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Safety of machinery — Evaluation of fault masking serial connection of interlocking devices associated with guards with potential free contacts

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National foreword

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TECHNICAL REPORT

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Safety of machinery — Evaluation of fault masking serial connection of interlocking devices associated with guards with potential free contacts

Sécurité des machines — Évaluation du masquage de fautes dans les connexions en série des dispositifs d'interverrouillage associés aux contacts sans potentiel

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

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The committee responsible for this document is ISO/TC 199, *Safety of machinery*.

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Safety of machinery — Evaluation of fault masking serial connection of interlocking devices associated with guards with potential free contacts

1 Scope

This Technical Report illustrates and explains principles of fault masking in applications where multiple interlocking devices with potential free contacts (B1 to Bn) are connected in series to one logic unit (K) which does the diagnostics (see Figures 1 to 7). It further provides a guide how to estimate the probability of fault masking and the maximum DC for the involved interlocking devices. This Technical Report only covers interlocking devices in which both channels are physical serial connections.

This Technical Report does not replace the use of any standards for the safety of machinery.

The goals of this Technical Report are the following:

— guidance for users for estimation of the maximum DC values;

— design guidance for SRP/CS.

NOTE 1 Interlocking devices with integrated self-monitoring are not included in the scope of this Technical Report.

NOTE 2 Limitation is also given by the diagnostic means implemented in the logic unit.

NOTE 3 This Technical Report is not restricted to mechanical actuated position sensors.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 12100, *Safety of machinery — General principles for design — Risk assessment and risk reduction*

ISO 13849-1:2006, *Safety of machinery — Safety-related parts of control systems — Part 1: General principles for design*

ISO 14119:2013, *Safety of machinery — Interlocking devices associated with guards — Principles for design and selection*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 12100, ISO 13849-1, ISO 14119 and the following apply.

3.1
fault masking
unintended resetting of faults or preventing the detection of faults in the SRP/CS by operation of parts of the SRP/CS which do not have faults

3.2
series connected devices
devices with potential free contacts (B1 to Bn) are connected in series to one logic unit (K) which does the diagnostics

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