



# Understanding Ground Fault and Leakage Current Protection

Ground-fault circuit interrupters (GFCIs) have been in use for over 40 years, and have proven themselves to be invaluable in the protection of personnel from the hazard of electric shock. Other types of leakage current and ground fault protective devices have been introduced for various applications since the introduction of GFCIs. The use of some protective devices is specifically required in the National Electrical Code® (NEC)®. Others are a component of an appliance, as required by the UL standard covering that appliance. This article will help to differentiate the various types of protective devices used today and clarify their intended uses.

## GFCIs

The definition of a ground-fault circuit interrupter is located in Article 100 of the NEC and is as follows: "A device intended for the protection of personnel that functions to de-energize a circuit or portion thereof within an established period of time when a current to ground exceeds the values established for a Class A device." Following this definition, a Fine Print Note provides additional information on what constitutes a Class A GFCI device. It states that a Class A GFCI trips when the current to ground has a value in the range of

4 milliamperes to 6 milliamperes, and references UL 943, the Standard for Safety for Ground-Fault Circuit-Interrupters.

Section 210.8 of the NEC covers specific applications where GFCI protection for personnel is required. In dwelling units, GFCIs are required in all 125-volt, single phase, 15- and 20-ampere receptacles installed in locations such as bathrooms, garages, outdoors, unfinished basements,

and kitchens. Article 550 of the NEC covering swimming pools has additional GFCI requirements.

In almost every new edition of the NEC since 1968, new GFCI requirements were added. See the sidebar on page 2 for examples of when the NEC first required GFCIs for various applications. Please note that this list does not include all locations where GFCI protection is required.

UL Guide Information for Ground-Fault Circuit Interrupters (UL Product Category Code KDCS) can be found in the UL White Book or online at [www.ul.com/database](http://www.ul.com/database).

## Other Types of Leakage Current and Ground Fault Protective Devices

The following describes various types of leakage current or ground fault protective devices:

**GFPE (Ground-Fault Protection of Equipment)** — Intended for the protection of equipment by disconnecting all ungrounded conductors of a circuit at

current levels less than that of a supply circuit overcurrent protective device. This type of device is designed typically to trip in the 30 mA or higher range, and therefore is not used for personnel protection. This type of device may be provided as required by Section 230.95 of the NEC. Additional information for Ground-Fault Sensing and Relay Equipment may be located under the UL Product Category KDA0X.

**LCDI (Leakage Current Detector Interrupter)** — LCDIs are permitted as an alternative to AFCIs in accordance with Section 440.65 of the NEC. LCDI power supply cord assemblies use a special cord employing a shield around the individual

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**H Kauffman**



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