

INTERNATIONAL STANDARD

NORME INTERNATIONALE



Reed switches – **Part 4: Application in conjunction with magnetic actuator used for magnetic sensing devices**

Contacts à lames souples – **Partie 4: Application en combinaison avec un actionneur magnétique utilisé pour les dispositifs de détection magnétiques**



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INTERNATIONAL STANDARD

NORME INTERNATIONALE



Reed switches –
Part 4: Application in conjunction with magnetic actuator used for magnetic sensing devices

Contacts à lames souples –
Partie 4: Application en combinaison avec un actionneur magnétique utilisé pour les dispositifs de détection magnétiques

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REED SWITCHES –

**Part 4: Application in conjunction with magnetic actuator
used for magnetic sensing devices**

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Draft	Report on voting
94/786/FDIS	94/807/RVD

Full information on the voting for its approval can be found in the report on voting indicated in the above table.

The language used for the development of this International Standard is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/publications.

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 webstore.iec.ch in the data related to the specific document. At this date, the document will be

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INTRODUCTION

Reed switches are used as sensing devices in a variety of applications (e.g. safety of machinery, alarm detectors, factory automation, pneumatics and hydraulics, railways, automotive, utilities, healthcare, consumer electronics and appliances, lifts).

The intention of this document is:

- 1) to define the functions, types, characteristics, product information, etc. for magnetic sensing devices:
 - recommended response speed and frequency of operating cycles are determined as rated values;
- 2) to specify the test and measurement procedures for magnetic sensing devices:
 - response speed and operating time of load are determined when used as trip function or presence sensing function according to the relevant standards;
- 3) to specify the additional tests for magnetic sensing devices used for specific product standards.

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REED SWITCHES –

Part 4: Application in conjunction with magnetic actuator used for magnetic sensing devices

1 Scope

This part of IEC 62246 gives additional requirements for the evaluation of functional characteristics on reed switching components operated by magnetic actuator and gives guidance for their implementation in selected applications.

This document specifies test and measurement procedures for the application of reed switch (contact) based magnetic sensors.

NOTE This document can be used in conjunction with specific product standards (e.g. IEC 60947-5-1) applying reed switching with magnetic actuation to provide specific requirements and verification methods.

In case the application of a reed contact magnetic sensor determines additional requirements exceeding those specified in this document, the sensor is evaluated with this application in accordance with the relevant IEC or ISO standard(s) (e.g. IEC 62061 or ISO 13849 series, IEC 60335-1 and relevant parts of the IEC 60335-2 series, IEC 60730-1, IEC 61373, ISO 16750-3).

This document does not apply to:

- sensing or monitoring of the position of elements of interlocking devices for movable guards (see ISO 14119);
- sensing or monitoring of the position of elements of pressure sensitive protective equipment (PSPE, see ISO 13856 series);
- electrical equipment for measurement, control, and laboratory use (see IEC 61010-1);
- aircraft – proximity switches (see ISO 6859-1).

Information contained in this document is relevant to the application of a magnetic sensor on new installations as well as modifications to existing installations.

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 60068-2-1:2007, *Environmental testing – Part 2-1: Tests – Test A: Cold*

IEC 60068-2-2:2007, *Environmental testing – Part 2-2: Tests – Test B: Dry heat*

IEC 60068-2-6:2007, *Environmental testing – Part 2-6: Tests – Test Fc: Vibration (sinusoidal)*

IEC 60068-2-10:2005, *Environmental testing – Part 2-10: Tests – Test J and guidance: Mould growth*
IEC 60068-2-10:2005/AMD1:2018

IEC 60068-2-11:2021, *Environmental testing – Part 2-11: Tests – Test Ka: Salt mist*

IEC 60068-2-17:1994, *Basic environmental testing procedures – Part 2-17: Tests – Test Q: Sealing*

IEC 60068-2-18:2017, *Environmental testing – Part 2-18: Tests – Test R and guidance: Water*

IEC 60068-2-21:2021, *Environmental testing – Part 2-21: Tests – Test U: Robustness of terminations and integral mounting devices*

IEC 60068-2-27:2008, *Environmental testing – Part 2-27: Tests – Test Ea and guidance: Shock*

IEC 60068-2-31:2008, *Environmental testing – Part 2-31: Tests – Test Ec: Rough handling shocks, primarily for equipment-type specimens*

IEC 60068-2-78:2012, *Environmental testing – Part 2-78: Tests – Test Cab: Damp heat, steady state*

IEC 60079 (all parts), *Explosive atmospheres*

IEC 60079-0:2017, *Explosive atmospheres – Part 0: Equipment – General requirements*

IEC 60079-1:2014, *Explosive atmospheres – Part 1: Equipment protection by flameproof enclosures "d"*

IEC 60079-10-1:2020, *Explosive atmospheres – Part 10-1: Classification of areas – Explosive gas atmospheres*

IEC 60079-11:2011, *Explosive atmospheres – Part 11: Equipment protection by intrinsic safety "i"*

IEC 60079-15:2017, *Explosive atmospheres – Part 15: Equipment protection by type of protection "n"*

IEC 60079-18:2014, *Explosive atmospheres – Part 18: Equipment protection by encapsulation "m"*

IEC 60079-18:2014/AMD1:2017

IEC 60417, *Graphical symbols for use on equipment*
(available at <http://www.graphical-symbols.info/equipment>)

IEC 60529:1989, *Degrees of protection provided by enclosures (IP Code)*

IEC 60529:1989/AMD1:1999

IEC 60529:1989/AMD2:2013

IEC 60695-2-10:2021, *Fire hazard testing – Part 2-10: Glowing/hot-wire based test methods – Glow-wire apparatus and common test procedure*

IEC 60695-2-11:2021, *Fire hazard testing – Part 2-11: Glowing/hot-wire based test methods – Glow-wire flammability test method for end-products (GWEPT)*

IEC 60695-2-12:2021, *Fire hazard testing – Part 2-12: Glowing/hot-wire based test methods – Glow-wire flammability index (GWFI) test method for materials*

IEC 60695-2-13:2021, *Fire hazard testing – Part 2-13: Glowing/hot-wire based test methods – Glow-wire ignition temperature (GWFI) test method for materials*

IEC 60721-3-3:2019, *Classification of environmental conditions – Part 3-3: Classification of groups of environmental parameters and their severities – Stationary use at weatherprotected locations*

IEC 60947-5-1:2016, *Low-voltage switchgear and controlgear – Part 5-1: Control circuit devices and switching elements – Electromechanical control circuit devices*

IEC 61373: 2010, *Railway applications – Rolling stock equipment – Shock and vibration tests*

IEC 61810-1:2015, *Electromechanical elementary relays – Part 1: General and safety requirements*
IEC 61810-1:2015/AMD1:2019

IEC 61810-7:2006, *Electromechanical elementary relays – Part 7: Test and measurement procedures*

IEC 62246 (all parts), *Reed switches*

IEC 62246-1:2015, *Reed switches – Part 1: Generic specification*

ISO/IEC 80079-20-1:2017, *Explosive atmospheres – Part 20-1: Material characteristics for gas and vapour classification – Test methods and data*

ISO 16750-3:2012, *Road vehicles – Environmental conditions and testing for electrical and electronic equipment – Part 3: Mechanical loads*

3 Terms and definitions

[IEC 62246-4:2023](#)

For the purposes of this document, the terms and definitions given in IEC 62246 (all parts), and the following apply.

[62246-4-2023](#)

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <http://www.iso.org/obp>

3.1 Types of magnetic-sensing device (MSD)

3.1.1

magnetic-sensing device

MSD

assembly of either devices or components or both working together for protective tripping or presence sensing purposes and comprising as a minimum

- a reed contact magnetic sensor;
and
- an output signal switching device

Note 1 to entry: The output switching device can be a reed switch.

Note 2 to entry: A description of the elements of the MSD is given in 3.2, that of the external connections of the MSD in 3.3 and that of the operation of the MSD in 3.4.

Note 3 to entry: Explanations regarding reed contact magnetic sensors are given in Annex A.

Note 4 to entry: Explanations regarding the operation of reed contact magnetic sensors are given in Annex B.

Note 5 to entry: Proximity switches specified in IEC 60947-5-2 and IEC 60947-5-3 are not magnetic sensing devices.

Note 6 to entry: In safety related applications, magnetic sensing devices can be used with a safety monitoring device.

3.1.2

reed contact magnetic proximity sensor

electromechanical control circuit device without external power supply, operated by the presence of a magnetic actuator or magnetic float actuator or ferromagnetic plate without contact and consisting of a reed contact-based sensor and a magnetic actuator

Note 1 to entry: Reed contact magnetic proximity sensors designed for industrial applications are called reed contact magnetic switches in IEC AFDIS 60947-5-1:2023, which is under preparation.

Note 2 to entry: Reed contact magnetic proximity sensors are not proximity switches, as specified in IEC 60947-5-2 and IEC 60947-5-3.

3.1.3

reed contact magnetic proximity sensor with magnetic actuator set

<separate type> reed contact-based magnetic sensor operated by the external presence of a magnetic actuator where the sensor housing and the magnetic actuator housing are separated

Note 1 to entry: The sensor can include one or more reed contacts.

Note 2 to entry: The sensor is operated when the magnetic actuator is within operating range. See Clause C.2 for the separate type.

3.1.4

reed contact magnetic proximity sensor with magnetic actuator set

<latching type> reed contact-based magnetic sensor operated by the external presence of a magnetic actuator and maintained by the built-in bias magnet where the sensor housing and the magnetic actuator housing are separated

Note 1 to entry: The sensor can include one or more reed contacts.

Note 2 to entry: The sensor is maintained when the magnetic actuator exceeds the operating range. See Clause C.3 for the latching type.

3.1.5

reed contact magnetic proximity sensor with magnetic actuator set

<fork type> reed contact(s)-based magnetic sensor operated by the external presence of a ferromagnetic plate where the sensor and the magnetic actuator are mounted in the same housing

Note 1 to entry: The sensor can include one or more reed contacts.

Note 2 to entry: The sensor is operated when the ferromagnetic plate is placed between the reed switch and the magnetic actuator. See Clause C.4 for the fork type.

3.1.6

reed contact magnetic sensor with magnetic actuator set

<plunger type> reed contact(s)-based magnetic sensor operated by the internal presence of magnetic actuator(s) separately mounted in a plunger element

Note 1 to entry: The sensor is operated when the plunger element reaches a predetermined range of positions by the actuator. See Clause C.5 for the plunger type.

3.1.7

reed contact magnetic sensor with magnetic actuator set

<float type> reed contact(s)-based magnetic sensor operated by the external presence of magnetic float actuator(s) separately mounted in a floating element

Note 1 to entry: The sensor is operated when the floating element reaches a given position range determined by the level of the liquid where the actuator floats. See Clause C.6 for the float type.