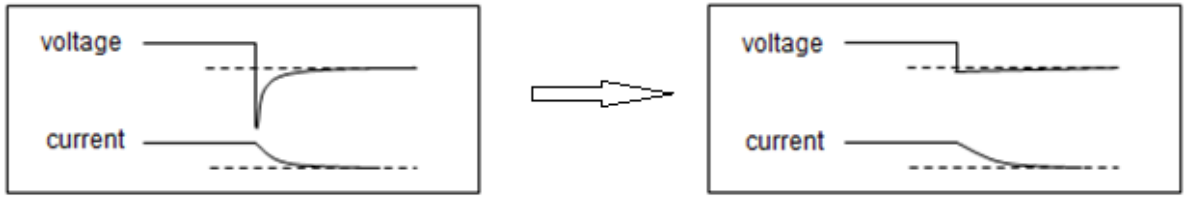
Diodes inside relays

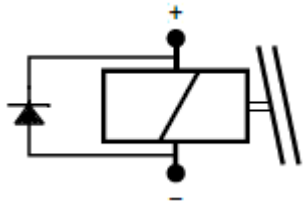
A magnetic relay coil stores energy while energy is being supplied and it also releases that energy when the voltage or current is removed. The coil releases its energy all at once in one swift moment. This release of energy creates a voltage spike which could interfere with the operation of other parts in the control system. A diode can suppress that high voltage spike and protect any components around the relay. Also, depending on the diode, it can protect the relay from surges from electronics.

A **back EMF suppression diode** (or flywheel diode or avalanche diode) prevents a surge generated by the relay coil during switching off.
This is no problem for the relay, but this surge can be a problem for the control electronics in the PLC etc.

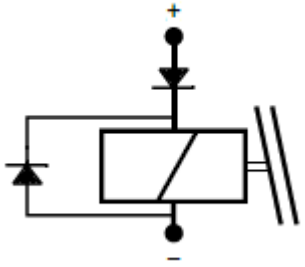


without suppression diode

with suppression diode



However if the connection is wrong (+ at – side and vice versa), the relay can be broken.
To prevent this: add a **polarisation diode**:



With a polarisation diode no current is flowing when the connection is wrong.

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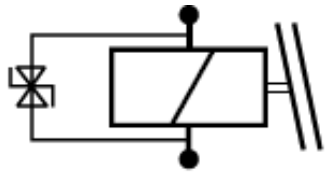
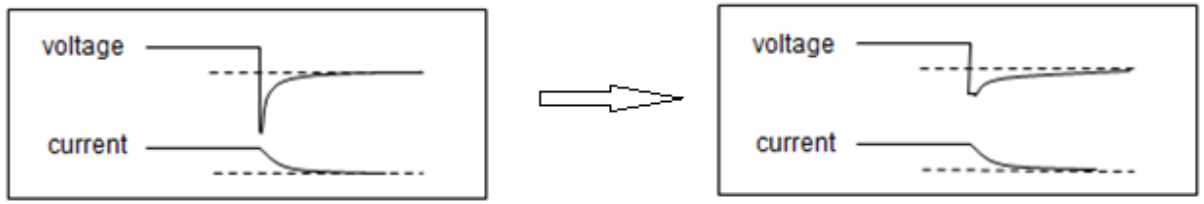
Diodes inside relays



To make it possible to connect the + at the – side and vice versa, and have surge protection: use a **double Zener diode** (= transil).

A double Zener diode prevents a surge generated by the relay coil and makes the relay polarity insensitive.

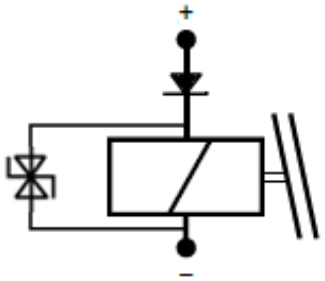


without double Zener diode

with double Zener diode

Besides protecting the control electronics in the PLC from a surge generated by the relay coil, the double Zener diode also protects the relay coil from a surge from the electronics (surge protection both ways).

To prevent current flowing back into the system (to protect the system), a double Zener diode and polarisation diode can be combined. In this case the relay is polarity sensitive.



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