Accurately and quickly diagnose and stop arc faults



AFCI pocket guide

www.usa.siemens.com/afci

SIEMENS

Plug-on Arc Fault Circuit Interrupter part numbers

Type	Poles	Amperage	Interrupt rating	
			10k AIC	22k AIC
Combination Type	1	15	Q115AFC	Q115AFCH
		20	Q120AFC	Q120AFCH
	2	15	Q215AFC	Q215AFCH
		20	Q220AFC	Q220AFCH
Branch/ Feeder	1	15	Q115AF	Q115AFH
		20	Q120AF	Q120AFH
	2	15	Q215AF	Q215AFH
		20	Q220AF	Q220AFH

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National Electric Code® Progression

1999 NEC®

- Listed AFCI future requirement in code
  - Allows Branch/Feeder AFCI
- January 1, 2002: bedroom receptacles

2002 NEC®

- Listed AFCI in ALL bedroom circuits
  - Allows Branch/Feeder AFCI

2005 NEC®

- Combination Type AFCI in bedroom circuits
- Branch/Feeder AFCI permitted until January 1, 2008

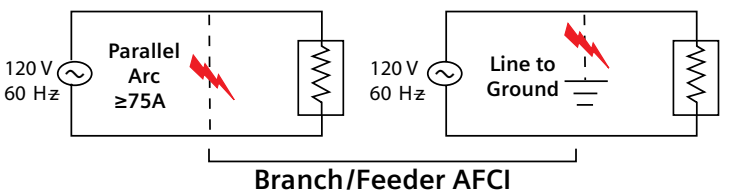
2008 NEC®

- Combination Type AFCI (CAFCI)
- Expand to 1 pole, 15 – 20A circuits installed in family rooms, dining rooms, living rooms, parlors, libraries, dens, bedrooms, sunrooms, recreation rooms, closets, hallways, or similar rooms or areas

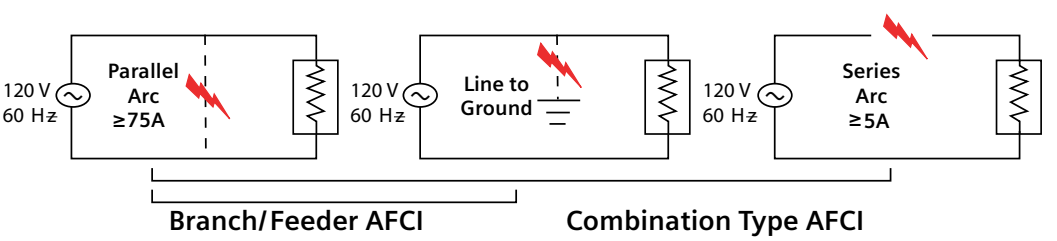
Comparison

Combination Type AFCI

- Provides protection against the high-energy parallel (line-to-neutral and line-to-ground) arcing and low-energy series arcing.②
  Combination = parallel + series arcing
- Protects downstream branch circuit wiring, cord sets, and power supply cords.



The Branch/Feeder AFCI can only detect line-to-neutral and line-to-ground arcing faults, as illustrated above.



A Combination Type AFCI detects all three types of arcing: line-to-neutral, line-to-ground, and series arcing. The Combination Type AFCI differs from the Branch/Feeder AFCI in its ability to detect series arcing faults.

② Branch/Feeder AFCI only protects against high energy arcing

Combination Type AFCI does not equal AFCI + GFCI:

While AFCIs do detect arcing to ground, they do not offer the same level of protection provided by GFCI circuit breakers.

GFCIs are designed to protect life and property, so they will trip at low energy events (5mA level for personnel protection and 30mA for equipment protection).

AFCIs are designed for fire protection, so they trip at a much higher energy level (~50mA). This level of energy can be very dangerous for people and equipment, so additional protection is required for applications with a high risk of ground faults.

LED indication guide

1-pole CAFCI LED indication guide

LED indicator		Last known trip condition
LED (A)	LED (B)	
OFF	OFF	Overcurrent
ON	OFF	Arc fault
ON	ON	Arc fault to ground

2-pole CAFCI LED indication guide

LED indicator			Last known trip condition
Yellow 1	Yellow 2	Yellow 3	
OFF	OFF	OFF	Overcurrent
ON	OFF	OFF	Arc fault (Leg A)
OFF	OFF	ON	Arc fault (Leg B)
ON	ON	ON	Arc fault to ground

Combination Type AFCI troubleshooting procedure

Siemens has developed a step-by-step troubleshooting procedure that simplifies the process of diagnosing the cause of AFCI trips. See instruction sheet at www.usa.siemens.com/afci for more details. An abbreviated procedure is listed below:

1. Check AFCI wiring
   - Load power, load neutral, and panel neutral (pigtail)
   - Multi-wire branch circuits used on single pole AFCI (dedicated load neutral wires required for single pole AFCIs)
   - Check all connection points for neutral-to-ground connections
2. If load(s) present:
   - Disconnect all loads
   - Re-connect and re-energize each load, one at a time
3. If no load present:
   - Disconnect AFCI load side wires and re-energize AFCI (panel neutral (pigtail) must remain connected)

Siemens Branch/Feeder AFCIs utilize a single trip window that distinguishes between an arcing event and an overcurrent condition as the reason for the last known trip condition. This window is permanently reset each time the AFCI is reset.

Intelli-Arc™ set-up instructions

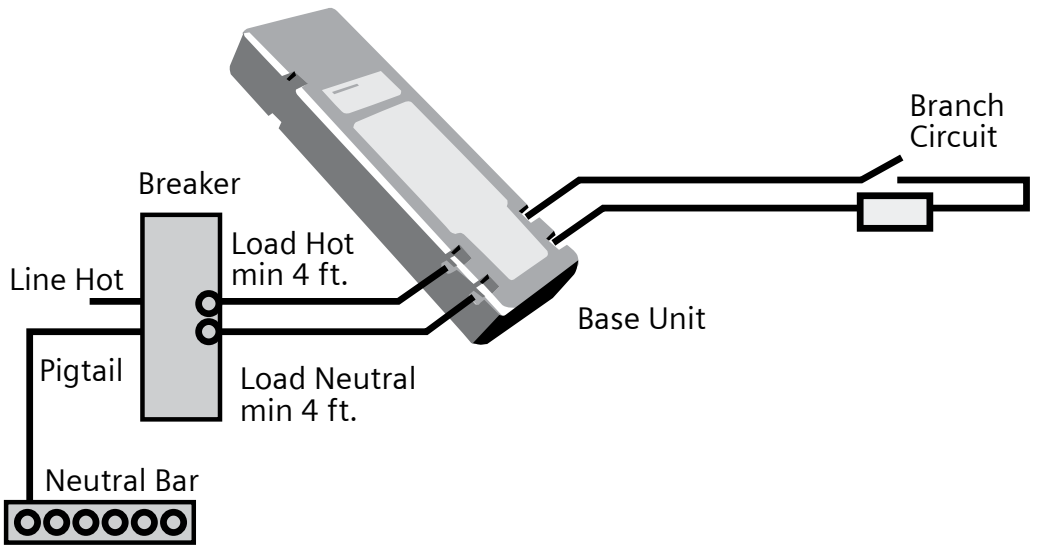
1. Turn “OFF” and lock out the power to the equipment in which the Arc Fault Diagnostic Tool is to be connected.
2. Move the handle of the breaker on the circuit to be analyzed to the “OFF” position. This circuit breaker serves as the disconnect device tor the Arc Fault Diagnostic Tool.
3. Remove the load side hot and neutral wires from the breaker of the branch circuit to be tested. Panelboard neutral (pigtail) wire must remain connected to panel neutral bar.
4. Connect the two wires removed in step 3 to the load terminals of the base unit. Connect 12 AWG copper conductors from the load terminals of the AFCI breaker to be tested to the line terminals of the Arc Fault Diagnostic Tool base unit.
    a) Base unit of Diagnostic Tool draws power from the power line. No batteries are used in this device.
    b) Each connection between Arc Fault Diagnostic Tool and the circuit breaker must have a length between 4 and 5 feet.
    c) Strip insulation of wires should be limited to a length of 3/8 inch. See Arc Fault Diagnostic Tool base unit label for stripping guide.
    d) Ensure that wire connectors are properly torqued. Do not over-torque. See Arc Fault Diagnostic Tool base unit label and circuit breaker label for the respective torque criteria.

Intelli-Arc set-up instructions
continued

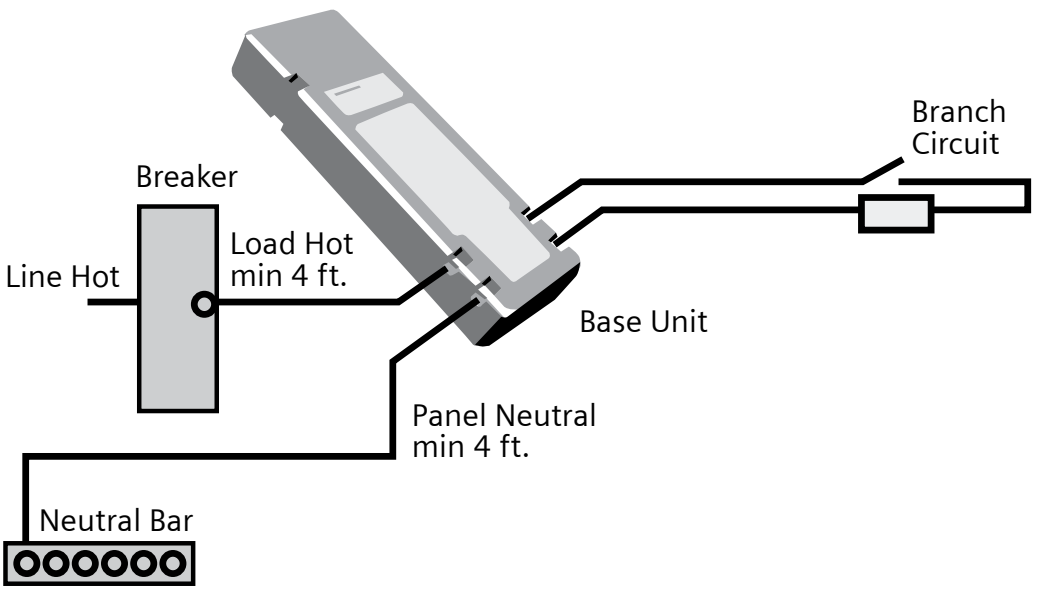
e) Wiring scheme to connect base unit of Diagnostic Tool:

5. For strain relief a lanyard opening is provided to mount the base unit in a safe and convenient location.
6. Establish a secured, safe work area around the load center or panelboard.
7. While exercising caution, turn power back on to the load center or panelboard.
8. Follow operating instructions.
   Turn off and lock out power supplying the device before removing base unit. Restore all branch circuit connections and close cover if testing is complete. Return to step 1 of setup instructions to test another branch circuit.

Intelli-Arc wiring schematics



AFCI or GFCI Breaker



Conventional Breaker

Intelli-Arc operating instructions

1. De-energize all individual loads on the branch circuit under evaluation at the outlet (switch, receptacle, junction box, work box, etc.)
2. While exercising caution, turn on the branch circuit breaker.
3. Turn “ON” the breaker supplying power to the branch circuit under evaluation.
4. Turn “ON” the handheld device (Fig. 3). Note: To confirm functionality of all LEDs, see LED test procedure below.
5. The communication LED will start blinking after the handheld establishes communication with the base unit. The LED will continue blinking as long as the handheld maintains communication.
6. Energize, and then de-energize loads one by one on the branch circuit being evaluated, observing LED indications on handheld device after each load is energized and de-energized. (See LED indications for more details.)
7. The “GF” and “AF” LEDs will lock in the top (red) position when any event causes the device to read maximum levels, even if the event ceases to exist. Press the “CLEAR” button to continue evaluation of the branch circuit.
8. Turn off and lock out power supplying the device before removing base unit. Restore all branch circuit connections. Close cover if testing is complete or return to step 1 of Setup instructions to test another branch circuit.
9. Always remove Arc Fault Diagnostic Tool and replace load center or panelboard cover before leaving the work site.



Fig. 3

Intelli-Arc LED indications

LED test procedure

1. Turn “OFF” handheld device.
2. Press and hold “CLEAR” button on handheld.
3. Press “PWR” button on handheld device, while continuing to hold “CLEAR” button.
4. The LED columns will light up one by one and each top LED will remain on sol long as the “CLEAR” button is pressed.
5. If any LED fails to illuminate during the procedure then the handheld device must be replaced.
6. Once the “CLEAR” button is released the top LEDs will clear and the handheld is ready for operation.

Ampacities of insulated conductors
(from NEC table 310-16)

Not more than three conductors in raceway or cable or earth (directly buried). (Based on ambient temperature of 30°C, 86°F)

AWG KCMIL	Copper conductors		Aluminum conductors Copper clad aluminum conductors	
	75°C (167°F)	90°C (194°F)	75°C (167°F)	90°C (194°F)
	Types RHW, THW, THWN, XHHW, USE, ZW	Types TBS, SA, SIS, FEP, FEPB, RHH, THHN, THHW, XHHW	Types RHW, THHW, THW, THWN, XHHW, USE	Types TBS, SA, SIS, THHN, THHW, THW-2, THWN-2, RHH, RHW-2, USE-2, XHH, XHHW, XHHW-2, ZW-2
14	20	20	—	—
12	25	25	20	25
10	30	35	30	35
8	40	50	40	45
6	55	65	50	60
4	70	85	65	75
3	85	100	75	85
2	95	115	90	100
1	110	130	100	115
1/0	125	150	120	135
2/0	145	175	135	150
3/0	165	200	155	175
4/0	195	230	180	205
250	215	255	205	230
300	240	285	230	255
350	260	310	250	280
400	280	335	270	305
500	320	380	310	350
600	355	420	340	385
700	385	460	375	420
750	400	475	385	435
800	410	490	395	450

The information provided in this pocket guide contains merely general descriptions or characteristics of performance which in case of actual use do not always apply as described or which may change as a result of further development of the products. An obligation to provide the respective characteristics shall only exist if expressly agreed in the terms of contract.

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