



RELIABLE POWER DISTRIBUTION

Outdoor systems for a more resilient grid

Start

SIEMENS

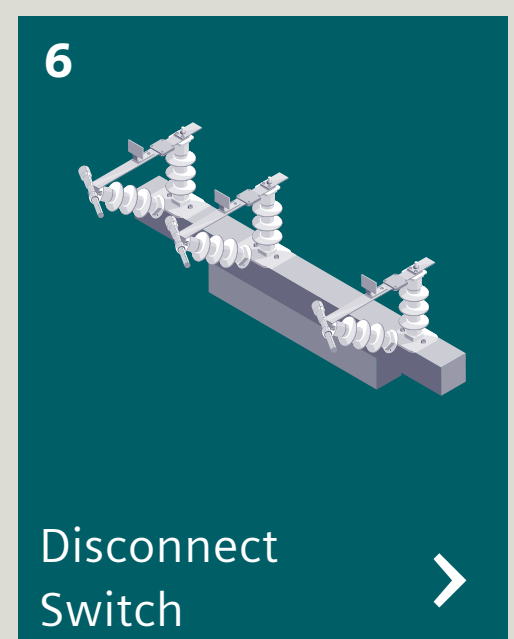
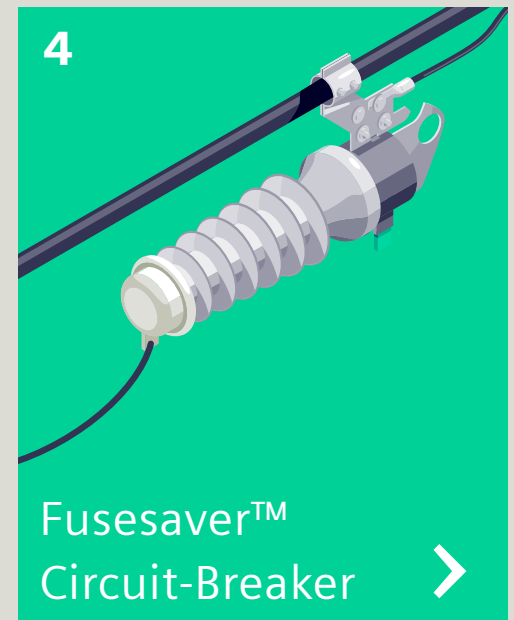


I Introduction

Power distribution grids are becoming more and more complex. To facilitate a reliable power supply, increased resilience is needed. Therefore, we focus on helping customers to improve the reliability and efficiency of their distribution grids. From the substation to the end users, we offer a complete portfolio for energy distribution over the entire supply chain: from planning through design and manufacturing up to installation, operation and service. By keeping them a step ahead of their challenges from end to end, utilities are enabled to optimize less developed network environments towards a future-oriented smarter grid.

Our benchmark in terms of sustainability and safety are an important foundation for all outdoor distribution projects. The entire portfolio of circuit-breakers and reclosing devices is based on vacuum switching technology, offering flexibility in application, as well as extreme resilience and durability. Virtually maintenance-free, this technology also ensures improved operator safety. Control and monitoring functions for smart grid application support asset performance and allow to make the most of your installation.

| Outdoor systems for distribution networks – from the substation to the end users



SUSTAINABILITY

We contribute to decarbonization

Our portfolio supports the integration of sustainable power generation into existing grids, and promotes future topics such as electromobility by increasing grid reliability. As a pioneer in vacuum switching technology, we drive the transformation towards equipment with a low environmental impact to further reduce emissions. Our outdoor switching devices are a successful example for state-of-the-art technology focused on sustainability over the entire product lifecycle.



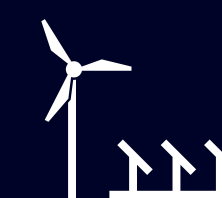
We combine the latest technology in vacuum switching and electronic control as an alternative to assets using oil or SF₆.



The use of selected high-quality materials (including reusables and recyclables) minimizes environmental impacts and enables an extended product life.



Remotely controlled assets reduce the need for truck rolls and personnel on site.



The integration of renewable energies is supported by an enhanced portfolio, designed to a better infeed from distributed power generation for a more reliable grid.



With pioneering innovations, we can provide advanced protection to minimize the risk of wildfires caused by electrical faults.

RESILIENCE

Outstanding capacity to adapt to critical situations

Overhead lines constitute about 70 percent of the world's medium-voltage power distribution grids. They extend many thousands of kilometres, often in sparsely populated areas. Impacts from external influences such as extreme weather events, lightning strikes, falling branches, or animals make them vulnerable to faults. To withstand adverse conditions and minimize faults and outages in networks, a greater resilience is required. With leading technology, high standards in quality, and ongoing development, we can provide an exceptional product portfolio to improve network performance.



Less and shorter periods of blackout: self-healing ability to recover fast by isolating a fault



Designed and tested for applications in harshest environments



Self-powered assets: with the ability to be powered either by low line current or voltage, the switching devices are particularly suitable to face challenges in rural areas



Ultra-fast fault clearing: unsurpassed clearing time helps to virtually eliminate the impacts of transient and permanent faults on lateral lines

No compromise on health and safety

Driven by innovation, our engineers always aim to develop safer switchgear solutions and improved design concepts. From conception to product development, the ease of installation and operation, reduced maintenance, and outstanding protection are at the core of our efforts. The result is a portfolio that encompasses products with a small footprint, less weight, fully integrated technology, simplified installation, and fast commissioning. These factors contribute to less operator risks and improved safety. Additionally, end users are less impacted by system downtime or maintenance work.



High operational safety (e.g. arc-resistant design where applicable, restrike-free equipment, mechanical and electrical interlocking)



Reduction of the risk of injury: smart product design with integrated technology, combined with a small footprint and less weight, improve the overall installation process while reducing injury hazards significantly.



Less contact with assets in service: a low-maintenance approach as well as product monitoring features reduce the direct contact with a product in service to a minimum.



Ultra-fast fault clearing: Reducing the number and duration of power outages minimizes interruptions and limits dangers and inconveniences.

COST-EFFICIENCY

Make the most of **your budget**

With a cost-efficient approach, customers achieve optimal results for their assets. This includes a lower investment cost, the avoidance of penalties (SAIDI and SAIFI), quicker installation and commissioning of equipment, and less truck rolls due to better network protection. Combined with low maintenance requirements, this results in low operating costs and a fast return on investment (CAPEX and OPEX savings).



Functional and solid product development helps to optimize applications and simplify installations.



Less truck rolls and lower labor cost result in reduced operational cost.



Further cost reduction is achieved thanks to low capital and maintenance cost.



Less outages lead to decreased penalty payments and a higher end-user satisfaction.

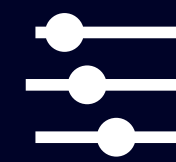
SMART GRIDS

Clever functions for reliable operation

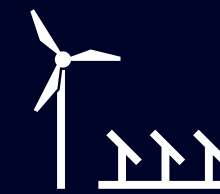
To meet varying electricity demands, our advanced solutions enable to sense, monitor, communicate, and manage energy flows, as well as real-time electricity asset management. Smart grids are designed to maintain system resiliency, stability and reliability while allowing maximum renewable power generation connected to the grid at the same time. Flexible solutions for automatic protection and remote operation, supported by state-of-the-art communications for lightning-fast data exchange is the key to achieve this. We meet the demanding requirements of smart grids, from simple standard to highly sophisticated protection functions, for maximum selectivity up to monitoring, remote control, and advanced self-healing for overhead-line networks.



Advanced capabilities for reliable and flexible communication



Extensive protection, metering and monitoring functions including loop automation

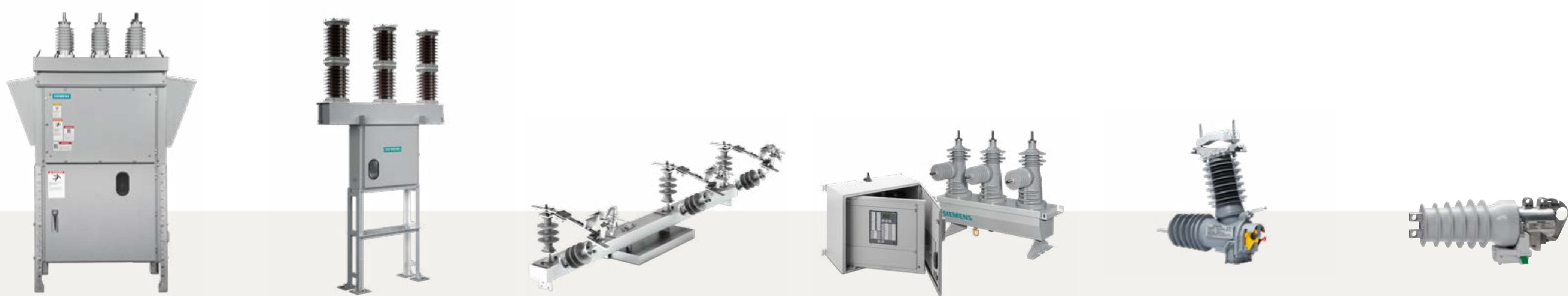


Smart grid-ready devices enable renewable power generation and improve grid resilience



Join the digital transformation to boost efficiency and create new opportunities in a changing ecosystem

Maximum reliability and safety in distribution grids



Substation

Overhead lines

**Dead-Tank
Circuit-Breaker**

up to 15 to 38 kV
20 to 40 kA
1,200 to 3,000 A

[Learn more](#) >

**Live-Tank
Circuit-Breaker**

up to 36 to 40.5 kV
25 to 31.5 kA
1,600 to 2,500 A

[Learn more](#) >

Disconnect Switch

up to 15 to 38 kV
600 to 2,000 A

[Learn more](#) >

**Smart Distribution
Recloser (SDR)**

up to 12 to 38 kV
12.5 to 16 kA
200 to 800 A

[Learn more](#) >

**Compact Modular
Recloser (CMR)**

up to 27 kV (3-phase)
or 38 kV (1-phase)
6.3 to 12.5 kA
630 to 800 A

[Learn more](#) >

**Fusesaver™
Circuit-Breaker**

up to 15 to 27 kV
1.5 to 6.3 kA
40 to 200 A

[Learn more](#) >

Dead-Tank Circuit-Breaker (SDV)

After introduction, the SDV product line has been operating reliably in distribution grids for 40 years, and it is available in arc-resistant and non-arc-resistant design. By removing grounding transformers while adding a fast-acting grounding capability, the SDV-R™ offers wind power producers a welcome alternative that not only reduces the total installed cost and physical footprint, but also eliminates the risk of transformer oil spills.

- Stored-energy (spring) and magnetic-actuated operating mechanisms for conventional and arc-resistant enclosures
- Enclosure construction tested for internal arcing in accordance with IEEE C37.20.7, for accessibility type 2B
- Fast-acting grounding switch for renewable applications



[Learn more](#) >

Technical data

| | | | |
|--|------------------|------------------|------------------|
| Number of phases | 3-phase | 3-phase | 3-phase |
| Rated voltage U_r | 15, 17.5 kV | 27.6 kV | 38 kV |
| Rated normal current I_r | 1,200 to 3,000 A | 1,200 to 2,000 A | 1,200 to 2,500 A |
| Rated short-circuit breaking current I_{sc} | 20 to 40 kA | 20 to 25 kA | 20 to 40 kA |
| Number of operating cycles without maintenance | 10,000 | 10,000 | 10,000 |

Asset performance

- Arc-resistant circuit-breaker with fast-acting grounding capability simplifies the installation and operation of the system and protection coordination.
- Highly reliable vacuum interrupters with Mean Time to Failure (MTTF) of more than 53,000 years
- Contact configuration designed for minimized contact erosion, providing up to 100 full-rated fault interruptions (depending on rating) before replacement
- Moderate and high seismic qualification (Zones 1 – 4) available

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Live-Tank Circuit-Breaker (3AF)

A low weight, a space-saving, safety-oriented design, and the rugged construction of 3AF circuit-breakers make them suitable for power distribution in the harshest conditions. They can be widely used in the substations of various distribution networks of power utilities and industries.

The design comprises a minimum of moving parts and a simple construction, which guarantees a long electrical and mechanical endurance.

- Reliable restrike-free operation in practically every kind of environment, even in the most adverse conditions
- Minimum of moving parts and a simple construction
- Long electrical and mechanical endurance



[Learn more](#) >

Technical data

| | | |
|--|----------------|------------------|
| Number of phases | 1, 2 & 3-phase | 1, 2 & 3-phase |
| Rated voltage U_r | 36 kV | 36, 40.5 kV |
| Rated normal current I_r | 1,600 A | 1,600 to 2,500 A |
| Rated short-circuit breaking current I_{sc} | 25 kA | 25/26.3, 31.5 kA |
| Number of operating cycles without maintenance | 10,000 | 10,000 |

Asset performance

- Easy transport and installation thanks to modular structure and lightweight components
- Suitable for capacitor and reactor switching
- Optimal adaptation to each application using current and voltage transformers
- Very few moving parts
- Virtually maintenance-free

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Disconnect Switch

The comprehensive product portfolio, from station class and distribution class disconnect switches to bypass and group-operated disconnect switches, ensures safe network operation.

- Designed for a wide variety of applications and climatic conditions



[Learn more](#) >

Technical data

| | |
|---|------------------------------|
| Number of phases | 1, 2, & 3-phase |
| Rated voltage U_r | 15, 25/27, and 38 kV |
| Rated normal current I_r | 600, 900, 1,200, and 2,000 A |
| Rated lightning impulse withstand voltage (BIL) | 110, 150, and 200 kV |

Asset performance

- Integration into SCADA with motorized group-operated disconnect switches
- Highly proved for safe operation

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Smart Distribution Recloser (SDR)

The SDR is a modular switching device adapted to harsh climatic conditions for a wide range of applications especially in microgrids and smart grids – starting with basic protection and monitoring functions up to cutting-edge technology with advanced capabilities for fast fault isolation and network digitalization.

- Flexible recloser system – for installation in substations or pole-mounted
- Up to nine times tripping and reclosing in case of a temporary line fault, thus avoiding longer network interruptions
- Ready for use in meshed grids with automatic source transfer within 6 cycles, and fault isolation possible under 500 ms for use in self-healing applications



[Learn more](#) >

Technical data

| | |
|--|------------------------------|
| Number of phases | 1, 3-phase and triple-single |
| Rated voltage U_r | 12, 15.5, 27, and 38 kV |
| Rated normal current I_r | 200, 400, 630, and 800 A |
| Rated short-circuit breaking current I_{sc} | 12.5, 16 kA |
| Number of operating cycles without maintenance | 30,000 |

Asset performance

- Just two designs cover the whole range (up to 27 kV and up to 38 kV)
- Long lifetime including preventive maintenance features like I2t-calculation for VI-lifetime, internal battery, and capacitor supervision
- Several diagnostic functions with watchdog alarm to mobile phones and SCADA systems
- More than 30,000 operating cycles
- Fast fault isolation < 500 ms possible
- 25 years maintenance-free service life (excluding batteries)

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Compact Modular Recloser (CMR)

The CMR approaches overhead distribution protection in a new way. Self-powered by the line voltage, the recloser provides fundamental protection and monitoring capabilities for single and multi-phase applications in the most cost-efficient way.

- Self-powered by line voltage
- Compact and lightweight (< 25 kg)
- Optically ganged multi-phase operations
- Fully insulated design



[Learn more](#) >

Technical data

| | | |
|--|--------------------------------------|--------------|
| Number of phases | 1, 2, & 3-phase | 1-phase only |
| Rated voltage U_r | up to 27 kV | up to 38 kV |
| Rated normal current I_r | 630 A (at 55 °C) 800 A (at 40 °C) | 800 A |
| Rated short-circuit breaking current I_{sc} | 12.5 kA | 6.3 kA |
| Number of operating cycles without maintenance | 10,000 | 10,000 |

Asset performance

- Self-powered by line voltage, no auxiliary power supply required
- Rechargeable battery for back-up power
- Integration into SCADA via optional Remote Control Unit (RCU)
- Integrated GPS time synchronization
- Wireless connectivity
- Configurable protection with multiple groups
- 25 years maintenance-free service life (excluding batteries)

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Fusesaver™ Circuit-Breaker

By virtually eliminating the impacts of faults on lateral lines, Fusesaver™ helps utilities to increase network reliability while minimizing operating costs of overhead MV networks in rural areas.

- The world’s fastest circuit-breaker (half-cycle switching)
- Small and lightweight (< 8 kg)
- Highly versatile with multiple functions (fuse saving, reclosing, sectionalizing, switching)
- Self-powered by low line current (as little as 0.15 A)
- Wireless multi-phase operation



[Learn more](#) >

Technical data

| | |
|--|-----------------|
| Number of phases | 1, 2, & 3-phase |
| Rated voltage U_r | 15, 27 kV |
| Rated normal current I_r | 40, 100, 200 A |
| Rated short-circuit breaking current I_{sc} | 1.5, 4, 6.3 kA |
| Number of operating cycles without maintenance | 2,000 |

Asset performance

- Self-powered by low line current, no auxiliary power supply required
- Rechargeable battery for back-up power
- Wireless connectivity
- Integration into SCADA via optional Remote Control Unit (RCU)
- Wirelessly ganged three phase switching
- Synchronized three-phase switching
- Configurable protection
- 25 years maintenance-free service life (excluding batteries)

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Smart Infrastructure intelligently connects energy systems, buildings and industries, enhancing the way we live and work to significantly improve efficiency and sustainability.

We work together with customers and partners to create an ecosystem that both intuitively responds to the needs of people and helps customers achieve their business goals.

It helps our customers to thrive, communities to progress, and supports sustainable development to protect our planet for the next generation.

Creating environments that care.

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