

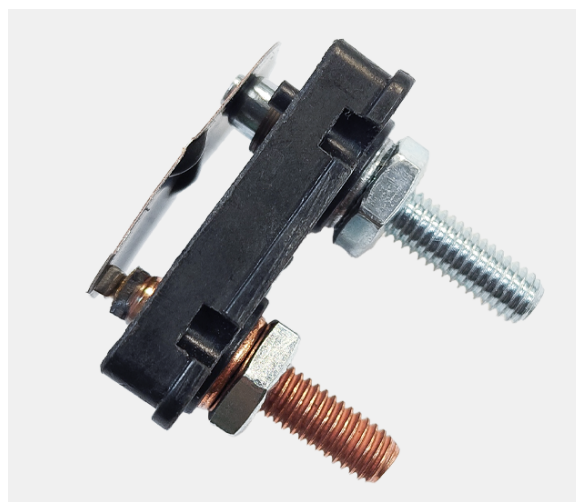
Why Does My Circuit Breaker Keep Tripping?

If your circuit breaker keeps tripping, it can be frustrating and potentially dangerous. To effectively troubleshoot the issue, it's important to understand how circuit breakers work and identify what might be causing repeated trips.

How Does a Circuit Breaker Work?

Circuit breakers are designed to open when exposed to a certain level of current, and the most common way that circuit breakers can measure current is via heat. All thermal circuit breakers have a thin metal strip known as bimetal that connects one terminal to another terminal. This bimetal strip bends when heated by excessive current. As the strip bends, it breaks the connection and shuts off power to prevent damage or fire hazards.

However, this mechanism can be affected by several factors—sometimes causing the circuit breaker to trip continuously even if there's no obvious problem.



■ **Below are the most common reasons why a circuit breaker may keep tripping:**

Continuous Circuit Overload

The first factor that must be checked is the circuit itself. This issue would most commonly be seen when using a Type I (automatic reset) circuit breaker. If there is an overload current being consistently applied, the breaker will repeatedly go through a cycle where the bimetal is heated up through the excessive current and then cooled back down once the connection is broken allowing the bimetal to reconnect the circuit. This will cause the circuit breaker to continuously cycle between ON and OFF until the issue with the actual circuit is resolved.

Solution:

Evaluate the total load on the circuit and redistribute or reduce power consumption where possible. Upgrading the circuit or using a properly rated breaker may be necessary.

Ambient Temperature

The next most common reason that may be causing a circuit breaker to continuously trip is ambient temperature. In this instance, there may be no issues with the circuit itself or the circuit breaker rating in a standard setting.

However, it is important to remember that the bimetal functions based off heat. Most thermal circuit breakers are tested at a standard room temperature of $23^{\circ}\text{C} \pm 3^{\circ}\text{C}$ ($73^{\circ}\text{F} \pm 5^{\circ}\text{F}$), per SAE J553 standards. If your breaker is installed in a hot location—such as under the hood of a vehicle or in an unventilated electrical enclosure—higher temperatures can cause the bimetal to heat up and may be responsible for the circuit breaker to trip at amperages lower than previously anticipated.

Solution:

Use ambient temperature correction charts (available in OptiFuse datasheets) to choose the correct breaker rating for your environment.

Incorrect Wire Size

Using a wire that is too small for the current it carries can generate excess heat. In these instances, the wire is not only conducting electrical current to the circuit breaker but also heat to the circuit breaker. This heat can transfer to the circuit breaker and trigger premature tripping, even if the breaker is properly rated.

Additionally, bundled wires may generate cumulative heat, affecting nearby components.

Solution:

Ensure all wires are correctly sized for their load and operate at no more than 80% of their rated capacity. Follow NEC guidelines or consult an expert when in doubt.

Loose or Faulty Connections

Loose electrical connections increase contact resistance, which in turn generates heat. Over time, this heat builds up and causes the breaker's bimetal strip to bend faster than expected.

Even if a circuit breaker seems to have no connection issues initially, external vibrations—common in automotive or industrial applications—can often cause previously secure connections to loosen.

Solution:

Regularly inspect and tighten all connections to manufacturer specifications. Use anti-vibration hardware, such as locking nuts or star washers, to ensure long-term stability.

Breaker Aging and Time-Related Factors

For older breakers, there are a variety of issues that may also impact the speed and current in which the circuit breaker will trip. Oxidation at the terminals – commonly seen in humid environments – can cause higher contact resistance resulting in higher heat.

For a breaker that has experienced a lot of use, it is common for the bimetal to begin to lose its initial properties. In this instance, the bimetal would require less heat than normal to trip and the circuit breaker itself must be replaced.

Solution:

If your circuit breaker is old or frequently tripping without clear cause, it may be time to replace the breaker.

These are just some of the most common reasons why a circuit breaker may continually trip. However, with each application comes a new variety of external conditions. If you are still experiencing abnormalities with your circuit breaker, it is recommended to reach out to **OptiFuse** directly at sales@optifuse.com and allow our team of experts to work to identify the issue.