Fusesaver
The **world's fastest** vacuum circuit-breaker

Quickly reduce operating costs while improving reliability of your rural medium voltage distribution network.

siemens.com/fusesaver

SIEMENS

Minimise the impact of temporary faults on rural overhead lines

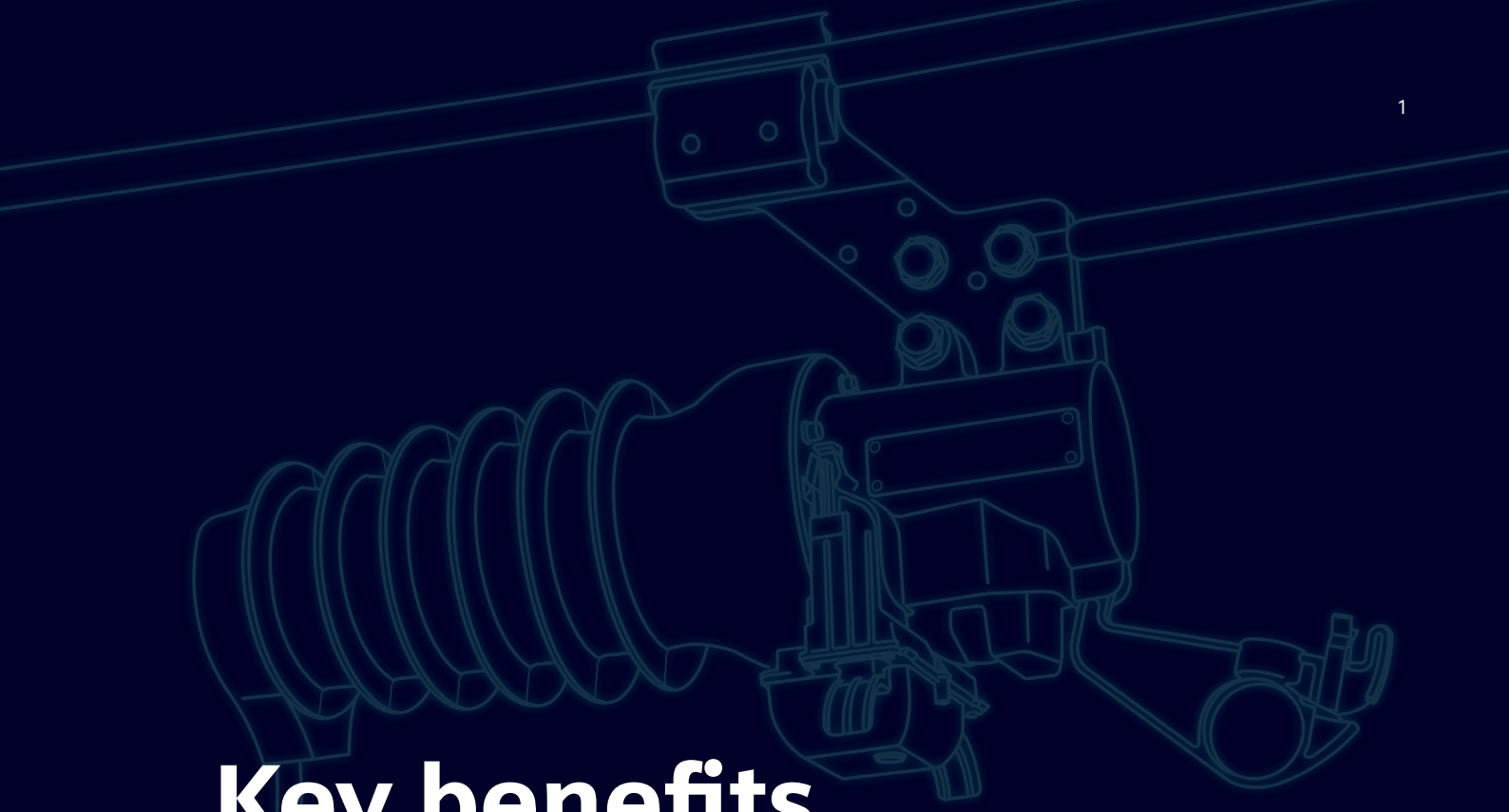
Fusesaver™ is the world's fastest medium-voltage (MV) outdoor vacuum reclosing circuit-breaker. It is the most cost-effective solution for optimising reliability while lowering operating costs of rural overhead MV networks. The smart device is capable of removing virtually all impacts of temporary faults.

The small footprint and light weight of the Fusesaver™ enable quick and easy installation and fast commissioning. Self-powered from line current, the circuit breaker has the capability for multi-phase fault clearance for both transient and permanent faults. The smart system provides wireless connectivity for remote access and can be easily integrated into a utility's SCADA network via a Remote Control Unit (RCU).

Fusesaver™ can detect, open and clear a fault in as little as one-half cycle (10 ms) and is configurable to either protect or replace the fuse.

Fusesaver™ can be installed in series with the fuse. When it senses a fault current, it will open before the fuse melts, interrupting the fault. Fusesaver™ then closes again, reconnecting supply. If the fault was transient, Fusesaver™ will have cleared the fault. If the line is still faulted, the fuse will now operate to clear the permanent fault. This is the traditional Open-Close (OC) Fusesaver™ approach.

Fusesaver™ can replace the fuse altogether. When installed in this manner, Fusesaver™ performs the same Open_Close operation to clear a transient fault, and can also perform a second "Open" operation (O-CO) to clear a permanent fault.



Key benefits

Increased network reliability

- Minimise impacts of transient and permanent faults
- Battery backup to maximise availability

Higher customer satisfaction

- Reduce the number and duration of power outages

Fast return on investment and lower operating costs

- Low capital cost
- Low installation cost
- Fewer crew callouts
- Reduced cost of outages (SAIFI and SAIDI)

Improved operator safety

- Ultra-fast fault clearing in 10 ms
- No direct contact with the unit while in service
- Time delay feature to clear the area during load break and pick-up
- Battery backup to ensure protection is running

Fast and easy line installation

- Install in less than 30 min per phase
- Multiple mounting options

Configurable protection

- Simple coordination with upstream Fuse + IDMT curves and downstream devices

Minimising the risk of arcs igniting fires

- Ultra-fast operation reduces arc energy
- Inhibit reclose via SCADA
- No exposed contacts

Future proof asset

- Wireless connectivity to SCADA via Remote Control Unit (RCU)
- Reconfigure and update while in service
- Remote Engineering Access

Fusesaver, the **ingenious system**

Developed as part of an integrated system of tools and accessories, Fusesaver™ minimises installation and operating costs. All system components work together, which permits easy installation, fast commissioning, and reliable operation in all conditions.

Due to its advanced design, the electrically floating device is designed to hang directly from the line. With no earth connection, it has no electrical stresses on its insulators, ensuring long life. While harvesting and storing energy from line current, it doesn't rely on a separate power source. Faults are detected with a cutting-edge, high-speed protection algorithm which results in unsurpassed, ultra-fast fault clearing in as little as 10 ms.

A typical Fusesaver™ installation includes the following items for each phase:

- Fusesaver™
- Communications Module
- Mounting kit
- Bird guard

Configuration of the unit is achieved through a wireless connection to the PC application Siemens Connect.

Industry-leading technology for advanced protection

Fusesaver™ represents a quantum leap in reclosing technology by showcasing an exceptionally compact and light-weight design and low capital cost.

The fully integrated unit contains a vacuum interrupter driven by a magnetic actuator. The external insulation is high-grade silicone rubber and the mechanism housing is marine grade aluminium for long outdoor life.

The Rechargeable Communications Module (RCM) with battery backup ensures:

Protection will always be running:

Increases operator safety by being ready to trip immediately if closed on a fault. Avoids single-phasing and ferroresonance with peer-to-peer communications for synchronous phase operation.

Maximised availability

Operators can safely trip and close Fusesaver™ with Fusesaver™ providing its checks Fusesaver™ is available over SCADA even when there is no line current.

Remote Engineering Access (REA)

Reduce operating costs and improve reliability by managing devices remotely.

Communications Module

The Communications Module plugs into the Fusesaver™ and provides a short-range wireless link between the circuit-breaker and other devices. While in use, settings can be simply changed, data can be downloaded and firmware upgraded via Siemens Connect. A Rechargeable Communications Module provides battery backup to the Fusesaver™ so protection is running even if there is no line current.

The Rechargeable Communications Module (RCM) provides backup power for up to 10 days*. Recharged from the minimum current required to self-power the Fusesaver™, the batteries can be easily removed and exchanged via the access panel when required.

Remote Control Unit (RCU)

The RCU is an optional addition to the Fusesaver™ system. It allows easy SCADA integration to monitor and operate the Fusesaver™ conveniently from the control room. The robust unit is manufactured from powder-coated stainless steel and contains a microprocessor and a shortrange radio to communicate with the Fusesaver™. When fitted with a long-range radio or modem, the pole-mounted RCU can connect with the SCADA control centre using the DNP3 protocol.

An optional Operator Panel provides push-button control of protection modes and the ability to open and close the Fusesaver™ from the RCU.

Remote Engineering Access uses the RCU to download event logs and update firmware and configurations remotely.

Siemens Connect

Siemens Connect is a PC application using a USB antenna to interface wirelessly with the Fusesaver™. It can:

- Configure and control the Fusesaver™ during commissioning
- Display fault data and line currents to assist with fault location
- Allow the manual trip and close control of the Fusesaver™
- Download event records and reliability statistics for off-line analysis

Suitable for overhead distribution networks up to 27KV

Ratings		Low range	Standard range	High range
Minimum line current for operation	A	0.15	0.50	1.00
Rated current	A	40	100	200
Rated line charging current	A	20	20	20
Rated short-circuit breaking current/SC	kA	1.50	4	6.30
Rated short-circuit making current/peak	kA	3.75	10.40	16.40
Rated short-time current	kA	1.50	4	6.30

* Battery performance varies depending on operation, configuration, discharge cycle, settings and features utilised, as well as ambient temperature.

Minimising the risk of wildfires

With just a spark from an electrical arc a wildfire can be ignited, affecting landscapes and lives for years. On extreme risk wildfire days, it is critical to eliminate any probability of faults on the electrical network igniting a fire.

Risk mitigation

- Fusesaver™ uses an encapsulated vacuum interrupter for fault clearance. Compared to traditional fuses, it doesn't expel molten material when operating.
- The unique fault clearing time of the Fusesaver™ greatly reduces the probability of an electric arc igniting a fire.
- The RCU allows the utility to change protection settings and to disable reclosing of the Fusesaver™ remotely over SCADA on extreme risk fire days.
- Single phase protective devices, such as fuses, can cause instabilities on networks using resonant earthing schemes. Fusesaver™ provides a synchronised three-phase switching operation for both protection and manual switching activities.

A single Fusesaver™ installation can pay for itself with the first operation and typically has a return on investment under two years.

Reliability

- A single blown fuse in a remote location can result in long outage periods for customers and high costs to replace the fuse. Typically 80% of faults on overhead lines are transient and can be cleared by the Fusesaver™ rather than creating a permanent outage when the fuse blows. Avoid the following costs:
- The time and cost of the line crew to drive to the site, patrol the line, replace the fuse and then return to base. This task can take hours, and the cost of a single truck roll may easily exceed $1,000 per outage.
- Regulatory penalty costs for lost customer minutes of supply can be as high as $2 per customer minute lost. A rural line with 100 customers without power for 120 minutes could cost as much as $24,000 per sustained outage.
- Lost revenue due to less consumed energy by end customers.

Features

- Configurable protection
  - Multiple curves
  - Inrush restraint
  - Cold load protection
- Multiple mounting options
  - Line clamping, cross-arm, pole mounting
- Wireless connectivity
  - Multi-phase protection trip and reclose
  - Protection operation via peer-to-peer communication
  - Synchronous manual operation via peer-to-peer communication
- Rated for load break and fault make for manual switching
  - Delayed operation for manual open/close for load break and load pick-up
- SCADA connection via Remote Control Unit (RCU)
  - DNP3 serial and IP communications protocol
- Smart grid-ready with Communications Module
- Unique compact design and lightweight (5.5 kg)
- Self-powered from low line current (as little as 0.15 A)
- Rechargeable battery back-up
- Half-cycle switching (10 ms)

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Siemens Ltd.
www.siemens.com.au
Australia Nationwide
Telephone +61 3 9721 2000
Facsimile +61 3 9721 2001

Head Office Australia
885 Mountain Highway
Bayswater VIC 3153
ABN: 98 004 347 880

Manufacturing Facility
Siemens Ltd.
2-4 Union Circuit
Yatala QLD 4207
Email: fusesaver.au@siemens.com

EMMS-B90003-00-7600

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