Circuit Breaker vs. Disconnect Switch

Can You Use a Circuit Breaker as a Disconnect Switch?

Introduction

Is it possible to use a circuit breaker as a switch interchangeably, or are they separate entities?

Circuit breakers and switches are not new technologies; in fact, Thomas Edison first developed the idea for a circuit breaker in 1879.

These items are often taken for granted as they work behind the scenes, and yet they are crucial for safety in homes and in industry.

For industrial purposes, both the switch and the circuit breaker need to be able to handle a higher capacity of electricity than a residential one would.

But what are the differences between a switch and a circuit breaker?

A Disconnect Switch

An electrical switch serves the purpose of controlling the flow of electrical current to a circuit. It can be used to both remove the flow of the current or to initiate it. There are many types of switches. Relays and contactors are two other types that are commonly used in electrical controls.

A disconnect switch performs the task of manually cutting or reconnecting power from an electrical supply by creating or closing an air insulation gap between two conduction points.

They're known as binary devices, which essentially means it has two states, open (O) and closed (|).

These symbols are international standards established by IEC.

IEC 60417-5007, (line), the power-on symbol indicates the equipment is in a fully powered state.

IEC 60417-5008, (circle), the power-off symbol indicates that the power has been disconnected from the device.

A Circuit Breaker

A circuit breaker is a safety device to prevent damage to devices in a circuit, such as electric motors, and wiring when the current flowing through the electrical circuit supersedes its design limits. It does this by removing the current from a circuit when an unsafe condition arises. Unlike a switch, a circuit breaker automatically does this and shuts off the power immediately, or darn close to immediately. In this way it works as an automatic service protection device.

A switch is typically used as an isolator, turning power on and off to a particular device. A circuit breaker, on the other hand, can be used to protect a circuit that contains many switches or devices. An exception to this is a disconnect switch, which is used to connect or disconnect power to an entire control panel, or machine.

Simply put, a switch is designed to switch power on and off, a circuit breaker "breaks" the circuit in an overload or fault condition. Switches switch and breakers break. These differences are crucial to understanding their safety and practicality.

The BIG Difference

When it's all said and done, a big reason NOT to use a circuit breaker as a disconnect switch is a question of endurance. Disconnect switches are designed for a high number of operations, how many times the disconnect switch is turned on and off. Circuit breakers are typically not rated for nearly the same amount of operations.

A miniature circuit breaker is a deceiving simple device. It is a much more complicated device, with more parts, than a switch. Cycling a breaker on and off numerous times will result in its eventual failure.

UL 489 Miniature Circuit Breaker

Disconnect Switch

However...

Circuit breakers can be rated for switching duty for lighting circuits. Circuit breakers applied in 120V or 277V fluorescent lighting circuits must be marked SWD or HID. SWD stands for Switching Duty. HID signifies rated for High Intensity Discharge lighting. The UL489 Standard for MCBs states that an SWD circuit breaker can be rated up to 20A, no more. HID breakers are rated up to 50A.

Which Will It Be Then?

The question still begs, even though it's obvious by now, can you use a circuit breaker like a switch in an industrial control panel? It's quite evident that though they share a similar function on a basic level, they are two separate entities.

Circuit breakers may work as effective as safe switches, but they are not switches. They are not interchangeable. Therefore, using a circuit breaker as a switch is not recommended.

Can I Use A Switch In Place Of A Circuit Breaker?

No. Don't ever do this. A switch cannot detect and interrupt an overload or fault condition. This can lead to an unsafe or potentially dangerous condition, putting equipment and more importantly, people at risk.

If you need more advice on how circuit breakers and switches function, and how to use them safely, don't hesitate to contact us.