



# Ground fault circuit interrupters

## Guides to Energy Management

### O V E R V I E W

A ground fault circuit interrupter (GFCI) is a compact, inexpensive piece of electrical safety equipment that protects you from electrocution. Because a GFCI detects ground faults, it can also prevent some electrical fires and reduce the severity of others by interrupting the flow of electric current.

#### What is a ground fault?

Normally, electricity flows in a circuit from the “hot” wire through the electrical equipment in your home, then back to the utility through a “neutral” wire. A circuit can also be completed when electrical current runs from the hot wire to ground. Have you ever experienced an electric shock? If you did, it probably happened because your hand or some other part of your body contacted a source of electrical current and your body provided a path for the electrical current to go to the ground, so that you received a shock. This rare, unexpected condition is called a “ground fault”.

#### What causes a ground fault?

Most ground faults occur in damp environments like your bathroom. Water is a conductor of electricity and creates a path for electricity to ground. Ground faults can also result from the deterioration of wire insulation, a build-up of moisture, dust or other contaminants in electrical equipment, defects in electrical equipment, or the misuse of equipment.

#### How does a ground fault circuit interrupter work?

A GFCI constantly monitors the balance of current flowing in a circuit. If the current

flowing in the “hot” wire differs by even a small amount from that returning in the neutral, the GFCI disconnects power to that circuit. If your hairdryer were to fall into a sink of water in the bathroom, the CFGI would sense the flow of electric current through the water and disconnect power to the hair dryer. You may get a painful shock, but you wouldn’t be electrocuted or receive a serious shock injury.

Danger exists when exposed conducting materials or metal parts of electrical equipment are not grounded, or when a wire intended to ground them is broken or by-passed. For example, suppose a bare wire inside an appliance in your home touches the metal case. The case is then charged with electricity. If you touch the appliance with one hand while the other hand is touching a grounded metal object, like a water faucet, you will receive a shock. If the appliance is plugged into an outlet protected by a GFCI, the power will be shut off before a fatal shock can occur.

**BC hydro**

**POWER  
SMART**

THE POWER IS YOURS

## Electrical code requirements

All new homes have GFCIs installed to meet electrical code requirements, but if your home is older than 20 years it may not. Always get a qualified electrician to install them. Your electrician will know where and how GFCIs must be installed according to the Canadian Electrical Code.

GFCI receptacles (or GFCI circuit breakers) are required in many locations in the home, including:

- Bathrooms
- Basements/crawlspaces
- Garages
- By swimming pools & hot tubs
- Kitchen countertops
- Outdoor receptacles

The Canadian Electrical Code outlines where GFCIs are mandatory, but there are other locations in the home where they are highly recommended. As a simple rule of thumb, GFCIs should be installed wherever there is metal and concrete, and especially where there is potential exposure to water.

Portable GFCIs should be used whenever operating electrically powered garden equipment such as mowers and hedge trimmers. It's also a good idea to use GFCIs with electric tools like drills, saws and sanders for do-it-yourself work in and around the house.

## Selecting a GFCI

There are several different types of GFCI units; a qualified electrician will be able to recommend the best model and install it for you. Note that you cannot use a surge protector or any device that has integral surge suppression downstream of a GFCI as it will constantly "trip".

### Combination circuit breaker and GFCI

A combination circuit breaker and GFCI is installed in the service panel instead of a regular circuit breaker. This type usually has a small test button on it, and protects the entire circuit.

### Receptacle unit

A receptacle GFCI is installed instead of a conventional receptacle outlet. It has reset and test buttons, usually placed between the two outlets, and protects anything plugged into them.

Depending on the model, it may also protect all other outlets which are downstream (come after it), but not upstream (between it and the fuse box). This method is common in many single-family homes where the main GFCI outlet is in the garage or on an exterior wall.

### Portable unit

A portable GFCI plugs into an existing three-prong grounded outlet and converts that receptacle to a ground fault protected receptacle. Some models include an extension cord for use around the outlet or in damp locations. These are handy, but are not permanent solutions.

## Summary

Ground fault circuit interrupters are lightweight, compact and inexpensive, making them a good investment for the safety of your home and family. GFCIs must always be installed by a qualified licensed electrician and should be tested often. Plan to test your GFCIs at the same time you normally test the smoke detectors in your home.

## Installation

This GEM is designed as a general guide. Please ensure that installations meet your requirements, manufacturers' instructions and all applicable codes, standards and regulations. BC Hydro is not responsible for installations.

## ASK US FOR MORE INFORMATION

The *Guides to Energy Management* series provides advice for BC Hydro customers.

Contact us for more information:

### Phone

Lower Mainland . . . . . (604) 431-9463

Elsewhere in B.C. . . . . 1-877-431-9463

[www.bchydro.com](http://www.bchydro.com)