8

C.D.U./U.D.C.: 621.316.542.2.027.2.001.11.001.2.001.4

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 337-2A

Première édition — First edition

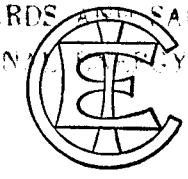
1973

Premier complément à la Publication 337-2 (1972) Auxiliaires de commande (appareils de connexion à basse tension pour des circuits de commande et des circuits auxiliaires, y compris les contacteurs auxiliaires)

Deuxième partie: Prescriptions particulières pour des types déterminés d'auxiliaires de commande Section deux: Prescriptions supplémentaires pour les commutateurs rotatifs de commande

First supplement to Publication 337-2 (1972) Control switches (low-voltage switching devices for control and auxiliary circuits, including contactor relays)

Part 2: Special requirements for specific types of control switches Section two: Additional requirements for rotary control switches



Bureau Central de la Commission Electrotechnique Internationale

1, rue de Varembé

Genève, Suisse

Prix Fr. s.
Price S. Fr. 18.—

IEC
VOL. 9

CONTENTS

Page

FOREWORD 5

PREFACE 5

Clause

1. General 7

1.1 Scope and object 7

2. Basic definitions and classification 7

3. Conditions for construction 11

4. Operating diagram 13

5. Tests 13

5.1 Performance of tests 13

5.2 Special tests 13

FIGURE 15

INTERNATIONAL ELECTROTECHNICAL COMMISSION

CONTROL SWITCHES (LOW-VOLTAGE SWITCHING DEVICES FOR CONTROL AND AUXILIARY CIRCUITS, INCLUDING CONTACTOR RELAYS) FIRST SUPPLEMENT TO PUBLICATION 337-2 (1972)

Part 2: Special requirements for specific types of control switches

SECTION TWO: ADDITIONAL REQUIREMENTS FOR ROTARY CONTROL SWITCHES

FOREWORD

1) The formal decisions or agreements of the I E C 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 international unification, the I E C expresses the wish that all National Committees should adopt the text of the I E C recommendation for their national rules in so far as national conditions will permit. Any divergence between the I E C recommendations and the corresponding national rules should, as far as possible, be clearly indicated in the latter.

PREFACE

This Recommendation has been prepared by Sub-Committee 17B, Low-Voltage Switchgear and Controlgear, of I E C Technical Committee No. 17, Switchgear and Controlgear.

Pursuant to a decision taken during the meeting held in Brussels in June 1971, a first draft was circulated in March 1972 and examined in Stockholm in September 1972. The final draft was submitted to the National Committees in October 1972 for approval under the Six Months' Rule.

The following countries voted explicitly in favour of publication:

Australia
Austria
Belgium
Canada
Denmark
Egypt
Finland
France
Germany
Hungary
Israel
Italy
Japan
Netherlands
Norway
Portugal
Romania
South Africa
Spain
Sweden
Switzerland
Turkey
Union of Soviet Socialist Republics
United Kingdom
United States of America
Yugoslavia

FIRST SUPPLEMENT TO PUBLICATION 337-2 (1972) CONTROL SWITCHES (LOW-VOLTAGE SWITCHING DEVICES FOR CONTROL AND AUXILIARY CIRCUITS, INCLUDING CONTACTOR RELAYS)

Part 2: Special requirements for specific types of control switches

SECTION TWO: ADDITIONAL REQUIREMENTS FOR ROTARY CONTROL SWITCHES

---

1. General

1.1 *Scope and object*

This Recommendation gives additional requirements, not found in Part 1, applicable to rotary, manually actuated control switches, together with definitions and terms useful in stating desired properties of design or performance.

Rotary control switches which are not manually actuated shall comply with the appropriate clauses of this Recommendation.

This Recommendation does not apply to rotary switches that are not control switches; such rotary switches are dealt with in other I E C Publications, e.g., as far as switches for industrial use are concerned: Publications 292-1 " Direct-on-line (full voltage) a.c. starters ", 292-2 " Reduced voltage a.c. starters: Star-delta starters " and 408 " Low-voltage air-break switches, air-break disconnectors, air-break switch-disconnectors and fuse-combinations ".

Note. — The rotary control switches may be built by stacking contact units on a common means (shaft) with an actuating system.

2. Basic definitions and classification

For the purpose of this Recommendation, the following definitions shall apply. The most important terms have been explicitely defined, while for the more obvious terms the definition has been implied through the wording of the text in which it appears.

2.1 *Rotary control switch (abbreviation: Rotary switch)*

A control switch having an actuator intended to be operated by rotation.

2.2 *Locating mechanism*

That part of the actuating system which retains the actuator and/or the contact elements in their positions.

2.3 *Dependent manual operation (of a rotary switch)*

An operation solely by means of directly applied manual energy, such that the speed and force of the operation are dependent upon the action of the operator.

2.4 *Independent manual operation (of a rotary switch)*

A stored energy operation where the energy originates from manual power, stored and released in one continuous operation, such that the speed and force of the operation are independent of the action of the operator.

2.5 *Actuating series*

A succession of operations, not forming an actuating cycle.

2.6 *Definite position (abbreviation: Position) (of a rotary switch)*

A position into which the locating mechanism pulls the rotary switch and retains it as long as the actuating moment does not exceed a certain value.

2.6.1 *Position of rest*

A stable (definite) position into which the locating mechanism tends to move back and retain the rotary switch by stored energy.

2.6.2 *Transit position*

A (definite) position in which the locating mechanism produces an intended marked change in the operating moment, but in which the actuator cannot remain by itself.

2.6.3 *Biased position*

A (definite) position of a rotary switch in which the actuator is pulled against a stop from which it will return to a position of rest by means of stored energy (for example, by means of a spring).

Note. — During the transfer from a biased position to the adjacent position of rest, the rotary switch may pass through one or more transit positions.

2.6.4 *Latched position*

A biased position in which the return mechanism is held by a latching arrangement.

Note. — The latching arrangement may be released manually or otherwise.

2.6.5 *Locked position*

A (definite) position in which a rotary switch is secured by separate action.

Note. — The locking may be obtained by turning a key, operating a lever, etc.

2.7 *Key-operated rotary switch*

A rotary switch where a key is used as the actuator.

Note. — Key withdrawal may be provided at any position.

2.8 *Limited movement rotary switch*

A rotary switch with a restricted angular movement of its actuator.

2.9 *Unidirectional movement rotary switch*

A rotary switch in which the actuating system allows rotation in one direction only.

2.10 *Contact unit*

A contact element or contact element combination which can be combined with similar units operated by a common actuating system.

2.11 *Operating diagram*

The representation of the intended order in which the contact elements of a rotary switch operate as a result of actuation.

3. Conditions for construction

3.1 *Mechanical*

Rotary switches intended to be protected against the ingress of water and/or of solid foreign bodies shall satisfy the conditions laid down in IEC Publication 144 when their actuators are installed to operate through the covers of enclosures themselves satisfying those conditions.

3.2 *Position indication*

The position indication shall be unambiguous, and the associated text or symbols shall be permanent and legible.

3.3 *Terminal markings*

Terminal markings shall be clear and unmistakably identifiable with respect to the operating diagram.

3.4 *Limitation of rotation*

When actuators with limited or unidirectional movement are used, they shall be fitted with robust means of limitation, capable of withstanding ten times the actual maximum actuating moment. However, in the special case of rotary switches having more than ten contact elements, the figure " ten times " may be replaced by " five times ".

3.5 *Actuating moment*

The moment required to operate the rotary switch shall be compatible with the application intended, taking into account the size of the actuator, the type of enclosure or panel, the environment of the installation and the use for which it is intended.

The minimum starting moment shall be sufficiently large to prevent inadvertent operation; e.g.: rotary switches to be used on enclosures complying with degree of protection IP X5 or IP X6 of IEC Publication 144 shall not become actuated when hit by the jet of water applied during the test of the enclosure.

To avoid operator fatigue, it is recommended that the maximum actuating moment should not exceed the following values:

— for rotary switches operated by fingers only : A newtons-metres (*);
— for rotary switches operated by the whole hand : B newtons-metres (*).

(*) Figures A and B are under consideration.

4. Operating diagram

As rotary switches may have a multiplicity of contact elements and a multiplicity of actuator positions, it is necessary that the manufacturer indicate the relationship between the actuator positions and the associated contact element positions.

It is recommended that the relationship be given in the form of an operating diagram, examples of which are shown in Figure 1, together with explanatory notes.

5. Tests

5.1 *Performance of tests*

For switches fully rotary in both directions, one operating cycle comprises either one fully clockwise operation of the actuator or one fully anti-clockwise operation of the actuator. However, in this case approximately ¾ of the total number of operating cycles shall be made in the clockwise direction, followed by the remainder in the anti-clockwise direction.

5.2 *Special tests*

The mechanical and electrical endurance tests shall be performed with the actuator operated by a machine that complies with the requirements of Clause 4.2 of IEC Publication 337-2 and of Clause 5.2.3 of this Recommendation.

5.2.1 *Mechanical endurance test*

The actuator of the rotary switch shall be operated with a frequency of approximately 3 600 operations per hour. The average angular velocity shall be low enough to permit the moving parts to come to rest in each position.

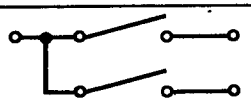
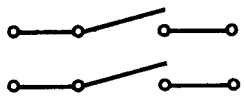
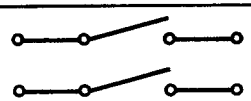
5.2.2 *Electrical endurance test*

The contact elements shall be operated with a frequency of approximately 300 switching cycles per hour, viz. 600 operations per hour for the contact elements under test in accordance with Clause 8.3.2 of IEC Publication 337-1.

5.2.3 *Operating machine for mechanical and electrical endurance tests*

The operating machine shall apply the actuating moment to the actuator in the direction of its notion.

The mechanical connection between the operating machine and the actuator shall have a sufficient free play (lost motion) to avoid the operating machine impeding the free motion of the actuator away from it.

Number of the example	Disposition of the contact element(s)	Actuator positions 1	2	3	4	5	. . .	
1		×						Contact element closed in actuator position No. 1 only.
2			×		×	×		Contact element closed in actuator positions No. 2, 4 and 5.
3			×					Two contact elements used as change-over contact elements with 3 terminals.
					×			
4			×					Contact element with pulse (fleeting) contact closed between actuator positions No. 2 and 3.
5		×		×	×	×		Contact element with pulse (fleeting) contact open between actuator positions No. 3 and 4.
6					×	×		Contact element with maintained contact between actuator positions No. 4 and 5.
7		×						Two contact elements with close-before-open contacts between actuator positions No. 1 and 2.
			×					
8		×						Two contact elements with open-before-close contacts between actuator positions No. 1 and 2 (*).
			×					
9 A		×		×				Operation in which contact element B is arranged to close before and open after contact element A.
B		×		×				

(*) Open-before-close contact elements may be used to break the current in one circuit before making the current in the other circuit, provided the time interval be properly related to the circuit conditions.

FIG. 1 — Examples of the recommended method for drawing operating diagram