

INTERNATIONAL STANDARD

NORME INTERNATIONALE

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

**Appareillage à basse tension –
Partie 5-1: Appareils et éléments de commutation pour circuits de commande –
Appareils électromécaniques pour circuits de commande**



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CONTENTS

FOREWORD.....	9
1 General.....	11
1.1 Scope and object	11
1.2 Normative references	12
2 Terms and definitions	14
2.1 Basic terms and definitions.....	16
2.2 Control switches.....	17
2.3 Parts of control switches	20
2.4 Operation of control switches	22
2.4.1 Operation of contactor relays	22
2.4.2 Operation of pilot switches	22
2.4.3 Operation of rotary switches	23
2.4.4 Operation of mechanically operated control switches	24
3 Classification.....	25
3.1 Contact elements	25
3.2 Control switches.....	25
3.3 Control circuit devices	25
3.4 Time delay switching elements	25
3.5 Control switch mounting	25
4 Characteristics	25
4.1 Summary of characteristics	25
4.1.1 General	25
4.1.2 Operation of a control switch	26
4.2 Type of control circuit device or switching element.....	26
4.2.1 Kind of control circuit device.....	26
4.2.2 Kind of switching elements	26
4.2.3 Number of poles.....	26
4.2.4 Kind of current	26
4.2.5 Interrupting medium	27
4.2.6 Operating conditions	27
4.3 Rated and limiting values for switching elements	27
4.3.1 General	27
4.3.2 Rated voltages (of a switching element).....	27
4.3.3 Currents	28
4.3.4 Rated frequency.....	28
4.3.5 Vacant	28
4.3.6 Normal and abnormal load characteristics	28
4.3.7 Short-circuit characteristics	28
4.4 Utilization categories for switching elements	28
4.5 Vacant.....	29
4.6 Vacant.....	29
4.7 Vacant.....	29
4.8 Vacant.....	29
4.9 Vacant.....	29
4.10 Electrically separated contact elements	29
4.11 Actuating quantities for pilot switches	29

4.12	Pilot switches having two or more contact elements	29
5	Product information	29
5.1	Nature of information.....	29
5.2	Marking.....	30
5.2.1	General	30
5.2.2	Terminal identification and marking	30
5.2.3	Functional markings	31
5.2.4	Emergency stop	31
5.2.5	Operating diagram	31
5.2.6	Time delay markings	31
5.3	Instructions for installation, operation and maintenance	31
5.4	Additional information.....	32
6	Normal service, mounting and transport conditions.....	32
6.3.1	Mounting of single hole mounted devices.....	32
7	Constructional and performance requirements.....	33
7.1	Constructional requirements	33
7.1.1	General	33
7.1.2	Materials.....	33
7.1.3	Current-carrying parts and their connections.....	34
7.1.4	Clearances and creepage distances	34
7.1.7	Conditions for control switches suitable for isolation	35
7.1.8	Terminals.....	35
7.1.14	Class II control circuit devices	35
7.1.15	Requirements for control devices with integrally connected cables	35
7.2	Performance requirements	35
7.2.3	Dielectric properties	35
7.2.4	Ability to make and break under normal and abnormal load conditions	35
7.2.5	Conditional short-circuit current.....	36
7.2.6	Vacant.....	36
7.2.7	Additional requirements for control switches suitable for isolation.....	36
7.2.8	Maximum recovery time	36
7.3	Electromagnetic compatibility (EMC).....	36
7.3.1	General	36
7.3.2	Immunity.....	37
7.3.3	Emission.....	38
8	Tests.....	43
8.1	Kinds of test.....	43
8.1.1	General	43
8.1.2	Type tests.....	43
8.1.3	Routine tests	43
8.1.4	Sampling tests	44
8.1.5	Special tests	44
8.2	Compliance with constructional requirements.....	44
8.2.1	Materials.....	44
8.2.2	Equipment	44
8.2.3	Enclosures for equipment.....	45
8.2.4	Mechanical and electrical properties of terminals	45
8.2.5	Verification of actuating force (or moment).....	46

8.2.6	Verification of limitation of rotation (of a rotary switch)	46
8.2.7	Conduit pull-out test, torque test and bending test with metallic conduits	46
8.3	Performance	46
8.3.1	Test sequences	46
8.3.2	General test conditions	47
8.3.3	Performance under no-load, normal load and abnormal load conditions	48
8.3.4	Performance under conditional short-circuit current	51
8.4	Tests for EMC	52
8.4.1	General	52
8.4.2	Immunity	52
8.4.3	Emission	53
8.4.4	Test results and test report	53
Annex A (normative)	Electrical ratings based on utilization categories (see 3.1)	61
Annex B (normative)	Example of inductive test loads for d.c. contacts	63
B.1	General	63
B.2	Construction	63
Annex C (normative)	Special tests – Durability tests	65
C.1	General	65
C.1.1	Durability declaration	65
C.1.2	Test procedures	65
C.1.3	Failure criteria	66
C.2	Mechanical durability	66
C.2.1	General	66
C.2.2	Test procedures	66
C.3	Electrical durability	66
C.3.1	General	66
C.3.2	Test procedures	66
Annex D	Vacant	69
Annex E (normative)	Items subject to agreement between manufacturer and user	70
Annex F (normative)	Class II control circuit devices insulated by encapsulation	
Requirements and tests		71
F.1	General	71
F.2	Terms and definitions	71
F.5	Marking	71
F.7	Instructional and functional requirements	72
F.7.1	Choice of compound	72
F.7.2	Adhesion of the compound	72
F.7.3	Dielectric properties	72
F.8	Tests	72
F.8.1	Kind of tests	72
Annex G (normative)	Additional requirements for control circuit devices with integrally connected cables	75
G.1	General	75
G.2	Terms and definitions	75
G.7	Constructional and performance requirements	75
G.7.1	Constructional requirements	75
G.7.2	Performance requirements	76
G.8	Tests	76

G.8.1	General	76
G.8.2	Type tests	76
G.8.3	Results to be obtained	77
Annex H (normative) Additional requirements for semiconductor switching elements for control circuit devices		78
H.1	General	78
H.2	Terms and definitions	78
H.3	Classification	78
H.3.1	Semiconductor switching elements	78
H.4	Characteristics	78
H.4.1	Rated voltage	78
H.4.2	Utilization categories	79
H.5	Product information	79
H.7	Constructional and performance requirements	79
H.7.1	Performance requirements	79
H.7.2	Ability to make under abnormal and normal conditions	80
H.7.3	Conditional short-circuit current	80
H.7.4	Electromagnetic compatibility (EMC)	80
H.8	Tests	80
H.8.1	Type tests	80
H.8.2	Voltage drop (U_d)	80
H.8.3	Minimum operational current (I_m)	81
H.8.4	OFF-state current (I_f)	81
H.8.5	Making and breaking capacities	81
H.8.6	Performance under short-circuit current conditions	81
H.8.7	Verification of electromagnetic compatibility	82
Annex J (normative) Special requirements for indicator lights and indicating towers		84
J.1	General	84
J.2	Terms and definitions	84
J.3	Classification	84
J.4	Characteristics	85
J.4.1	Rated operational voltage of an indicator light	85
J.4.2	Rated thermal power of an indicator light	85
J.4.3	Rated values of the lamp	85
J.5	Product information	85
J.6	Normal service, mounting and transport conditions	85
J.7	Constructional and performance requirements	86
J.8	Tests	86
J.8.3	Tests for indicator lights and indicating towers	86
J.8.4	Shock and vibration	88
J.8.5	Degree of protection for indicating towers	89
Annex K (normative) Special requirements for control switches with direct opening action		90
K.1	General	90
K.2	Terms and definitions	90
K.3	Classification	90
K.4	Characteristics	91
K.4.4	Utilization categories for switching elements	91
K.5	Product information	91

K.5.2	Marking	91
K.5.4	Additional information	91
K.6	Normal service, mounting and transport conditions	92
K.7	Constructional and performance requirements	92
K.8	Tests	93
Annex L (normative)	Special requirements for mechanically linked contact elements	96
L.1	General.....	96
L.2	Terms and definitions	96
L.3	Classification	96
L.4	Characteristics	96
L.5	Product information	96
L.6	Normal service, mounting and transport conditions	97
L.7	Constructional and performance requirements	97
L.8	Tests	97
L.8.4	Special test for mechanically linked contact elements	98
Annex M (normative)	Terminal marking, distinctive number and distinctive letter for control circuit devices	99
M.1	Scope	99
M.2	Terminal marking rule.....	99
M.2.1	General	99
M.2.2	Function digit	99
M.2.3	Sequence digit.....	99
M.2.4	Numbering method.....	100
M.3	Distinctive number and distinctive letter.....	100
M.3.1	General	100
M.3.2	Distinctive number	100
M.3.3	Distinctive letter	100
M.4	Terminal numbering sequence.....	100
M.5	Contactors designated by the distinctive letter E.....	101
M.6	Contactors designated by distinctive letters X, Y or Z	103
M.6.1	Contactors designated by the distinctive letter Z.....	103
M.6.2	Contactors designated by the distinctive letter X	103
M.6.3	Contactors designated by the distinctive letter Y	103
Annex N (normative)	Procedure to determine reliability data for electromechanical devices in control circuits used in functional safety applications	104
N.1	General.....	104
N.1.1	Overview	104
N.1.2	Scope and object	104
N.1.3	General requirements.....	104
N.2	Terms, definitions and symbols	104
N.3	Method based on durability test results	104
N.3.1	General method	104
N.3.2	Test requirements	104
N.3.3	Number of samples	105
N.3.4	Characterization of a failure mode	105
N.3.5	Weibull modelling.....	105
N.3.6	Useful life and upper limit of failure rate.....	105
N.3.7	Reliability data	105
N.4	Data information.....	105

N.5 Example	105
Bibliography	106
Figure 1 – Examples of the recommended method for drawing an operating diagram of a rotary switch	55
Figure 2 – Operation of push-buttons	56
Figure 3 – Difference e between the over-travel of the actuator and that of the contact element	56
Figure 4 – Examples of contact elements (schematic sketches)	57
Figure 5 – Test circuits for multi-pole control switches – Contacts of same polarity, not electrically separated	58
Figure 6 – Test circuits for multi-pole control switches – Contacts of opposite polarity, and electrically separated	58
Figure 7 – Load L_d details for test conditions requiring different values of make and break current and/or power factor (time constant)	59
Figure 8 – Test circuit, conditional short-circuit current (see 8.3.4.2)	59
Figure 9 – Current/time limits for d.c. test loads (see 8.3.3.5.4)	60
Figure 10 – Voltage drop measurement at contact point of the clamping unit or terminal	60
Figure B.1 – Construction of load for d.c. contacts	64
Figure C.1 – Normal circuit (see C.3.2.2)	68
Figure C.2 – Simplified circuit (see C.3.2.2)	68
Figure F.1 – Insulation by encapsulation	72
Figure F.2 – Test apparatus	73
Figure H.1 – Relationship between U_e and U_B	79
Figure H.2 – Example of test circuit for the verification of voltage drop, minimum operational current and OFF-state current (see H.8.2, H.8.3 and H.8.4)	81
Figure H.3 – Short-circuit testing (see H.8.6.1)	82
Figure J.1 – Mounting dimensions for indicating tower socket	86
Figure J.2 – Mounting dimensions for temperature rise tests	87
Figure K.1 – Verification of robustness of the actuating system	95
Figure L.1 – Example of representation of NO and NC contacts which are mechanically linked and NC non-linked contact	97
Figure L.2 – Symbol for device containing mechanically linked contacts	97
Table 1 – Utilization categories for switching elements	29
Table 2 – Mounting hole diameter and dimensions of the key recess (if any)	32
Table 3 – Preferred minimum distances between centres of mounting holes	33
Table 4 – Verification of making and breaking capacities of switching elements under normal conditions corresponding to the utilization categories	39
Table 5 – Verification of making and breaking capacities of switching elements under abnormal conditions corresponding to the utilization categories	40
Table 6 – Test conditions for glow-wire test	40
Table 7 – Acceptance criteria	41
Table 8 – Immunity tests	42
Table 9 – Test values for electrical performance and ageing test of screwless-type clamping units	54

Table A.1 – Examples of contact rating designation based on utilization categories.....	61
Table A.2 – Examples of semiconductors switching element ratings for 50 Hz and/or 60 Hz ..	62
Table A.3 – Examples of semiconductors switching element ratings for d.c.	62
Table B.1 – DC loads.....	64
Table C.1 – Making and breaking conditions for electrical durability	67
Table M.1 – Diagrams of control switches.....	101
Table M.2 – Diagrams of contactor relays designated by the distinctive letter E.....	102
Table M.3 – Diagrams of contactor relays designated by the distinctive letter Y.....	103

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LOW-VOLTAGE SWITCHGEAR AND CONTROLGEAR –**Part 5-1: Control circuit devices and switching elements –
Electromechanical control circuit devices**

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International Standard IEC 60947-5-1 has been prepared by subcommittee 121A: Low-voltage switchgear and controlgear, of IEC technical committee 121: Switchgear and controlgear and their assemblies for low voltage.

This fourth edition cancels and replaces the third edition published in 2003 and its Amendment 1:2009. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

- a) update of normative references;
- b) update and restructuration of subclauses in 7.1;
- c) addition of material requirements and test;
- d) update of EMC requirements;

- e) clarification of requirements and update of 8.2;
- f) addition of requirements for screwless-type clamping units;
- g) update of existing Tables 4 and 5;
- h) addition of new Tables 6, 7, 8 and 9;
- i) addition of a new Figure 10 ;
- j) addition of a new Annex N.

The text of this standard is based on the following documents:

FDIS	Report on voting
121A/62/FDIS	121A/76/RVD

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

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

This International Standard should be used in conjunction with IEC 60947-1.

The provisions of the general rules, IEC 60947-1, are applicable to this standard, where specifically called for. General rules, clauses and subclauses thus applicable, as well as tables, figures and annexes are identified by a reference to IEC 60947-1, for example 1.2.3, Table 4 or Annex A of IEC 60947-1:2007.

The following differing practices of a less permanent nature exist in the countries indicated below.

- 7.2.4.1: Making and breaking capacities (United States of America and Canada)
- 8.3.3.5.2: Test circuits and connections (United States of America and Canada)

A list of all the parts in the IEC 60947 series, under the general title *Low-voltage switchgear and controlgear*, can be found on the IEC website.

The committee has decided that the contents of this publication will remain unchanged until the stability date indicated on the IEC website under "<http://webstore.iec.ch>" in the data related to the specific publication. At this date, the publication will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

LOW-VOLTAGE SWITCHGEAR AND CONTROLGEAR –

Part 5-1: Control circuit devices and switching elements – Electromechanical control circuit devices

1 General

1.1 Scope and object

This part of IEC 60947 applies to control circuit devices and switching elements intended for controlling, signalling, interlocking, etc., of switchgear and controlgear.

It applies to control circuit devices having a rated voltage not exceeding 1 000 V a.c. (at a frequency not exceeding 1 000 Hz) or 600 V d.c.

However, for operational voltages below 100 V a.c. or d.c., see 4.3.2.2.

This standard applies to specific types of control circuit devices such as:

- manual control switches, for example push-buttons, rotary switches, foot switches, etc.;
- electromagnetically operated control switches, either time-delayed or instantaneous, for example contactor relays;
- pilot switches, for example pressure switches, temperature sensitive switches (thermostats), programmers, etc.;
- position switches, for example control switches operated by part of a machine or mechanism;
- associated control circuit equipment, for example indicator lights, etc.

NOTE 1 A control circuit device includes (a) control switch(es) and associated devices such as (an) indicator light(s).

NOTE 2 A control switch includes (a) switching element(s) and an actuating system.

NOTE 3 A switching element can be a contact element or a semiconductor element.

It also applies to specific types of switching elements associated with other devices (whose main circuits are covered by other standards) such as:

- auxiliary contacts of a switching device (e.g. contactor, circuit breaker, etc.) which are not dedicated exclusively for use with the coil of that device;
- interlocking contacts of enclosure doors;
- control circuit contacts of rotary switches;
- control circuit contacts of overload relays.

Contactor relays also comply with the requirements and tests of IEC 60947-4-1 except for the utilization category which comply with this standard.

This standard does not include the relays covered in IEC 60255 or in the IEC 61810 series, nor automatic electrical control devices for household and similar purposes.

The colour requirements of indicator lights, push-buttons, etc., are found in IEC 60073 and also in CIE S 0004/E-2001 from the Commission of Illumination (CIE).

The object of this standard is to state:

- a) the characteristics of control circuit devices;
- b) the electrical and mechanical requirements with respect to:
 - 1) the various duties to be performed;
 - 2) the significance of the rated characteristics and of the markings;
 - 3) the tests to verify the rated characteristics;
- c) the functional requirements to be satisfied by the control circuit devices with respect to:
 - 1) environmental conditions, including those of enclosed equipment;
 - 2) dielectric properties;
 - 3) terminals.

1.2 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.

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

IEC 60068-2-14:2009, *Environmental testing – Part 2-14: Tests – Test N: Change of temperature*

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

IEC 60068-2-30:2005, *Environmental testing – Part 2-30: Tests – Test Db: Damp heat, cyclic (12 h + 12 h cycle)*

IEC 60073:2002, *Basic and safety principles for man-machine interface, marking and identification – Coding principles for indications and actuators*

IEC 60417-DB:2002¹, *Graphical symbols for use on equipment*

IEC 60617-DB:2012², *Graphical symbols for diagrams*

IEC 60695-2-10:2013, *Fire hazard testing – Part 2-10: Glowing/hot-wire based test methods – Glow-wire apparatus and common test procedure*

IEC 60695-2-11:2014, *Fire hazard testing – Part 2-11: Glowing/hot-wire based test methods – Glow-wire flammability test method for end-products (GWEPT)*

IEC 60695-2-12:2010, *Fire hazard testing – Part 2-12: Glowing/hot-wire based test methods – Glow-wire flammability index (GWFI) test method for materials*

IEC 60695-2-12:2010/AMD1:2014

IEC 60947-1:2007, *Low-voltage switchgear and controlgear – Part 1: General rules*

IEC 60947-1:2007/AMD1:2010

IEC 60947-1:2007/AMD2:2014

¹ “DB” refers here to the IEC on-line database, available at: <http://www.graphical-symbols.info/equipment>.

² “DB” refers there to the IEC on-line database, available at: <http://std.iec.ch/iec60617>.

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2 Terms and definitions

For the purposes of document, the terms and definitions given in IEC 60947-1, as well as the following apply.

Alphabetical index of definitions References

A

Actuating quantity 2.4.2.1
Adjustable delay (of a contact element) 2.4.1.4

B

Biased position 2.4.3.4
Bounce time 2.4.4.10
Break-contact element (normally closed) 2.3.3.4
Button 2.3.4

C

Change-over contact elements 2.3.3.5
Contact element (of a control switch) 2.3.3
Contact unit 2.3.3.10
Control circuit device 2.1.1
Control station 2.1.4
Control switch 2.1.2
Control switch suitable for isolation 2.1.3
Covered push-button 2.2.2.11

D

d-delay (of a contact element) 2.4.1.2
Definite position (abbreviation: position) (of a rotary switch) 2.4.3.1
Delayed action push-button 2.2.2.9
Dependent action contact element 2.3.3.9
Differential value 2.4.2.4
Direct drive 2.4.4.3
Double gap contact element 2.3.3.2

E

e-delay (of a contact element) 2.4.1.1
Electrically separated contact elements 2.3.3.7
End stop 2.3.6
Extended button 2.3.4.3