



SLOVENSKI STANDARD

SIST EN 50205:2001

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Relays with forcibly guided (linked) contacts

Relays with forcibly guided (linked) contacts

Relais mit zwangsgeführten Kontakten

Relais de tout ou rien à contacts guidés (liés)

Ta slovenski standard je istoveten z: **EN 50205:1997**

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CENELEC

European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

Central Secretariat: rue de Stassart 35, B - 1050 Brussels

Foreword

This European Standard was prepared by the CENELEC BTWG 78-4, Relays with forcibly actuated contacts.

The text of the draft was submitted to the formal vote and was approved by CENELEC as EN 50205 on 1997-07-01.

The following dates were fixed:

- latest date by which the EN has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 1998-06-01
- latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 1998-06-01

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Introduction

The requirements contained in this European Standard apply to all-or-nothing relays in circuits used for safety purposes.

This special type of all-or-nothing relay is referred to as an all-or-nothing relay with forcibly guided (linked) contacts. Such all-or-nothing relays can be used for realizing self-monitoring systems.

1 Scope

This standard applies to all-or-nothing relays with forcibly guided (linked) contacts. The intention of this standard is to define standardized requirements and tests for forcibly guided (linked) operation. Existing standards dealing with all-or-nothing relays maintain their validity. The requirements of this standard apply in addition to the existing standards wherever the all-or-nothing relays are equipped with forcibly guided (linked) contacts.

2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

EN 60947-5-1 +corr. March 1993	1991	Low-voltage switchgear and controlgear. Part 5: Control circuit devices and switching elements. Section One: Electromechanical control circuit devices (IEC 60947-5-1: 1990)
IEC 60050		International Electrotechnical Vocabulary (IEV)
IEC 60255-23	1994	Electrical relays. Part 23: Contact performance
IEC 60255-1-00	1975	Electrical relays - All-or-nothing electrical relays ¹⁾
IEC 60664-1	1992	Insulation coordination for equipment within low-voltage systems. Part 1: Principles, requirements and tests
IEC 61810-5 (in preparation)		Electromechanical all-or-nothing relays. Part 5: Insulation coordination (IEC 94/46/CDV)

NOTE : The next revision of IEC 60255-23 is intended to include contact loads in accordance with the utilization categories AC 15 and DC 13 to EN 60947-5-1:1991 (IEC 60947-5-1:1990), Table C.2

¹⁾ Under revision. New number IEC 61810-1, present draft available as IEC 94/48/CDV.

3 Definitions

Terms and definitions used and applicable to this standard are included in the standards listed in Clause 2, and in the International Electrotechnical Vocabulary (IEC 60050).

Additionally, for the purpose of this standard, the following definitions apply:

3.1 all-or-nothing relay with forcibly guided (linked) contacts: All-or-nothing relay with at least one break contact and at least one make contact designed in such a way that it is made sure by mechanical means that make and break contacts can never be in closed position simultaneously.

NOTE 1: If one of the make contacts is closed, never one of the break contacts is closed. If one of the break contacts stays closed, never one of the make contacts closes.

NOTE 2: Operation of forcibly guided (linked) contacts means that if, for example, any given make contact fails to open and the relay is de-energized, none of the break contacts closes. The same principle applies for the failure to open of a break contact with energization of the relay, i.e. in this case, no make contact shall close.

3.2 application typ A: Contact set with forcibly guided (linked) contacts which are all forcibly guided (linked) to each other.

3.3 application typ B: Contact set with forcibly guided (linked) contacts and additional contacts which are not forcibly guided (linked) as well as contact set with change-over contacts.

3.4 failure to open: A contact has failed to open whenever a closed contact no longer opens, i. e. as a result of welding.

NOTE: Failure to open can occur with make contacts and break contacts.

4 Requirements

4.1 *Forcibly guided (linked) operation*

The efficacy of the forcibly guided (linked) contact operation shall be maintained as long as the relay operates - even when beyond the specified endurance. This applies both for the loaded and unloaded contacts. Contact gaps shall never become less than 0,5 mm over the entire endurance, not only under normal operating conditions, but also when a fault occurs. In case of double break and double make contacts each gap shall be at least 0,3 mm under the same conditions as above.

The forcibly guided (linked) contact operation shall be maintained even if individual parts of the relay fail. Under such circumstances, it is irrelevant whether this failure is due to wear or breakage.

4.2 *Change-over contacts*

Only break contacts and make contacts shall be used as forcibly guided (linked) contacts; contacts which are designed as change-over contacts shall be used either as break contacts or make contacts in the sense of forcibly guided (linked) operation. If the unused contact is connected to a non-safety circuit, it shall be made sure by a circuit analysis that this does not impair safety.

4.3 *Mechanical endurance*

All-or-nothing relays with forcibly guided (linked) contacts shall be capable of performing at least 10^7 switching cycles.

4.4 *Operating conditions*

4.4.1 *Ambient temperature*

All-or-nothing relays with forcibly guided (linked) contacts shall function correctly in an ambient temperature range of at least $-10\text{ }^{\circ}\text{C}$ to $+55\text{ }^{\circ}\text{C}$.

4.4.2 *Energizing quantity*

All-or-nothing relays with forcibly guided (linked) contacts shall correspond to pick-up class "c", and shall at least correspond to class "2" in the operative range of their energizing quantity (see 3.1 of IEC 60255-1-00).

4.5 Insulation

The requirements and dimensioning rules of IEC 61810-5 apply.²⁾

4.5.1 Clearances and creepage distances

Unless otherwise explicitly specified by the manufacturer, overvoltage category III to IEC 60664-1 shall apply when determining the clearances between the voltage-carrying, electrically conducting parts.

Unless otherwise explicitly specified by the manufacturer, pollution degree 3 to IEC 60664-1 shall be assumed for determining the creepage distances between the voltage-carrying, electrically conductive parts.

Depending on the encapsulation of the contacts, a different pollution degree may be used as the basis inside the encapsulation.

Expected inherent pollution shall be taken into consideration. A design according to pollution degree 1 is not permissible, even inside the encapsulation.

4.5.2 Solid insulation

The solid insulation between the voltage-carrying, electrically conductive parts shall be determined according to IEC 61810-5²⁾ (voltage test for reinforced insulation still under consideration).

4.6 Characteristic values and markings

4.6.1 Characteristic values

In the case of relays of application typ B the forcibly guided (linked) contacts and the contacts which are not forcibly guided (linked) shall be clearly specified in the data sheet.

The manufacturer shall prepare and keep information about the vibration resistance ($f = 10$ to 200 Hz). Information about the contact loads shall be provided according to IEC 60255-23. Until a new issue of IEC 60255-23 will list contact loads corresponding to the utilization categories, it is recommended to specify also contact loads according to the utilization categories AC 15 and DC 13 as defined in EN 60947-5-1, table C.2.

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4.6.2 Markings

In addition to the information about all-or-nothing relay markings given in IEC 60255-1-00, the manufacturer of all-or-nothing relays with forcibly guided (linked) contacts shall provide a durable and easily legible indication of the application typ on the housing of the all-or-nothing relay. In the case of application typ A the following symbol may be used as an alternative:

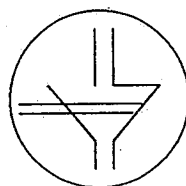


Fig. 1: Symbol for a forcibly guided (linked) contact set, application typ A

5 Type test procedure

5.1 Testing the forcibly guided (linked) contact operation

A principal aim of the type test is to verify the function of forcibly guided (linked) operation. All theoretically possible defects shall be assumed and the effect of such defects be considered.

The test shall be conducted by building a respective defect into a contact of the all-or-nothing relay.

The defect shall be built into break contacts and make contacts separately under worst case conditions.

²⁾ Until publication of IEC 61810-5, the respective provisions of IEC 60664-1:1992 apply.

The contact shall be changed to the defective condition by such means as, for example, soldering the contacts together or using an appropriate glue. The thickness of the contact tips shall not change by more than 0,02 mm as a result of having been soldered or glued.

The defect shall be built into a break contact with the all-or-nothing relay in release condition. The defect shall be built into a make contact at the lower limit of the operative range of its energizing quantity.

5.1.1 *Scope of consideration*

All parts which are involved in the forcibly guided (linked) operation shall be subjected to the type test. The test shall consider the breakage, overload and, in particular, wear of these parts. Regarding possible failure exclusion, see 5.1.2.5.

5.1.1.1 *Conducting parts*

It shall be considered whether, in case any electrically conducting parts break or come loose, the construction of the all-or-nothing relay prevents any short-circuits or conductive connections from occurring which would nullify the function of forcibly guided (linked) operation.

NOTE 1: Bridging by conducting parts may be prevented by such means as, for example, insulation or other appropriate methods applied between the conducting parts.

NOTE 2: Examples for conducting parts are contacts, contact springs, return springs and armature return springs.

5.1.1.2 *Miscellaneous functional parts*

The failure of movable functional parts as a result of, for example, breakage or wear shall be considered.

NOTE: A movable functional part is, for example, the actuator of the contact set.

5.1.1.3 *Failure to open*

If a contact fails to open, for example as a result of welding, this shall be taken into consideration. This failure to open shall be tested on break contacts (failure to open of a break contact) and make contacts (failure to open of a make contact).

5.1.2 *Test procedure*

5.1.2.1 *Testing contact behaviour in cases of failure to open*

5.1.2.1.1 *Measurement method*

Various methods may be used in order to measure the contact gap. The manufacturer shall state which method is used.

- a) Optical check to determine if the contact gap is $\geq 0,5$ mm;
- b) It shall be possible to pass a measurement wire with a diameter of $0,5^{+0,002}_{-0}$ mm between the contact tips without force. An electric circuit including the contact shall not be closed during this test.

NOTE: Other methods for checking the contact gap are under consideration (e.g. dielectric withstand voltage test).

5.1.2.1.2 *Static testing*

5.1.2.1.2.1 *Failure to open of a make contact*

After a defect has been built into a make contact and the relay de-energized, the contact gap of any break contact shall be at least 0,5 mm.

5.1.2.1.2.2 *Failure to open of a break contact*

After a defect has been built into a break contact and the relay energized, the contact gap of any make contact shall be at least 0,5 mm.

This test shall incorporate the maximum driving forces which can be anticipated to act on the contact. Possible vibration shall be taken into consideration.