

COMMISSION ÉLECTROTECHNIQUE INTERNATIONALE

(affiliée à l'Organisation Internationale de Normalisation — ISO)

RECOMMANDATION DE LA CEI**INTERNATIONAL ELECTROTECHNICAL COMMISSION**

(affiliated to the International Organization for Standardization — ISO)

IEC RECOMMENDATION**Publication 337-1**

Première édition — First edition

1970

**Auxiliaires de commande (appareils de connexion à basse tension
pour des circuits de commande et des circuits auxiliaires, y compris
les contacteurs auxiliaires)****Première partie: Prescriptions générales**

**Control switches (low-voltage switching devices for control
and auxiliary circuits, including contactor relays)****Part 1: General requirements**

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CENTRAL BUREAU

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Bureau Central de la Commission Electrotechnique Internationale

1, rue de Varembe

Genève, Suisse

Prix Fr. s. 33.-
Price S. Fr.

IEC

Vol 9

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

**CONTROL SWITCHES (LOW-VOLTAGE SWITCHING DEVICES
FOR CONTROL AND AUXILIARY CIRCUITS,
INCLUDING CONTACTOR RELAYS)**

Part 1: General requirements

FOREWORD

- 1) The formal decisions or agreements of the IEC on technical matters, prepared by Technical Committees on which all the National Committees having a special interest therein are represented, express, as nearly as possible, an international consensus of opinion on the subjects dealt with.
- 2) They have the form of recommendations for international use and they are accepted by the National Committees in that sense.
- 3) In order to promote this international unification, the IEC expresses the wish that all National Committees having as yet no national rules, when preparing such rules, should use the IEC recommendations as the fundamental basis for these rules in so far as national conditions will permit.
- 4) The desirability is recognized of extending international agreement on these matters through an endeavour to harmonize national standardization rules with these recommendations in so far as national conditions will permit. The National Committees pledge their influence towards that end.

PREFACE

This Recommendation has been prepared by Sub-Committee 17B, Low-voltage Switchgear and Controlgear, of IEC Technical Committee No. 17, Switchgear and Controlgear.

Work was commenced during the meeting of the Sub-Committee held in New Delhi in 1960, when the Secretariat was entrusted with reviewing a first preliminary draft. The next document was examined during the meeting held in Bucharest in 1962 where it was decided to limit the work, in a first step, to definitions, nomenclature and general requirements. The next drafts were examined during the meetings held in Bergamo in 1963, in Prague in 1964, in Tokyo in 1965, in Paris in 1967 and in Brussels in 1968. As a result of this latter meeting, the final draft was submitted to the National Committees for approval under the Six Months' Rule in May 1969.

The following countries voted explicitly in favour of publication:

Australia
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Belgium
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Denmark
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Germany
Hungary
Iran
Israel
Italy

Netherlands
Norway
Poland
South Africa
Sweden
Switzerland
Turkey
Union of Soviet Socialist Republics
United Kingdom
United States of America *
Yugoslavia

* With the exception of the Note of Clause 7.2.

CONTROL SWITCHES (LOW-VOLTAGE SWITCHING DEVICES FOR CONTROL AND AUXILIARY CIRCUITS, INCLUDING CONTACTOR RELAYS)

Part 1: General requirements

1. General

1.1 Scope

This Recommendation applies to mechanical switching devices intended to be installed in control circuits or auxiliary circuits of switchgear and controlgear for the purpose of controlling, signalling, interlocking, etc. These devices are intended to perform solely switching operations and include micro-gap switches.

Note. — Proximity switching devices and contactless switching devices are not considered in this Recommendation, but will be dealt with at a later stage.

This Recommendation applies only to devices, the rated insulation voltage of which does not exceed 1 000 V a.c. (at a frequency not exceeding 1 000 Hz) or 1 200 V d.c.

In this Recommendation, the general term “control switch” will be used for such devices.

Control switches are inter alia:

- manual control switches, e.g.: push-buttons, rotary switches, foot switches, etc.;
- electromagnetically operated control switches, either time-delayed or instantaneous, e.g.: contactor relays;
- pilot switches, e.g.: pressure switches, temperature sensitive switches (thermostats), programmers, etc.;
- position switches, e.g.: limit switches or other control switches operated by part of a machine or mechanism.

This Recommendation does not cover switching devices intended for isolating purposes.

Mechanical switching devices serving the purpose of control switches, but forming an integral part of another mechanical switching device, such as certain control contacts of contactors or of circuit-breakers, are not covered by this Recommendation. However, if they are self-contained and can be used independently, they shall satisfy this Recommendation.

Mechanical switching devices, covered by other Recommendations and used as control switches shall also comply with the appropriate clauses of this Recommendation.

Protective relays (e.g.: overload relays) are not considered to be control switches.

1.2 *Object*

The object of this Recommendation is to state:

- 1) The characteristics of control switches, in particular with reference to the contact element and the actuator.
- 2) The electrical and mechanical requirements to be satisfied by the control switches with respect to:
 - a) the various duties to be performed;
 - b) the significance of the rated characteristics and of the markings;
 - c) the tests to verify the rated characteristics.

2. **Definitions**

For the purpose of this Recommendation, the following definitions and those found in Part 2 shall apply.

Note. — In addition to the definitions used in this Recommendation, this clause also contains definitions of terms generally useful in description or designation of control switches.

2.1 *Basic definitions*

2.1.1 *Control switch*

A mechanical switching device which serves the purpose of controlling the operation of switchgear or controlgear, including signalling, electrical interlocking, etc.

Note. — A control switch consists of one or more contact elements with a common actuating system.

2.1.2 *Control station*

An assembly of one or more control switches fixed on the same panel or located in the same enclosure.

Note. — A control station panel or enclosure may also contain related equipment, e.g.: potentiometers, signal lamps, instruments, etc.

2.1.3 *Contact element (of a control switch)*

All the structural parts, fixed and movable, conducting and insulating, of a control switch necessary to close and open one single conducting path of a circuit.

Notes 1. — The contact element and the actuating system may form an indivisible unit, but frequently one or more contact elements may be combined with one or several actuating system or systems. The actuating systems may be different.

2. — Definitions relating to various kinds of contact elements are given in Clause 2.3.

2.1.4 *Actuating system (of a control switch)*

All the operating means of a control switch which transmit the actuating force to the contact element.

Note. — The operating means of an actuating system may be mechanical, electromagnetic, hydraulic, pneumatic, thermal, etc. (see Clause 2.4).

2.1.5 *Actuator*

The part of the actuating system to which an external actuating force is applied.

Notes 1. — The actuator may take the form of a handle, knob, push-button, roller, plunger, etc.

2. — Control switches actuated by an internal actuating force (electro-magnet, piston, etc.) may have no actuator.

2.1.6 *Contact gap*

The total clearance between the contacts, or any conducting parts connected thereto, of a pole of a control switch in the open position.

Note. — A contact gap of less than 1 mm for single-break and 2×1 mm for double-break contacts is normally called a *micro-gap*.

2.2 *Definitions concerning operations*

2.2.1 *Operation (of an actuator or a contact element)*

The transfer from one position to an adjacent position.

2.2.1.1 *Actuating operation*

The operation of an actuator.

Note. — An actuator may have more than two positions.

2.2.1.2 *Switching operation (of a contact element)*

The transfer of a contact element from the open to the closed position or vice versa.

2.2.2 *Operating cycle*

According to whether the operating cycle of an actuator or of a contact element is considered, distinction is made between *actuating cycle* and *switching cycle* as follows.

2.2.2.1 *Actuating cycle (of an actuator)*

A succession of operations, commencing at any one position, progressing through all other positions and ending at the initial position, in such a manner that a minimum number of operations is required.

Note. — A succession of operations not forming an actuating cycle is called an *actuating series*.

2.2.2.2 *Switching cycle (of a contact element)*

One closing followed by one opening operation or vice versa.

2.2.3 *Operating sequence*

A succession of specified operations with specified time intervals.

Note. — In this Recommendation, distinction is made between an *actuating sequence*, referring to an actuator, and a *switching sequence*, referring to a contact element.

2.2.4 *Travel*

The displacement (translation or rotation) of a point on a moving element.

Notes 1. — Distinction is made between *actuator travel* and *contact travel*.

2. — Distinction between *pre-travel*, *over-travel*, etc. will be made in the appropriate sections of Part 2.

2.2.5 *Actuating force (or moment)*

The force (or moment) applied to an actuator, necessary to complete the intended operation.

2.2.6 *Restoring force (or moment)*

The force (or moment) provided to restore an actuator or a contact element to its initial position.

2.3 *Definitions concerning contact elements*

2.3.1 *Make-contact element (normally open)*

A contact element which closes a conducting path when the control switch is actuated.

2.3.2 *Break-contact element (normally closed)*

A contact element which opens a conducting path when the control switch is actuated.

2.3.3 *Single-break contact element* (see Figure 3, page 42)

A contact element which opens the conducting path of its circuit in one location only.

2.3.4 *Double-break contact element* (see Figure 4, page 42)

A contact element which opens the conducting path of its circuit in two locations in series.

2.3.5 *Change-over contact elements*

A contact element combination which includes one make-contact element and one break-contact element.

Notes 1. — Distinction is made between change-over contact elements having three terminals (see Figure 5, page 42) and change-over contact elements having four terminals (see Figures 6 and 7, page 42); regarding the latter, the two contact elements may be electrically insulated but they are not necessarily separated (see Clause 2.3.7).

2. — Distinction is made between *make before break* (overlap) change-over contact elements where the two circuits are both closed for a part of the travel of the moving contacts from one position to the other, and *break before make* (non-overlap) change-over contact elements where the two circuits are both open for a part of the travel of the moving contacts from one position to the other. Unless otherwise stated, change-over contact elements are break before make.

2.3.6 *Pulse (fleeting) contact element*

A contact element which opens (or closes) a circuit for a part of the travel during the transition from one position to another.

2.3.7 *Electrically separated contact elements*

Contact elements belonging to the same control switch, but adequately insulated from each other so that they can be connected into electrically separated circuits.

2.3.8 *Snap action contact element*

A contact element in which the velocity of contact motion is substantially independent of the velocity of the actuating system.

Note. — Snap action implies means of storing energy during the first part of the travel of the actuating system, while the contacts remain at rest.

2.4 *Methods of actuating control switches*

2.4.1 *Manual control switch*

A control switch intended to be actuated by human force.

2.4.2 *Electromagnetically operated control switch*

A control switch actuated by an electro-magnet.

2.4.2.1 *Contactor relay*

A contactor utilized as a control switch.

Notes 1. — The limits of operation for a contactor relay shall be in accordance with IEC Publication 158-1, Low-voltage Controlgear, Part 1: Contactors.

2. — In the past, a contactor relay has been referred to by a great variety of names, such as: control relay, auxiliary relay, etc., but it is recommended that preference should be given to the term "contactor relay".

2.4.2.1.1 *Instantaneous contactor relay*

A contactor relay operating without intentional time delay.

Note. — Unless otherwise stated, a contactor relay is an instantaneous contactor relay.

2.4.2.1.2 *Time-delay contactor relay*

A contactor relay with specified time-delay characteristics.

2.4.3 *Pilot switch*

A non-manual control switch actuated in response to specified conditions of an actuating quantity.

Notes 1. — The actuating quantity may be pressure, temperature, velocity, liquid level, elapsed time, etc.

2. — Occasionally, the English term "pilot switch" is used for a manual control switch having two positions of rest and used in conjunction with contactors, but such a use of the term "pilot switch" is deprecated.

2.4.4 *Position switch*

A pilot switch the actuating system of which is operated by a moving part of a machine, when this part reaches a predetermined position.

Note. — A special case of a position switch is the limit switch.