

# Arc Fault Circuit Interrupter (AFCI) with Shared Neutral

## FAQ

### Frequently Asked Questions



#### 1. What is AFCI Protection?

AFCI protection guards against damage or fires that can result from arcing and sparking circuits. Arc faults can occur from conditions that include deteriorated wires, poor connections and breaches in wire insulation. With more than 47,000 home fires claiming more than 455 lives and injuring 1,500 victims and \$1.5 billion in property damage from 2007 – 2011\* annually, the added safety provided by AFCI protection is an important step forward in reducing this risk.

\*Reference sourced from NFPA.org

#### 2. What is an AFCI with shared neutral?

An AFCI with shared neutral consists of two one-pole GE circuit breakers that are tied together with a handle tie, forming a simple, two-pole shared neutral solution.

#### 3. What makes the neutral “shared”?

In a typical application, a single #14/3 or #12/3 wire is run to a location that is close to the utilization area. The neutral wire is then split, one goes with the red wire and one goes with the black wire. Ordinarily you would not be able to have just one neutral coming back to a typical AFCI breaker. However, GE’s AFCIs have the ability to fully protect against arc faults without monitoring the circuit neutrals. This allows you to wire a multi-wire or a shared neutral the same way you would with a thermal magnetic breaker.

#### 4. Can the AFCI with shared neutral be used for retrofit installations?

Yes, for retrofit installation, GE AFCIs can be substituted for the existing thermal magnetic breakers without the need to sort out existing shared or mixed neutrals. For existing multi-wire or shared neutral applications, follow the same instructions as for new installations. For existing mixed neutral situations, the breaker will not nuisance trip because it is not monitoring the neutral. In addition, the existing neutrals do not need to be sorted and can be left on the neutral bar.

#### 5. How does this differ from other AFCIs that are on the market today?

Most AFCIs require the neutral to come back to the circuit breaker to prevent the breaker from tripping. In retrofit installations where you would likely be replacing thermal magnetic circuit breakers, there is a high probability that there are neutral wires tied together throughout the house. This creates a situation where you would need to search out all of these wire runs, which can be a cumbersome, time-intensive process. GE’s AFCI with shared neutral eliminates the need to search these out because it can tolerate mixed neutral situations that are often encountered when replacing thermal magnetic circuit breakers.

**6. How is the GE AFCI with shared neutral easier to install than other AFCI circuit breakers?**

With the GE AFCI, there is no need to hunt down mixed neutral runs. You just need to swap out the thermal magnetic breaker and wiring with the GE AFCI.

**7. Why can the GE AFCI breakers function with shared and mixed neutrals and others can't?**

GE's Patented Discrete Wavelet Transform Algorithm allows for accurate response to abnormalities in a circuit's waveform caused by arcing conditions, without the need for a clean neutral return path. Unlike other brands, the neutral load lug provided on the GE AFCI breaker is there simply for your wiring convenience, and is purely optional. For new construction you have the option of returning the neutral wire to the breaker or simply to the neutral bar (as space allows). For retrofits it's a true time-saver. You don't have to track down the exact neutral wire that may be split or shared upstream- you can simply pull and replace.

**8. What if it's easier to run the neutral wire back to the breaker instead of a ground bar?**

The GE AFCI breakers include lugs to support this wiring option as well. Every installation is different; the GE AFCI breakers provide the flexibility to wire it either way to suit the installation.

**9. Are there cost saving opportunities if I use a GE AFCI with shared and mixed neutral capability?**

There are potential savings in both time and materials costs. For new construction, the installer can take advantage of running one 3-wire conductor versus two 2-wire conductors, eliminating labor and material costs. For retrofit situations, GE's AFCIs eliminate the need to hunt down mixed neutrals hidden in the dwelling, substantially reducing labor costs.

**10. Why is the GE AFCI only available in a one-pole version?**

The design of the GE AFCI eliminates the need to stock and inventory multiple pole versions. The NEC only requires arc fault protection on single pole 120 V circuits in dwellings. Therefore a traditional two and three pole offering is not required unless an installer wants to use shared neutrals. Installing a handle tie on the GE AFCI negates the need for anything more than a one-pole offering. With the GE AFCI you can use two one-poles (or even three one-poles with a handle tie in a 120/208V shared neutral application) and cover all applications. Plus, it is generally more economical than most factory two-pole AFCI options.

**11. Does the GE AFCI with shared and mixed neutral capability fit into existing panels?**

The GE AFCI circuit breakers will fit into existing GE panels. They are generally not listed for use in competitors' panels and may void the Underwriters Laboratory (UL) rating if used in a non-GE panel.

However, if it is the time to upgrade and change out the circuit breakers for AFCI circuit breakers, it is recommended that you also change out the panel. If you do install a new GE panel and AFCI circuit breakers, it will be a real time-saver compared with having to sort out the existing wiring.

**12. What approvals do the GE AFCI circuit breakers carry?**

The AFCI circuit breakers have UL and cUL approval.

**13. For residential installations, where should AFCIs be used?**

National Electrical Code (NEC) 2014 requires AFCI circuit protection in all dwelling areas of the home, which would typically include the kitchen, family room, dining room, bedrooms, sunrooms, hallways, closets, recreation rooms and other similar areas throughout a residence. For more information on NEC 2014 visit [www.electricalcodecoalition.org](http://www.electricalcodecoalition.org).

**14. Do Dual Function Circuit Interrupter (DFCI) circuit breakers offer the same shared neutral advantage?**

Unfortunately, due to the added ground fault protection DFCIs provide, they do require a clean neutral return path to the circuit breaker. However for retrofits, if you are replacing a traditional ground fault interrupter (GFCI) circuit breaker with a DFCI, the existing wiring would not be utilizing shared neutrals because of the GFCI protection, so the existing wiring can be exchanged for the new circuit breaker.

In addition, the dual function protection can be achieved by using a standard AFCI and a GFCI receptacle at the first receptacle on the load end. This would almost eliminate the potential for mixed neutrals. If the circuit is using a ground fault receptacle that is functioning properly with additional downstream outlets, there will not be any mixed neutrals beyond the first receptacle.

**15. Where can I find more information about GE AFCI circuit breakers?**

[www.geindustrial.com/residential](http://www.geindustrial.com/residential) or contact your local GE account manager.