



# Fusesaver™ circuit breaker

With O-CO functionality

Medium voltage

Many utilities worldwide have chosen to remove fuses from their overhead network entirely to address reliability, operator safety, and fire prevention concerns. In order to meet this requirement, Siemens is pleased to release a new range of Fusesaver models that provide an additional open operation in case the Fusesaver recloses onto a fault. The Fusesaver with O-CO functionality provides a new solution to improve rural networks reliability.

The fuse is no longer necessary to clear a permanent fault. **The Fusesaver with O-CO functionality is the ultimate fuse saver as the fuse is not required at all.**

This open-close-open (O-CO) operation sequence is enabled by a next generation electronics platform.

As the Fusesaver with O-CO functionality is a primary protection device and protection must be operational even when the line is not energized, it is mandatory for a communications module with on-board battery to be fitted to each Fusesaver with O-CO functionality. In light of this requirement, the communications module has also been upgraded with greater battery capacity. As part of this overall new electronics platform, a range of new features and performance enhancements have been implemented as follows:

Feature	Description
O-CO reclose sequence	The Fusesaver with O-CO functionality is capable of closing onto a fault, detecting the fault current and tripping again. Further, the Fusesaver with O-CO functionality runs protection even when a line is de-energized such that if a fault occurs it will trip with a single shot protection mode.
Normal and fast curves configurable for all protection operations	The Fusesaver with O-CO functionality maintains two fully configurable protection curves that can be applied to any protection trip.
Protection mode control improvements	The user now has much greater configurability of protection functionality depending upon status of the external lever. Not only can the protection curve be changed, but also the protection sequence and the three phase lockout and pseudo three phase trip functions can be enabled or disabled. The protection sequence can be configured to OFF, single shot or O-CO and this can be changed via SCADA control if a remote control unit (RCU) is installed.
Thermal-overload protection	Provides self protection against excessive load current. Thermal-overload protection is always active.
Fault-passage indication functionality	When a Fusesaver trips to lockout on a permanent fault, the LED of the communications module will blink every three seconds for a user defined period of time up to seven hours.
Radio-communications encryption	Encryption has been added to the peer-to-peer communications.
Increased battery capacity	The battery capacity in the communications module has been increased to improve service life.
Language support for Siemens Connect	Siemens Connect is now capable of supporting additional languages.
Capacity charging configurability	The user can now configure whether the capacitor charge shall always default to the battery when a communications module is fitted. This increases the battery life on lines with extreme numbers of line-current off events.
-40 °F (-40 °C) operation	The Fusesaver with O-CO functionality low-temperature operating range has been extended to -40 °F (-40 °C).

## O-CO Protection

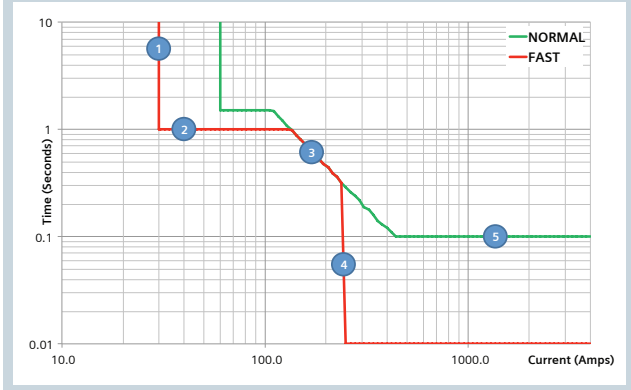
Each “O” of the O-CO can be set with either the NORMAL or FAST time-current curve. The first open of a sequence can be configured to be as fast as a half-cycle clearing time (10 ms) after contact part. This is also true when in a single-shot protection mode.

As the second “O” has had to close onto the line, latch, detect the fault, and then open, there is a minimum rated clearing time of 40 ms on this operation. Therefore, O-CO functionality cannot be used with a partner fuse. However, a policy file can be uploaded to the Fusesaver to allow traditional O-C functionality when used with a partner fuse.



## Time-current curve

The Fusesaver O-CO has a NORMAL and FAST protection curve. The inverse part of the curve (3) is defined by the  $i^2t$  of the fuse type the Fusesaver is replacing and is common to both curves. Additional configuration items required for each curve are the pick-up level (1), the maximum time element (2), the instantaneous multiplier (4), and the minimum time element (5).



## Ratings

The Fusesaver with O-CO functionality has been type tested in accordance with the applicable sections of the IEC: 62271-100 circuit breaker standard. The Fusesaver with O-CO functionality is available in two models dependent upon minimum line current, rated current and fault current capability:

Model Type		Standard range	High range
Minimum line current for self-powering	A	0.5	1.0
Rated current	A	100	200
Rated short-circuit breaking current $I_{sc}$	kA	4	4
Rated short-circuit making current $I_{peak}$	kA	10	10
Rated short-time current	kA	4	4
Rated short-time current duration	s	0.2	1.0
Rated line-charging current	A	10	10

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The standard-range and high-range Fusesaver with O-CO functionality are all available with the following voltage rating options:

Rated voltage	kV	15.5	27
Rated lightning-impulse withstand voltage	kV	110	125
Rated power-frequency withstand voltage	kV	50	60

The Fusesaver is suitable for use in outdoor environments with ambient temperatures in the range of -40 °F to +122 °F (-40 °C to +50 °C) and relative humidity in the range of 5 percent to 95 percent.

[www.usa.siemens.com/fusesaver](http://www.usa.siemens.com/fusesaver)

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