shaving success case



Plant

Glencane Bionergia, sugar and ethanol production with electrical cogeneration, Sao Paulo, Brazil



Customer needs

Reliable and secure power supply through minimized downtime for ethanol, sugar production and electricity cogeneration.
Level the power consumption avoiding penalties, and supervision of the whole MV and LV electrical system



Digital offering

UniGear ZS1, Relion 615, RIO600, PML630, COM600S

“

The compact power management solution does real time power leveling, so the plant no longer exceeds the contacted amount, thus avoiding utility penalties. We had a fast return on investment in about 7 months.

”

- ✓ Improved internal energy cost management with the forecasting possibilities provided by the Data Historian in the COM600S unit.
- ✓ Remote and easy access to the disturbance recordings and editing parameters of the PML630
- ✓ Ability™ solution easily plugged on digital switchgear (IEC 61850)



Load-shedding success case



Plant

Ajinomoto Group, spices and flavor production, Thailand



Customer needs

Ensure uninterrupted power to the plant, integrating a new cogeneration plant and ensuring continuous uptime of the plant's main process in case of power loss.



Digital offering

UniGear ZS1, PML630, Relion® 615 series, RIO600, MicroSCADA Pro

“

ABB compact power management solution easily integrates generators and loads, allows real-time power control, offers easy to configure load shedding ensuring highest critical process continuity.

”

- ✓ Secure continued power supply to critical loads with compact power management system on top of MV digitalized switchgear
- ✓ Integrated real-time control functionality from the switchgears to the SCADA system
- ✓ Fast installation and commissioning using IEC 61850 standard



Power restoration

Why?

Most of plants have medium and low voltage grid to supply all production areas. A power loss on main incomers (e.g. utility failure) or internal (fault in the plant grid) can disrupt the production.

How?

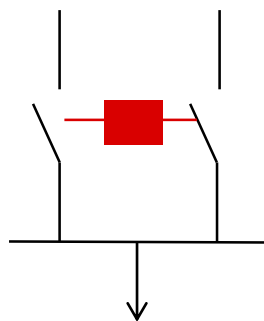
Automatic power restoration digital solution systems can manage different scenarios of fault, maximizing production continuity. A fault and restoration on main feeders can be managed with automatic transfer systems, while a fault on the distribution grid (e.g. a ring topology) can be resolved by Loop Control solution.

Automatic transfer switch (ATS) from one power source to another, is ensuring power supply to process, in case of voltage failures.

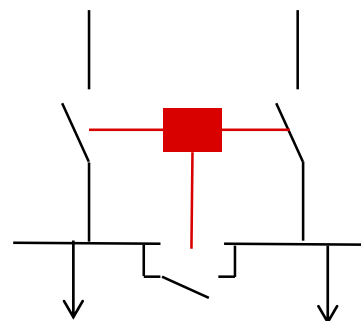
On medium voltage by means of **Relion® relays**, it is possible to configure a synchronized ATS, which guarantees **200-300ms** restore time.

On low voltage ATS functionality can be configured into **Emax** and **Ekip UP** trip units.

High Speed Transfer System (HSTS) is suitable for sensitive production processes requiring transfer time <100ms. **SUE3000**, can restore voltage in **30ms**, offering uninterrupted operations.



Example: Busbar with two feeders



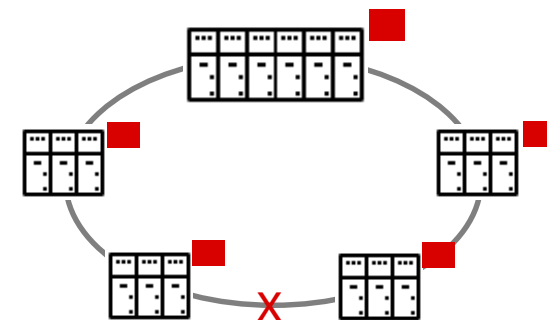
Example: Busbars with two feeders and bus-coupler breaker

Automatic ring re-configuration enables automatic and quick power restoration in an MV ring, when a fault happens.

The solution is based on **LC1000 Loop Control**, able to restore a fault in less than **0,5 sec.**

It is made of Relion® components to implement FDIR (Fault Detection, Isolation and Restoration), communicating on IEC 61850.

It can be applied to switchgears with switch-disconnectors or, for higher performances, with circuit breakers.



Example: on fault, the fault is isolated opening the relevant branch, and supplying the rest of the ring.

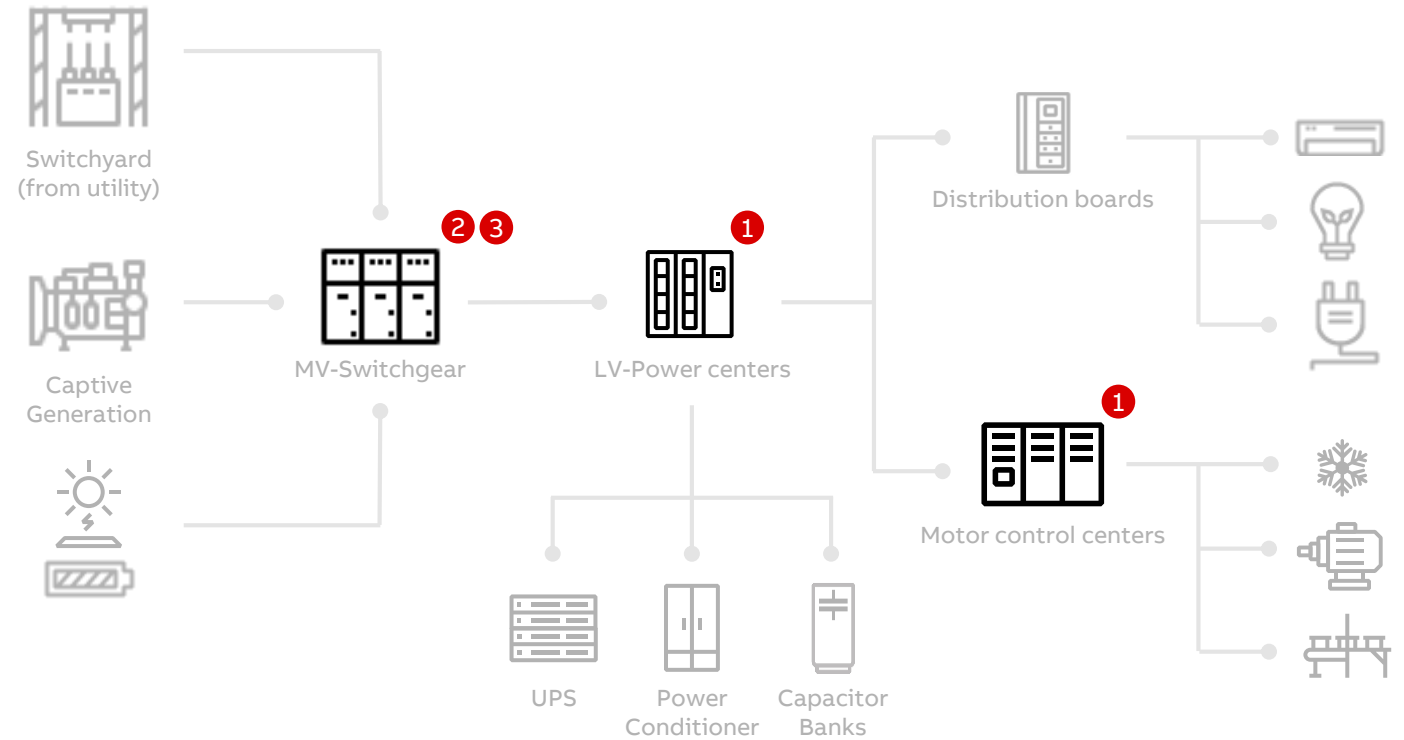
Efficiency and production continuity



Power restoration

Automatic transfer switch ensuring power in case power supplier
Automatic ring reconfiguration

- ① Emax, Ekip UP
- ② Relion, SUE3000
- ③ Loop Control, Automatic ring reconfiguration



Ring reconfiguration and ATS success case



Plant

Hospital center, France



Customer needs

Ensure uninterrupted power to the facility, integrating genset ensuring continuous uptime of the plant's main process in case of power loss.



Digital offering

Loop Control LC1000, for 0,5 sec automatic ring reconfiguration. ATS between utility feeder and backup genset.

“

ABB proposed a modular solution based on standards, like IEC 61850, which guarantees high power availability, with less than 0,5s fault restoration and genset management.

”

- ✓ UniSec Digital, medium voltage air insulated secondary switchgear, can easily offer add-ons functions like ATS and LC1000.
- ✓ Fast installation and commissioning using IEC 61850 standard



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People and equipment protection

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Efficiency and production continuity

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Asset performance and optimization

- Condition monitoring
- Predictive maintenance

4

Flexibility and sustainability



Condition monitoring

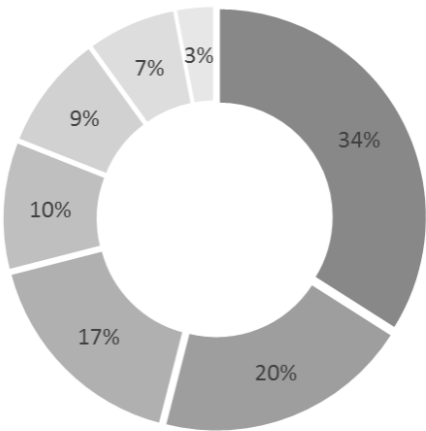
Why?

The electrification system is the backbone of any production plant. A fault can then disrupt the operations, and can also delay a restoration. Therefore acting before a fault it can save a lot of money and problems, increasing also asset performances and people safety.

How?

Digitalization is supporting the continuous condition monitoring of the asset performances, balancing the costs with benefit. So, it shall focus on variables related to most important failure cases. A condition monitoring solution is made of a device collecting and analyzing data and dedicated sensors and electronic data sources.

Monitor main electrical system failure causes



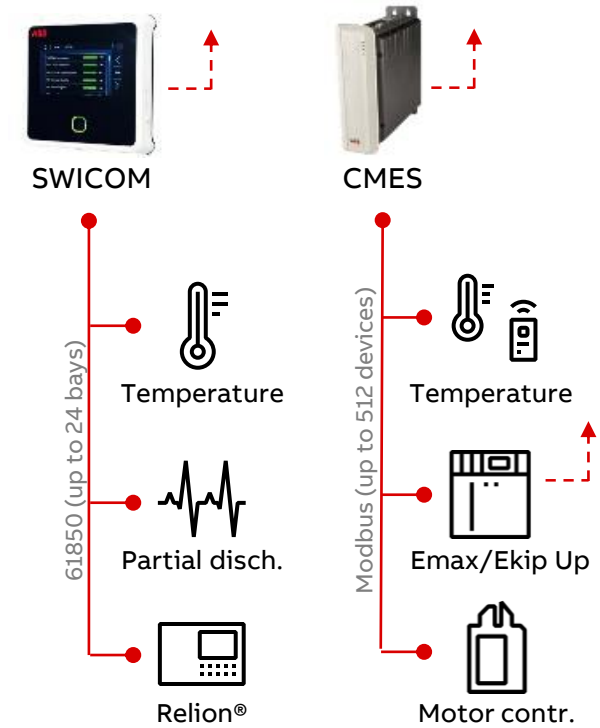
Statistical analysis of failure cases in electrical systems:

- Loose connections / joints
- Environment & humidity
- Incorrect work
- Faulty insulation / short circuit
- Faulty equipment
- Other
- Overload

Manual (corrective or time based)	Automatic (condition monitoring)
Temperature power parts inspection (require shutdown)	Continuous joints temperature monitoring
Environment assessment (might require shutdown)	Continuous environmental monitoring (temperature, humidity, etc)
Insulation inspection and tests (might require shutdown)	Continuous partial discharge monitoring
Circuit Breaker Periodical tests (requires shutdown)	Continuous operations monitoring with protection relays

Condition monitoring devices

SWICOM condition monitoring device for MV switchgear and **CMES** Condition monitoring for LV Power centers and MCCs, collect data from sensors and devices, diagnose and analyze health and allow data transfer to local/remote systems.



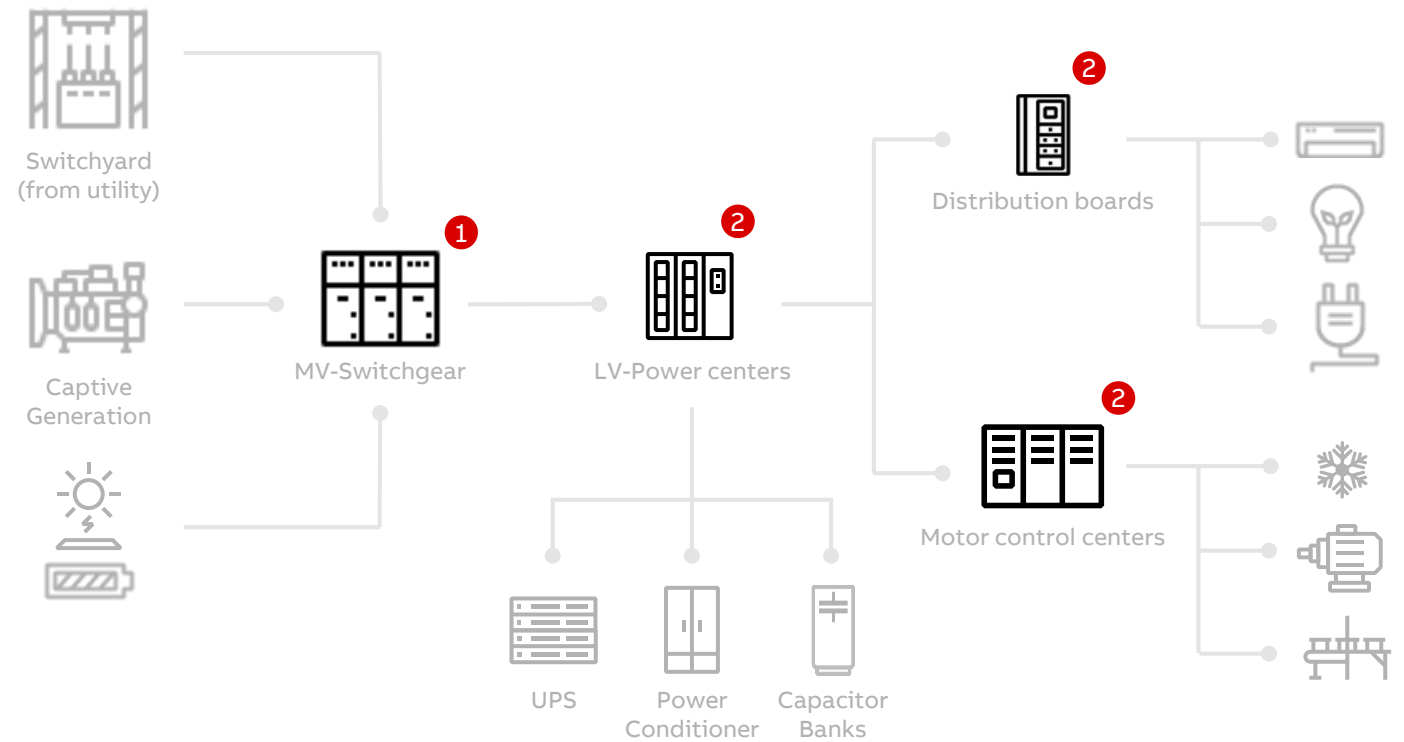
Asset performance and optimization



Condition monitoring

Sensors to detect abnormal behavior.
Condition monitoring to support troubleshooting and drive service activities

- 1 SWICOM, MySiteCare
- 2 MNS® Digital and NeoGear™ Digital (with CMES), Emax/Ekip UP



Condition monitoring success case



Plant

Chocolate producer, Italy



Customer needs

Being sure about the reliability of the main MV primary switchgear supplying the plant and connecting the cogeneration plant. Moving to condition based maintenance approach.



Digital offering

MySiteCare is a circuit breaker mechanical, electrical and thermal condition monitoring device.

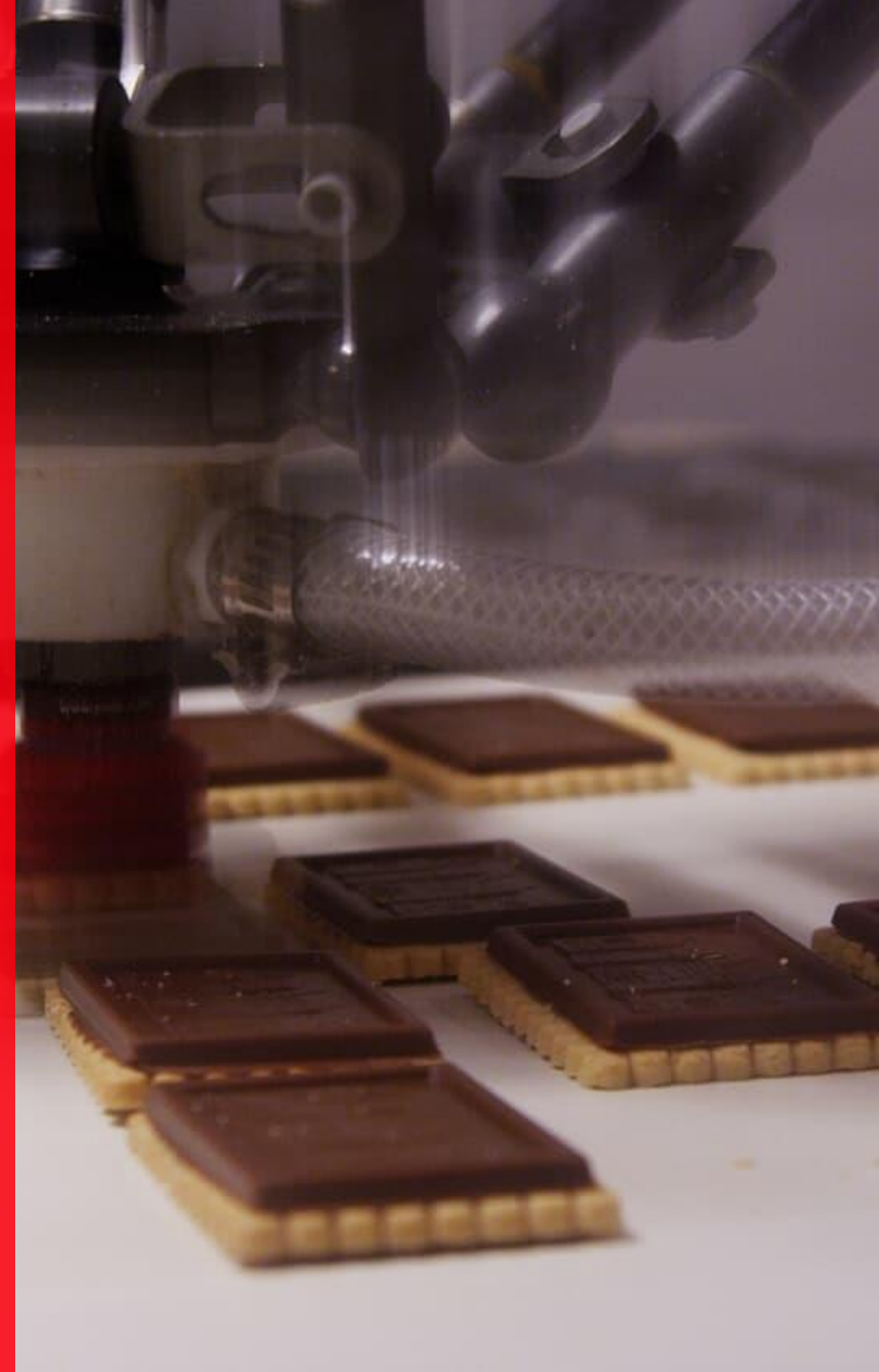
“

With MySiteCare we discovered in advance aging of insulations in one bay due to thermal stress.

It saves inspection time of about 30%, with an estimated opex savings of 40%.

”

- ✓ MySiteCare offers dedicated plug'n'play sensors to detect circuit breaker electrical remaining life, mechanical and thermal stresses of
- ✓ Diagnostic is presented as overall by-component and traffic lights, to drive and optimize maintenance activity



Predictive maintenance

Why?

Predictive maintenance provides benefits that improve the bottom line, with a focus on maintenance and retrofit cost optimization. It is not just cost effective maintenance with maintenance based on best predicted scenario, but also full visibility on assets risk analysis, used to prioritize remedial actions. Accurate prediction saves from costly breakdowns.

How?

Predictive maintenance is based on predictive analytics, which exploits collected data with offline assessment and/or online condition monitoring.

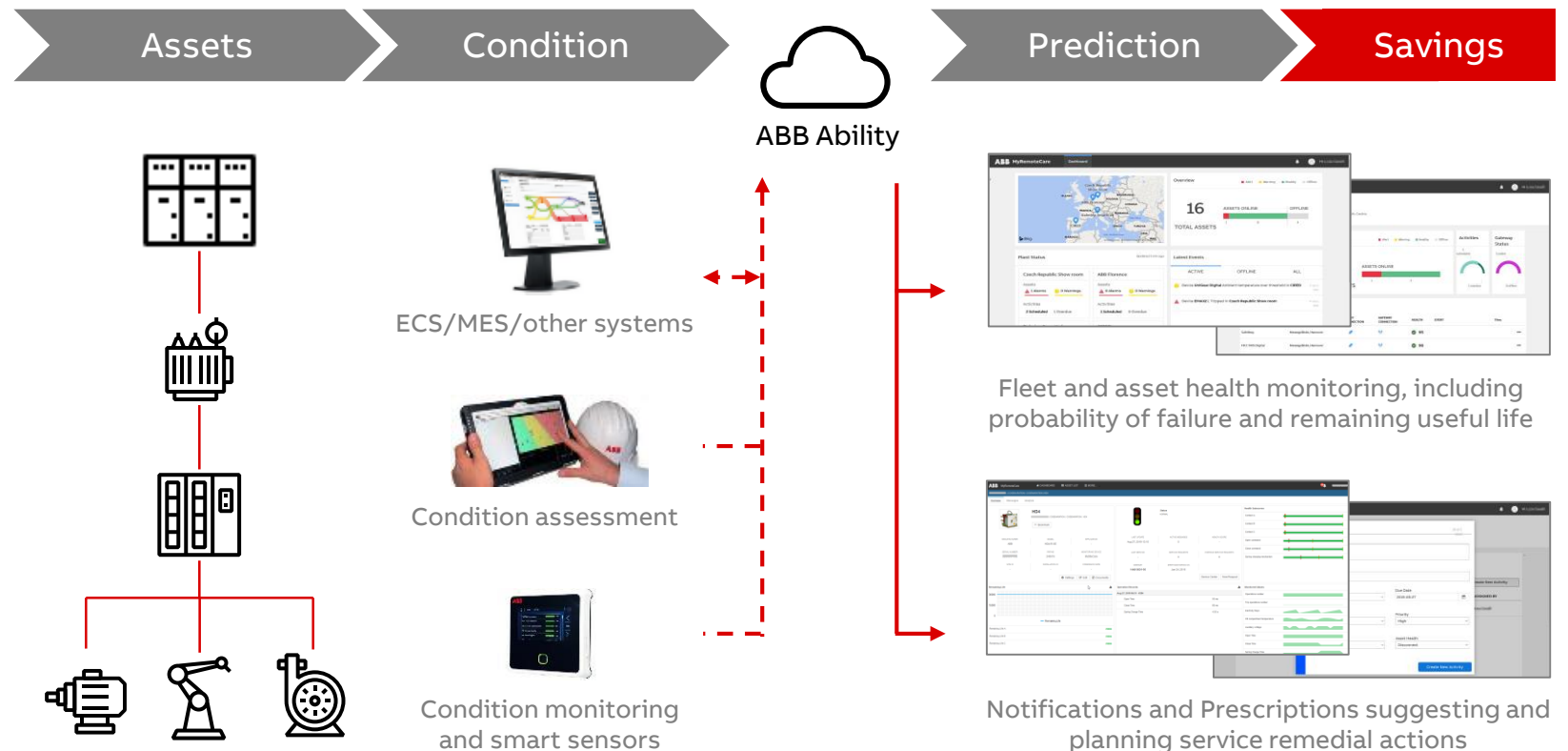
Typical calculated outputs are probability of failure within a year, remaining useful life, service prescriptions, and risk map analysis.

Asset condition data collection

Relevant electrification assets in the plant can be monitored to track condition. Raw and calculated data can be predictive analytics.

ABB Ability™: gain insights on assets

ABB Ability solutions offers asset health dashboard, and predictive analysis to optimize maintenance and improve availability, reliability.



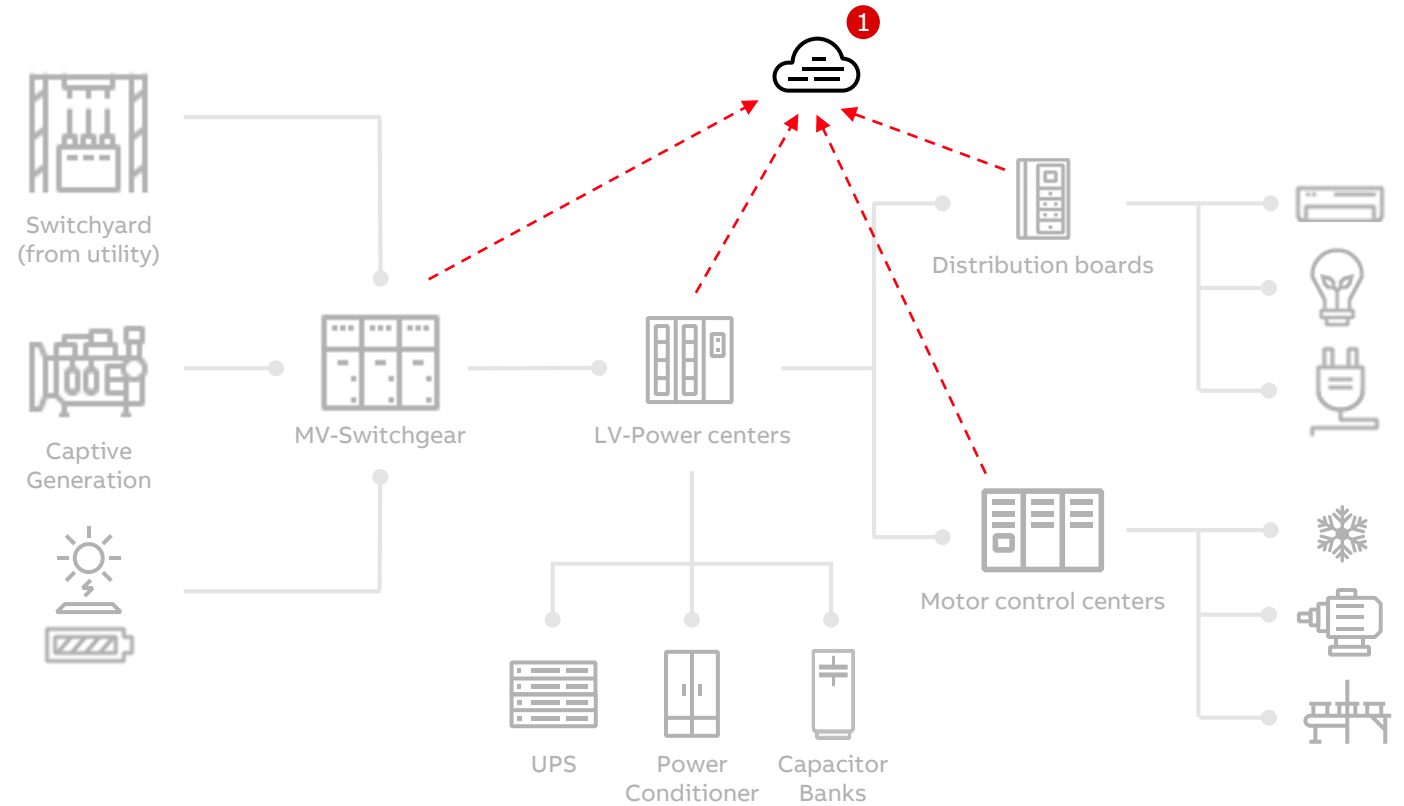
Asset performance and optimization



Predictive maintenance

Site and multi-site asset health analysis to predict and notify potential faults, minimizing maintenance, while increasing safety and asset lifetime

1 ABB Ability MyRemoteCare



Predictive maintenance success case



Plant

Sugar producer, Middle East



Customer needs

Monitor condition of main MV primary switchgear, predicting failures and optimizing maintenance activities.



Digital offering

MyRemoteCare asset health for electrical system

“

With MyRemoteCare we can easily have the overview of assets health status, planning maintenance only when required, and ensure process continuity. Remote monitoring of asset condition increase safety.

”

- ✓ MyRemoteCare multi-site dashboard offers a clear asset health overview and scheduled service activities.
- ✓ A field service can remotely see behavior details of assets, and service prescriptions to better plan any field activities.



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People and equipment protection

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Efficiency and production continuity

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Asset performance and optimization

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Flexibility and sustainability

- Digital switchgears



Digital switchgears

Why?

Flexibility has become a core competitive advantage for food and beverage industry. Flexibility to produce more, flexibility to modify and extend production, flexibility to scale a solution to different sites.

How?

Digitalization of equipment, as switchgears, is a key step towards flexibility and easiness to engineer/install/operate, higher safety and reliability, while reducing operational costs.

Safe, Smart and Sustainable!

A digitalized equipment is **ready for ABB Ability™ solutions for energy and asset management.**

Safe.

Safer operation: higher reliability⁽¹⁾
Safer service: remote awareness⁽²⁾ and safer tests⁽³⁾

(1) Digital enables design with fewer components, which results in fewer internal failure points. Latest sensors avoid saturation and ferro-resonance (might cause overvoltage failure).

(2) Digital devices enable remote management, so no need to be in front of the switchgear.

(3) Latest sensors avoid high-voltage exposure during tests and inspections. No problems of open circuits on current transformers and short-circuit on voltage transformers, during maintenance.

Smart.

90% less wiring⁽¹⁾
25% reduced installation and commissioning time⁽²⁾
30% faster delivery⁽³⁾
Higher plant performances⁽⁴⁾

(1) IEC 61850 offers active supervision, high reliability with redundant connection, and with GOOSE more complex logics, substituting inter-panel wires.

(2) Less inter-panel wiring on 30 panels saves 2 working days.

(3) Minimized components (one-size-fit-all sensors), easy to adapt to changing requests.

(4) Digital control and protection, including all-in-one and centralized solutions, extends plant performances, and improve asset lifecycle management

Sustainable.

10% reduced footprint⁽¹⁾
15% optimized weight⁽²⁾
Save energy and CO₂⁽³⁾
Integrate renewables and e-mobility⁽⁴⁾

(1) Avoid a busbar meter cubicle, because voltage sensors are placed in existing panel

(2) Smaller switchgear and sensors weigh 10-15 times less than conventional instrument transformer.

(3) An MV digital switchgear 14 panels, in 30 years, with with latest sensors: save 250MW and 150 tons CO₂.

(4) Digital control and protection enables easy generator synchronization, complex logic and integration of power management functions.

Flexibility and sustainability

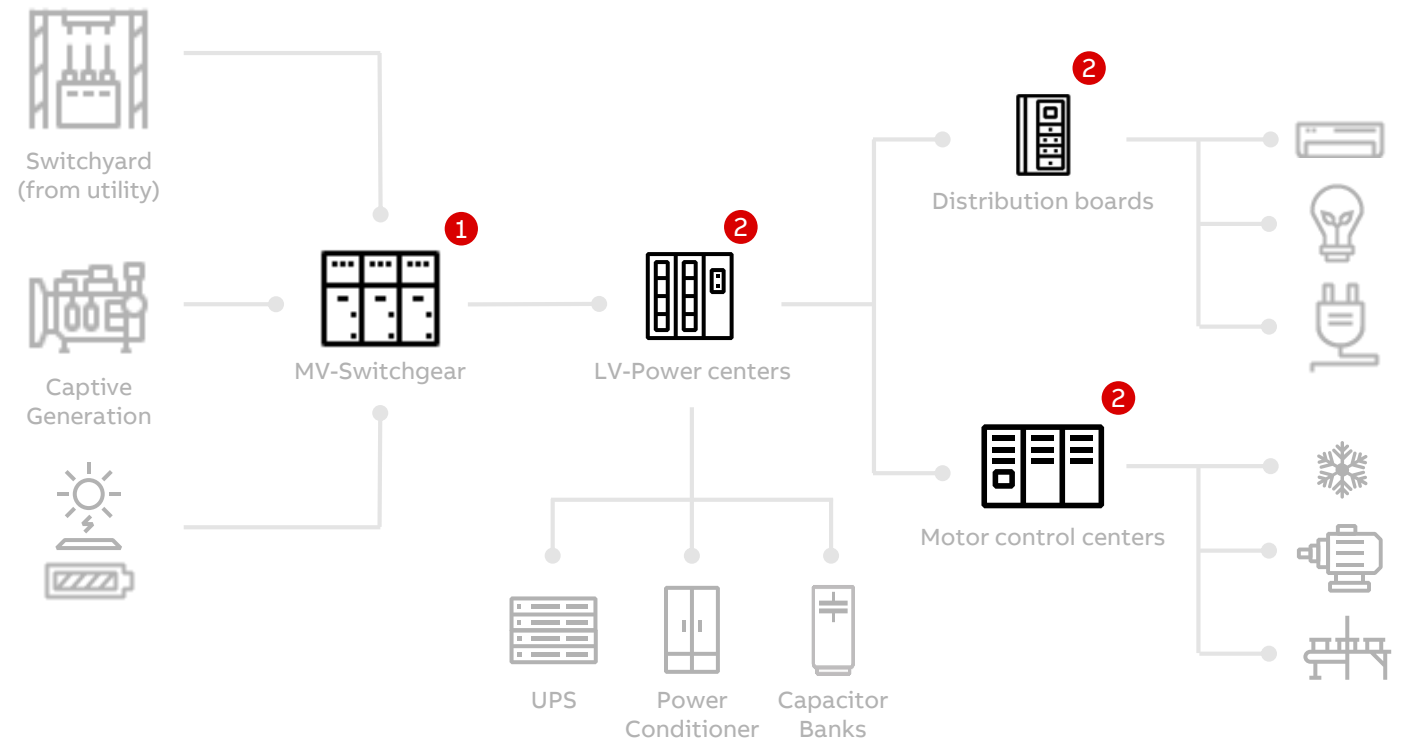


Digital switchgear

Highly configurable and easily upgradable during lifetime. Provided with advanced sensing technology to lower switchgear power consumption and minimize spare parts. ABB Ability™ solutions can be easily plugged on a digital switchgear.

1 UniGear Digital, ZX Digital, UniSec Digital

2 MNS® Digital, NeoGear™ Digital



Digital switchgear success case



Plant

Buitoni (Nestlé Group), pizza production, Benevento, Italy



Customer needs

- Extend the electrification system in order to expand the product lines
- MV/LV selectivity study
- Reliable electrification system and communication to electrical control system



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Digital offering

UniSec Digital, Relion® 615 Series, featuring IEC61850, GOOSE for logic selectivity.

“

We have now state-of-the-art electrical system, fully digitalized, ensuring the continuity and performances of our production.

”

- ✓ Fast installation and commissioning using IEC 61850 standard
- ✓ Arc proof switchgear



Digital switchgear success case



Plant

Nestlé, ice cream production,
Ferentino, Italy



Customer needs

- ensures maximum reliability of the electricity supply and enables complete and remote control of the plants directly from the Assago (Milan) headquarters



Digital offering

UniSec Digital, Relion® 615 Series,
featuring IEC61850, GOOSE for logic selectivity, and WebHMI.

“

Ensures rapid intervention and configurations for connections to Smart Grids as well as secure remote management, for quick troubleshooting.

”

- ✓ Fast installation and commissioning using IEC 61850 standard
- ✓ WebHMI embedded in the relays to securely and remotely manage the electrical system
- ✓ Arc proof switchgear

Digital transformation?

ABB Ability™.

People and equipment protection

Being committed to world-class products, systems and services with health and safety as our key priority.

Efficiency and production continuity

Enable energy efficiency and energy flow control. Pluggable power management solutions to maximize production continuity.

Asset performance and optimization

Monitor the reliability and efficiency of your assets to optimize the operation and maintenance processes.

Flexibility and sustainability

Enjoy flexible, scalable and modular digital solutions, which allow also an efficient integration of renewables and e-mobility.

ABB