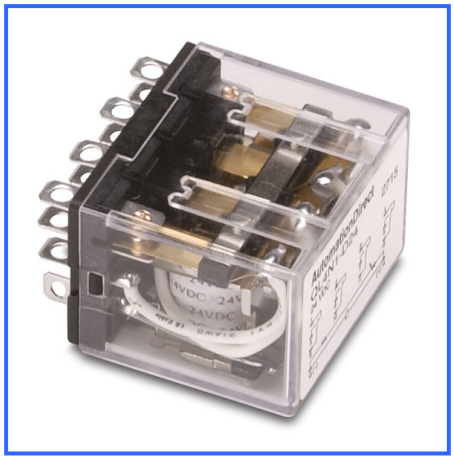
Product Family: Electro Mechanical Relays **Number: AN-LC-008**

Subject: Relay Applications **Date Issued: 9/30/03**

Revision: Original



Background

Automation Direct has waited a long time to find a manufacturer with multiple years experience manufacturing general purpose relays with the highest degree of quality and reliability. The end results are The QM and QL series cube relays (available in 24 VDC, 120 VAC and 240 VAC coil voltages. In addition, the RS series utilizes slim plug-in 24 VDC card relays to create a bank of four or six units in DIN-rail mountable terminal modules. All relays feature LED indicators for easy troubleshooting. They are intended for use in variety of applications, environments and industries. Several options are available along with a variety of package styles and configurations to meet a large range of application requirements. Automationdirect relays have a record of reliable operation; they are backed by a worldwide network of support and service professionals.

Control Panel Application

Most programmable logic controller (PLC) output cards have low output power capabilities. To overcome this characteristic relays are used to switch larger loads. For this reason it is common to find relays being used with PLC outputs to control machine field devices. An example of this situation is when the output signal from the control device, is not large enough to activate a local device, such as, a solenoid. The relay acts as an intermediary device that is used to mechanically switch a voltage or current that is larger than can be output from the controller's output card. Relays are also used on the input side of a PLC when the signal from the field device cannot be directly used as an input to the PLC. In this situation, the relay coil is controlled by the field device and is used to switch signal level voltages to the input card. Relays are also used to isolate circuits and protect against electronic noise. Other application examples include heaters, blowers, solenoid valves used to drive pneumatic/hydraulic cylinders, motorized actuators used in compressors, etc.

Figure 1: DIN-rail socket

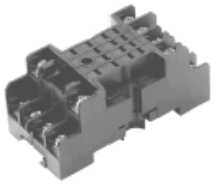


Figure 2: Holding Clip

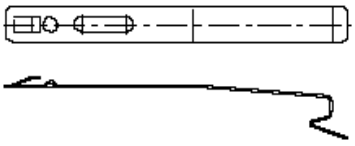


Figure 3: Relay Panel

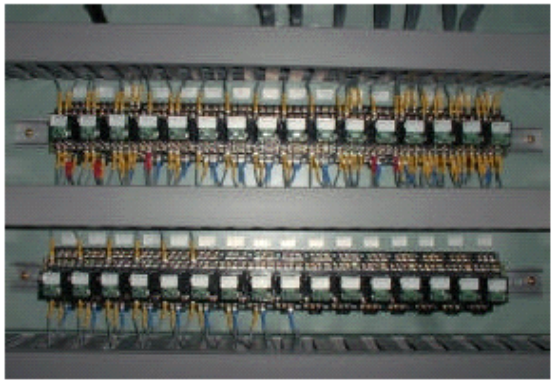
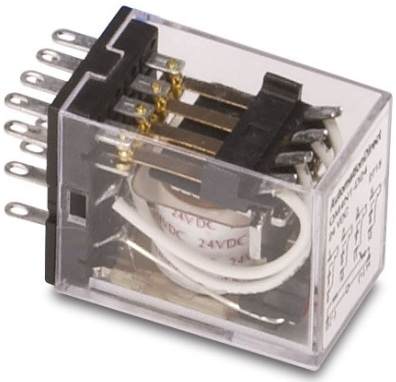


Figure 4: Control Cabinet

Control Panel Mounting

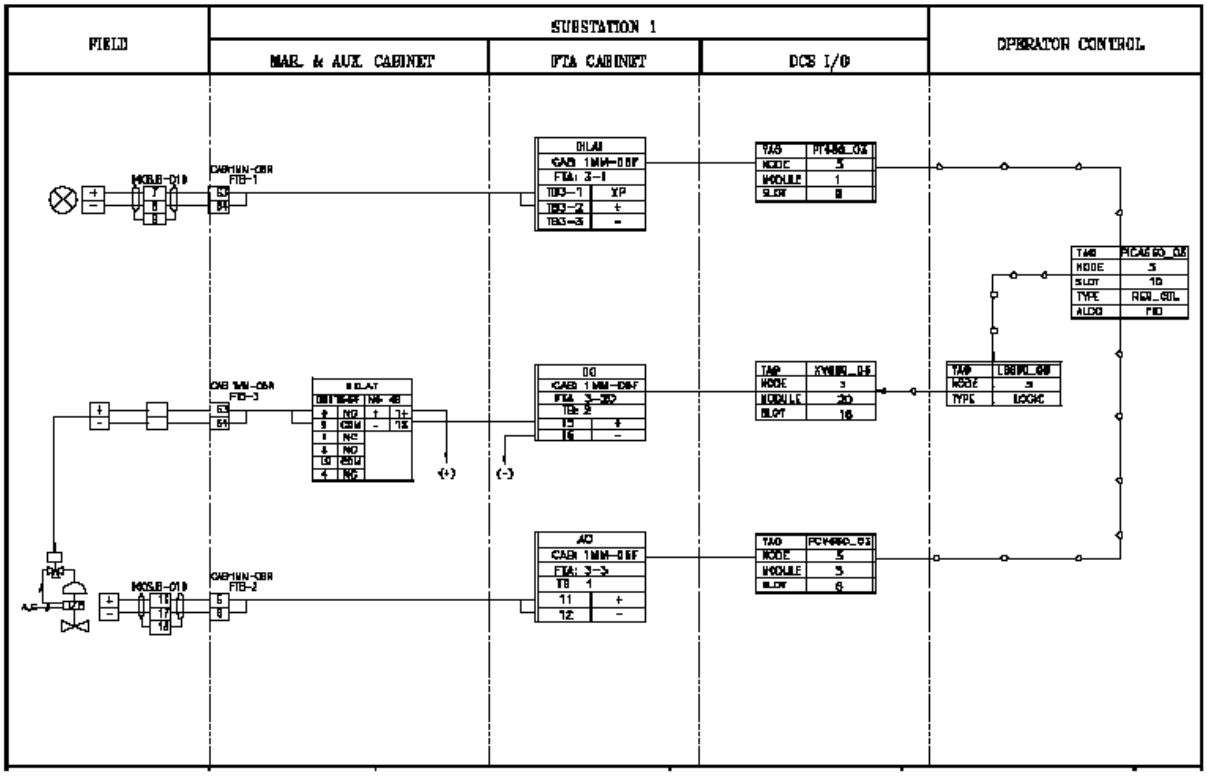
The most common method for mounting relays in a control panel cabinet is to clip a DIN mountable relay socket (refer to figure 1) to a steel DIN-rail. In applications where the cabinet will be subject to vibration a relay holding clip can be used to prevent the relay from vibrating out of the socket (refer to figure 2). The use of sockets and DIN-rails greatly simplifies and eases the installation process. Sockets also allow relays to be easily replaced when necessary. Refer to figures 3 and 4 for examples of relay mounting, wiring and control panel layout.



Solenoid Wiring Example

The schematic in figure 5 illustrates the wiring of a power relay in a typical control panel application. In this application, a relay is installed inside an auxiliary cabinet where the signal from a DCS output card is used to energize the relay coil. When the coil is energized, the circuit providing power to the solenoid is completed and the solenoid valve is opened.

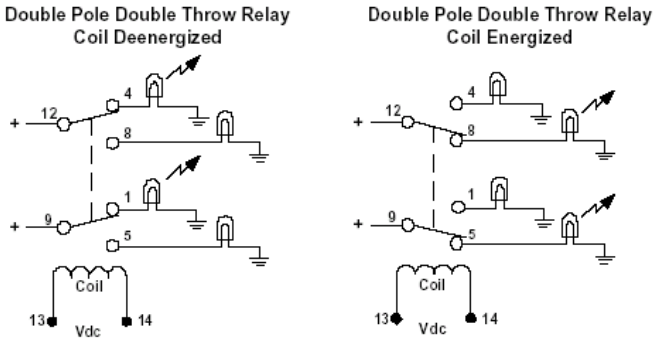
Figure 5: Control Panel Solenoid Wiring Example



Simplified Example Circuitry

Figure 6 shows a simplified wiring diagram for a DPDT throw relay.

Figure 6: Simplified Example Circuitry (MY Series)



Elevator Application #1

In this application, approximately 170 relays were installed in a rooftop control panel (refer to figures 7 and 8). Several relay models were used based on their applicable coil voltage. The relays receive their signals from a variety of local devices such as a door switch, floor position-detecting sensor, operator interface buttons, etc. Many of the relays are used to control logic and to do calculations and decision-making; others are used to switch output signals to motor actuators, lighting devices, fans etc. Elevator design technology has advanced since the control panels shown in figures 7 and 8 were manufactured, however a large number of these elevators are still in operation and replacement relays are still manufactured and available.

Figure 7: Elevator Control Panel

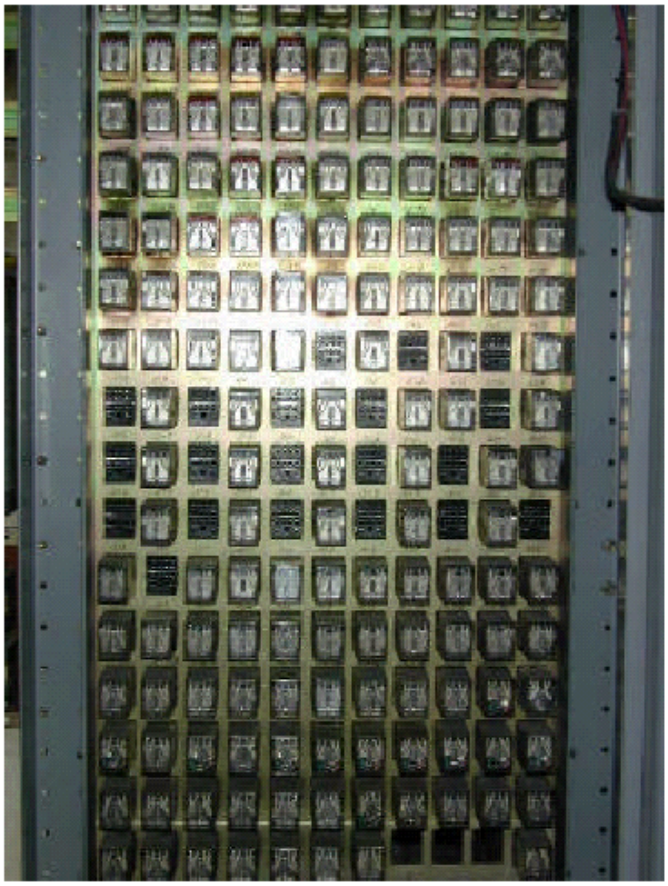


Figure 8: Elevator Control Panel

Elevator Application #2

Relays are still used in the control panels of current elevator designs. However, they typically are not used for logic control or calculation functions. The relays in figures 9,10, 11 and 12 show how relays are used in a newer elevator designs. The relays shown in figure 9 are used to control the elevator floor and door signals.

The relays in Figure 10 are being used for fire mode operation. Figure 11 shows the elevator control cabinet. The relays in figure 12 are used to control the elevator's car ventilation fan, lighting, and motor cooling fan.

Figure 9: Elevator Relay Use

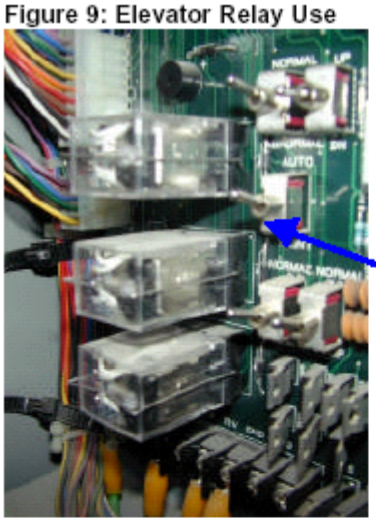


Figure 10: Elevator Relay Use

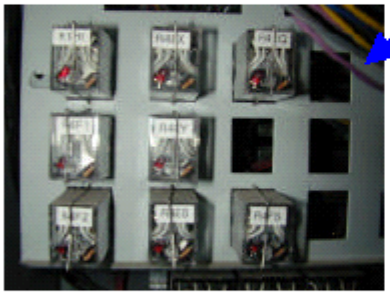


Figure 11: Control Cabinet

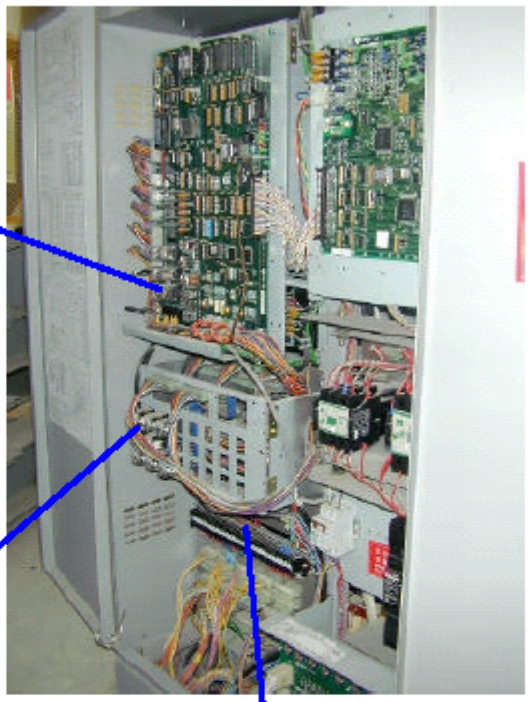
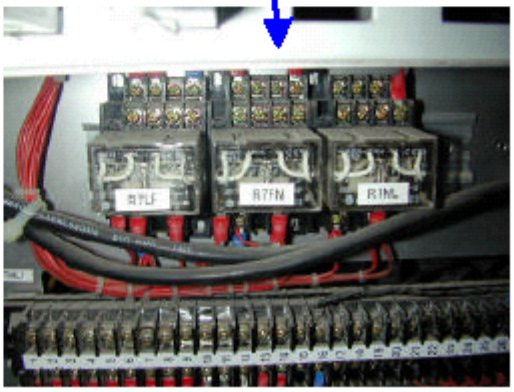


Figure 12: Elevator Relay Use



Temperature and Humidity Chamber Application

PLCs and relays combine to control a number of functions within a Humidity control chamber (figures 13 –16). Output signals are sent from the chamber's dedicated proportional integral derivative (PID) controller to the relay coils. The relay contacts are wired as switches to control magnetic contactors, solenoid valves and a buzzer. Figure 13 shows a small bank of relays behind a side service door.

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Figure 13: Humidity Chamber Service Door

Figure14 shows an example of relays being used with magnetic contactors.

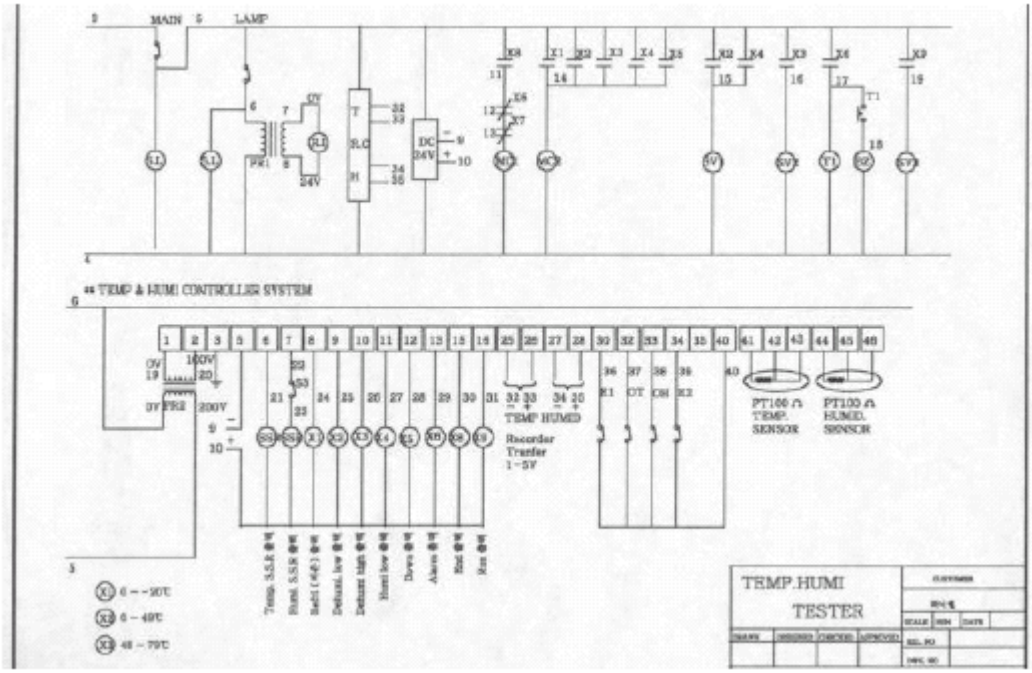
Figure 14: Bank of Relays and Contactors

Figure 15 shows an example of LED relays used with a timer relay.

Figure 15: LED Relays

Figure 16 shows a portion of the Humidity Controller's wiring diagram.

Figure 16: Humidity Chamber Wiring Diagram



Technical Assistance: If you have questions regarding this Application Note, please contact us at 770-844-4200 for further assistance.