

The selection and use of pneumatic positioning switches

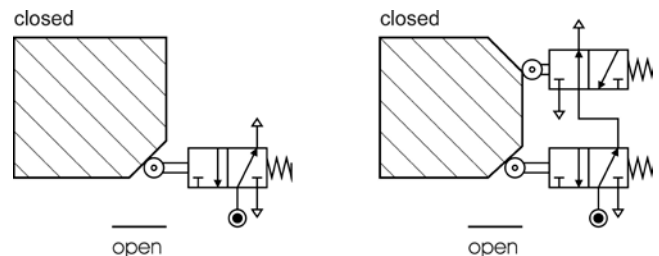
Problem

The position of movable functional parts and movable guards on machinery are registered by position switches that generate signals depending on the position of machine parts. In general, these are electric components, but so-called pneumatic stop relay valves are also in use. The safety design of electrical position switches is evaluated on the basis of test principles for emergency opening position switches for safety purposes. No similar test principles for evaluating pneumatic position switches with a similar function are known to exist.

Activities

The requirements for interlocking devices associated with guards are outlined in DIN EN ISO 14119 in particular. These requirements are formulated very generally and do not suffice for evaluating pneumatic position switches in terms of safety functions.

IFA thus conducted comprehensive studies on widely available pneumatic position switches from various manufacturers. The studies were devised with a view to the requirements for the respective electric switches – requirements which are described in the principles for testing and certifying emergency opening position switches. Above all, the study recorded their functional properties, their behaviour under long-term loads and in fault situations, and their protection against circumvention by simple means.



Pneumatic position switches for locking protective separation equipment.

Left: Individual switch with emergency power interruption.

Right: NC/NO-combination with emergency power interruption.

Results and Application

For pneumatic position switches for safety purposes, it must be borne in mind that the energy supply has to be interrupted upon activation. The element that trips the switch (e.g.: roller lever) and the emergency opening system (e.g.: slide valve) must be connected in an interlocking manner. In other words, the design itself should keep the connection from being lost.

Some, but not all, of the common pneumatic position switches on the market studied by IFA fulfil comparable requirements to those for electrical emergency opening position switches. The pneumatic position switches with a positive evaluation can be used for safety functions, such as locking separating protective devices. These can be used as individual switches or in a NC/NO-combination (see illustration).

Area of Application

All manufacturers and operators of machines and equipment that use pneumatic power.

Additional Information

- DIN EN ISO 4414: Pneumatic fluid power – General rules and safety requirements for systems and their components (04.11). Beuth, Berlin 2011
- Principles of testing and certification for positively opening position switches (GS-ET-15, 02.11). Published by.: Expert committee for electrical engineering, Testing and certification facility in DGUV Test, Cologne 2011
- DIN EN ISO 14119: Safety of machinery – Interlocking devices associated with guards – Principles for design and selection (03.14). Beuth, Berlin 2014
- DIN EN ISO 13849-1: Safety of machinery – Safety-related parts of control systems – Part 1: General principles for design (12.08). Beuth, Berlin 2008
- DIN EN ISO 13849-2: Safety of machinery – Safety-related parts of control systems – Part 2: Validation (02.13). Beuth, Berlin 2013
- Kühlem, W.: Pneumatische Positionsschalter für Sicherheitsfunktionen. In: BIA-Report 4/97. Hrsg.: Hauptverband der gewerblichen Berufsgenossenschaften (HVBG), Sankt Augustin 1997 www.dguv.de/webcode/d6675

Expert Assistance

IFA, Division 5: Accident prevention – Product safety

German Social Accident Insurance Institution for the woodworking and the metalworking industry, Regional Administration Hanover

Literature Requests

IFA, Central Division