

INTERNATIONAL STANDARD

NORME INTERNATIONALE

AMENDMENT 1
AMENDEMENT 1

**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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FOREWORD

This amendment has been prepared by subcommittee 17B: Low-voltage switchgear and controlgear, of IEC technical committee 17: Switchgear and controlgear.

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

FDIS	Report on voting
17B/1653/FDIS	17B/1667/RVD

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

The committee has decided that the contents of this amendment and the base publication will remain unchanged until the maintenance result date indicated on the IEC web site 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- withdrawn;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.

CONTENTS

Modify the title of Annex D to read:

Annex D – Vacant

Add the following new annex title:

Annex M (normative) – Terminal marking, distinctive number and distinctive letter for control circuit devices

Add the following new table titles:

Table M.1 – Diagrams of control switches

Table M.2 – Diagrams of contactor relays designated by the distinctive letter E

Table M.3 – Diagrams of contactor relays designated by the distinctive letter Y

FOREWORD

Before the final paragraph that begins "The committee has decided ... " insert the following new paragraph:

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.

1.1 Scope and object

Replace the seventh paragraph by the following new text:

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.

1.2 Normative references

Replace the reference to IEC 60068-2-30:1980 by the following:

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

Insert the following new reference:

IEC 60417, *Graphical symbols for use on equipment*

Replace the reference to IEC 60947-1:1999 by the following:

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

Add, after the reference to IEC 60947-4-1, the following references:

Amendment 1 (2002)

Amendment 2 (2005)

Insert the following new reference:

IEC 60947-5-5:2005, *Low-voltage switchgear and controlgear – Part 5-5: Control circuit devices and switching elements – Electrical emergency stop device with mechanical latching function*

Replace the reference to IEC 61000-4-3:2002 by the following:

IEC 61000-4-3:2008, *Electromagnetic compatibility (EMC) – Part 4-3: Testing and measurement techniques – Radiated, radio-frequency, electromagnetic field immunity test*

Replace the reference to IEC 61000-4-4:1995 by the following:

IEC 61000-4-4:2004, *Electromagnetic compatibility (EMC) – Part 4-4: Testing and measurement techniques – Electrical fast transient/burst immunity test*

Replace the reference to IEC 61000-4-5:1995 by the following:

IEC 61000-4-5:2005, *Electromagnetic compatibility (EMC) – Part 4-5: Testing and measurement techniques – Surge immunity test*

Replace IEC 61000-4-6:1996 and its Amendment 1 (2000) by the following:

IEC 61000-4-6:2008, *Electromagnetic compatibility (EMC) – Part 4-6: Testing and measurement techniques – Immunity to conducted disturbances, induced by radio-frequency fields*

Replace the reference to IEC 61000-4-11:1994 by the following:

IEC 61000-4-11:2004, *Electromagnetic compatibility (EMC) – Part 4-11: Testing and measurement techniques – Voltage dips, short interruptions and voltage variations immunity tests*

Add, after the reference to IEC 61140, the following reference:

Amendment 1 (2004)

Replace the reference to CISPR 11:1997 by the following:

CISPR 11:2003, *Industrial, scientific and medical (ISM) radio-frequency equipment – Electromagnetic disturbance characteristics – Limits and methods of measurement*
Amendment 1 (2004)
Amendment 2 (2006)

5.1 Nature of information

Modify the existing text of item g) as follows:

g) Rated impulse withstand voltage (see 4.3.1.3).

Modify the existing text of item l) as follows:

l) Conditional short-circuit current.

5.2.2 Terminal identification and marking

Replace the text of this subclause as follows:

Subclause 7.1.8.4 of IEC 60947-1 applies.

5.2.3 Functional markings

Add, at the end of this subclause, the following new paragraph:

Symbols shall be in accordance with IEC 60417.

5.2.4 Emergency stop

Replace the existing text by the following:

Actuator shape and colour, background colour and direction of unlatching for emergency stop devices with mechanical latching function shall be in accordance with 4.2 of IEC 60947-5-5.

5.2.5.2 Terminal markings for operating diagrams

Add, at the end of the existing paragraph, the following new sentence:

See also Annex M.

Table 2 – Mounting hole diameter and dimensions of the key recess (if any)

Replace the word “Taille” in the heading of the first column by the word “Size”.

7.1 Constructional requirements

Replace the orphan text, before 7.1.1, as follows:

Subclause 7.1 of IEC 60947-1 applies except for 7.1.2, 7.1.3, 7.1.7, 7.1.9 and 7.1.13, and with the following additions:

7.1.3 Clearances and creepage distances

Replace the existing text of this subclause by the following:

Minimum values are given in Table 13 and Table 15 of IEC 60947-1.

7.1.4.5 Emergency stop

Replace the existing note by the following new note.

NOTE Additional requirements for emergency stop devices with a latching function are given in IEC 60947-5-5.

7.1.6 Conditions for control switches suitable for isolation

Replace the existing text of the first paragraph by the following new text:

A control switch suitable for isolation shall be manually operated with a direct opening action (see Annex K) and shall comply with the isolating function in the open position (see 2.1.19 and 7.1.7 of IEC 60947-1).

8.3.2.1 General requirements

Replace the existing text of the second paragraph by the following:

The tests shall be performed with the actuator operated by a machine complying with the requirements of 8.3.2.1 a) for linear movement or, for a rotary switch, in accordance with 8.3.2.1 b) or 8.3.2.1 c).

Add, after item b), the following new item c):

- c) For limited movement rotary switches, operation shall be at a speed of 1 to 4 revolutions per second.

8.3.3.5.2 Making and breaking capacities of switching elements under normal conditions

Modify the existing text of the fourth dashed item of the second paragraph as follows:

- 5 000 operations at 10 s intervals (or at a shorter interval determined by the manufacturer).

8.3.4.3 Test circuit and test quantities

Replace, in the second paragraph, the first sentence by the following:

The test circuit load impedance shall be an air-cored inductor in series with a resistor, adjusted to a prospective current of 1 000 A, or another value if stated by the manufacturer but not less than 100 A, at a power factor of between 0,5 and 0,7 and at the rated operational voltage.

Figure 4 – Examples of contact elements (schematic sketches)

Add, in Figure 4e), in the last column, the following note:

NOTE Multiple electrically separated contact configurations are also covered by Zb.

B.2 Construction

This correction applies to the French text only.

Annex D (normative) – Clearances and creepage distances of control circuit devices

Replace the title and the text of this annex by the following:

Annex D – Vacant

H.7.1.2 Minimum operational current (I_m)

Replace the note as follows:

NOTE In Table A.2 the minimum operational currents are specified for the ratings shown.

Table H.1 – Immunity tests

Replace the existing table by the following new table:

Table H.1 – Immunity tests

Type of test	Test level required		Acceptance criteria
Electrostatic discharge immunity test IEC 61000-4-2	8 kV / air discharge or 4 kV / contact discharge		B
Radiated radio-frequency electromagnetic field immunity test (80 MHz to 1 GHz and 1,4 GHz to 2 GHz) IEC 61000-4-3	10 V/m		A
Electrical fast transient/burst immunity test IEC 61000-4-4	2 kV / 5 kHz on power ports ^a 1 kV / 5 kHz on signal ports ^b		B
Surge immunity test (1,2/50 µs – 8/20 µs) IEC 61000-4-5 ^c	2 kV (line to earth) 1 kV (line to line)		B
Conducted disturbances induced by radio-frequency fields immunity test (150 kHz to 80 MHz) IEC 61000-4-6	10 V		A
Power frequency magnetic field immunity test ^d IEC 61000-4-8	30 A/m		A
Voltage dips immunity test IEC 61000-4-11	Class 2 ^{e, f} 0 % during 0,5 cycle	Class 3 ^{e, f} 0 % during 0,5 cycle	B
	Class 2 ^{e, f, g} 0 % during 1 cycle 70 % during 25/30 cycles	Class 3 ^{e, f, g} 0 % during 1 cycle 40 % during 10/12 cycles 70 % during 25/30 cycles 80 % during 250/300 cycles	C
Voltage interruptions immunity test IEC 61000-4-11	Class 2 ^{e, f, g} 0 % during 250/300 cycles	Class 3 ^{e, f, g} 0 % during 250/300 cycles	C
Immunity to harmonics in the supply IEC 61000-4-13	No requirements ^h		

^a Power port: the point at which a conductor or cable carrying the primary electrical power needed for the operation of the switching element or associated equipment is connected.

^b Signal port: the point at which a conductor or cable carrying information for transferring data or signals is connected to the switching element.

^c Not applicable for ports with a rated voltage of 24 V or less.

^d Applicable only to equipment containing devices susceptible to power frequency magnetic fields.

^e Class 2 applies to points of common coupling and in-plant points of common coupling in the industrial environment in general.
Class 3 applies to in-plant couplings in industrial environment only. This class should be considered when a major part of the load is fed through converters; welding machines are present; large motors are frequently started or loads vary rapidly.
The manufacturer shall state the applicable class.

^f The given percentage means percentage of the rated operational voltage, e.g. 0 % means 0 V.

^g The value before the solidus (/) is for 50 Hz and the value behind is for 60 Hz tests.

^h Requirements are under study for the future.

J.3 Classification

Add a new final dashed item as follows:

- Nature of light source (for example: filament lamp, LED)

J.7.1.13 Colour of the lens

Delete the title and text of this subclause.

K.4.3.1.2 Rated insulation voltage

Replace the existing text of this subclause by the following:

The minimum value of the rated insulation voltage of the contact elements shall be 250 V.

K.4.3.2.1 Conventional free air thermal current

Replace the existing text of this subclause by the following:

The minimum value of the conventional free air thermal current of the contact elements shall be 2,5 A.

K.5.2.7 Direct opening action

Add, after the symbol, the following reference:

IEC 60617-S00226 (2001-07)

K.8.3.4.2.1 Verification of conditional short-circuit current

Replace the existing text of the first paragraph by the following new text:

The test shall be made as stated in 8.3.4.2, except that the current is made by a direct opening contact element and not by the additional switching device and the test is made on the device by making the current three times by the same contact element in a single phase circuit.

K.8.3.4.4.1 Operation ability after the test

Modify the existing text of the first paragraph to read:

... by the manufacturer through the direct opening travel (see items a) and b) of K.5.4.1).

L.8.4 Special test for mechanically linked contact elements

Replace, under item a) 3), the existing note by the following new note 1:

NOTE 1 This test ensures a minimum gap of 0,6 mm in accordance with Table 13 of IEC 60947-1.

Replace, under item b) 4), the existing note by the following new note 2:

NOTE 2 This test ensures a minimum gap of 0,6 mm in accordance with Table 13 of IEC 60947-1.

Add, after Annex L, the following new Annex M.

Annex M (normative)

Terminal marking, distinctive number and distinctive letter for control circuit devices

M.1 Scope

This annex applies to control switches and contactor relays irrespective of their construction, having terminal marking.

The use of this annex is required where terminal marking is a requirement in this standard, or is usual practice.

M.2 Terminal marking rule

M.2.1 General

Terminal marking in accordance with this annex is based, in principle, on a two-digit number.

M.2.2 Function digit

Subclause L.3.2.1 of IEC 60947-1 applies.

M.2.3 Sequence digit

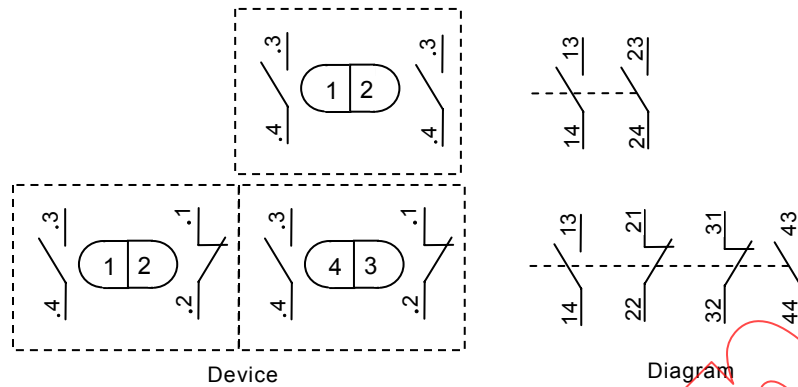
The tens digit is a continuous sequence number beginning with 1 (except for control switches designated 01 and contactor relays designated 01E), independent of the contact function.

Terminals belonging to the same contact are marked with the same sequence digit.

For contactor relays having 10 contact elements, the sequence digit 0 is used instead of 10.

The sequence digit may be omitted from the terminal marking only if additional information provided by the manufacturer or the user clearly gives such digit.

EXAMPLE For control switches



NOTE The dots before the function number shown in these examples are used merely to show the digit relationship, and do not need to be used in practice.

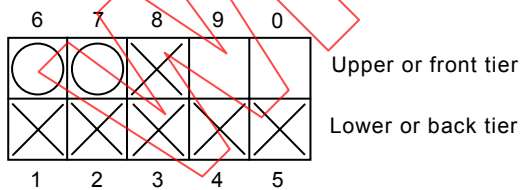
M.2.4 Numbering method

The contact terminals shall be numbered sequentially from left to right on the device; for devices with tiers of terminals, the numbering shall begin with the tier nearest to the mounting level.

EXAMPLE Contact numbering methods on contactor relays of various constructional types, but with the same distinctive number 62 E



The prescribed numbering method does not allow blank contact cells inside a contact series.



M.3 Distinctive number and distinctive letter

M.3.1 General

The quantity and type of the contact elements of a control switch according to this annex are indicated by a distinctive number. Contacts of contactor relays are indicated by a distinctive number followed by a distinctive letter.

M.3.2 Distinctive number

The first digit of the distinctive number gives the quantity of make contact elements and the second digit the quantity of break contact elements. The third digit, if any, shall give the quantity of change-over contact elements in control switches.