IEC 60730-1

Edition 5.0 2015-12

INTERNATIONAL STANDARD

NORME INTERNATIONALE

AMENDMENT 1
AMENDEMENT 1

Automatic electrical controls – Part 1: General requirements

Dispositifs de commande électrique automatiques – Partie 1: Exigences générales

IEC 60730-1:2013-11/AMD1:2015-12(en-fr)

About the IEC
The International Electrotechnical Commission (IEC) is the leading global organization that prepares and publishes International Standards for all electrical, electronic and related technologies.

About IEC publications
The technical content of IEC publications is kept under constant review by the IEC. Please make sure that you have the latest edition, a corrigenda or an amendment might have been published.

IEC Catalogue - webstore.iec.ch/catalogue
The stand-alone application for consulting the entire bibliographical information on IEC International Standards, Technical Specifications, Technical Reports and other documents. Available for PC, Mac OS, Android Tablets and iPad.

IEC publications search - www.iec.ch/searchpub
The advanced search enables to find IEC publications by a variety of criteria (reference number, text, technical committee,…). It also gives information on projects, replaced and withdrawn publications.

IEC Just Published - webstore.iec.ch/justpublished
Stay up to date on all new IEC publications. Just Published details all new publications released. Available online and also once a month by email.

Electropedia - www.electropedia.org
The world's leading online dictionary of electronic and electrical terms containing more than 30 000 terms and definitions in English and French, with equivalent terms in 15 additional languages. Also known as the International Electrotechnical Vocabulary (IEV) online.

IEC Glossary - std.iec.ch/glossary
More than 60 000 electrotechnical terminology entries in English and French extracted from the Terms and Definitions clause of IEC publications issued since 2002. Some entries have been collected from earlier publications of IEC TC 37, 77, 86 and CISPR.

IEC Customer Service Centre - webstore.iec.ch/csc
If you wish to give us your feedback on this publication or need further assistance, please contact the Customer Service Centre: csc@iec.ch.

A propos de l'IEC
La Commission Electrotechnique Internationale (IEC) est la première organisation mondiale qui élabore et publie des Normes internationales pour tout ce qui a trait à l'électricité, à l'électronique et aux technologies apparentées.

A propos des publications IEC
Le contenu technique des publications IEC est constamment revu. Veuillez vous assurer que vous possédez l'édition la plus récente, un corrigendum ou amendement peut avoir été publié.

Catalogue IEC - webstore.iec.ch/catalogue
Application autonome pour consulter tous les renseignements bibliographiques sur les Normes internationales, Spécifications techniques, Rapports techniques et autres documents de l'IEC. Disponible pour PC, Mac OS, tablettes Android et iPad.

Recherche de publications IEC - www.iec.ch/searchpub
La recherche avancée permet de trouver des publications IEC en utilisant différents critères (numéro de référence, texte, comité d'études,…). Elle donne aussi des informations sur les projets et les publications remplacées ou retirées.

IEC Just Published - webstore.iec.ch/justpublished
Restez informé sur les nouvelles publications IEC. Just Published détaille les nouvelles publications parues. Disponible en ligne et aussi une fois par mois par email.

Electropedia - www.electropedia.org
Le premier dictionnaire en ligne de termes électroniques et électriques. Il contient plus de 30 000 termes et définitions en anglais et en français, ainsi que les termes équivalents dans 15 langues additionnelles. Egalement appelé Vocabulaire Electrotechnique International (IEV) en ligne.

Glossaire IEC - std.iec.ch/glossary
Plus de 60 000 entrées terminologiques électrotechniques, en anglais et en français, extraites des articles Termes et Définitions des publications IEC parues depuis 2002. Plus certaines entrées antérieures extraites des publications des CE 37, 77, 86 et CISPR de l'IEC.

Service Clients - webstore.iec.ch/csc
Si vous désirez nous donner des commentaires sur cette publication ou si vous avez des questions contactez-nous: csc@iec.ch.

IEC 60730-1

Edition 5.0 2015-12

INTERNATIONAL STANDARD

NORME INTERNATIONALE

AMENDMENT 1
AMENDEMENT 1

Automatic electrical controls – Part 1: General requirements

Dispositifs de commande électrique automatiques – Partie 1: Exigences générales

INTERNATIONAL ELECTROTECHNICAL COMMISSION

COMMISSION ELECTROTECHNIQUE INTERNATIONALE

ICS 97.120

ISBN 978-2-8322-3077-0

FOREWORD

This amendment has been prepared by subcommittee IEC technical committee 72: Automatic electrical controls.

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

FDIS	Report on voting
72/1017/FDIS	72/1026/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 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.

1 Scope and normative references

1.1 Scope

Add the following new text:

This standard applies to **controls** powered by primary or secondary batteries, requirements for which are contained within the standard, including Annex V.

Add the following new subclauses:

1.1.9 This standard applies to the electrical and **functional safety** of **controls** capable of receiving and responding to communications signals, including signals for power billing rate and demand response.

The signals may be transmitted to or received from external units being part of the **control** (wired), or to and from external units which are not part of the **control** (wireless) under test.

1.1.10 This standard does not address the integrity of the output signal to the network devices, such as interoperability with other devices unless it has been evaluated as part of the **control system**.

1.2 Normative references

Add the following references:

IEC 62151, *Safety of equipment electrically connected to a telecommunication network*

IEC 62368-1, *Audio/video, information and communication technology equipment – Part 1: Safety requirements*

2 Terms and definitions

2.13 Miscellaneous definitions

Add the following new definitions:

2.13.10
smart grid
intelligent grid
electric power **system** that utilizes information exchange and **control** technologies, distributed computing and associated sensors and actuators, for purposes such as:

– to integrate the behaviour and actions of the network **users** and other stakeholders,
– to efficiently deliver sustainable, economic and secure electricity supplies

[SOURCE: IEC 60050-617:2011-10, 617-04-13]

2.13.11
smart enabled control
control that is intended to interact with the **smart grid** and allows certain functions related to power billing rate or power demand response to be remotely controlled or enabled generally by communication with the power utility or by **user** remote interface

Note 1 to entry: For example, remote interface includes computer or smart phone.

7 Information

7.2.1

Replace Note 2 by the following:

NOTE 2 Information provided by marking (C) can also be included in documentation (D, E).

Replace the first sentence of the second dashed item by the following:

By documentation on hard copy (D) – this information shall be provided for the **user** or **installer** of the **control**, and shall consist of legible instructions.

Add, after second dashed item, the following new dash:

– By documentation on electronic media on internal or external memory (E) – this information is as alternative to (D).

7.2.2

Replace the existing text by the following:

Information which is indicated as being required by marking (C) or by documentation (D,E) shall also be provided for the testing authority in an agreed manner if so requested by the testing authority.

7.2.3

Replace the existing text by the following:

For **controls** submitted in, on or with an equipment, the requirement for documentation (D,E) is replaced by declaration (X).

7.2.5

Replace the existing text by the following:

The requirement for documentation (D,E) is considered to be met if such information has been provided by marking (C).

7.2.5.1

Replace the existing text by the following:

The requirement for declaration (X) is considered to be met if such information has been provided by either documentation (D,E) or by marking (C).

7.2.6

Replace the second and third sentences by the following:

Unless otherwise indicated in a part 2, for **incorporated controls**, the only marking required is the manufacturer's name or trade mark and the **unique type reference**, if other required marking is provided by documentation (D,E). For **incorporated controls** declared under requirement 50, see the explanation of documentation (D,E) contained in 7.2.1.

7.2.7

Replace the last sentence by the following:

The other marking required shall be included in documentation (D,E).

Table 1 – (7.2 of edition 3) – Required information and methods of providing information

Replace the following requirements:

Information	Clause or subclause	Method
6 Purpose of **control**	2.2, 4.2.4, 4.3.5, 6.3, 17.16	D or E
6a Construction of **control** and whether the **control** is electronic	6.15, Annex H, H.2.5.7	X
18 Which of the terminals for **external conductors** are for a wider range of conductor sizes than those indicated in Table 3	10.1	D or E
19 For **screwless terminals**, the method of connection and disconnection [d], if not readily identifiable	10	D
20 Details of any special conductors which are intended to be connected to the terminals for **internal conductors**	10.2.1	D or E
32 Method of attachment for **non-detachable cords** [f]	10.1, 11.7	D or E
34 Details of any limitation of **operating time** [h]	14, 17	D or E
39 **Type 1 action** or **type 2 action**	6.4	D or E
40 Additional features of **type 1 action** or **type 2 actions**	6.4.3, 11.4	D or E
43 Reset characteristics for cut-out action [j]	6.4	D or E
45 Any limitation to the number or distribution of flat push-on **receptacles** which can be fitted	10.2.4.4	D or E
46 Any **type 2 action** shall be so designed that the **manufacturing deviation** and **drift** of its **operating value**, **operating time** or **operating sequence** is within the limit declared in requirements 41, 42, and 46 of Table 1	11.4.3	D or E
47 Extent of any **sensing element**	2.8.1	X
49 **Control pollution degree**	6.5.3	D or E
75 **Rated impulse voltage**	2.1.12, 20.1	D or E
77 Temperature for the ball pressure test	21.2.1, 21.2.2, 21.2.3 and 21.2.4	X
78 Maximum declared torque on single bush mounting using thermoplastic material	Table 20, Footnote a	D or E
79 **Pollution degree** in the **micro-environment** of the **creepage distance** or **clearance** if cleaner than that of the **control**, and how this is designed	Table H.24	X
80 **Rated impulse voltage** for the **creepage distance** or **clearance** if different from that of the **control**, and how this is ensured	Table H.24	D or E
81 The values designed for tolerances of distances for which the exclusion from **fault** mode "short" is claimed	Table H.24	X
86 For **SELV** or PELV circuits, the **ELV** limits realized	2.1.5, T.3.2	X
87 Value of accessible voltage of **SELV**/PELV circuit, if different from 8.1.1, product standard referred to for the application of the **control**, in which standard(s) the accessible **SELV**/PELV level(s) is (are) given	2.1.4, 6.8.4.1, 6.8.4.2, 8.1.1.1	X
95 Maximum short circuit current as declared	11.3.5.2.1 b)	X

Add the following new rows:

96 Overcurrent protective device external to the **control**	11.14	D or E
97 For **incorporated controls** or **integrated controls**, whether the overload test shall be done at control level	27.5.3	X
98 Maximum altitude at which the **control** can be used if greater than 2 000 m	20.1	X

8 Protection against electric shock

8.1.1

Replace the third paragraph by the following:

If **SELV**- or PELV-circuits supplied at higher than 24 V, or higher than declared according to requirement 87 of Table 1, are accessible, the current between the **accessible part**(**s**) and either pole of the supply source of the **SELV**/PELV circuits shall comply with H.8.1.10.1.

11 Constructional requirements

11.2 Protection against electric shock

Add, after 11.2.7, the following new subclause:

11.2.8 Overcurrent protection

Controls shall be capable of carrying the currents likely to flow in abnormal conditions for such periods of time as are determined by the characteristics of the protective device if declared in requirement 96 of Table 1.

Compliance is checked by the test of 27.5.

11.13 Protective controls and components of protective control systems

Add, after 11.13.4.5, the following new subclauses:

11.13.5 Smart enabled controls

11.13.5.1 A **smart enabled control** shall be so designed that the external communication signals (data or power demand) do not unintentionally override the operating parameters of a **type 2 action control** nor interfere with any protective function of the **control**.

A **smart enabled control** is permitted to alter the operating parameters of a type 2 **control** within defined limits so long as the protective functions remain intact.

11.13.5.2 A **smart enabled control** that integrates operating and protective functions shall be evaluated as a **protective control**.

11.13.5.3 Any transmitter or communication module that is external to the **control** and acts as the interface between the **control** and the telecommunication network shall comply with IEC 62151 or IEC 62368-1. Nevertheless the measures to ensure protection against electric shock in this standard (e.g. Annex T) shall be met.

11.13.5.4 Any transmitter or communication module that is part of the **smart enabled control** shall comply with the requirements of this standard.

11.13.5.5 *Compliance of 11.13.5 is checked by evaluating the **control** in accordance with the requirements of H.27.1 and other relevant requirements of this standard.*

13 Electric strength and insulation resistance

13.2 Electric strength

Replace Table 12 with the following:

Table 12 – (13.2 of edition 3) – Insulation or disconnection test voltages [a] *(1 of 2)*

Insulation or disconnection to be tested [c d]	Test voltage for working voltage (U) [b q]		
	SELV [e]	**Working voltage** ≤ 50 V [f]	**Working voltage** [f] 50 V < U ≤ 690 V
Functional insulation [g]	100	100	2 × U
Basic insulation [h i]	500	1 250	1 200 + U
Supplementary insulation [h i j k l]	–	1 250	1 200 + (U)
Reinforced insulation [h i j k l]	–	2 500	2 400 + (2 × U)
Full disconnection [o]	N/A	1 250	1 200 + U
Micro-disconnection [o]	100	100	2 × U
Electronic disconnection [m n]	100	100	–
Micro-interruption [p]	–	–	–

NOTE 1 A DC potential equivalent to 1,414 times the test voltage specified in Table 12 may be applied.

NOTE 2 For **controls** intended for incorporating into an appliance or in conjunction with other equipment the higher electric strength test values of the equipment standard can be considered.

[a] Void.

[b] The high-voltage transformer used for the test shall be so designed that when the output terminals are short-circuited after the output voltage has been adjusted to the test voltage, the output current is at least 200 mA. The overcurrent relay shall not trip when the output current is less than 100 mA. Care shall be taken that the r.m.s. value of the test voltage is measured within ±3 %. See also Annex H.

[c] Special components which might render the test impractical, such as electronic parts, neon lamps, coils or windings shall be disconnected at one pole or bridged as appropriate to the insulation being tested. Capacitors shall be bridged except for the tests for **functional insulation** when one pole is disconnected. Where such a proceeding is not practical, the tests of Clauses 15 to 17 inclusive are considered to be sufficient.

[d] For **class I controls** and **class 0I controls** and **controls** for class I situations, care shall be taken that adequate **clearance** is maintained between metal foil and accessible metal to avoid over-stressing of insulation between **live parts** and earthed metal parts.

[e] No requirement up to 24 V a.c. r.m.s. if the circuit is insulated from the mains by **double insulation** or **reinforced insulation** (may be earthed).

[f] Applies to **controls** galvanically connected to mains.

[g] **Functional insulation** on printed wiring boards submitted in **normal use** to a voltage up to 50 V is not subjected to the tests of 13.2.

[h] See 13.3.1.

Table 12 *(2 of 2)*

i	Any metal in contact with accessible metal is also regarded as accessible.
j	For the tests of **supplementary insulation** and **reinforced insulation**, the metal foil is applied in such a way that sealing compound, if any, is effectively tested to accessible insulating surfaces.
k	For **accessible parts** which are protected by means of **protective impedance**, the tests are carried out with the components disconnected, the mid-point of the two impedances being regarded as an intermediate metal part.
l	For **controls** incorporating **reinforced insulation** as well as **double insulation**, care should be taken that the voltage applied to the **reinforced insulation** does not over-stress the **basic insulation** or the supplementary parts of the **double insulation**.
m	The device which actually performs the disconnection is first removed from the circuit. If necessary, any **control** input is connected such that the device is providing the disconnection. The test voltage is then applied to the terminals and **terminations** of the device which carry the load current.
n	See Clause H.28.
o	For the test of **full disconnection** and **micro-disconnection**, contacts are opened automatically or manually and tested as soon after opening as possible to ensure that the contact separation and the supporting insulation are satisfactory. In the case of temperature sensing **controls**, it may be necessary to provide special samples specially calibrated to open between 15 °C and 25 °C to enable this test to be carried out at room temperature immediately after removal from the humidity cabinet.
p	There are no electric strength requirements for **micro-interruption**, since the satisfactory completion of the tests of Clauses 15 to 17 inclusive are considered to be sufficient. Furthermore, for a **control** which has no **micro-disconnection** in one position of its **actuating means** and **micro-interruption** in other positions, there are no requirements for electric strength for those positions corresponding to **micro-interruption**.
q	All a.c. voltages are r.m.s. at 50 Hz to 60 Hz.

20 Creepage distances, clearances and distances through solid insulation

20.1.7.1 *Replace the existing text by the following:*

For **micro-disconnection** and **micro-interruption**, there is no specified minimum distance for the **clearance** between the contacts and between those current-carrying parts where the **clearance** varies with the movement of the contacts.

23 Electromagnetic compatibility (EMC) requirements – Emission

23.1.1 Test conditions

Replace the first paragraph by the following:

One previously untested sample is subjected to the test.

24 Components

24.1

Replace the second paragraph by the following:

Capacitors connected between two line conductors or between a line conductor and the neutral or between **hazardous live parts** and protective earth shall be in accordance with IEC 60384-14 and shall be used in accordance with its rated values.

25 Normal operation

Replace the existing text with the following:

25.1 General

See Annex H.

25.2 Overvoltage and undervoltage test

A **control** incorporating an electro-magnet shall operate as intended at any voltage within the range of 85 % of the minimum rated voltage and 110 % of the maximum rated voltage, inclusive.

*Compliance is checked by subjecting the **control** to the following tests at the maximum and minimum operating conditions declared, except that only a **control** having T_{min} less than 0 °C is tested at T_{min}:*

*The **control** is subjected to 1,1 $V_{R\ max}$ until equilibrium temperature is reached and then tested immediately for **operation** at 1,1 $V_{R\ max}$ and at rated voltage.*

*The **control** is also subjected to 0,85 $V_{R\ min}$ until equilibrium temperature is reached and then tested immediately for **operation** at 0,85 $V_{R\ min}$.*

27 Abnormal operation

27.3 Overvoltage and undervoltage test

Replace the text with VOID.

27.5 Overload tests on in-line cords controls

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

27.5 Overload tests

27.5.1 General

The tests are conducted as follows.

– ***Controls** as specified without protective devices and without incorporated fuses are loaded for 1 h with the conventional tripping current for the fuse which in the installation will protect the **control**.*

– ***Controls** protected by protective devices (including fuses) are loaded in such a way that the current through the **control** is 0,95 times the current with which the protective device releases after 1 h. The temperature rise is measured after a steady state has been reached or after 4 h, whichever is the shorter time.*

– ***Controls** protected by incorporated fuses complying with IEC 60127-1 shall have those fuses replaced by links of negligible impedance and shall be loaded in such a manner that the current through the links shall be 2,1 times the rated current of the fuse. The temperature rise is measured after the **control** has been loaded for 30 min. The value 2,1 times can be de-rated by 0,5 %/K, if the overload test is carried out at a higher temperature compared to normal room temperature.*

– ***Controls** protected both by incorporated fuses and by protective devices are loaded either as described above with incorporated fuses or with another protective device, choosing the test requiring the lower load.*

– ***Controls*** *protected by protective devices which will short-circuit only in case of overload shall be tested both as* ***controls*** *with protective devices and as* ***controls*** *without protective devices.*

27.5.2 Overload tests carried out on in-line cord controls as indicated in 11.10.2 and provided with a plug and socket outlet

The tests according to 27.5.1 shall be carried out.

The temperature shall not exceed those indicated in Table 13.

27.5.3 For controls not covered by 27.5.2

The tests according to 27.5.1 shall be carried out at ambient temperature (20 ± 5) °C. If declared in requirement 97 of Table 1, the test will not be done for ***incorporated controls*** *and* ***integrated controls****.*

The compliance with items a) to g) of H.27.1.1.3, where applicable, is verified.

Annex A – Indelibility of markings

A.1.4

Replace the fourth paragraph by the following:

The solvents used are:

– *neutral liquid detergent blended from alkyl benzene sulphonate and non-ionic detergents or 2 % of a solvent in deionized (distilled) water where the solvent consists of:*

  - *70 % (with volume) Natriumdodecylbenzylsulfonat, (Isomere), formula: C18H29NaO3S, CAS-No. 25155-30-0, and*
  - *30 % (with volume) Glycerin (other names: Glycerol, 1,2,3-Propantriol, Propantriol,E 422), formula: C3H8O3, CAS-No. 56-81-5;*

– *n-hexane (aliphatic solvent hexane with a content of aromatics of maximum 0,1 volume %, initial boiling point of approximately 69 °C and specific gravity of approximately 0,66 g/cm^3, CAS-No. 110-54-3), and*

– *deionized (distilled) water.*

Annex H – Requirements for electronic controls

H.2 Terms and definitions

H.2.24 Definitions related to access to data exchange

Add the following new definition:

H.2.24.9
public network
data and signals not confined to the physical space within the household, or locations specified as being covered within the scope of this standard

Note 1 to entry: Examples of **public networks** include but are not limited to:

– Internet;

– Wi-Fi Devices;

– Bluetooth > 10 m Devices.