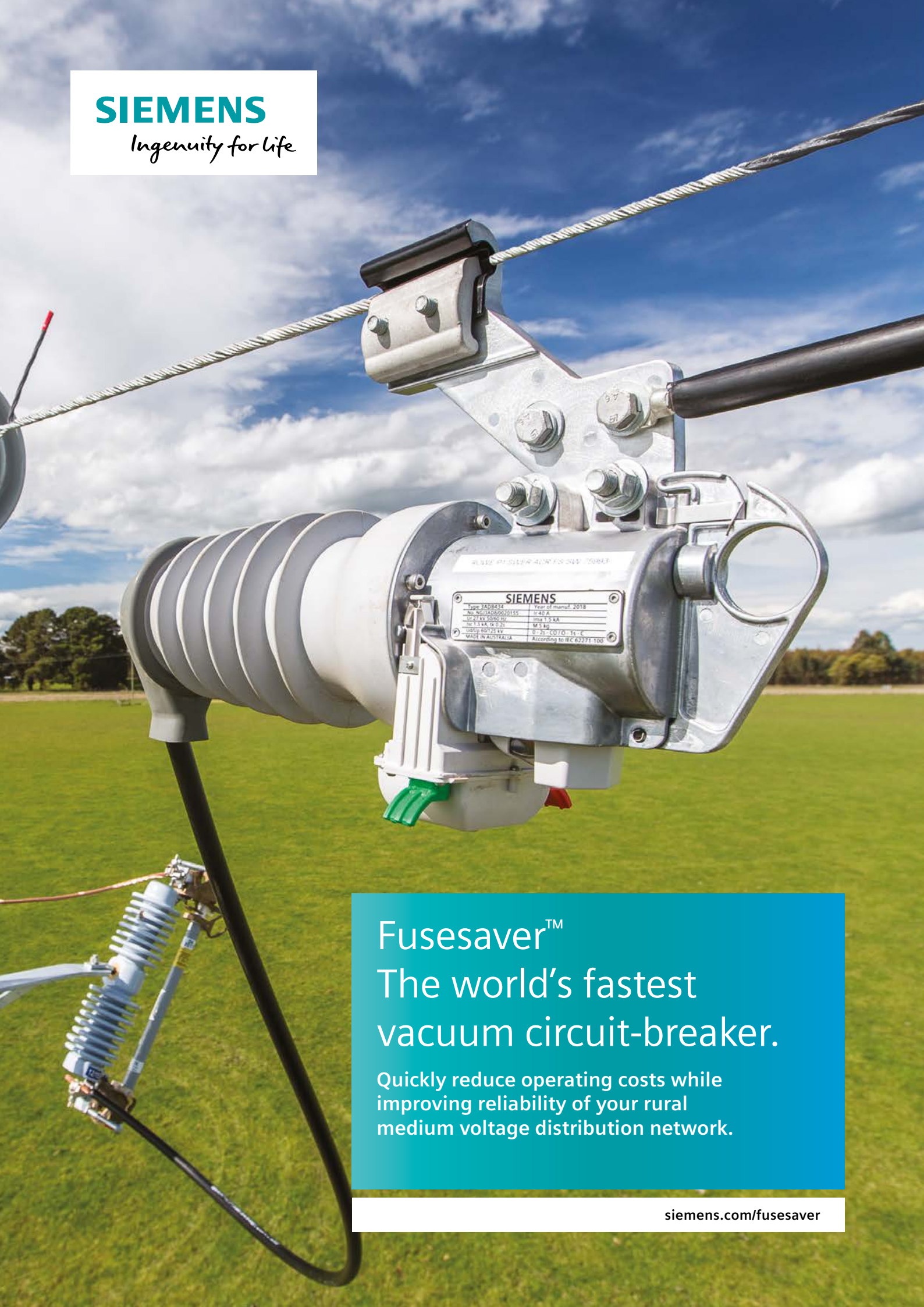
SIEMENS
Ingenuity for life
SIEMENS
Fusesaver™
The world's fastest vacuum circuit-breaker.
Quickly reduce operating costs while improving reliability of your rural medium voltage distribution network.
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Minimise the impact of temporary faults on rural overhead lines

Fusesaver™ is the world's fastest medium-voltage (MV) outdoor vacuum 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 can melt, and clear a transient fault. Then the Fusesaver™ closes again reconnecting supply. 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, the Fusesaver™ can perform the same Open-Close functionality to clear a transient fault but can also perform a second "Open" operation (OCO) to clear a permanent fault.

Key benefits

Increased network reliability

- Minimise impacts of transient and permanent faults

Higher customer satisfaction

- Reduce the number and duration of power outages

Fast return on investment and less 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

Fast and easy line installation

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

Configurable protection

- Simple coordination with upstream and downstream devices

Minimising the risk of arcs igniting fires

- Reduction of arc energy
- Inhibit reclose via SCADA

Future proof asset

- Wireless connectivity to SCADA via Remote Control Unit (RCU)
- Reconfigure and update while in service
- Remote data 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 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 marine grade aluminium for long outdoor life.

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. The built-in battery of the Communications Module supplies a back-up energy source to the Fusesaver™ during periods when there is no line current.

The battery of the Communications Module can provide backup power for up to 10 days* and is recharged from even the minimum rated current to self-power the Fusesaver™. When required, the battery cells can be easily removed and exchanged via the access panel.

The Communications Module enables:

- Multi-phase protection: Grouped Fusesaver™ can communicate with each other.
- The download of event log from the Fusesaver™.
- Manual operation using the Siemens Connect PC application or the exposed trip-and-close actuators under the module.
- Energy supply from the module's rechargeable battery if the line is dead.
- Integration into the smart grid via the utility's SCADA system with the use of a Remote Control Unit (RCU).

Communications Module

Remote Control Unit (RCU)

The RCU is an optional addition to the Fusesaver™ system. It allows an 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 short-range 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.

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
- Readout of fault data and line currents to assist with fault location
- Manual trip and close control of the Fusesaver™
- Download of event records and statistics for off-line analysis

Remote Control Unit

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.*

Features

- **Half-cycle switching (10 ms)**
- **Smart grid-ready with Communications Module**
- **Self-powered from low line current (as little as 0.15 A)**
- **Rechargeable battery back-up**
- **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
- **Configurable protection**
  - Multiple curves
  - Inrush restraint
  - Cold load protection
- **Unique compact design and lightweight (5.5 kg)**
- **Multiple mounting options**
  - Line clamping, cross-arm, pole mounting
- **SCADA connection via Remote Control Unit (RCU)**
  - DNP3 serial and IP communications protocol

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.

- 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.

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.

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

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EMMS-B90003-00-7600