



TECHNICAL REPORT



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

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

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CONTENTS

FOREWORD.....	5
INTRODUCTION.....	7
1 Scope.....	8
2 Normative references	8
3 Terms and definitions	8
3.1 Failure of systems.....	9
3.2 Confirmation of safety measures for reed switch-devices	9
3.3 Reliability data of reed switch-devices	10
3.4 Functional safety of reed switch-devices	11
4 Approach adopted for this document.....	12
4.1 General.....	12
4.2 Application of reed switches in accordance with IEC 62246 (all parts).....	12
4.3 Application in accordance with ISO 13849 (all parts), IEC 62061 and IEC 61508 (all parts).....	13
4.4 Application of the design of the E/E/PE safety-related system.....	13
4.5 Application of SIL capability to function units	14
4.5.1 General	14
4.5.2 Procedures	14
4.5.3 Random hardware failures	14
4.5.4 Systematic faults	15
4.5.5 Safety manual	15
4.5.6 Application of SIL capability for the allocation of SIL to systems	15
5 Examples of reliability data for reed switch-devices	16
6 Examples of classification of involved groups for responsibility.....	16
Annex A (informative) Hydraulic and pneumatic fluid power	17
A.1 Example of electric actuator in hydraulic fluid power	17
A.2 Examples of group safety standards	17
A.3 Example of safety requirements	17
A.4 Example of safety measures for the reed switch-device	17
A.4.1 Usage conditions of end-user	17
A.4.2 Usage conditions of the reed switch-device	18
A.5 Example of calculation of failure rates for the reed switch-device.....	19
A.5.1 Dangerous failure rate of the reed switch-device	19
A.5.2 Estimates for diagnostic coverage (DC)	20
A.5.3 Estimates for common cause failure (CCF).....	20
A.6 Example of classification of involved groups for responsibility.....	20
Annex B (informative) Safety of machinery.....	21
B.1 Example of guard interlocking device	21
B.2 Example of group safety standards	21
B.3 Example of safety requirements for the system	21
B.3.1 Description of Type 3 interlocking device – example.....	21
B.3.2 Typical characteristics	22
B.3.3 Remarks	22
B.3.4 Description of Type 4 interlocking device – example.....	23
B.3.5 Typical characteristics	23
B.3.6 Remarks.....	23

B.4	Example of safety measures for the reed switch-device	23
B.4.1	Usage conditions of end-user	23
B.4.2	Usage conditions of the reed switch-device	24
B.5	Example of calculation of failure rates for the reed switch-device	24
B.5.1	General	24
B.5.2	Dangerous failure rate of reed switch-device	24
B.5.3	Estimation for diagnostic coverage (DC)	24
B.5.4	Estimates for common cause failure (CCF)	24
B.6	Example of classification of involved groups for responsibility	25
Annex C (informative)	Automatic electrical controls for household and similar use	26
C.1	Example of automatic electrical burner control system	26
C.2	Examples of group safety standards	26
C.3	Example of safety requirements for the system	26
C.4	Example of safety measures for the reed switch-device	27
C.4.1	Usage conditions of end-user	27
C.4.2	Usage conditions of reed switch-device	28
C.5	Example of calculation of failure rates for the reed switch-device	28
C.5.1	Dangerous failure rate of reed switch-device	28
C.5.2	Estimates for diagnostic coverage (DC)	29
C.5.3	Estimates for common cause failure (CCF)	29
C.5.4	Accident damage reduction	29
C.6	Example of classification of involved groups for responsibility	29
Annex D (informative)	Household and similar electric appliances	31
D.1	Example of automatic electric washing machine	31
D.2	Examples of group safety standards	31
D.3	Example of safety requirements for the system	31
D.4	Example of safety measures for the reed switch-device	31
D.4.1	Usage conditions of end-user	31
D.4.2	Usage conditions of reed switch-device	32
D.5	Example of calculation of failure rates for the reed switch-device	33
D.5.1	Dangerous failure rate of reed switch-device	33
D.5.2	Estimates for diagnostic coverage (DC)	33
D.5.3	Estimation for common cause failure (CCF)	33
D.6	Example of classification of involved groups for responsibility	33
Annex E (informative)	Electric power systems	35
E.1	Example of measuring and protection relay system	35
E.2	Industrial standards	35
E.3	Safety requirements for the system – example	35
E.4	Safety measures for the reed switch device – example	35
E.4.1	Usage conditions of end-user	35
E.4.2	Usage conditions of the reed switch-device	36
E.5	Example of the calculation of failure rates for the reed switch-device	37
E.6	Example of classification of involved groups for responsibility	37
Annex F (informative)	Railway application	39
F.1	Example of automatic train control (ATC) system	39
F.2	Examples of group safety standards	39
F.3	Example of safety requirements for the system	39
F.4	Example of safety measures for the reed switch-device	39

F.4.1	Usage conditions of end-user	39
F.4.2	Usage conditions of the reed switch-device	40
F.5	Example of calculation of failure rates for the reed switch-device	41
F.6	Example of classification of involved groups for responsibility	42
Bibliography	43
Figure A.1	Architecture of an electric actuator in hydraulic fluid power	18
Figure A.2	Control circuit of reed switches of magnetic proximity switches	19
Figure A.3	B_{10} value estimated by Weibull analysis	19
Figure B.1	Electric interlocking device with a proximity switch actuated by a magnet actuator	22
Figure B.2	Electric interlocking device with two proximity switches	22
Figure B.3	Typical architecture of guard interlocking device	23
Figure C.1	Architecture of a microcomputer type gas meter	27
Figure C.2	Control circuit of a reed switch in flow sensor	28
Figure C.3	Accident occurrences and casualties by year (Japan)	29
Figure D.1	Architecture of an automatic electric washing machine	32
Figure D.2	Control circuit of a magnetic proximity switch	33
Figure E.1	Architecture of a measuring and protection relay system	36
Figure E.2	Control circuit of a reed switch in a measuring and protection relay	37
Figure F.1	Architecture of the automatic train control (ATC) system	40
Figure F.2	Control circuit of reed switches in the ATC system	41
Table 1	Diagnostic coverage (DC)	10
Table 2	Maximum allowable safety integrity level for a safety function carried out by a type A safety-related element or subsystem	13
Table 3	Performance level	13
Table 4	Architectural constraints on subsystems: maximum SIL that can be claimed for a safety-related control function (SRCF) using this subsystem	14
Table A.1	Possible sharing of responsibility on an electric actuator	20
Table B.1	Possible sharing of responsibility on a guard interlocking device	25
Table C.1	Detection methods and action in the event of emergency	26
Table C.2	Possible sharing of responsibility on microcomputer type gas meter	30
Table D.1	Possible sharing of responsibility on an automatic electric washing machine	34
Table E.1	Failure rates of reed relays in a measuring and protection relay system	37
Table E.2	Possible sharing of responsibility on a measuring and protection relay system	38
Table F.1	Field failure rates of reed relays in the ATC system	41
Table F.2	Possible sharing of responsibility on reed relays in the ATC system	42

INTERNATIONAL ELECTROTECHNICAL COMMISSION

REED SWITCHES –

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

FOREWORD

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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*