



# TECHNICAL REPORT



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## Reed switches – Part 3: Reliability data for reed switch-devices in typical safety applications

INTERNATIONAL  
ELECTROTECHNICAL  
COMMISSION

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## INTERNATIONAL ELECTROTECHNICAL COMMISSION

### REED SWITCHES –

### Part 3: Reliability data for reed switch-devices in typical safety applications

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IEC TR 62246-3, which is a Technical Report, has been prepared by IEC technical committee 94: All-or-nothing electrical relays.

The text of this Technical Report is based on the following documents:

Draft TR	Report on voting
94/425/DTR	94/429/RVDTR

Full information on the voting for the approval of this Technical Report can be found in the report on voting indicated in the above table.

This document has been drafted in accordance with the ISO/IEC Directives, Part 2.

A list of all parts in the IEC 62246 series, published under the general title *Reed switches*, can be found on the IEC website.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under "<http://webstore.iec.ch>" in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

A bilingual version of this publication may be issued at a later date.

**IMPORTANT – The 'colour inside' logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.**

## INTRODUCTION

This Technical Report:

- provides reliability data for reed switch-devices applied to machinery systems and also E/E/PE systems;
- selects typical safety applications for reed switch-devices according to the requirements from typical group safety standards;
- selects references, terms and definitions for machinery systems, E/E/PE systems and reed switch-devices, lifecycle activities, safety integrity and performance level, failures and safety measures for the reed switch-devices from typical group safety standards;
- addresses a way to share the responsibility on the components in the life cycle phases;
- addresses the application of IEC 62246 (all parts);
- considers the relation between safety requirements for the system from industrial standards and basic safety measures for the reed switch-devices of a single E/E/PE safety-related system and for two E/E/PE safety-related systems operating in:
  - a low demand mode of operation,
  - a high demand or continuous mode of operation.
- considers usage conditions at the end-user side:
  - environmental conditions for reed switches' use;
  - proof test period;
  - preventive maintenance.
- considers usage conditions at the E/E/PE system manufacturer side:
  - switching load;
  - failure mode;
  - diagnostic coverage for reed switch-devices.
- considers usage conditions at the component manufacturer side:
- considers how to evaluate the risk of the reed switch-devices fault occurrence based on the requirements from ISO 13849 (all parts), IEC 62061 and IEC 61508 (all parts):
- addresses a way to calculate reliability data of the reed switch-devices based on the requirements from ISO 13849 (all parts), IEC 62061 and IEC 61508 (all parts)
- analyses dangerous failure rates,  $B_{10D}$  values of the reed switch-devices according to the switching loads;
- calculates dangerous failure rates of the reed switch-devices based on usage rate per year;
- considers long-term field demonstration tests and operating experiences of the systems.

## REED SWITCHES –

### Part 3: Reliability data for reed switch-devices in typical safety applications

#### 1 Scope

This part of IEC 62246, which is a Technical Report, provides basic technical background and experience about reliability data for reed switch-devices applied to machinery systems as well as E/E/PE safety-related control systems during the life cycle phases in general and industrial safety applications.

The document selects typical safety applications from group safety standards, and includes national safety standards and regulations accordingly. This document shows major reliability aspects for a proper design according to the standards, but it does not cover all details of an individual design. The responsibility for the verification of system design remains with the system integrator/manufacturer.

#### 2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 61508 (all parts), *Functional safety of electrical/electronic/programmable electronic safety-related systems*

IEC 62061:2005, *Safety of machinery – Functional safety of safety-related electrical, electronic and programmable electronic control systems*

IEC 62061:2005/AMD1:2012

IEC 62061:2005/AMD2:2015

IEC 62246-1-1:2018, *Reed switches – Part 1-1: Generic specification – Blank detail specification*

ISO 13849 (all parts), *Safety of machinery – Safety-related parts of control systems*