How to avoid the most common relay problems

Do you know how to avoid the most common relay problems?

Everything begins with really knowing your application before you select a solution!

Data sheets are only part of the process when selecting a relay. They provide basic facts about the construction, capability and functionality of a relay, but other factors must be carefully considered to assure the best possible solution and avoid relay failure.

1) Actual Maximum and Minimum Operating Temperature

Temperatures affect a relay's operation in several ways. It is crucial to know the ambient (surrounding) temperature adjacent to the relay in any application utilising an electromechanical or solid state relay. The ability of the electromechanical relay's coil to function properly, for example, is directly affected by surrounding temperatures. Coil functionality is essential to a relay's proper switching. The relay's coil resistance is affected by temperature which, in turn affects the pull-in and drop out voltages. At extremely high temperatures the insulation on a coil can be damaged, causing malfunction in the relay, or plastics can lose stability. The materials used in a relay's electrical contacts can also be greatly affected by extremes of temperature, so knowing the minimum and maximum temperatures is essential.

2) Continuous Load Current Draw

This is the amount of electricity in amperes being used in the circuit and an essential piece of information when selecting the correct relay for the application. Current is also a heat generator, which can affect a relay's functionality and contact materials, and a vital piece of information.

3) Switching Current

This is the amount of electricity in amperes that is actually being switched by the relay during its operation. Depending upon the type of electrical load being switched, transient voltages can occur, potentially affecting the relay's switching performance under certain conditions. For example, closing a contact on a highly capacitive or lamp load, may create initial currents many times higher than the operating current. As well, opening an inductive circuit may create transient voltages which can result in damage to the contacts. DC motor loads, such as found in an electric winch, can also create sustained transients before the motor comes to rest.

4) Load Voltage

The level of voltage and the type of voltage affects the relay system. The power is in direct proportion to voltage and current. Load voltages are also important when considering the coil to contact isolation required. In DC circuits, load voltages above 24VDC require special handling to avoid arc damage to contacts.

5) Control Parameters

Other questions about the control system containing the relay(s) can contribute to the selection of the proper relay. Is the control voltage and the power available to drive the relay properly? Is the supply voltage regulated? Is the control signal from a relay contact, or a solid-state switch? These questions provide good examples of details that will be helpful when discussing the relay selection process.

6) Load Type - see switching current

Exactly what the relay is switching will determine the type of electrical load and will provide valuable information for the relay selection process. Electrical loads vary, but play an important role in choosing the proper relay. Resistive loads are commonly seen in heating equipment. Inductive loads are common to electric motors, transformers and coils.

Capacitive loads are seen in energy-storing circuits, such as certain electric motors, power supplies, some types of lamps, radio and telecom equipment. Incandescent lighting/lamp loads are common in domestic and energy conservation applications.

7) Cycle Rate

Some applications, e.g. temperature controllers, may demand that a relay open and close faster than it's designed to respond. Rapid cycling adds heating effects that can hinder relay performance at high ambient temperatures. It can also reduce contact life by increased arcing. In some applications the electromechanical relay can become life expired in a short space of time.

8) Connection Method

Exactly how a relay is connected into a circuit can create its own challenges and factors into the relay selection process. The integration of circuit wiring terminals can create resistance heating. Wires and terminal connectors must be properly sized to cope with the load and provide maximum heat dissipation. If the relay is PCB-mounted, track dimensions, soldering and wash downs are factors to be considered. A variety of sockets can also accommodate most relays but can introduce extra problems if not considered with care.

Discuss your application with a DURAKOOL Relay Applications/Sales Engineer.

REMEMBER

Datasheets cannot be used to fully select a solution. At best, they just get you in the ballpark. Datasheets are constructed to present generalised information about relay capabilities. Assumptions made about the applicability of a relay in a given application cannot be made without clear definition of the application parameters and the specific capabilities of the relay chosen from the generalised data.

With solid information about the 8 factors listed above, Durakool can guide you to the most robust and efficient solution there is.