

# Back EMF Protection Electric Locks and Relays

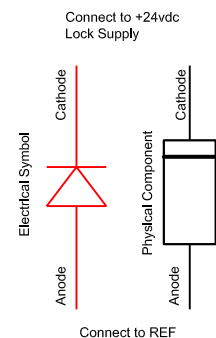
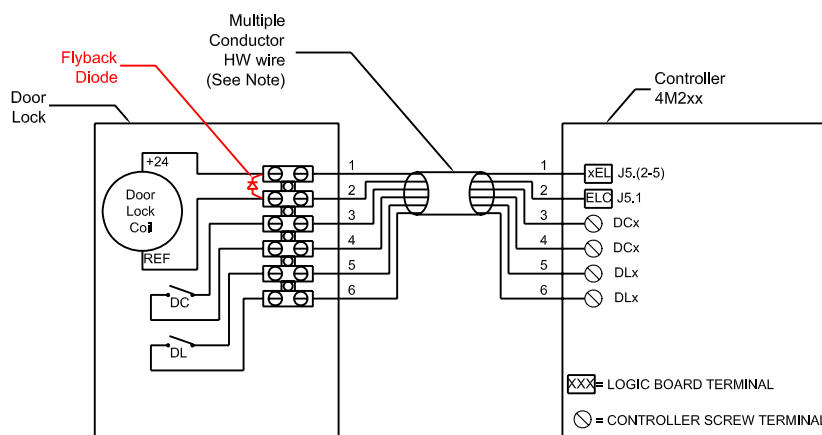
Back EMF (CEMF) is a large voltage spike with opposite polarity which is generated when an inductive load is de-energized. The amplitude of this voltage spike is dependent on the following factors:

- \* Size of the Inductor
- \* Nominal Voltage of the Inductor
- \* The rate at which power is removed

The most common sources of CEMF within a residential elevator are the electric door locks. The typical CEMF of a 24vdc doors locks is -300vdc. If the wrong type of multiconductor hoistway cable is used, this CEMF can be transmitted to the adjacent safety string conductors and be fed back into the controller. This CEMF can damage electronic circuits.

CEMF can be eliminated in DC circuits by using a flyback diode or greatly reduced by the use of a Metal Oxide Varistor (MOV). MOV's have to be used to mitigate CEMF in AC circuits.

The diode or MOV must be connected directly across the Door Lock Coil as shown below:



Note: DO NOT USE "THERMOSTAT" WIRE  
Hoistway wire must be stranded.

- \* 18AWG minimum (16 strands / 30AWG)
- \* 300V minimum insulation rating.

Recommended Diode:  
Radio Shack PN: 276-1104  
Digikey PN: 1N4005-E3/54GICT-ND

Recommended MOV:  
Digikey PN: 495-1404-ND

The following links are being provided for an in-depth explanation of CEMF and fly back diodes:

<http://www.douglaskrantz.com/Services/FlybackDiode.pdf>

[http://en.wikipedia.org/wiki/Flyback\\_diode](http://en.wikipedia.org/wiki/Flyback_diode)