



PTCs (a.k.a. Circuit Breakers) vs. Fuses

The PTC, or Positive Temperature Coefficient Resistor, acts as a type of circuit breaker. In general, the resistance increases dramatically as the PTC threshold temperature is exceeded due to the load current passing through it. This presents a high resistance, which in effect opens a circuit, protecting the device in question in the event of an over current condition. This is a misunderstood and widely misused component, and this application note should help clarify the most appropriate applications for the PTC. Basically, the PTC is well suited for battery protection, but its slow and inaccurate response could jeopardize delicate electronic equipment.

A PTC is appropriate for battery protection, since most battery shorts are heavy shorts thus quickly tripping the PTC. Even if they are not a heavy short, the battery is a rugged device that can tolerate high current for substantial times until the PTC trips.

Although Altronix offers both PTCs and Fuses in our ALTV248 series of camera power supplies, we believe that for the above reasons that the slow acting and inaccurate trip threshold PTC does not protect the cameras as reliably as the fast acting fuse. It is better to make a service call to replace a fuse than a camera that was falsely protected. Since PTCs need to cool down to reset, it will most probably require a service call to release the short and reset the power supply anyway. However, for camera housing blowers and heaters a PTC will do just fine, since these devices better tolerate overload conditions. For DC power supplies, Altronix designs include electronically resettable current limiting, which are superior to fuses or PTCs, and employ the PTC for battery, motor or heater protection.

PTC PROS:

1. It can be reused.
2. It will reset itself after the device cools down and the short is released.

PTC CONS:

1. It is not an accurate device. A 1 AMP rated PTC might never blow at 2 AMPs, and might take greater than 30 seconds to blow at 5 AMPs, thus offering no protection to the device. Once it does blow, it might require shutting off the power supply to reset it, so as to allow cool down of the PTC. In essence, it could require a service call to reset the power supply. In addition, PTCs are very temperature sensitive. They will trip at lower current ratings as the ambient temperature goes up, and higher than specified current ratings as the ambient temperature goes down. These PTC ratings can vary by +/- 50 percent over manufacturers specified temperature range.

FUSE PROS:

1. It is faster acting and far more accurate than a PTC. For example, 1 AMP fuse will blow at 1.25-1.5 AMPs, in about 1 second.

FUSE CONS:

1. They are designed for one time use and must be replaced when they blow.

Remember that it is easier to replace a fuse than an expensive camera.