



AFCI Outlets

The electrical system of a home is complex and filled with branch circuits that allow us to control lights and plug in appliances. An Arc Fault Circuit Interrupter (AFCI) Outlet is an important addition to a home's electrical system because it is designed to recognize many types of potentially dangerous arc-faults and respond by interrupting power to help prevent arc-faults that may lead to a fire. **AFCIs reduce the chances of the electrical system BECOMING an ignition source of a fire.**

Overview

SmartlockPro® OBC (Outlet Branch Circuit) AFCI outlets may be used on any wiring system as specified by the National Electrical Code® (NEC®) and are easy to install in both new construction and retrofit applications.

Based on the wiring method used, the SmartlockPro OBC AFCI Outlet provides a sensible option to protect a home from the dangers associated with arc-faults. The device features TEST and RESET buttons on the face of the outlet, offering homeowners the convenience of localized control so there is no need to examine the circuit breakers in the event the device trips. "OBC" stands for Outlet Branch Circuit and is defined by UL as:

"A device intended to be installed at a branch circuit outlet, such as at an outlet box. It is intended to provide protection of cord sets and power-supply cords connected to it (when provided with outlets) against the unwanted effects of arcing. This device may provide feed-through protection of the cord sets and power-supply cords connected to downstream outlets."

AFCI outlets ideally should be installed as the first outlet in a branch circuit. A branch circuit is the wiring within the walls that runs from the circuit breaker to outlets throughout the house. AFCI outlets provide "feed-through protection", meaning anything installed or plugged into an outlet from that location in the circuit to the end of the branch receives the same level of arc-fault protection. However, note that when **replacing** outlets it is not necessary to double back and find the first outlet – homeowners may simply make the replacement with an AFCI outlet.

What are Arc-Faults?

An arc-fault is an unintentional arcing condition of the electrical current in a circuit. Arcing creates high intensity heating at the point of the arc resulting in burning particles that can exceed 10,000 degrees Fahrenheit and may, over time, ignite surrounding material such as wood framing or insulation. There are two types of potentially dangerous arcs, series arcs and parallel arcs.



A **series arc** can occur when wiring or cords become unintentionally broken or frayed and the conductor wire, the one that carries the electricity, has an exposed or un-insulated gap. A dangerous heat source could ignite from this condition.



A **parallel arc** can occur when a wire's insulation is cut into the wire by a nail or staple or if an appliance cord is sliced or damaged by an object such as a table or chair.

The U.S. Fire Administration (USFA) National Fire Incident Reporting System reported that in 2011, an estimated 47,700 home structure fires reported to U.S. fire departments involved some type of electrical failure or malfunction as a factor contributing to ignition.

These fires resulted in 418 civilian deaths, 1,570 civilian injuries, and \$1.4 billion in direct property damage.

According to the National Fire Protection Association (NFPA), arc-faults are "the principle electrical failure mode resulting in fire".

What causes Arc-Faults?

Although the source can be unseen or unnoticed, arc-faults can occur anywhere in the home's electrical system including:



Within walls from nails, screws or staples inadvertently driven into wires.



Through old or cracked wires or cords.



At loose electrical connections or cords damaged by doors closing on them.



Through wires or cords damaged by heat, sunlight or humidity.



Within electrical cords accidentally damaged by furniture resting or pressing upon them.

Other general causes include:

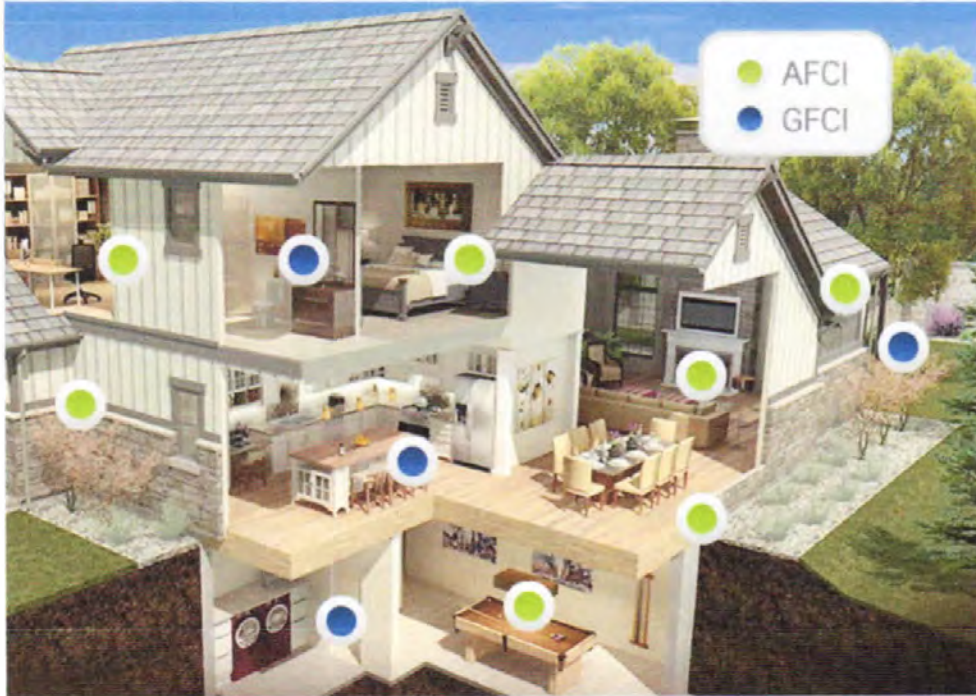
Wire Degradation

- Natural degradation through age
- Humidity or heat
- Extended mechanical stress from bending or winding or other physical damage
- Extended voltage stress

Physical Damage

- Animals chewing through insulation
- Nails, tacks from construction or picture hanging driven into a wall through a wire(s)
- Extension or power supply cord damage from sharp bends or furniture on or against cords
- General cord damage
- Poor wiring or connection at devices/ j-boxes

ACFI vs. GFCI



| | AFCI | GFCI |
|-------------------------------|---|--|
| Function | Provides protection from electrical fires that could result from arc-faults | Protects people from shocks and electrocution due to ground faults |
| Operation | Works by detecting potentially hazardous arc-faults and quickly cutting off power | Works by interrupting power if a ground fault is detected |
| Where Required by NEC® | <ul style="list-style-type: none"> - Family rooms - Dining rooms - Living rooms - Parlors - Libraries - Dens - Bedrooms - Sunrooms - Recreation rooms - Closets - Hallways - Kitchens - Laundry rooms - Dormitories | Wet or damp locations Indoor: <ul style="list-style-type: none"> - Kitchens - Bathrooms - Basements - Laundry rooms - Garages Outdoor: <ul style="list-style-type: none"> - Porches - Any areas where water may be present |

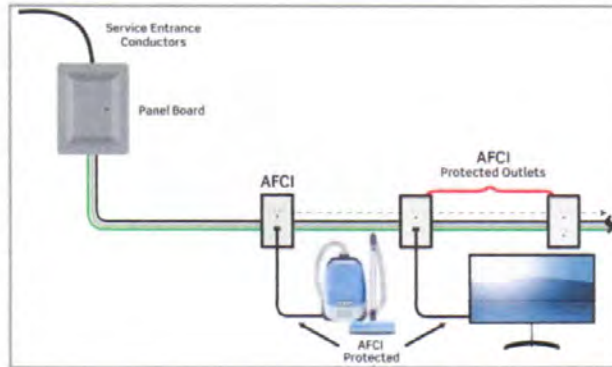
AFCI Outlet Installations Based on 2014 National Electrical Code

The National Electrical Code specifically points out the applications when AFCI protection is required. These applications are based on three different construction scenarios.

New Branch Circuit

NEC 210.12(A)

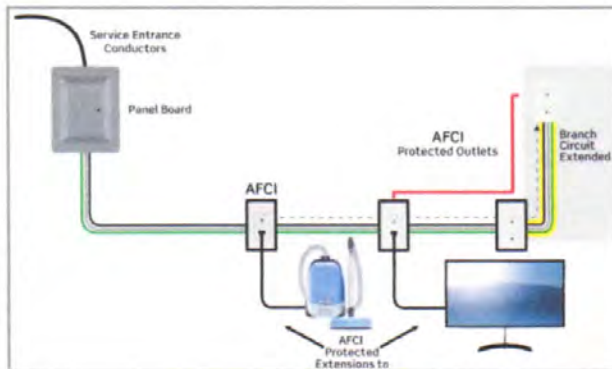
Covers new branch circuits originating from the panel. AFCI protection required for all 15A and 20A, 120V branch circuits supplying outlets in designated locations.



Modifications or extension to an existing branch circuit

NEC 210.12(B)

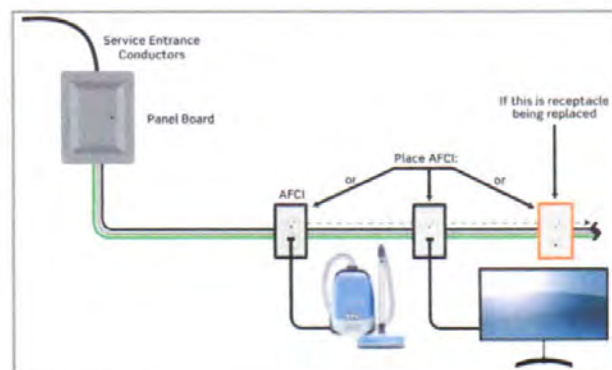
AFCI protection needs to be added when modifying or extending existing branch circuits in locations designated in 210.12(A). Not required if extension of circuit is less than 6 ft. and does not include any additional outlets or devices.



Changing out an existing outlet

NEC 406.4(D)

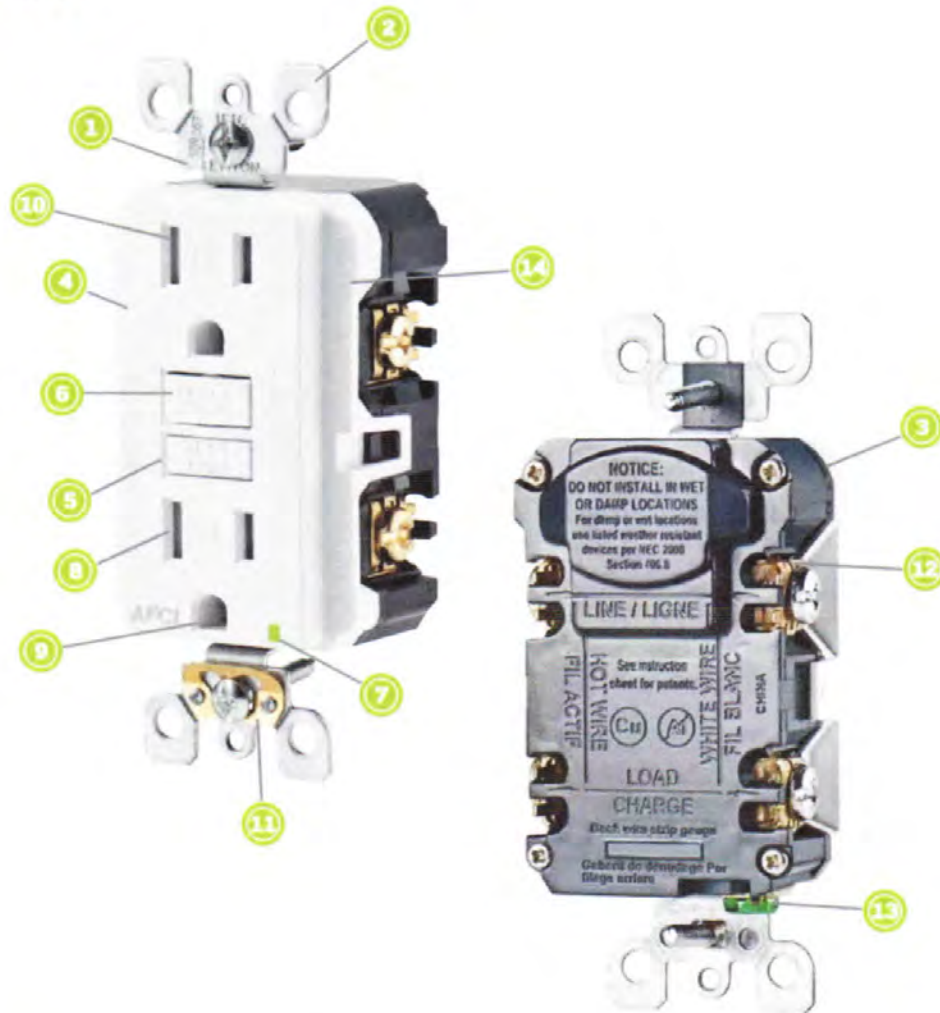
Covers replacement of any outlets in those locations designated in 210.12 that are not currently AFCI protected.



Components of AFCI Outlets

Figure 1 shows a typical Leviton duplex AFCI outlet and identifies several components of the device. There are some variations, but basically, all AFCI outlets have these elements.

Figure 1



- 1 The MOUNTING STRAP is the backbone of the AFCI and holds the device in place within the wallbox.
- 2 The PLASTER EARS are part of the mounting strap and help the AFCI sit flush with the wall.
- 3 The BODY is the back part of the AFCI.

- ④ The IMPACT RESISTANT FACE reduces cracking or damage from hard contact.
- ⑤ The TEST BUTTON is used to test the AFCI and confirm it is working properly. When pressed, the RESET BUTTON pops up and the AFCI shuts off the power.
- ⑥ The RESET BUTTON pops up when the AFCI is tested. SmartlockPro AFCIs PATENTED RESET LOCKOUT will prevent reset if the AFCI circuit is not functioning properly and cannot respond to an arc fault.
- ⑦ The DUAL FUNCTION INDICATOR LIGHT: (1) if the device is miswired during installation (line-load reversal) and cannot be reset, the green LED will be ON to indicate a line-load reversal. Once the AFCI is properly wired and can be RESET, (2) the LED acts as a power indicator that remains ON as long as the AFCI is operating correctly and providing power.
- ⑧ The CONTACTS are inside the AFCI. They grip the blades of an inserted plug and provide the electrical current to the lamp or appliance.
- ⑨ The GROUND CONTACT is also inside the AFCI. It grips the ground pin of three-pronged plugs.
- ⑩ The TAMPER RESISTANT SHUTTER blocks access to the contacts unless a properly rated two or three prong plug is inserted into the device.
- ⑪ The SELF GROUND CLIP ensures the device is grounded in a properly grounded metal wallbox without having to connect a ground wire directly to the AFCI.
- ⑫ The EXTERNAL BACK WIRE CLAMP connects the wires (called electrical conductors) from a power source to the AFCI. The terminal screws on AFCIs are color coded so they clearly show which conductor should be connected to which terminal screw. The brass colored screws are for the "hot" conductor. The silver colored terminal screws are for the neutral conductor.
- ⑬ The GREEN HEXAGONAL GROUND SCREW is fastened to the strap and is used to connect the AFCI outlet to the ground wire (if any) in the wallbox.
- ⑭ The RATING is indicated on the device and shows the AFCI's electrical rating. AFCIs are available with either 15 Amp or 20 Amp ratings at 125 Volts. All AFCIs are rated 20A-125V Feed-Through. (Meaning it can be installed on a branch circuit protected by a 20A circuit breaker.)

Types of AFCI Outlets



Cat. No. AFTR1

- **15 Amp Duplex** – Use for replacement or new outlet circuits.



Cat. No. AFTR2

- **20 Amp Duplex** – For circuits that use appliances, tools and equipment with a higher rating.



Cat. No. AFRBF

- **Blank Face** – Install where AFCI protection is desired but an outlet is not needed such as lighting circuits and smoke detectors.



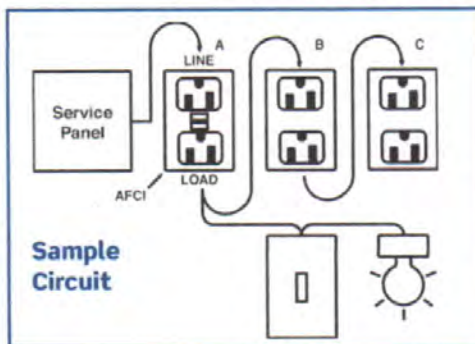
Cat. No. AFSW1

- **15 Amp Switch** – Use on branch circuits where a single pole switch is controlled from the first outlet. Helps protect switched load and all downstream switches/outlets.



Installation and Wiring Considerations

1. If there is any installation where the customer is unsure of how to proceed, or does not feel able to carry out the tasks specified in the wiring device instruction sheets, **STOP RIGHT THERE!** In such a case always advise the customer to **CONSULT AN ELECTRICIAN**. Electrical wiring can be complicated, and unless the installation can be properly and safely completed by the customer, the very best plan is to contact an electrician.
2. The information in this manual is here to help you serve your customers. Do not use this information as a substitute for the installation instructions provided with the devices. The instructions contain very specific and detailed directions for the device they're packed with. Use this guide as a general reference, but familiarize yourself with the specific instruction sheets for the devices your customers will be asking about.
3. Remind your customers that in order to prevent death or injury before they begin any wiring project, **THEY MUST TURN OFF POWER AT THE FUSE OR CIRCUIT BREAKER THAT SUPPLIES ELECTRICITY TO THE WIRES THEY WILL BE WORKING WITH**. And after they complete their installation, they should restore power at the fuse or circuit breaker and verify that the new device is working properly. If the fuse blows or the circuit breaker opens when power is restored, or if the new device doesn't seem to be working properly, the customer should immediately contact an electrician.
4. **DO NOT** install the AFCI outlet in an electrical box containing (a) more than four (4) wires (not including the grounding wires) or (b) cables with more than two (2) wires (not including the grounding wire). Contact an electrician if either (a) or (b) is true.
5. Placement in Circuit: The Outlet Branch Circuit Type AFCI should be placed as the first outlet in the circuit when installing a new branch circuit or when making modifications or extensions. In these cases, always place Outlet Branch Circuit Type AFCI in position A. All outlets of the protected branch, including lighting outlets, must be connected to the load side of the AFCI. However, as previously noted, when simply replacing outlets it is not necessary to double back and find the first outlet – homeowners may simply make the replacement with an AFCI outlet.



Testing an AFCI Outlet

An AFCI outlet must be tested immediately after installation. If the AFCI is mis-wired, it may not mitigate the effects of arcing faults due to unintentional arcing in a circuit. If the LINE wires are mistakenly connected to the LOAD terminals, the AFCI will not reset and will not provide power to either the AFCI outlet face or any outlets fed from the AFCI.

How to Test an AFCI Outlet

An AFCI is shipped from the factory in the tripped condition and cannot be reset until it is wired correctly and power is supplied to the device.



1. Plug a lamp or radio into the AFCI outlet (and leave it plugged in). For the AFCI/Switch combination device put the switch in the ON position to turn on its controlled load. For the blank face, a downstream load should be similarly turned on. Turn the power ON at the service panel. Ensure that the AFCI is still in the tripped condition by pressing the TEST button. If the indicator light on the AFCI outlet face is ON and the lamp or radio is OFF, refer to the Troubleshooting section of the instructions provided with the product because LINE and LOAD wiring connections have been reversed. The AFCI will not RESET in this condition.



2. Press the RESET button fully. If the lamp or radio turns ON and the Indicator Light turns ON, the AFCI has been installed correctly. If the AFCI cannot be reset, refer to the Troubleshooting section. Plug a lamp or radio into surrounding outlets to see which one(s), in addition to the AFCI, lost power when you pressed the TEST button. DO NOT plug life saving devices into any of the outlets that lost power. Place an "AFCI PROTECTED OUTLET" sticker on every outlet that lost power then press the RESET button to reset the AFCI.



3. Press the TEST button (then RESET button) **every month** to assure proper operation. If the Indicator Light does not go out and come back on or if the AFCI cannot be reset, then it must be replaced.



Sell-Up Opportunities

▪ Lockout Action

- Automatically tests the AFCI every time the RESET button is depressed; the AFCI will not reset if the AFCI circuit is not functioning properly or if protection has been compromised
- A line-load reversal diagnostic feature is provided which prevents the AFCI from being reset and stops power from being fed to the AFCI outlet face or through to downstream devices if the AFCI is incorrectly installed
- Tamper Resistant to comply with the latest NEC® requirements for tamper resistant outlets in residences and childcare facilities
- Integral TEST and RESET buttons allow users to test and reset the device without needing to go to a breaker panel
- 20A feed-through capability can be used on all standard 15A and 20A circuits
- No need to coordinate with a particular breaker style
- Device design reduces nuisance tripping
- Compatible with all Decora® devices and wallplates