



# HELIX 100

## Technical Tip No 14.

**PRODUCT: HELIX 100**

**SUBJECT: TRIGGERING EXTERNAL DEVICES**

**DATE: 25TH JANUARY 2008**

**REVISION: 1**

Helix 100 may be factory-supplied (depending on the exact product line) with an electric doorstrike powered by the same 12VDC as powers the Helix 100 itself. The doorstrike is "fail-secure" – when no power is applied the door is locked, and triggered by means of the relay built into the SIOB (Secure Input/Output Board or relay board).

Some applications require different devices to be triggered. This may be due to a regulatory requirement (e.g. some jurisdictions as a fire regulation may require egress or exit without impedance if power is lost – a "fail-safe" mode), customer preference, mechanical constraint (a door lock may have a wider tongue than the supplied doorstrike can handle), a differing locking mechanism (e.g. electric mortise locks, automatic door openers etc) or differing applications (control of lighting or other appliance etc).

Some precautions have to be taken for applications that differ from the single General Lock-supplied doorstrike.

### **Normally-powered devices**

If your application requires a device that is powered-up in the quiescent waiting state (and can safely be powered by the General Lock-supplied power adapter – see below), then it should be connected to the "NO" or "normally open" terminal of the SIOB rather than the "NC" or "normally closed" terminal.

### **Back-EMF**

When an electromagnetic appliance has power applied to it, a magnetic field is built up which contains stored magnetic energy.

Electromagnetic appliances include:

- Door strikes
- Electromagnetic locks or EM locks (these have particularly high stored magnetic energy)
- Electric mortise locks
- Electric motors
- Relays (the coil is an electromagnet)
- Fluorescent lights
- Solenoids
- Inductors
- Contactors

When the power is cut to an electromagnetic appliance (which might be when a Helix 100 triggers and the SIOB relay contact opens), the magnetic field starts to collapse. As the field collapses, it tries to generate a current in the wiring (coil) of the electromagnetic appliance. If the current cannot flow (due to the open relay contact), a voltage spike will be generated.

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This voltage spike is called “back-voltage” or “back-EMF”. It can be many times greater in magnitude than the voltage (say, 12V) used to power the electromagnetic appliance. In fact, voltage spikes of hundred or even thousands of volts may be experienced.

These voltage spikes may cause malfunctions or failure in electronic equipment (such as the Helix 100 used to trigger the device in the first place). Repeated voltage spikes may also cause gradual deterioration, so that a system initially working may gradually degrade and then fail later. These voltage spikes may also be dangerous to personnel (they may cause electric shocks).

Electromagnetic appliances must therefore always be fitted with back-EMF suppression devices. These are typically either a reverse-connected diode, or a Metal-Oxide Varistor (MOV).

The General Lock-supplied doorstrike has an MOV fitted (small blue component connected to the wiring terminals).

You should always fit a back-EMF suppression device to an electromagnetic appliance (unless the appliance data sheet explicitly confirms the presence of one). General Lock supplies a spare diode in every Helix 100 package shipped, intended for use with non-General Lock electromagnetic appliances. The diode should be fitted the correct way around (refer to the wiring diagram supplied with the Helix 100), preferably close to the electromagnetic appliance. If it is connected the wrong way, it will short out the power supply when the strike is activated (may cause equipment failure, even a fire hazard).

### Device ratings

If you intend to power a non-General Lock-supplied electromagnetic appliance from the General Lock-supplied plug-pack power adapter, several criteria must be met:

- The electromagnetic appliance must operate on 12V
- The electromagnetic appliance must operate on DC (not AC). AC-powered doorstrikes typically “buzz” when actuated; DC-powered doorstrikes typically “click” only.
- The electromagnetic appliance must not overload the General Lock power adapter, or the SIOB relay (see below)

If any of these criteria are not met, the electromagnetic appliance must be powered from a separate power supply. There should not be a common ground/earth connection between the separate power supply and the SIOB or Helix 100. The only connections between the non-General Lock equipment and the Helix 100/SIOB should be to the “COM” and either “NO” or “NC” terminals of the SIOB (and no connection made from any of these terminals to any other connection on the SIOB or Helix 100).

### Power supply ratings

The General Lock-supplied power adapter has a limited power/current rating. A Helix 100 with a single SIOB typically draws 130mA (but the peak current is somewhat higher). If your electromagnetic appliance rated current (at 12VDC) plus 180mA is less than the power adapter rating, then the General Lock power adapter may be used.

Otherwise, another power supply must be used.

### SIOB Relay ratings

The SIOB relay is rated at 1 amp at up to 24 volts AC or DC.

If any of the ratings of the electromagnetic appliance exceed these, then there is a danger that the SIOB relay will fail – the SIOB relay should not be used to switch such currents/voltages.

Instead, an intermediate relay (with a suitable current/voltage rating) should be used, with the SIOB switching the intermediate relay’s coil. Remember that the intermediate relay coil is an electromagnetic appliance so will need back-EMF suppression.

### FURTHER INFORMATION:

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