

**Applications**

Electronic safety relays are used for monitoring safety-related control systems. The requirements for the electrical equipment of machines are specified in IEC/EN 60204. The machine operator must assess the risk on his machine according to EN 954-1 and then manufacture the controls accordingly for the corresponding safety category 1, 2, 3 or 4.

**Construction**

The electronic safety relay consists of a supply unit, the electronics and 2 redundant relays with position operating contacts for the enabling and message circuits.

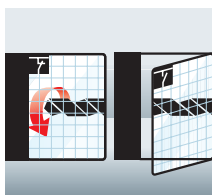
**Product range overview**

The range includes relays for:

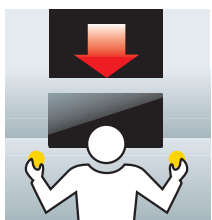
Emergency-Stop circuits



Protective guard monitoring



Monitoring of two-hand controls



Contact expansion modules with and without delay are also available.

**Category according to EN 954-1**

The electronic safety relays are approved by employer's liability insurance association or Technical Monitoring Service (TUV) and their internal assembly corresponds to the requirements for category 4 according to EN 954-1. Combined with external wiring, which is the responsibility of the machine operator, the safety relay can be used for categories 2 to 4.

The electronic safety relays are single-fault proof, i. e. one fault in the safety circuit (e.g. a short-circuit in the emergency-stop circuit) does not cause hazardous conditions.

EN 954-1 excludes the possibility of two independent faults occurring at the same time.

**Stop category**

IEC/EN 60204-1 defines two relevant stop categories for stopping in the event of an emergency:

- Stop category 0: shut-down by means of immediate removal of the power supply to the machine actuators.
- Stop category 1: controlled stopping with power available to the machine actuators to achieve the stop. Power is not removed until the stop is achieved.

Basic devices and expansion modules are available for both categories.

**Function**

In fault-free operation, following the starting command, the safety circuits are monitored by the electronics, and the enabling paths are activated via the relays. Following the switch OFF command, and also in the event of a fault (earth fault, faulty insulation, wire breakage, etc.), the enabling paths are blocked immediately (Stop category 0) or with a time delay (Stop category 1) and the motor is disconnected from the power supply. Since a short circuit in a redundant safety circuit does not cause a hazardous condition, the fault is not detected until the system is reset, when switching on is prevented.

**Single/dual channel construction**

Safety relays for stopping in the event of an emergency and for monitoring of protective guards are available for single-channel and dual-channel applications. The single-channel construction enables earth fault monitoring to be implemented for the safety circuit. The dual-channel application provides a redundant Emergency-Stop or protective guard monitoring circuit. This allows monitoring for short circuits and cable insulation faults to be implemented as well. The device can also be used with or without reset monitoring. Here, the device is not started and enabling paths switched until the falling edge of the reset pushbutton has been detected. An application for the device without reset monitoring is for example, for monitoring of protective doors for an automatic restart.