

OVERVIEW

When powering magnetic loads, such as mag locks, door strikes, crash bars, and solenoids, the installer should protect the rest of the system against the back-EMF (high voltage, reverse polarity spike) generated by the collapsing magnetic field when power is removed from the device. This application note covers the use of a reverse diode to protect against back-EMF voltage spikes.

Related Documents

In addition to this application note, please see the following documents for more information:

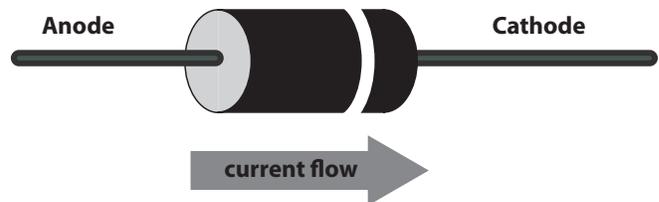
- *White Paper - Inductive Loads in Life Safety Applications*
- *FPO Power Supply Installation Manual*
- *C4/C8 Installation Manual*
- *M8 Installation Manual*
- *Application Note AN-29 - C4/C8 Programmable Lock Control*



Protecting against Back-EMF

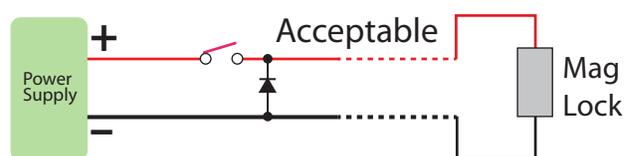
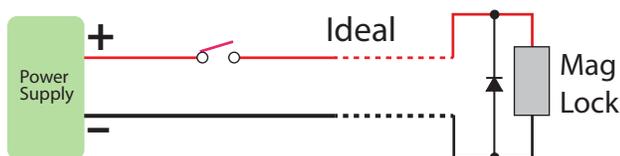
Most of today's locks handle back-EMF internally, either by reverse diode or other methods. These locks do not require external protection. However the internal back-EMF diodes built into locks often fail over time, causing problems to appear months, or even years down the road. However, some new locks do not have any built-in back-EMF protection and older pre-installed locks also may not have protection, or the protection may have failed years ago. A good practice is to place a reverse diode on all locking circuits as cheap insurance, regardless of the protection that may or may not be present internally to the lock.

External diodes for back-EMF protection should be placed as close to the lock, electrically, as possible. Given an ideal situation, this means placing the diode at the lock itself. Obviously this is not always possible, especially in retrofit applications where the locks are already installed. In these cases, it is acceptable to place the diodes at the power supply side of the lock circuit (after the relay).



When using an external diode, most any general purpose power diode will work. Avoid small signal diodes, as they cannot handle the voltage and current levels generated by the back-EMF of most locks.

The 1N4000 series is inexpensive and easily obtainable and works well as back-EMF protection.



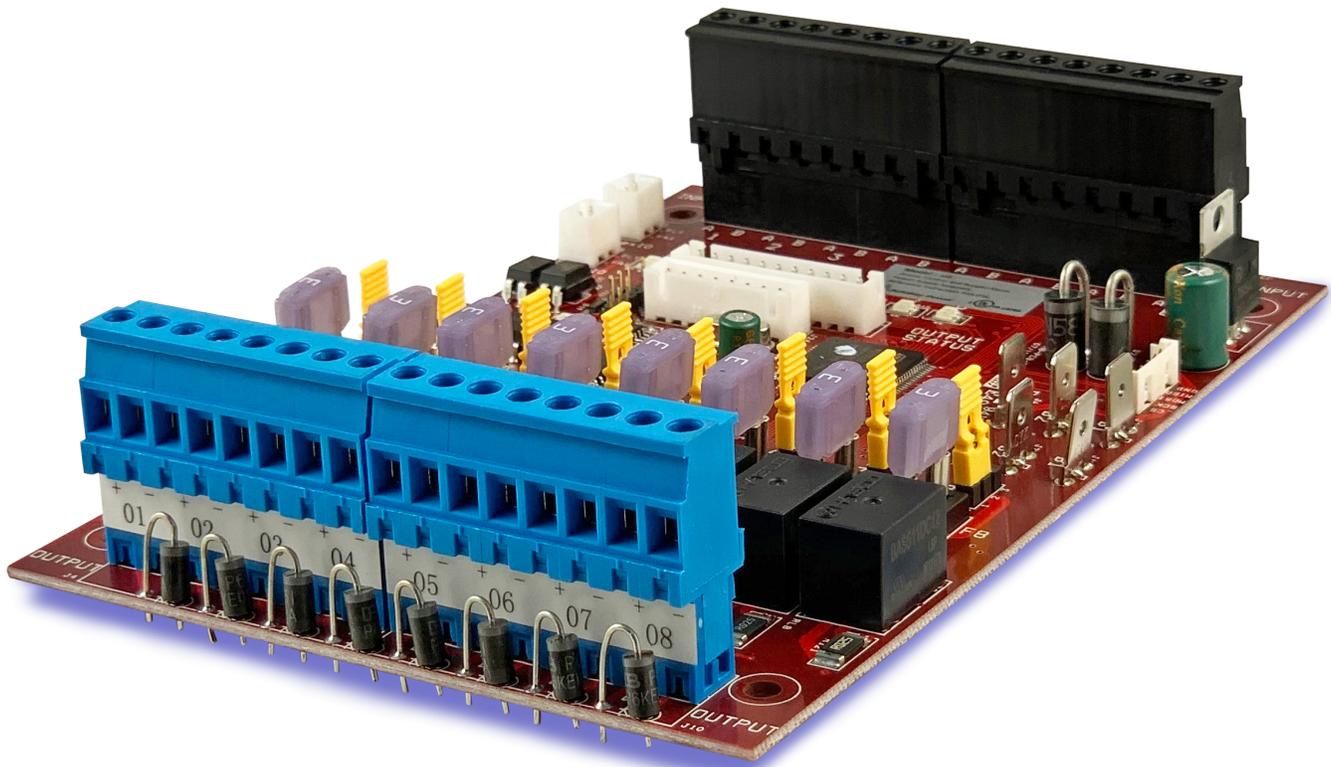
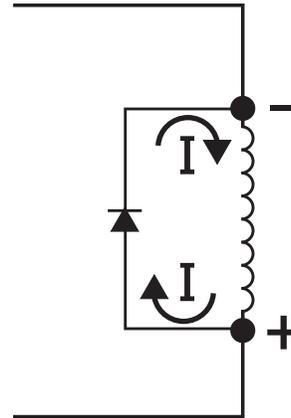
DESIGN TIP

LifeSafety Power's C4, C8, and M8 lock control boards have back-EMF diodes across each set of output terminals built in, eliminating the need for external diodes.

Delay in Lock Release

Occasionally when a reverse diode is added to a lock, a delay in lock release can occur. Typically this only happens with large maglocks with no built-in internal back-EMF protection (or failed protection). This delay is caused when the current continues to flow from the lock, through the external diode, causing the lock to remain "self-powered" - in some cases for up to 2 seconds. In these cases, the reverse diode must be removed from the locks exhibiting the delay. Diodes should remain on all other locking devices if they are not exhibiting the delay.

See the C4/C8 or M8 manual for instructions on removing the internal reverse diode from an output.



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