

FAQ

The Key Elements to a High-End Safety Relay

Safety relays are used across a wide range of industries and in a broad array of equipment to protect machines and operators during a catastrophic fault to avoid costly maintenance or equipment replacement. Whether single function or multi-function, safety relays are a critical part of systems such as elevator controls, railway technology, robots, machine tools, packaging equipment, and more.

Q: What is the primary operation that safety relays provide to the user?

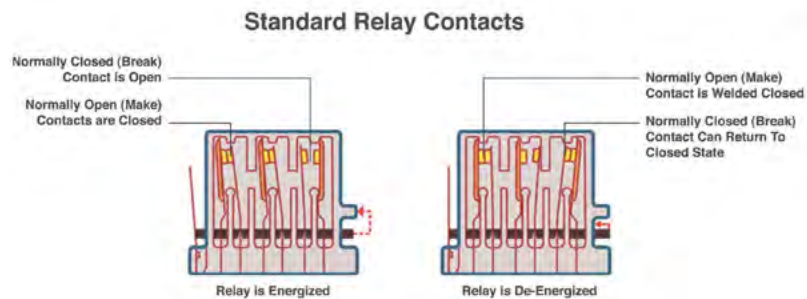


Figure 1: This illustration shows the operation of a standard safety relay in a fault situation like a welded contact.

A: Safety relays have forced-guided relay contacts (also known as positive-guided relay contacts, captive contacts, and locked contacts — see Figure 1). The contacts in a particular contact set are mechanically linked together so that no single contact in the relay can change state without changing the state of all other contacts. This makes it impossible for NO (normally open) and NC (normally closed) contacts to be closed at the same time. This forced guidance must be present even if a relay part fails to function correctly.

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Q: Why is having a forced-guided relay necessary?

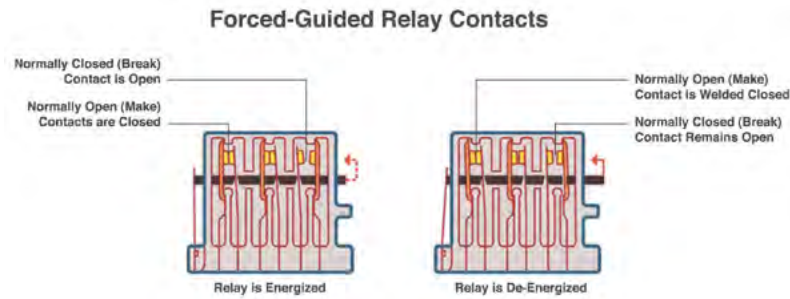


Figure 2: Illustrated above is the operation of standard relays in a fault situation like a welded contact.

A : It is important that your relay remain engaged when there is a machine failure. This not only keeps access to the area where the fault occurred restricted to protect the operator from being harmed, but it also stops the machine from causing further damage to itself. With standard relays, opposing contacts can end up in the same state causing a safety risk like providing entry to a dangerous location (see Figure 2).



Q: Are single-pole and multi-pole versions available?

A : A safety relay consists of at least one normally closed contact and one normally open contact. Depending on the company you choose to partner with, you'll find that there are a variety of safety relays available. Forced-guided relays can be found in 2-pole, 3-pole, 4-pole, 6-pole, and 8-pole versions for multiple applications where complex equipment and machines are installed. These various contact arrangements should come with international approvals so that machines can be sold around the world.



Q: Do contact materials make a difference when selecting a safety relay?

Safety Relay Selection Material Table

Material	Characteristics	Applications	Range
AgSnO ₂ + 0.2µmAu C	very low welding tendency highest burn-up resistivity very good arc suppression	special for switching, inductive loads	10mA - 10A
AgNi10 + 0.2µmAu N	low welding tendency high burn-up resistivity good arc suppression	circuits with medium to high switching current, DC current circuits	10mA - 10A
AgNi10 + 5µmAu S	higher welding tendency low burn-up resistivity low contact resistance	where very low to medium switching current and voltage is mandatory	2mA - 300mA

Figure 3: Different materials used in safety relays provide a variety of characteristics to the user.

A : Yes — material selection is important and varies based on the required switching current and the type of load. The chart above in Figure 3 indicates some of the materials used more often. Note that all contacts are typically gold flash plated for long shelf life and that mixed contact materials are available as options.



Q: Are safety relays available in a variety of formats for different types of equipment?

A : Both individual safety relays and modules are available for use, including those that fit DIN rail and PCB sockets. The relays are often available in standard vertical configurations as well as low profile flat pack designs. DIN rail mount modules are often available as well. These may include a choice of isolated or bussed channels, screw cage clamp connections, an LED coil voltage indicator, reverse polarity LED protection, and a broad enough number of channels to suit your application.



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Q: How can I be sure that the safety relay I purchase is fully operational?

A: Safety relays are required to have function testing performed on every relay produced rather than completing only batch testing. This ensures that the safety relay or module is 100% safe to use in your application. During relay use the force guidance of the relay ensures that opposing contacts are always in opposite states. This behavior enables simple diagnostics and fault detection when monitoring the forcibly guided feedback contacts.

Q: What if I don't see the exact combination of contacts or materials that I need?

A: Manufacturers of safety relays often run into applications that stretch the boundaries of the devices. In these cases, a company like Altech can offer technical assistance in determining a design for a custom system. Some common customizations include coil voltage and resistance, mixed contact materials, various contact pressures, contact arrangements, and operate/release times.

Q: What accessories should I make sure my supplier has on hand?

A: Accessories for safety relays are often specific to the relay's model number. Be sure that sockets are available for your DIN rail and printed circuit board projects. This is especially important in printed circuit board applications so relays can be removed without de-soldering them from the board.

Q: What are some standard applications where safety relays are necessary?

A: Safety relays can be used in any piece of machinery or equipment where the safety of the user and/or machine is paramount. Applications include safety door controls, two-hand operating devices, pressure mat controls, light curtains, speed controls, and a wide number of monitoring devices. Such equipment is found in rail transportation systems, elevator controls, cutting machines, medical equipment, stamping machines, robot and cobots, printing and textile machinery, cranes, and many other systems.

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- 5 to 110VDC
- PCB sockets
- Custom configurations
- Various contact materials
- DIN Rail sockets and modules

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The Altech OA 5642, 5643 and 5644

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- 6-110V DC Coils
- 2-4 Output Contacts
- Various Contact Materials

APPLICATION EXAMPLES

Two Hand Safety Devices	Robots	Pressure Mat Controls
Press Systems	Stamping Machines	Light Barriers and Curtains
Elevators and Escalators	Medical Equipment	Speed Controls
Cranes	Railway Systems	Monitoring Devices
Door and Gate Drive Systems	Emergency Stop Modules	Safety Gate
Printing and Textile Machinery	Safety Door Controls	Monitor of Safety Circuits

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