Troubleshooting

Problem: AFCI trips shortly after it has been turned on.

Possible Cause	*Solution*
The arc-fault circuit interrupter is not wired properly. *(Yellow trip indicator will be visible)*	Check that the load power wire, panel neutral (pig-tail) wire and load neutral wire are properly connected.*
Overloaded circuit	If the yellow electronic trip indicator is not visible, there are probably too many devices plugged into the circuits and overloading the AFCI.
An arc-fault condition exists *(Yellow trip indicator will be visible)*	Turn off all branch circuit loads. If the AFCI trips with all loads off, de-energize load center, disconnect load side wire from the AFCI. If the AFCI does not trip with load side wires disconnected, check branch circuit wiring for an arcing condition. If the AFCI does not trip with all loads off, turn on one device at a time until the AFCI trips. Check the energized device for arc-fault.*

Problem: AFCI trips immediately after the AFCI or a connect device has been turned on.

Possible Cause	*Solution*
The arc-fault circuit interrupter is not wired properly. *(Yellow trip indicator will be visible)*	Check that the load power wire, panel neutral (pig-tail) wire and load neutral wire are properly connected.
Overloaded circuit	There are probably too many devices plugged into the circuits and overloading the AFCI.*
Short circuit	If the AFCI trips when a device is turned on, remove the device from the circuit and turn the AFCI on. If the AFCI does not trip this would indicate a short in the device.*
AFCI does not have a dedicated neutral *(Yellow trip indicator will be visible)*	Check wiring to ensure that there are no shared neutral connections.
A ground-fault condition exists *(Yellow trip indicator will be visible)*	A quick way to check for ground-fault conditions is to substitute a GFCI circuit breaker in place of the AFCI. If the GFCI trips, then you have a ground-fault condition. A common ground-fault is a grounded neutral. This occurs when the neutral conductor contacts a grounded conductor, so check your junction box and fixture connections.
An arc-fault condition exists *(Yellow trip indictor will be visible)*	Turn off all branch circuit loads. If the AFCI trips with all loads off, de-energize the load center, disconnect load side wire from the AFCI. If the AFCI does not trip with load side wires disconnected, check branch circuit wiring for an arcing condition. If the AFCI does not trip with all loads off, turn on one device at a time until the AFCI trips. Check the energized device for arc-fault.*

* A qualified electrician should make the repairs.

Replace AFCI circuit breaker, if these solutions do not work.

- *Electronic Trip Indicator*
  A yellow flag will display in the window next to the circuit breaker handle to indicate that the Siemens AFCI tripped due to a fault condition. If the circuit breaker trips due to an overload or short circuit condition, the flag will not be visible. This feature is sure to reduce troubleshooting time for the contractor.
- *Shorter Housing*
  The AFCI housing has been shortened by 3/4" for easy installation access to the panel neutral bar.
- *Neutral and Load Terminal Identification*
  The new Siemens AFCI uses a yellow chromate (gold) slotted Robertson screw for the load terminal, and a clear chromate (silver) slotted screw for the neutral terminal.

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What Is An Arc-Fault?

An arc-fault is an unintentional discharge of electricity in a circuit. Arcing exists in two basic varieties:

natural, or normal occurring arcing
occur when a light is switched on or a vacuum cleaner or any motor driven appliance is turned on, and

unsafe arc-faults
occur either as series or parallel faults in wire, electrical devices or connected loads

Arcing faults, which can and generally do go undetected, can reach extraordinarily high temperatures–upwards of 9,000 degrees Fahrenheit. The heating of surrounding materials creates a carbon remnant that acts as a high impedance conductor. As the carbon path extends, the by-products of the arc increase the available fuel source, magnifying the likelihood of a fire.

Problems in home wiring, like arcing and sparking, are associated with more than 40,000 home fires each year. These fires claim over 350 lives and injure 1,400 victims annually.
Consumer Product Safety Review, Volume 4, Summer 1999

What Causes An Arc-Fault?

Arc-faults may occur anywhere in the home's electrical system as a result of:

- Worn electrical insulation or damaged wire
- Misapplied or damaged plug-in appliance cords and equipment
- Loose electrical connections
- Accidentally piercing electrical cable behind drywalls with drill bit, nail or screw
- Hammering electrical cable staples too tightly into studs during rough wiring
- Natural aging and cord exposure to heat vents, sunlight, or foot traffic

There are many causes for arc-faults, and the results can be disastrous

What Are Arc-Fault Circuit Interrupters (AFCIs)?

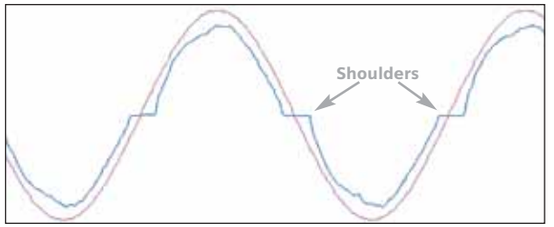
When an unwanted arcing condition is detected, an AFCI de-energizes the circuit, and reduces the potential for a fire to occur.

Traditional circuit breakers are only intended to respond to overloads and short circuits. Ground-fault circuit interrupters (GFCIs) are an effective means of preventing severe electrical shock by detecting loss of current in a circuit, but do not protect against arcing conditions that produce erratic current flow. An AFCI provides a new level of protection not offered by either of these devices.

How Do AFCIs Work?

Siemens AFCIs employ electronic circuitry to continuously monitor the circuit and detect the unique characteristics of arcing. Arc-faults are identifiable by the interruption of current in a circuit. This interruption will be displayed as "shoulders" in the current waveform.

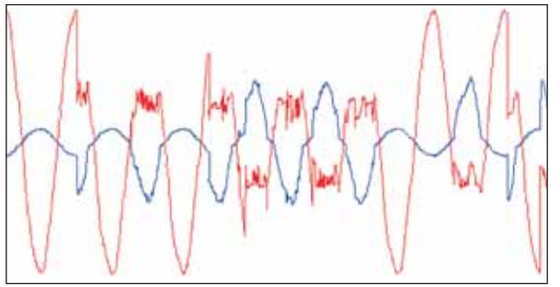
Characteristics Of Arcing Current



Normal Current *Arcing Condition*

Arcing often occurs intermittently in each half cycle of the voltage waveform. The complex arcing event causes sputtering arcs that vary the current from normal load patterns.

Sputtering Arc From Cut Electrical Cord

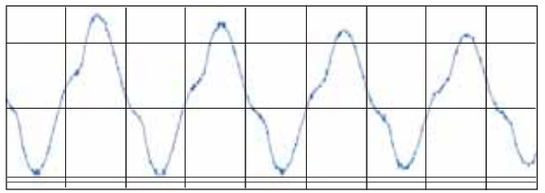


Voltage *Current*

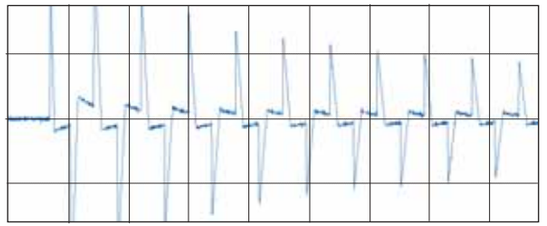
What About Nuisance Tripping?

Connected loads, such as fluorescent lighting, motors, dimmers and switches, may have inherent arcing as a normal mode of operation. The Siemens AFCI is designed to distinguish these arcing faults from hazardous arcing faults by monitoring the intensity, duration, and frequency of the arcing fault.

Vacuum Cleaner



Dimmer



Siemens AFCIs have been tested with a wide variety of products, including fluorescent lights, hand drills, vacuum cleaners, hair dryers, dimmers, and other appliances containing electric motors to make sure they will not nuisance trip and the loads do not mask the presence of an arc.

NEC Requirements

Requirements of the 1999 National Electrical Code® Article 210-12 (B):

"Dwelling Unit Bedrooms. All branch circuits that supply 125 volt, single phase, 15 and 20 ampere receptacle outlets installed in dwelling unit bedrooms shall be protected by an arc-fault circuit interrupter(s)."

Requirements of the 2002 National Electrical Code® Article 210-12 (B):

"Dwelling Unit Bedrooms. All branch circuits that supply 125 volt, single phase, 15 and 20 ampere receptacle outlets installed in dwelling unit bedrooms shall be protected by an arc-fault circuit interrupter listed to provide protection of the entire branch circuit."

Analysis of the change–extends arc-fault circuit interrupter protection to all outlets in dwelling bedrooms, as well as requiring protection of the entire branch circuit.

Check with your local authority to confirm requirements in your area.

Technical Specifications

Siemens AFCI circuit breakers are UL listed per Standard 1699 and meet the requirements of the National Electrical Code Section 210-12. These devices provide the normal overload and short circuit protection that all circuit breakers provide and in addition they provide the added protection against arc faults.

Other Applications

You should also consider adding AFCI protection to existing homes. Older homes with standard circuit breakers may benefit from the added detection of arcing that can occur in aging electrical systems. Siemens AFCI circuit breakers easily replace any single pole 15 or 20 amp circuit breaker in the load center.

Selection Information

1-Pole, 120V AC, 60 Hz

Ampere Rating	Catalog Number	AIC	Std. Master Ctn. Qty.	Std. Master Ctn. Wt.	Wire Range
Plug-In AFCIs					
15	**Q115AF**	10K	1/10	.5/15	#14-#8
15	**Q115AFH**	22K	1/10	.5/15	#14-#8
20	**Q120AF**	10K	1/10	.5/15	#14-#8
20	**Q120AFH**	22K	1/10	.5/15	#14-#8

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