

Technical References



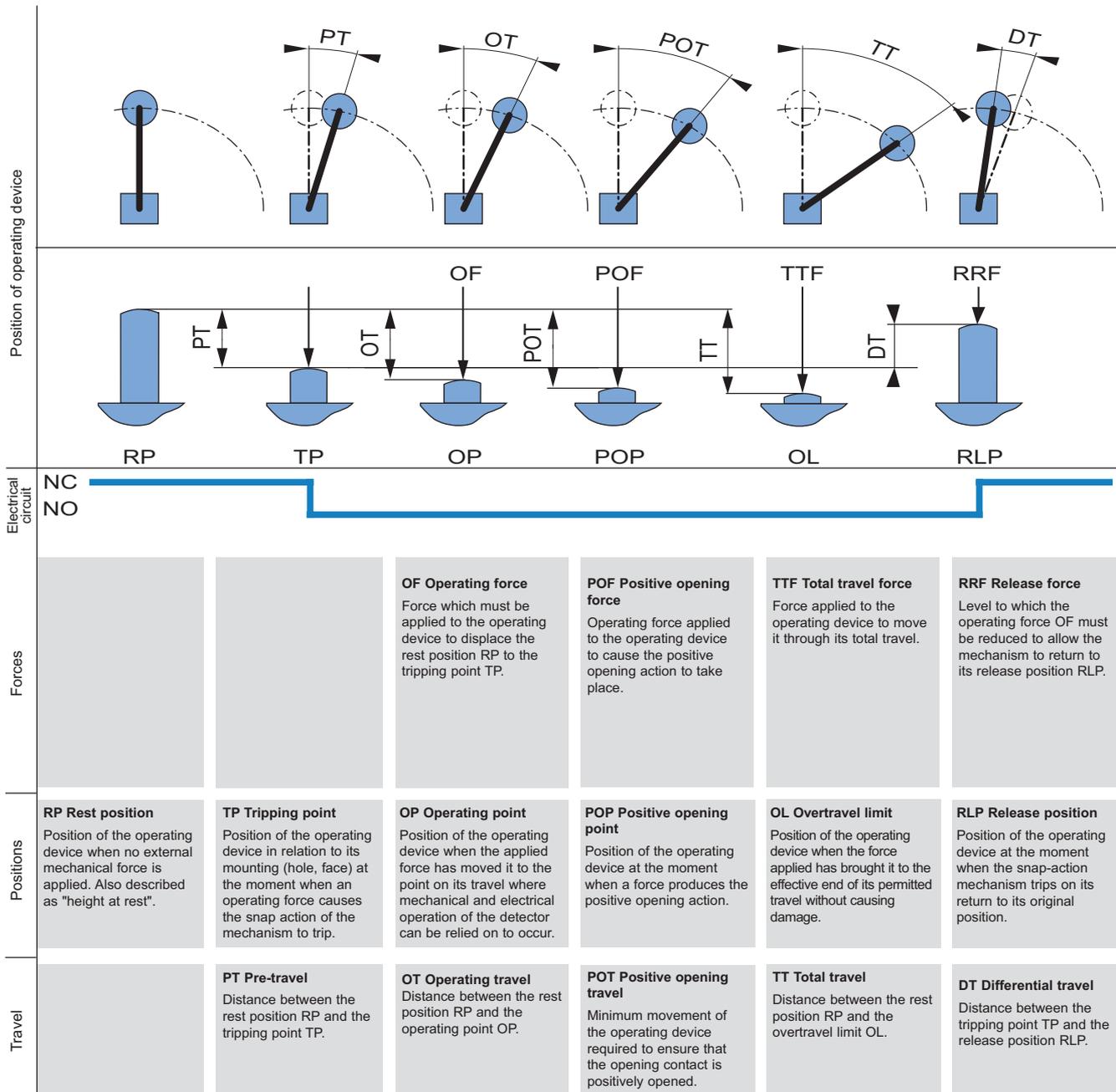
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Mechanical characteristics

Terminology

Forces - Positions - Travel



- Positive opening action : see IEC 947-5-1 chapter 3, § 2.2

N.B. : The max. and min. values quoted for each detector (min. operating force, max. total travel, etc.) are the maxima and minima users must allow for if they are to use our products under the proper conditions.

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Key Operated Safety Limit Switches – Technical Guide

Standards

Extract from standards EN 292-2 and EN 1088.

Moving guards to prevent risks created by moving (and therefore dangerous) parts must be used in conjunction with locking devices or interlocks with guard locking.

Interlocks with guard locking must be used on machines with inertia.

An interlock with guard locking must be used if the stopping time is greater than the time required for a person to reach the danger zone. This mechanism will delay unlocking the moving guard until the dangerous movement has actually stopped.

Areas of application

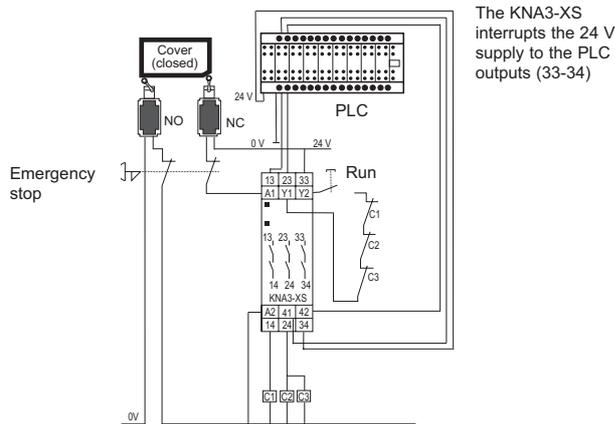
Key-operated safety interlock switches have been designed specifically for protecting operators working on dangerous machines. They can be used to lock or unlock moving guards on industrial machines, and meet the requirements of standards EN 292-2, EN 294, EN 1088 and EN 60204-1.

Key-operated safety interlock switches are mainly used in applications which form part of the machine operating process. They are used to stop any dangerous movement whenever the moving guard system is open.

Examples of application

Monitoring of immediate access moving guards

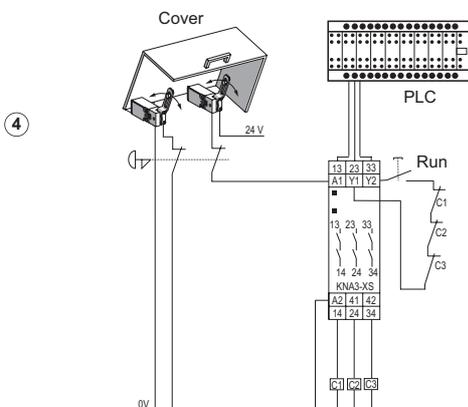
- ① Level 3 for 1 or 2 moving cover(s): KNA3-XS + 83 893 001



Emergency stop and moving cover controlled by two channels on terminals 41-42 (data contact) to a PLC output.

Monitoring of immediate access rotary guards

- Level 3 for 1 moving cover: KNA3-XS + 83 893 3



Machine control circuits

The use of safety interlock switches in conjunction with XS and RS safety relays creates control circuits conforming to EN 954-1.

Operating principle

The start circuit is only closed after the key has been inserted fully and is used to close the NC contacts. Removing the key once the moving cover is open causes the positive action opening of the NC contact(s).

The opening of the moving guard can be:

Immediate

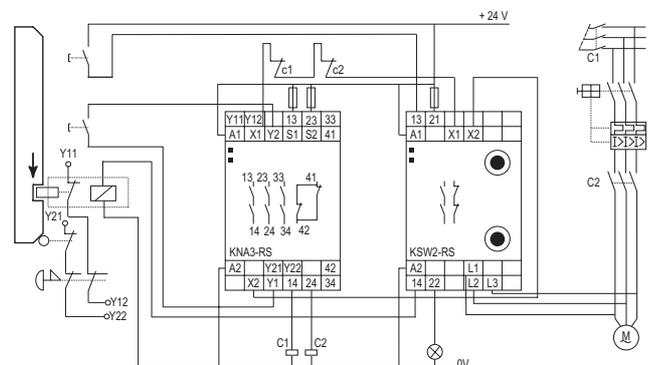
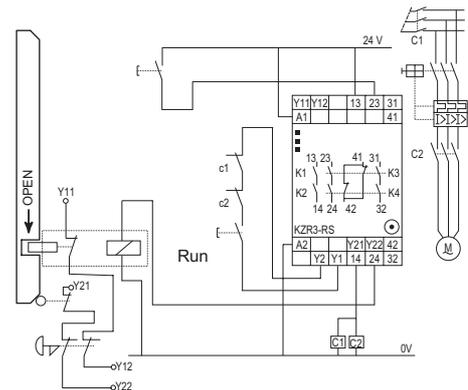
Machines without inertia. Machines with a stopping time which is less than the time taken to access the danger zone.

Delayed

Machines with a stopping time which is greater than the time taken to access the danger zone.

Monitoring of delayed access moving guards

- ② Level 3 for 1 moving cover: KZR3-RS + 83 893 201
- ③ Level 4 for 1 moving cover: KNA3-RS + KSW2-RS + 83 893 201



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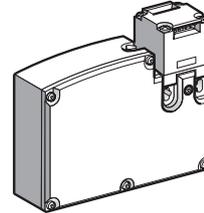
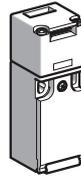
Key-operated safety interlock switch, plastic

Without key locking

Switches with plastic body for use on light machinery, **without inertia**. For use in unstable environments where there is a risk of the guard opening accidentally (due to vibrations, if the guard is positioned at an angle, bouncing of the guard, etc). **The guard is kept closed by adding a door stopping mechanism.**

With interlocking and locking of the key using an electromagnet

Devices in plastic cases for use on machines **with inertia**, or which require controlled opening of the guard. The moving guard is locked by removing the voltage, or by applying voltage to the electromagnet. A special tool can be used to unlock the guard manually, to ensure the safety of personnel carrying out maintenance operations on the machine, or if there is a malfunction.



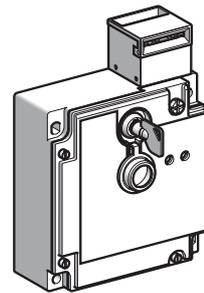
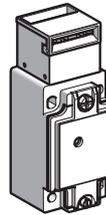
Key-operated safety interlock switch, metal

Without key locking

Switches with metal body for use on machines **without inertia** in a **stable environment** where there is no risk of the guard opening accidentally (due to vibrations, if the guard is positioned at an angle, bouncing of the guard, etc)

With interlocking and locking of the key using an electromagnet

Devices in metal cases for use on machines **without inertia**, or which require controlled opening of the guard. The moving guard is locked by removing the voltage. A key-operated lock can be used to unlock the guard manually, to ensure the safety of personnel carrying out maintenance operations on the machine, or if there is a malfunction. These devices are fitted with 2 LEDs: one indicates the opening/closing of the guard, the other whether it is locked.



Safety switch for hinged guards

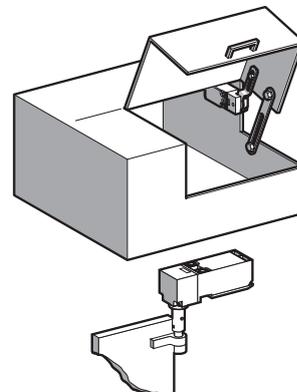
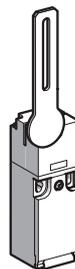
With angular or rotary movement head

Switches with plastic body and angled lever or rotary shaft. They are designed for use on small industrial machines with compact doors, covers or **rotating housings**.

These ensure the safety of the operator by stopping the dangerous movement immediately the lever or rotary shaft reaches an angle of 5°. These devices provide a solution for monitoring **rotary guards** with a small opening radius on machines without inertia.

They are particularly suitable for adapting existing machines to meet applicable standards, as they can be mounted on covers which are already installed, including those mounted imprecisely.

Mounting the switch increases the safety of the operator as it reduces the opening distance of the guard, and therefore the risk of reaching the danger zone.



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