



SIEMENS

Fusesaver[®]

Medium-voltage circuit
breaker installation and
operation manual

usa.siemens.com/fusesaver

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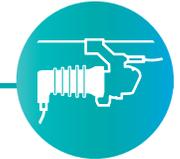
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1 Safety information



This manual provides installation, operation and testing procedures for the Siemens Fusesaver. Thoroughly read this manual before installing and operating your Siemens Fusesaver.

The information contained herein is general and not intended for specific application purposes. It does not relieve the user of responsibility to use sound practices in application, installation, operation, and maintenance of the equipment purchased.

Only qualified personnel who are familiar with this equipment should install or operate it.

1.1 Qualified person

For the purpose of this instruction manual, a qualified person is one who is familiar with the installation, construction or operation of the equipment and the hazards involved. In addition, this person has the following qualifications:

- Is thoroughly familiar with this manual.
- Is trained and authorized to switch, de-energize, clear, ground, and tag circuits and equipment in accordance with established safety procedures.
- Is trained in techniques to distinguish exposed energized parts from other parts of electric equipment and to determine the nominal voltage of exposed live parts.
- Is trained in the proper techniques to determine approach distances specified in the applicable local standards.
- Is trained in the decision-making process necessary to determine the degree and extent of the hazard and the personal protective equipment and job planning necessary to perform the task safely.
- Is trained in the proper care and use of protective equipment, such as rubber gloves, hard hat, safety glasses or face shields, flash clothing, etc., in accordance with established safety practices.
- Is trained in rendering first aid.

1 Safety information



1.2 Signal words

The signal words “DANGER”, “WARNING”, “CAUTION”, and “NOTICE” used in this manual indicate the degree of hazard that may be encountered by the user. These words are defined as:

DANGER

For the purpose of this manual and product labels, **DANGER** indicates an imminently hazardous situation which, if not avoided will result in death or serious injury.

WARNING

For the purpose of this manual and product labels, **WARNING** indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

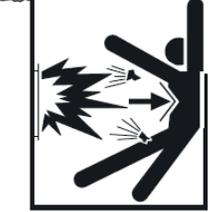
CAUTION

For the purpose of this manual and product labels, **CAUTION** indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

NOTICE

For the purpose of this manual and product labels, **NOTICE** indicates a potentially hazardous situation that, if not avoided, may result in property damage.

1.3 Safety instructions

	 DANGER
	Hazardous voltage – danger to life! Do not work on energized equipment. Always de-energize and ground the lines before working on the equipment.
	If live-line work must be performed, follow the requirements of local occupational health and safety regulations and employ personal protective equipment (PPE) suitable for the voltages involved. It is the user's responsibility to develop safe and adequate working procedures complying with these requirements. Fusesaver may be energized from either side. Always consider all parts as energized until they are de-energized, tested for absence of voltage and grounded.

1.4 Proper application

	 WARNING
	The correct Fusesaver model must be selected for the network application. Fusesaver is suitable for use on networks with phase-to-phase maximum voltage levels of 27 kV. The user must assess the potential load and fault current levels at the point of application and confirm these are within the capability of the Fusesaver model selected.

These instructions cannot cover all possible variations in equipment options, site specific restrictions, local procedures, and every contingency that may emerge during installation, operation or maintenance. When additional information is required to address any particular problem not adequately explained in this manual, please contact your local Siemens Service Center for further advice.

2 Packing and storage



2.1 Packaging

Each Fusesaver or Fusesaver kit is packaged in a cardboard box labeled with a contents list and the serial number of the Fusesaver.

To open the box, use a box cutter to cut through the sealing tape and then fold open the top flap to access the contents. All items in the box can then be easily removed. Other miscellaneous items such as mounting hardware are packed separately.

NOTICE

Do not open the box through the bottom flap as the box cutter can cause damage to the Fusesaver.

Typical Weights and Dimensions:

Package of line-mounted Fusesaver

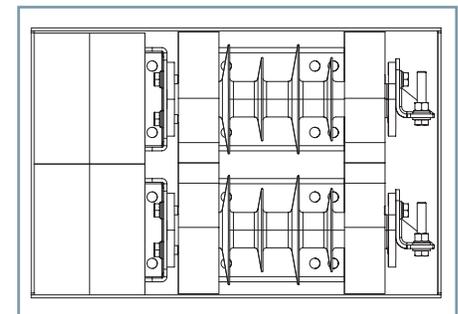
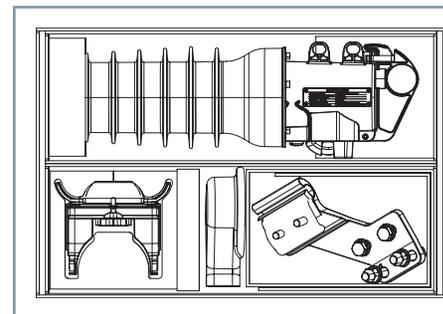
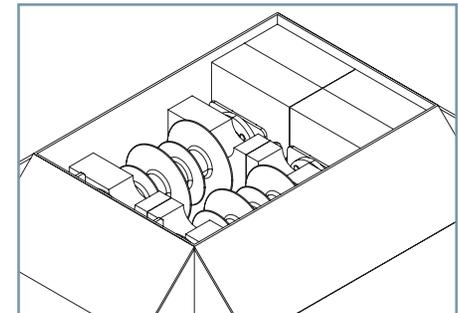
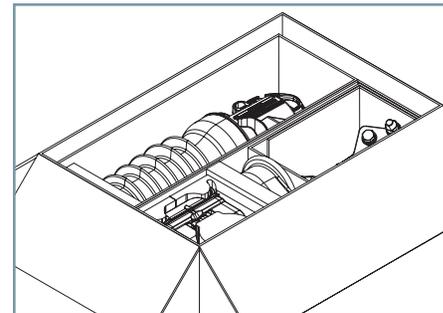
21.85" (555 mm) L x 14.37" (365 mm) W x 9.84" (250 mm) H

Approximately 18.73 lbs (8.5 kg) gross

Package of cross arm/pole-mounted Fusesaver

21.85" (555 mm) L x 14.37" (365 mm) W x 9.84" (250 mm) H

Approximately 27.56 lbs (12.5 kg) gross



2 Packing and storage



2.2 Receipt and handling of shipment

On receipt, the contents of each box should be checked for shipping damage, and the manufacturer informed immediately if any damage is evident:

- Check the cardboard box for shipping damage.
- Major damage must be documented photographically.

- Ensure that the transport company confirms any damage to the cardboard box.

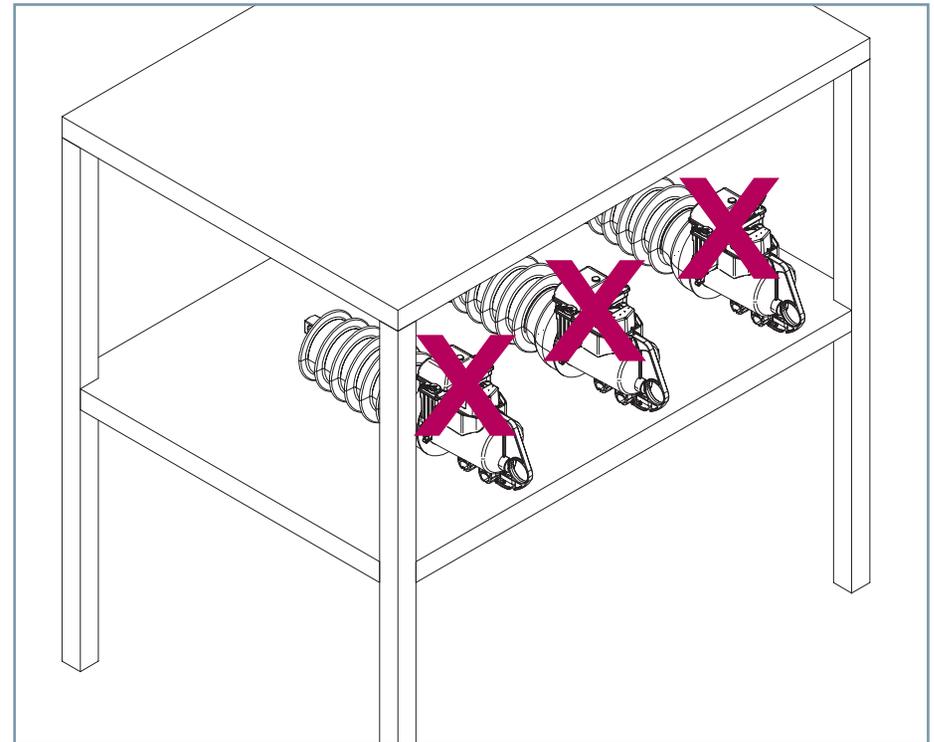
The Fusesaver box should be handled with care and protected from water exposure. Store in a clean and dry location.

NOTICE

Do not drop the Fusesaver or any of its parts or accessories.

NOTICE

Do not store the Fusesaver with the communications module connected. This will drain the battery in the communications module.



3 Workshop testing



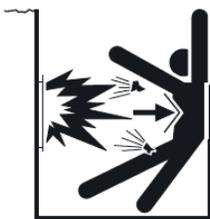
Every Fusesaver is inspected and tested at the factory before dispatch. No further testing by the end user is required. However, if the user has a policy to do confirmation testing before deployment, then the following inspection and test regimes are possible by suitably qualified personnel.

3.1 Dielectric test

To confirm the dielectric integrity of the vacuum interrupter the user can apply a 48 kV ac (50/60 Hz) voltage across the open contacts of the Fusesaver for 60 seconds.

Note that vacuum interrupters can experience self-extinguishing momentary breakdowns under high voltages. These momentary breakdowns do not indicate a loss of vacuum or failure of the test.

DANGER




Hazardous voltages are present during dielectric testing.

Contact with an energized unit under test will likely result in severe personal injury or death.

Dielectric testing should occur with a grounded test cage to provide a physical barrier between the technician and the equipment under test.

CAUTION



The vacuum interrupter may emit x-rays during dielectric testing.

X-rays may be hazardous to your health.

Dielectric testing should be conducted within a solid sheet metal cage made from ferrous material with a minimum thickness of 0.06" (1.6 mm). The technician should maintain a minimum 9.84 ft (3 m) distance to the Fusesaver under test.

3.2 Resistance of main circuit

To confirm the integrity of the primary current path the user can measure the resistance from terminal to terminal using a standard dc resistance meter with a minimum 10 A capability.

The recommended resistance measurement by model is as follows:

Model type		Low range	Standard range	High range
DC resistance	$\mu\Omega$	<8070	<1350	<390

3 Workshop testing



3.3 Communications module battery test

The communications module is available in two versions:

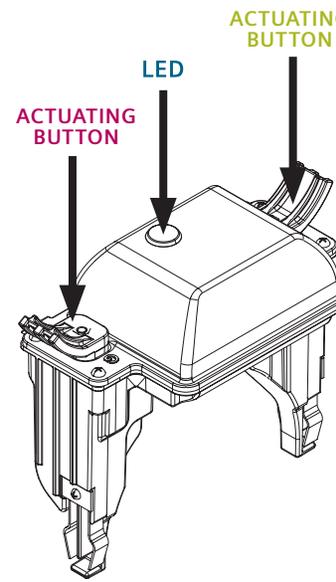
- Primary cell (non-rechargeable).
- Rechargeable.

NOTICE

Do not electrically probe the three gold plated pins as this may damage the communications module.

The user can check the battery charge level by pressing both actuating buttons (red and green) simultaneously of the communications module when separated from the Fusesaver.

Communications module battery test



Blinks	Charge	Primary cell	Rechargeable
0	Flat	DO NOT USE	DO NOT USE
1	Very low	DO NOT USE	Charge before use
2	Low	USE NOT RECOMMENDED	Charge before use
3	Marginal	OK to use – replace soon	Charge before use
4	Good	OK to use	OK to use
5	Full	OK to use	OK to use

The LED blinks once brightly and then rapidly while the test is underway. At the end of the test, the LED blinks a number of times to indicate the battery charge level. This blink pattern repeats three times. For example, the blink pattern for a battery with a "low" charge is: xx – 1s – xx – 1s – xx where "x" is a blink. Refer to section 6.2 for how to recharge batteries.

3 Workshop testing



3.4 Operations test

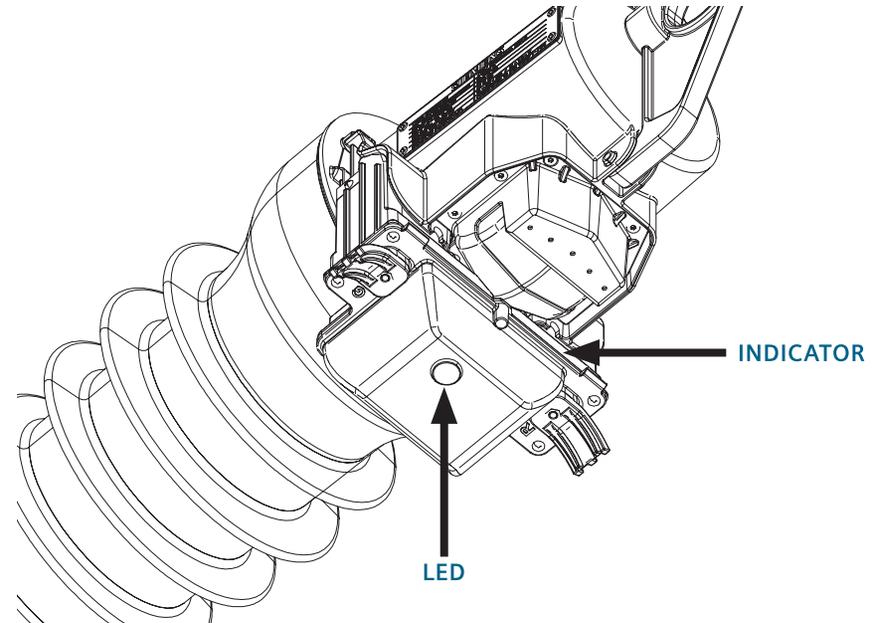
The user can conduct an operations test to confirm the Fusesaver can trip and close. Connect the communications module to the Fusesaver and wait until the LED blinks to confirm connection to the Fusesaver. To open the Fusesaver press the GREEN actuating button. To close the Fusesaver press the RED actuating button.

After pressing the applicable actuating button, the LED starts flashing. After the configured delay of up to 60 seconds, the Fusesaver operates. The indicator changes color to confirm the operation.

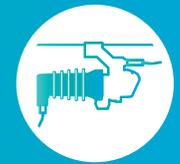
NOTICE

Conducting excessive operations or leaving the communications module connected to the Fusesaver for extended periods without primary line current drains the battery in the communications module.

Fusesaver operation



4 Installation procedure



Fusesaver installation can be achieved using live-line or dead-line (under isolation) processes.

4.1 Connecting cables

The preferred method for connecting to the Fusesaver is with a cable that has a two-hole NEMA palm crimped to one end. Aluminium cables and palms connected with galvanized steel bolts are recommended wherever possible. If the connecting cable is not aluminium, an appropriate bi-metallic lug classified for use with aluminium terminals is required.

The cable used to connect to the Fusesaver should have the following typical values by model type to achieve full current rating of the model:

Model	Aluminium	Copper
Low range	> AWG 2 (30 mm ²)	> AWG 5 (15 mm ²)
Standard range	> AWG 0 (50 mm ²)	> AWG 3 (25 mm ²)
High range	> AWG 0000 (100 mm ²)	> AWG 000 (70 mm ²)

The cable may be bare or insulated. Water blocking is not required. The same cable used to connect the fuse to the main line is normally adequate for connecting to the Fusesaver.

4.2 Fusesaver mounting

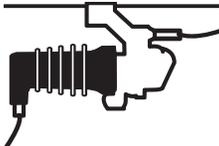
The Fusesaver is an electrically floating device so it requires no grounding and can be installed using three different approaches. In all cases, the Fusesaver should be mounted horizontally. For mounting options not covered here contact a Siemens Service Center.

The Siemens Service Center has available general arrangement drawings and solid models of various configurations of the following installation options, that the end user can utilize to create their customized pole top construction drawings.

4.2.1 Line mount installation

The most common method for mounting of the Fusesaver is to hang it directly from a suitably sized conductor. The line clamp assembly provides a mechanical mounting point and is not an electrical connection as it has an insulating sleeve between the clamp and the line. A cable is still required to provide an electrical connection from the Fusesaver terminal to the line.

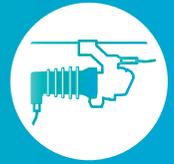
 **WARNING**



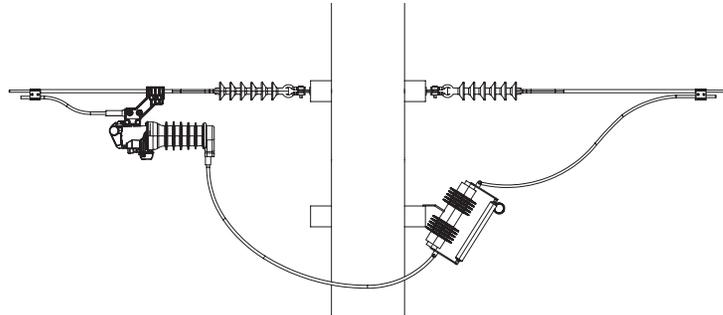
Do not hang the Fusesaver device from an undersized conductor. This may result in conductor fatigue and failure of the conductor.

It is the user's responsibility to determine whether the size and type of conductor or dead-end that the Fusesaver is being mounted from is mechanically capable of supporting the weight of the Fusesaver. As a guide, if the mounting of the Fusesaver causes a kink in the conductor, then the conductor is not suitable for line hanging of Fusesaver.

4 Installation procedure

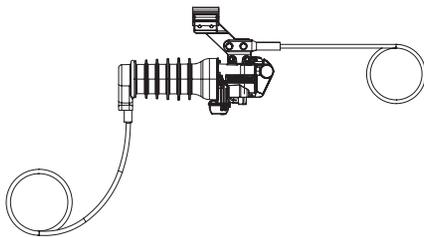


Line-mounted Fusesaver



Prepare the Fusesaver on the ground prior to installation by fitting the line clamp, connecting cables and birdguard as follows:

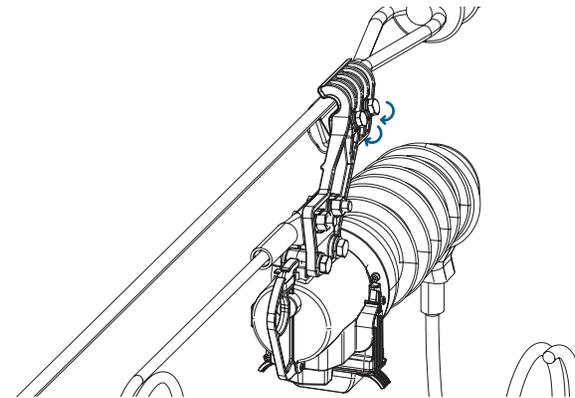
Fusesaver ready for installation



- Prepare the connection cable by cutting to length, stripping insulation as required and fitting a 2-hole NEMA palm to one end.
- Slide the birdguard over the connecting cable.
- Attach the connecting cables 2-hole palm lug to the Fusesaver and orient the connecting cable using 1/2" or M12 bolts (torque 30 lb-ft (40 Nm)).
- Stretch the flange of the birdguard over the first shed on the Fusesaver for the full circumference. The bird guard should grip the shed securely.
- Neatly coil the connection cables.

The Fusesaver assembly can now be installed to the line according to the following steps:

Clamping to dead-end

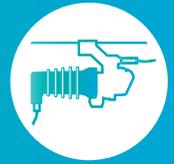


- Loosen the M10 bolts in the line clamp assembly. The plastic insulating sleeve is held in the line clamp assembly during fitment.
- Secure the Fusesaver with the line clamp assembly ensuring the plastic sleeve is seated on the conductor dead-end and tighten the M10 bolts (torque 15 lb-ft (20 Nm)).
- Uncoil and then secure the connection cable at the line clamp end onto the conductor with a parallel groove clamp (torque is marked on the parallel groove clamp) or other appropriate line connection device.
- Uncoil and then secure the other connection cable to the partner fuse or isolating link assembly.
- Conduct line energization process according to local rules and regulations.

NOTICE

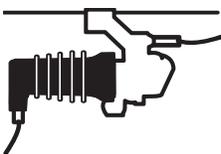
It is recommended to fit the Fusesaver to the conductor dead-end or to fit an armor rod over the conductor before connecting the Fusesaver.

4 Installation procedure

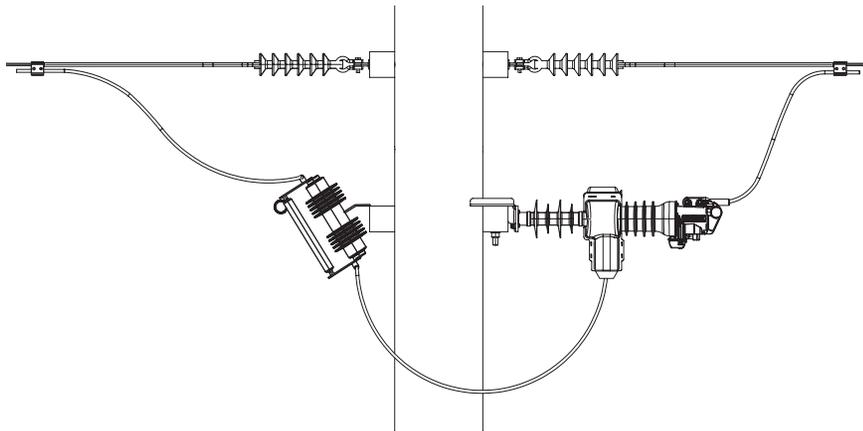


4.2.2 Cross-arm mount installation

In situations where line mounting is not possible, the Fusesaver can be mounted from the crossarm. The solution consists of a composite station post insulator with custom end brackets to facilitate connection to the Fusesaver and the crossarm. A wild-life guard is available to extend the effective creepage distance.

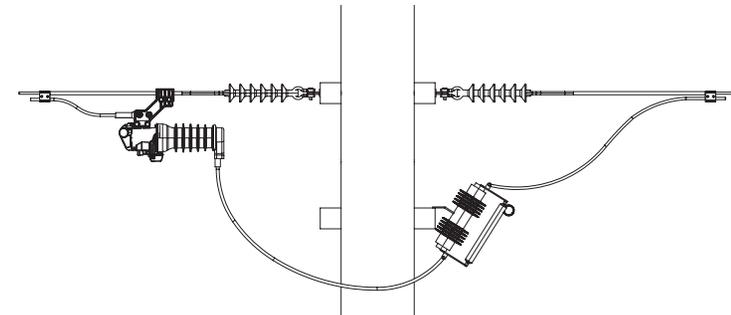
	<p style="text-align: center;">⚠ CAUTION</p> <p>Applying an excessive cantilever load on the Fusesaver will damage the product.</p> <p>The maximum cantilever load is 110 lbs (50 kg).</p> <p>Do not pull on the Fusesaver.</p>
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Cross-arm-mounted Fusesaver



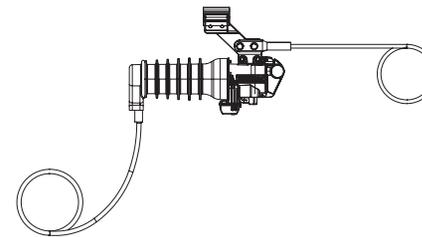
The crossarm mount is a standard composite station post insulator with custom end brackets suitable for connection to crossarm sizes: 3.94" x 2.95" (100 x 75 mm), 3.94" x 3.94" (100 x 100 mm), 4.92" x 3.94" (125 x 100 mm) or 4.92" x 4.92" (125 x 125 mm).

Line-mounted Fusesaver



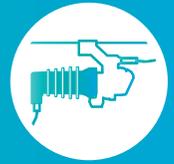
Prepare the Fusesaver on the ground prior to installation by fitting the line clamp, connecting cables and birdguard as follows:

Fusesaver ready for installation



- Prepare the connection cable by cutting to length, stripping insulation as required and fitting a 2-hole NEMA palm to one end.
- Slide the birdguard over the connecting cable.
- Attach the connecting cables 2-hole palm lug to the Fusesaver and orient the connecting cable using 1/2" or M12 bolts (torque 30 lb-ft (40 Nm)).
- Stretch the flange of the birdguard over the first shed on the Fusesaver for the full circumference. The bird guard should grip the shed securely.

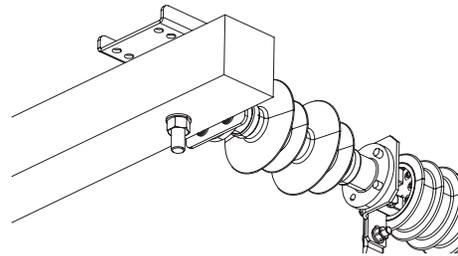
4 Installation procedure



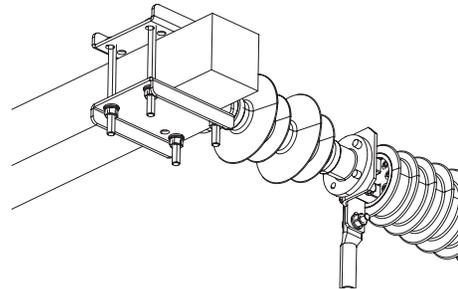
The Fusesaver assembly can now be installed to the crossarm as per the following steps:

- A. **Bolted connection (I):** Drill a vertical hole through the crossarm diameter 7/8" (22 mm). Attach the crossarm bracket with post insulator on the crossarm using 3/4" or M20 bolt (torque dependent on the material of the crossarm).
- B. **Fishplate connection (II) (optional):** Attach the crossarm bracket with post insulator on the crossarm with the fish plate using included 1/2" or M12 bolts (torque dependent on material of the crossarm but not more than 30 lb-ft (40 Nm)).

Bolted connection

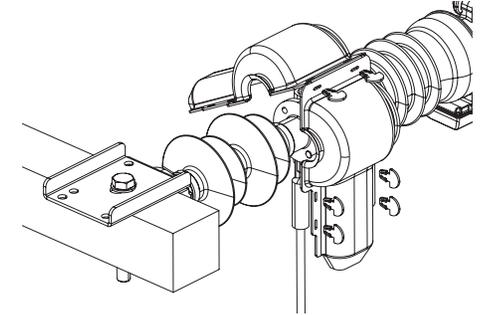


Fishplate connection

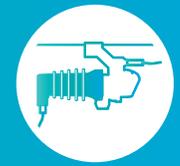


- C. Secure the connection cable on the conductor above the crossarm with a parallel groove clamp (torque is marked on the parallel groove clamp) or other approved line connection device.
- D. Uncoil and then secure the connection cable to the rating plate end of the Fusesaver.
- E. Uncoil and then secure the other connection cable at the crossarm side of the Fusesaver to the partner fuse or isolating link assembly.
- F. Fit the wildlife guard over the first shed of both the composite post insulator and the Fusesaver.
- G. Close the wildlife guard on the Fusesaver and secure in place using the plastic push mount fasteners. The wildlife guard should grip the Fusesaver tightly.
- H. Conduct line energization process according to local rules and regulations.

Wild life guard fitment

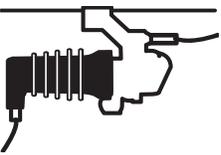


4 Installation procedure

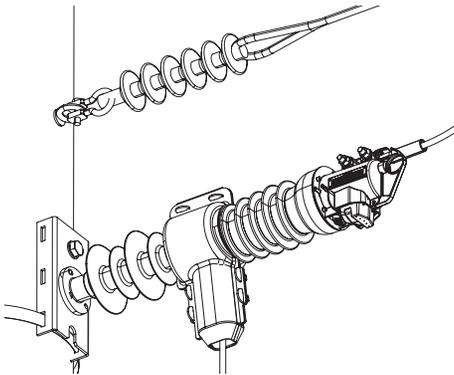


4.2.3 Pole mount installation

The Fusesaver can also mount directly on the pole using a variation of the crossarm mounting solution. The bracket on the earth end of the composite post insulator is designed for pole mounting. The wildlife guard is again recommended.

	<p>⚠ CAUTION</p> <p>Applying an excessive cantilever load on the Fusesaver will damage the product.</p> <p>The maximum cantilever load is 110 lbs (50 kg). Do not pull on the Fusesaver.</p>
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Pole-mounted Fusesaver



Prepare the Fusesaver on the ground prior to installation by fitting the Fusesaver to the pole mount assembly and attaching the connecting cables in the same way as per the crossarm mount assembly described previously.

The Fusesaver assembly can now be installed to the pole as per the following steps:

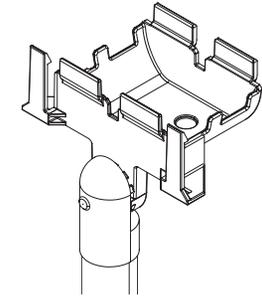
- Bolted Connection (I):** Drill two 7/8" (22 mm) diameter holes through the pole with 8" (200 mm) spacing. Attach the pole mount bracket to the pole using M20 bolts
- Bolt and strap (II):** Drill a 7/8" (22 mm) diameter hole through the pole. Attach the pole mount bracket to the pole via the upper hole using a 3/4" or M20 bolt. Fit strapping through the slots in the base of the bracket to the pole and tighten.
- Attach the connection cables and wildlife guard as per crossarm mounting described previously.

4.3 Communications module attachment/fitting

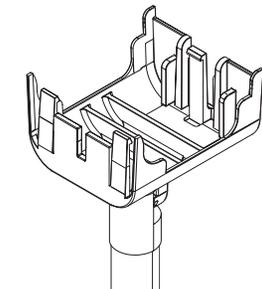
The communications module has been designed so that it can only be attached to the Fusesaver in the correct orientation and once in place holds itself with self-engaging locking tabs.

The communications module can be installed onto the Fusesaver before the Fusesaver is installed on the line or it can be installed and removed at any time later from ground level. Ground level attachment and removal is achieved with the use of the communications module attachment tool and a live-line tool (hot stick) with a universal splined head. A different attachment tool is required for the primary cell and the rechargeable battery versions of the communications module.

Primary cell attachment tool

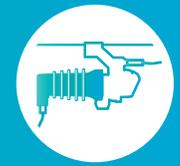


Rechargeable attachment tool



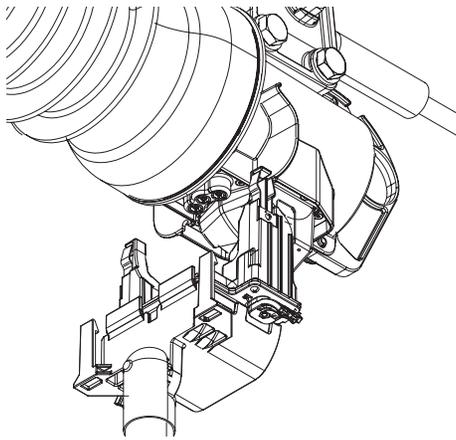
	<p>⚠ WARNING</p> <p>Falling objects may cause serious injury.</p> <p>When removing or installing a communications module use appropriate personal protective equipment including a hard hat.</p>
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4 Installation procedure



To install a communications module to a Fusesaver in service follow these steps:

Fitting communications module



- A. Fit the attachment tool to the universal splined head on a live-line tool (hot stick)
- B. Place communications module in the attachment tool.
- C. Lift communications module into the air and insert it into the Fusesaver.
- D. The attachment tool is then lowered away, and the communications module is left behind.

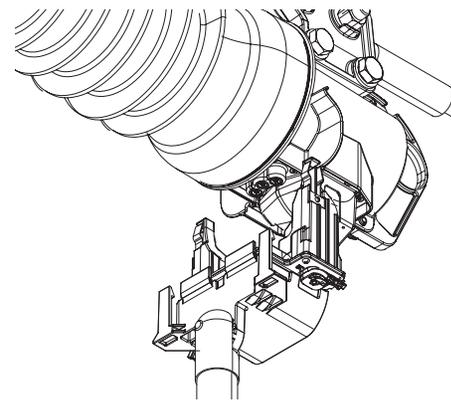
When a communications module is plugged into the Fusesaver it can take up to 40 seconds for the Fusesaver and communications module to discover each other. The LED on the underside of the communications module is flashed four times in quick succession to let the user know that this discovery has taken place.

To operate multiple Fusesavers in a ganged fashion, the site must have been configured to support this. After connection to the Fusesaver, the communications modules have to find each other over their short-range radio links and to bind together as a group, so that ganged operation is possible. It can take up to a minute after the last communications module is installed for the group to form.

When the group is formed, all Fusesavers in the group flash their LEDs with four bursts of three flashes. Therefore when installing communications modules to operate in ganged mode wait for at least one minute or until you see this LED pattern on the members of the group before pushing a trip or close actuator.

To remove a communications module from a Fusesaver in service, follow these steps:

Removing communications module



- A. Rotate live-line tool (hot stick) with attachment tool 180°.
- B. Raise the tool to engage the communications module.
- C. Lift the attachment tool into the air and insert it into the communications module.
- D. The latching arms catch on the mating feature in the housing of the communications module.
- E. Pull downwards with 10-20 lbs (5-10 kg) of force and remove the communications module from the Fusesaver.

4.4 Fusesaver configuration

The Fusesavers can be configured either before installation in the workshop or after installation as per operational preferences of the user. Refer to KFS-2035 manual for how to do this.

4.5 Fusesaver status check

As a final check after installation, configuration and line energization it is possible to connect to the Fusesaver wirelessly using the PC application "Siemens Connect". Refer to KFS-2035 manual for how to do this.

With this PC application, the user can check the line current flowing through the Fusesaver, confirm that the protection is running and that the Fusesaver is otherwise functioning as expected before leaving the site.

5 Operation



5.1 Automatic operation

When in the closed state the Fusesaver operates automatically to clear faults on the line as per the user-configured settings. Refer to KFS-2034 manual for details on Fusesaver configuration options.

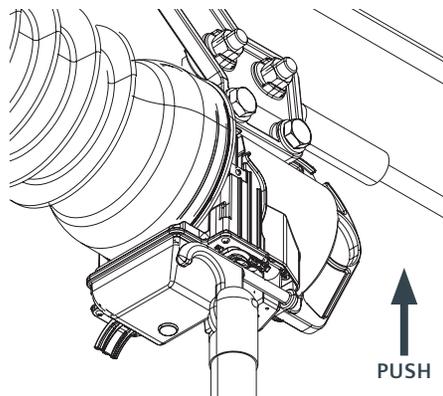
5.2 Manual operation

The communications module is fitted with two actuators. When operated by pushing upwards, the Fusesaver opens or closes. The actuators are color coded:

Color	Operation
Green	Opens the Fusesaver
Red	Closes the Fusesaver

Note that by special order these colors can be reversed.

Operation of actuators



After pushing an actuator, there is a time delay before the Fusesaver operates. The delay is configurable from 0 to 60 seconds for an open and fixed at 60 seconds for a close.

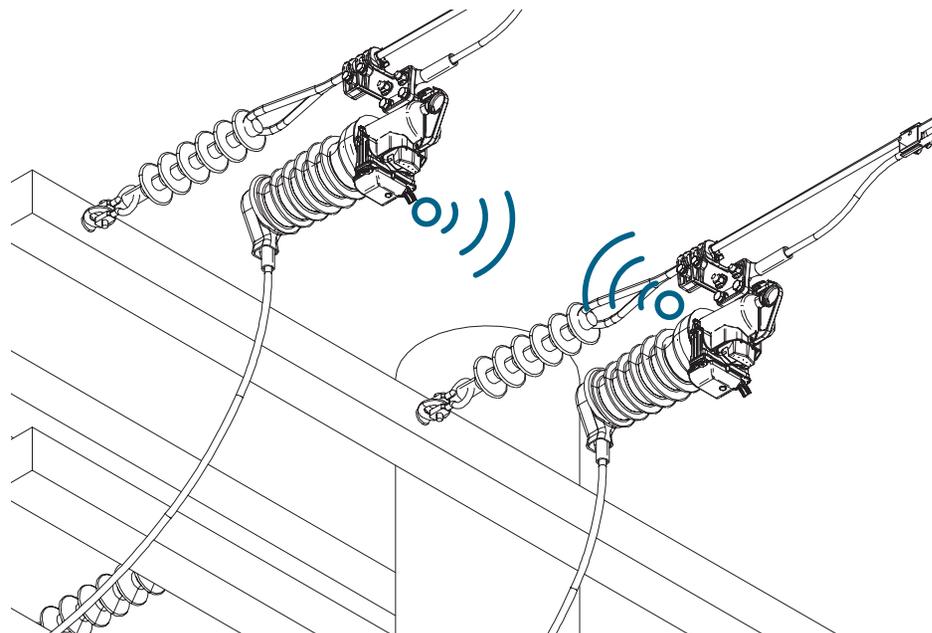
When an actuator has first pushed the LED on the communications module flashes for several seconds at a fast rate to let the user know that the operation has been requested. Once the operation is scheduled, the LED keeps blinking confirming the trip or close instruction is pending. If the action is rejected, then the LED stops blinking. Reasons for rejection might include that the Fusesaver is already in the requested state or because the external lever is pulled down.

Once scheduled, the action can only be cancelled by use of the external lever on the Fusesaver subject to the configuration setting. Cancellation only applies to the Fusesaver whose lever is pulled down.

When multiple Fusesavers are used on a two or three phase line, they can

be configured so that pushing the actuator on one communications module operates all the Fusesavers on the line as if the actuators have been pushed on all three at the same time. This is achieved by the communications modules using their radios to communicate with each other.

Ganged manual operation



5 Operation



5.3 Electrical isolation

The Fusesaver can be used to open the circuit and de-energize the line after which another device can be used to provide electrical isolation.

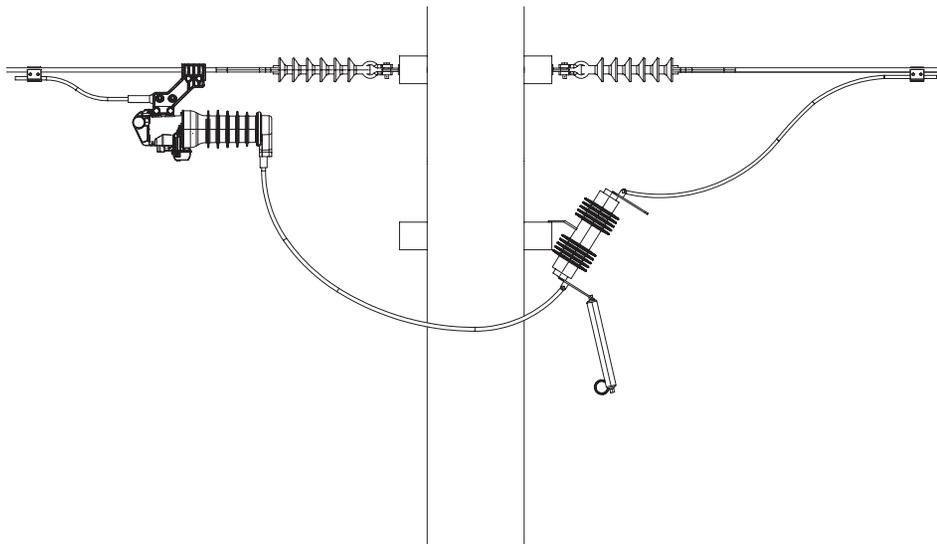
For example:

- Disconnecting or removing bridges at the birdguard end to provide

the visible air gap for the applicable system voltage;

- opening adjacent fuses or isolating links; and
- opening nearby air break switches.

Electrical isolation



NOTICE

It is the responsibility of the user to ensure the installation method and isolation distances achieved comply with local regulations and good practice.

5.4 External lever

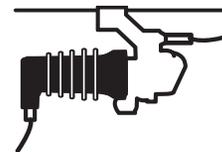
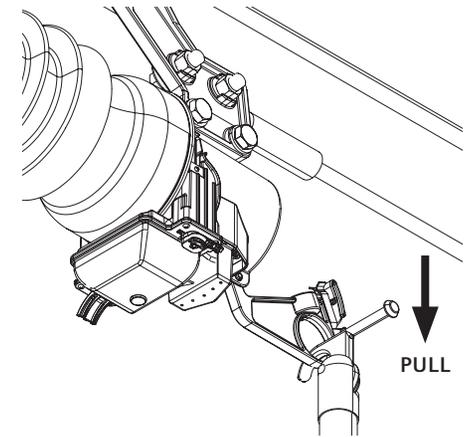
The external lever is used by an operator to change the way a Fusesaver works for operational reasons such as live line working. The effect of pulling the lever down is determined by configuration (refer KFS-2034 manual for options).

The effect is in three areas:

- Protection mode
- Manual operation
- SCADA control.

When the lever has changed state, the LED light blinks ten times in five seconds to confirm to the operator that the Fusesaver has recognized the lever position change.

External lever operation



CAUTION

Do not pull down the lever with excessive force. The lever fully operates when it is in the horizontal position.

5 Operation



5.5 Fault passage indication

The Fusesaver has a configurable fault passage indication function that causes the LED to flash for a specified time after the Fusesaver detects or operates on certain fault types. The LED blinks with a steady ON-OFF pattern until either the configured time-out occurs or the local operator closes the Fusesaver.

If the Fusesaver has tripped to lockout, then the LED is powered by the communications module battery.

5.6 Fusesaver event data

While in service a local user can connect to the Fusesaver wirelessly using the PC application Siemens Connect. Refer to KFS-2035 manual for how to do this. With this PC application, the user can check the operation status of the Fusesaver, view last fault data and download the event log.

6 Maintenance



The Fusesaver has been designed for a mechanical life of 2,000 reduced maintenance operations.

This section describes the tasks a user may need to perform on a Fusesaver installation in service.

6.1 Firmware updating

Both the Fusesaver and communications module have firmware to control their operation. Siemens regularly releases updated firmware that supports new features and provides stability and performance enhancements.

While in service a local user can connect to the Fusesaver wirelessly via the communications module and upload new firmware using a dedicated PC application. Refer to KFS-2035 manual for detailed instructions.

NOTICE

During firmware updates the Fusesaver protection is deactivated. Ensure upstream protective devices are available to provide back-up protection in case of a downstream fault.

6.2 Battery replacement

Both the primary cell and rechargeable battery options use highly stable and long life lithium-based chemistries. Despite the long life of these chemistries, it is likely that they require replacement over the asset life of the Fusesaver.

A user can monitor the estimated remaining battery charge by connecting wirelessly to the Fusesaver using the Siemens Connect PC application.

Remove and replace the communications module from the Fusesaver in service according to section 4.3.

6.2.1 Primary cell communications module

The Primary cell communications module has built-in sealed for life non-rechargeable batteries that provide an estimated 10-year life subject to appropriate site selection. Sites with inadequate line current to power the Fusesaver or that have a high number of faults may deplete the battery sooner.

When the battery is depleted, the entire communications module must be replaced. It is not possible to replace the battery cells.

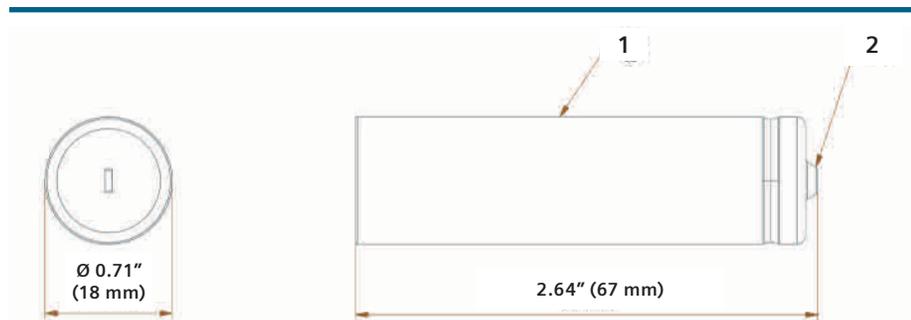
6.2.2 Rechargeable communications module

The rechargeable communications module battery has a life of approximately eight years subject to operating temperature (sustained high temperature reduces life). When the batteries are at end-of-life, the user can replace the battery cells. Replacement batteries can be ordered from a local Siemens office or a local battery supplier but must meet the following specification.

6 Maintenance



Battery specification



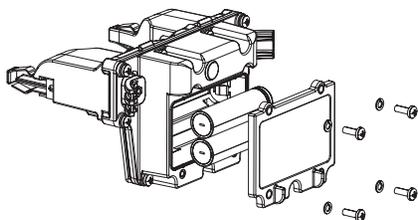
1) Molicel lithium-ion battery (18650, 3.6 V, 2000 mAh).

2) Contact nipple to be welded to positive terminal by specialist battery manufacturer.

	CAUTION
	<ul style="list-style-type: none">• Siemens does not approve the use of alternative battery types.• This battery MUST NOT be used without the nipple fitted.

Replace the battery cells according to the following procedure:

Battery replacement



- Remove the battery compartment cover by undoing the four screws.
- Remove the battery cells from their holder.
- Fit new cells while ensuring correct polarity.

- Press both actuators and conduct a battery test according to section 3.3 and confirm batteries are adequately charged.
- Check and clean battery cover compartment seal.
- Fit battery compartment cover by tightening screws.

- Reset the battery life by holding down the GREEN lever for 10 seconds. LED blinks 3 times quickly to confirm battery life is reset.
- If required, connect a charger to recharge batteries.
- Communications module is ready for return to service.

6.3 Battery charging

The battery cells in the rechargeable communications module can be recharged using a standard off-the-shelf battery charger suitable for 18650 lithium-ion cells.

- Remove the battery cells from the rechargeable communications module.

- Charge the battery cells using the bench charger and according to the instructions of the charger unit.
- Fit the battery cells back into the communications module taking care to get the polarity correct.
- Fit the cover and tighten the screws ensuring the seal is correctly seated.

NOTICE

Recharging of the batteries in the primary cell communications module is not possible.

6 Maintenance



6.4 Fusesaver replacement

Typically a Fusesaver would only need replacement if it has exceeded its electrical life or has had an internal failure.

NOTICE

The Fusesaver device has no user-maintainable or serviceable elements. Disassembly of the Fusesaver device is not required and voids the Siemens warranty.

If the vacuum interrupter is worn out the Fusesaver will need replacement. The wear of the vacuum interrupter is calculated by the Fusesaver micro-processor and reported through the Siemens Connect PC application.

In case of Fusesaver failure, the device should be removed from service and returned to the factory for investigation.



WARNING

Stored electrical energy inside Fusesaver

The Fusesaver contains stored electrical energy in capacitors inside the unit. These capacitors could have voltages of 170 V dc. Maintenance should be performed only by factory approved Siemens personnel.

The use of unauthorized parts in the repair of the equipment or tampering by unqualified personnel may result in dangerous conditions which could cause death, severe injury, or equipment damage.

- When a replacement of a single Fusesaver from a multi-phase installation is required, the user should follow these steps:
- A. Wirelessly connect to the Fusesaver's in the line using the "Operate an Existing Installation" tab of the Siemens Connect PC application and download the event log if possible.
 - B. Dismount the Fusesaver to be replaced using the reverse process to installation as described in section 4.2. Remove the communications module from the affected Fusesaver.
 - C. Wirelessly connect to the remaining Fusesaver's in the line using the "Change an existing installation" tab of the Siemens Connect PC application and unconfigure the Fusesavers.
 - D. Install the replacement Fusesaver according to instructions in section 4.2.
 - E. Wirelessly connect to ALL Fusesaver's in the line using the "Setup a new installation" tab of the Siemens Connect PC application and configure the Fusesavers.

NOTICE

When configuring the line, it is recommended to use a new "Line Name" or add a revision to the line name that a new event file is created. If the same line name is used, it is likely that the event file gets corrupted.

Alternatively, after downloading the previous event file, this file can be renamed before configuring the Fusesavers.

6 Maintenance



6.5 Return an item

If a Fusesaver is faulty, please contact your local Siemens Service Center to organize for return, investigation and repair as required.

6.6 Spare parts

To ensure that the Fusesaver operates reliably, spare parts must be replaced only by trained and certified personnel. To order spare parts, a MLFB ordering code is required – please contact the Siemens Service Center.

6.7 Manufacturer's product liability

The manufacturer's product liability shall be excluded if at least one of the following criteria applies:

- Original Siemens spare parts are not used.
- Fitters carrying out replacements have not been trained and certified by Siemens. Parts have been incorrectly fitted or adjusted.
- Settings are not made in accordance with Siemens specifications.
- After installation and setting, no final test is performed with authorized person including documentation of the test results.

6.8 Fusesaver disposal

The materials of the Fusesaver are recyclable. Disposal of the Fusesaver with minimum environmental impact is possible on the basis of existing legal regulations.

- The metal components can be recycled as mixed scrap, although wide-ranging dismantling into sorted scrap and mixed scrap residues is more environmentally sustainable.
- Electronic scrap must be disposed of in accordance with applicable regulations. All electronic modules in Fusesaver are ROHS compliant.

The Fusesaver consists of the following materials:

- Steel
- Aluminium
- Copper
- Plastics

- Rubber materials
- Ceramics
- Electronic boards.

If the packaging is no longer needed, it can be fully recycled.

	⚠ WARNING
	Stored electrical energy inside Fusesaver The Fusesaver contains stored electrical energy in capacitors inside the unit. These capacitors could have voltages of 170 V dc. Maintenance should be performed only by factory approved Siemens personnel. Do not disassemble the Fusesaver without seeking guidance from the Siemens Service Center as the operator may be exposed to these dangerous voltages.

6.9 Battery disposal

Material safety data sheets and regulatory guides for the batteries are available for download in the Siemens Outdoor Systems Data Management Cloud via authenticated user login at <https://sosdmc.siemens.cloud>

These documents provide guidance on hazardous waste categorization, recycling and disposal.

In general, lithium batteries are considered non-hazardous waste when undamaged and the batteries are spent. Batteries involved in a fire may be considered to be hazardous waste.

The batteries contain recyclable material and recycling is encouraged.

7 Troubleshooting



Refer to the FAQ page on the Siemens Outdoor Systems Data Management Cloud site at <https://sosdmc.siemens.cloud/> for the latest troubleshooting guide.

User access authentication required.



	WARNING
	<p>Stored energy. Can cause death, serious injury, or property damage.</p> <p>Mechanisms contain stored energy, which may be released during disassembly.</p> <p>Wear suitable protection and take appropriate precautions when disconnecting and removing moving parts.</p>

	WARNING
	<p>Heavy objects. Can cause death or serious injury.</p> <p>Disassembly may cause an unbalanced load, and could result in falling objects.</p> <p>Take appropriate precautions in a properly designated workspace to maximize support and stability.</p>

Siemens equipment is environmentally friendly product predominantly consisting of recyclable materials. For disposal, some disassembly, separation, and professional services handling may be required.

Materials to be handled include but are not limited to:

- Metals: Should be transferred and recycled as mixed scrap metals.
- Plastics: Plastic containing a recycle symbol should be recycled. Plastic lacking the recycle symbol should be discarded as industrial waste.
- Small electronics, insulated cables, and motors: Should be recycled via electronics scrap disposal companies specialized in separating and sorting as described above.
- Batteries: Should be recycled via a recycling company.

Disposal regulations vary from locality to locality and may be modified over time. Specific regulations and guidelines should be verified at the time of waste processing to ensure that current requirements are being fulfilled. For specific assistance in understanding and applying regional regulations and policies or manufacturer's recommendations, refer to the local Siemens service representative for additional information.

Legal Manufacturer

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