

Automatic electrical controls for household and similar use —

Part 2-9: Particular requirements for temperature sensing controls

The European Standard EN 60730-2-9:2002, with the incorporation of amendments A1:2003, A2:2005, A11:2003 and A12:2004, has the status of a British Standard

ICS 97.120

National foreword

This British Standard is the official English language version of EN 60730-2-9:2002, including amendments A1:2003, A2:2005, A11:2003 and A12:2004. It was derived by CENELEC from IEC 60730-2-9:2000, including amendments 1:2002 and 2:2004. It supersedes BS EN 60730-2-9:1995 which will be withdrawn on 2008-12-01.

The CENELEC common modifications have been implemented at the appropriate places in the text. The start and finish of each common modification is indicated in the text by tags **[C]** **[C]**. Where a common modification has been introduced by amendment, the tags carry the number of the amendment. For example, the common modifications introduced by CENELEC amendment A11 are indicated by **[C11]** **[C11]**.

The start and finish of text introduced or altered by amendment is indicated in the text by tags **[A]** **[A]**. Tags indicating changes to CENELEC text carry the number of the CENELEC amendment. For example, text altered by amendment A1 is indicated by **[A1]** **[A1]**.

The UK participation in its preparation was entrusted to Technical Committee CPL/72, Electrical control devices for household equipment and appliances, which has the responsibility to:

- aid enquirers to understand the text;
- present to the responsible international/European committee any enquiries on the interpretation, or proposals for change, and keep the UK interests informed;
- monitor related international and European developments and promulgate them in the UK.

A list of organizations represented on this committee can be obtained on request to its secretary.

Cross-references

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English version

Automatic electrical controls for household and similar use
Part 2-9: Particular requirements for temperature sensing controls
(includes amendments A1:2003, A2:2005, A11:2003 and A12:2004)
(IEC 60730-2-9:2000 + A1:2002 and + A2:2004 modified)

Dispositifs de commande électrique automatiques
à usage domestique et analogue
Partie 2-9: Règles particulières pour
les dispositifs de commande thermosensibles
(inclut les amendements A1:2003, A2:2005,
A11:2003 et A12:2004)
(CEI 60730-2-9:2000 + A1:2002 et + A2:2004
modifiée)

Automatische elektrische Regel- und Steuergeräte
für den Hausgebrauch und ähnliche Anwendungen
Teil 2-9: Besondere Anforderungen
an temperaturabhängige Regel- und Steuergeräte
(enthält Änderungen A1:2003 A2:2005, A11:2003
und A12:2004)
(IEC 60730-2-9:2000 + A1:2002 und + A2:2004
modifiziert)

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Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CENELEC member.

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CENELEC

European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

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Foreword

The text of the International Standard IEC 60730-2-9:2000, prepared by IEC TC 72, Automatic controls for household use, together with the common modifications prepared by the Technical Committee CENELEC TC 72, Automatic controls for household use, was submitted to the formal vote and was approved by CENELEC as EN 60730-2-9 on 2001-12-04.

This European Standard supersedes EN 60730-2-9:1995 + corrigendum March 2001 + A1:1996 + A1:1996/corrigendum March 2001 + A11:1997 + A11:1997/corrigendum March 2001+ A2:1997 + A2:1997/corrigendum March 2001 + A12:2001.

The following dates were fixed:

- latest date by which the EN has to be implemented
at national level by publication of an identical
national standard or by endorsement (dop) 2002-12-01
- latest date by which the national standards conflicting
with the EN have to be withdrawn (dow) 2008-12-01

This Part 2-9 is to be used in conjunction with EN 60730-1:1995, Automatic electrical controls for household and similar use - Part 1: General requirements, and its amendments. Consideration may be given to future editions of EN 60730-1.

This Part 2-9 supplements or modifies the corresponding clauses of EN 60730-1 so as to convert it into the European Standard: Particular requirements for temperature sensing controls.

Where a particular clause or subclause of Part 1 is not mentioned in this Part 2-9, that clause or subclause applies as far as is reasonable. Where this Part 2-9 states "addition", "modification" or "replacement", the relevant text of Part 1 is to be adapted accordingly.

Where reference is made to other international or harmonized standards, the edition of that standard quoted in annex ZA (normative) is applicable.

Special national conditions (snc) causing a deviation from this European Standard are listed in annex ZB (normative) and are in addition to those in EN 60730-1.

There are no national deviations from this European Standard other than those listed in Annex ZC of EN 60730-1.

In this standard:

- 1) The following print types are used:
 - Requirements proper: in roman type;
 - *Test specifications: in italic type;*
 - Explanatory matter: in small roman type.
- 2) Subclauses, notes, tables and figures which are additional to those in Part 1 are numbered starting from 101, additional annexes are lettered AA, BB, etc.

Annexes designated "normative" are part of the body of the standard.

Annexes designated "informative" are given for information only.

In this standard, annexes H, J, ZA and ZB are normative and annexes AA, BB and CC are informative.

Annexes ZA and ZB have been added by CENELEC.

Endorsement notice

The text of the International Standard IEC 60730-2-9:2000 was approved by CENELEC as a European Standard with agreed common modifications.

Foreword to amendment A1

The text of amendment 1:2002 to the International Standard IEC 60730-2-9:2000, prepared by IEC TC 72, Automatic controls for household use, together with the common modifications prepared by the Technical Committee CENELEC TC 72, Automatic controls for household use, was submitted to the formal vote and was approved by CENELEC as amendment A1 to EN 60730-2-9:2002 on 2003-04-01.

The following dates were fixed:

- latest date by which the amendment has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2004-04-01
- latest date by which the national standards conflicting with the amendment have to be withdrawn (dow) 2008-12-01

This document supplements or modifies the corresponding clauses of amendment 1:2002 to IEC 60730-2-9:2000 so as to convert it into amendment A1 to EN 60730-2-9:2002.

NOTE EN 60730-2-9 originally referred to EN 60730-1:1995 and its amendments. This amendment enables EN 60730-2-9 to be used with EN 60730-1:2000. Consideration may be given to future editions of EN 60730-1.

Endorsement notice

The text of amendment 1:2002 to the International Standard IEC 60730-2-9:2000 was approved by CENELEC as an amendment to the European Standard with agreed common modifications. These modifications also modify the common modifications in EN 60730-2-9:2002.

Foreword to amendment A11

This amendment to EN 60730-2-9:2002 has been prepared by the Technical Committee CENELEC TC 72, Automatic controls for household use.

The text, based on document CLC/TC 72(DE)60, was agreed for submission to the CENELEC Unique Acceptance Procedure (UAP) at the meeting of CLC/TC 72 in Brussels on 2001-11-15/16.

The draft was circulated in June 2002 and was approved by CENELEC as amendment A11 to EN 60730-2-9:2002 on 2003-03-01.

The following dates were fixed:

- latest date by which the amendment has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2004-03-01
- latest date by which the national standards conflicting with the amendment have to be withdrawn (dow) 2008-12-01

Foreword to amendment A2

The text of document 72/643/FDIS, future amendment 2 to IEC 60730-2-9:2000, prepared by IEC TC 72, Automatic controls for household use, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as amendment A2 to EN 60730-2-9:2002 on 2004-12-01 with inclusion of a common modification prepared by the Technical Committee CENELEC TC 72, Automatic controls for household use.

The following dates were fixed:

- latest date by which the amendment has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2005-09-01
- latest date by which the national standards conflicting with the amendment have to be withdrawn (dow) 2007-12-01

Endorsement notice

The text of amendment 2:2002 to the International Standard IEC 60730-2-9:2000 was approved by CENELEC as an amendment to the European Standard with agreed common modifications.

Foreword to amendment A12

This amendment to the European Standard has been prepared by the CENELEC Technical Committee TC 72: Automatic controls for household use.

The text of the draft was submitted to the Unique Acceptance Procedure and was approved by CENELEC as amendment A12 to EN 60730-2-9:2002 on 2004-09-01.

The following dates were fixed:

- latest date by which the amendment has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2005-09-01
- latest date by which the national standards conflicting with the amendment have to be withdrawn (dow) 2007-09-01

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AUTOMATIC ELECTRICAL CONTROLS FOR HOUSEHOLD AND SIMILAR USE –

Part 2-9: Particular requirements for temperature sensing controls

1 Scope and normative references

This clause of part 1 is applicable except as follows:

1.1 Replacement:

This part of IEC 60730 applies to automatic electrical temperature sensing controls for use in, on or in association with equipment for household and similar use, including electrical controls for heating, air-conditioning and similar applications. The equipment may use electricity, gas, oil, solid fuel, solar thermal energy, etc., or a combination thereof.

This part 2-9 applies to automatic electric controls using NTC or PTC thermistors, additional requirements for which are contained in annex J.

☐ Examples of such controls include boiler thermostats, fan controls, temperature limiters and thermal cut-outs. ☐

1.1.1 This part 2-9 applies to inherent safety and to operating values, operating times and operating sequences where such are associated with equipment safety. ☐ ☐

This part 2-9 does not apply to automatic electrical controls designed exclusively for industrial applications.

This part 2-9 is also applicable to individual controls utilized as part of a control system or controls which are mechanically integral with multifunctional controls having non-electrical outputs.

Automatic electrical controls for equipment not intended for normal household use, but which nevertheless may be used by the public, such as equipment intended to be used by laymen in shops, in light industry and on farms, are within the scope of this standard.

1.1.2 This part 2-9 also applies to the electrical safety of temperature sensing controls with non-electrical outputs such as refrigerant flow and gas controls.

1.1.3 ☐ EN 60730-2-1 is not applicable to temperature sensing controls ☐.

Throughout this part 2-9 the word "equipment" includes "appliance" and "control system".

1.1.4 This part 2-9 applies to manual controls when these are electrically and/or mechanically integral with automatic controls.

Requirements for manual switches not forming part of an automatic control are contained in IEC 61058-1.

1.1.5 ☐ This part 2-9 applies to single operation devices as defined in this standard. ☐

1.2 Replacement:

This part 2-9 applies to controls with a rated voltage not exceeding A1 690 A1 V and with a rated current not exceeding 63 A.

1.3 Replacement:

This part 2-9 does not take into account the response value of an automatic action of a control, if such a response value is dependent upon the method of mounting the control in the equipment. Where a response value is of significant purpose for the protection of the user, or surroundings, the value defined in the appropriate household equipment standard or as determined by the manufacturer shall apply.

1.4 Replacement:

This part 2-9 applies also to controls incorporating electronic devices, requirements for which are contained in annex H.

1.5 Normative references

This subclause of part 1 is applicable except as follows:

Addition:

IEC 60335 (all parts), *Safety of household and similar electrical appliances*

IEC 60691:1993, *Thermal links – Requirements and application guide*

2 Definitions

This clause of part 1 is applicable except as follows:

2.2 Definitions of types of control according to purpose

2.2.9 Replacement:

2.2.9

A1 single operation device (SOD)

control having a temperature sensing element which is intended to operate only once and then requires complete replacement

2.2.9.1

bi-metallic single operation device

single operation device having a bi-metallic temperature sensing element

NOTE 1 A bi-metallic single operation device does not reset above a declared temperature (see 11.4.103).

NOTE 2 Requirements for thermal links (which are not allowed to reset) are contained in IEC 60691.

2.2.9.2

non-bi-metallic single operation device

part of a control the operation of which cannot be separated from other functions of the control and having a non bi-metallic sensing element that operates only once and then requires complete or partial replacement.

NOTE When such parts can be tested separately, they are considered to be thermal links within the scope of IEC 60691. A1

2.2.9.2.1

rated functioning temperature (T_f)

temperature of the sensing element of a non bi-metallic SOD which causes it to change the state of conductivity of the control when measured under specified conditions as declared by the manufacturer

2.2.9.2.2

holding temperature (T_c)

maximum temperature of the sensing element of a non bi-metallic SOD at which it will not cause the control to change its state of conductivity during a specified time under specified conditions as declared by the manufacturer

2.2.9.2.3

maximum temperature (T_m)

temperature of the sensing element of a non bi-metallic SOD, stated by the manufacturer, up to which the mechanical and electrical properties of the control having changed its state of conductivity, will not be impaired for a given time **A1**

2.2.19

operating control

add, to the definition, the following explanatory paragraph:

In general, a thermostat is an operating control.

2.2.20

protective control

add, to the definition, the following explanatory paragraph:

In general, a thermal cut-out is a protective control.

Additional definitions:

2.2.101

room thermostat

independently mounted or incorporated thermostat intended to control the temperature of habitable space

2.2.102

fan control

automatic temperature sensing control intended to control the operation of a fan or blower

2.2.103

boiler thermostat

thermostat intended to control boiler/liquid temperature

2.2.104

modulating thermostat

thermostat which controls the temperature between two limits by continuously controlling the input to the load

2.2.105

voltage maintained thermal cut-out

a thermal cut-out which is maintained in its operated condition by the voltage which appears across it in that condition **A1**

A₂ 2.2.106**agricultural thermostat**

a thermostat intended for use in agricultural confinement buildings A₂

C₁ Text deleted C₁

2.3 Definitions relating to the function of controls**2.3.14 Additional definition:****2.3.14.101****time factor**

transient response of temperature sensing controls by defined change of the activating quantity

2.5 Definitions of types of control according to construction

Additional definitions:

2.5.101**push-and-turn actuation**

two-step actuation accomplished by first pushing, then rotating the actuating member of the control

2.5.102**pull-and-turn actuation**

two-step actuation accomplished by first pulling, then rotating the actuating member of the control

3 General requirements

This clause of part 1 is applicable.

4 General notes on tests**4.1 Conditions of test**

This clause of part 1 is applicable except as follows:

4.1.7 Not applicable.

Additional subclauses:

4.1.101 For the purposes of the tests of this standard and unless otherwise indicated, ambient temperature excursions beyond $T_{\max}$ during abnormal operation as a precursor to the operation of a manual reset thermal cut-out or a bi-metallic SOD are ignored.

C C

4.1.102 For manual reset thermal cut-outs and bi-metallic SODs which have an operating value above $T_{\max}$, the temperature at the sensing element is raised, as necessary, to achieve any cycling required during the tests.

4.2 Samples required

4.2.1 Addition:

Six samples of **CE** **CE**SODs are used for the test of clause 15.

Additional samples are required for the tests of clause 17.

5 Rating

This clause of part 1 is applicable.

6 Classification

This clause of part 1 is applicable except as follows:

6.4 According to features of automatic action

6.4.3 Additional subclauses:

6.4.3.101 – for sensing actions, no increase in the operating value as a result of any leakage from the sensing element, or from parts connecting the sensing element to the switch head (Type 2.N).

6.4.3.102 – an action which operates after a declared thermal cycling test as specified in 17.101 (Type 2.P).

In general, thermal cut-outs for specific applications, such as pressurized water heating systems, may be classified as having Type 2.P action.

6.4.3.103 – an action which is initiated only after a push-and-turn or pull-and-turn actuation and in which only rotation is required to return the actuating member to the off or rest position (Type 1.X or 2.X).

6.4.3.104 – an action which is initiated only after a push-and-turn or pull-and-turn actuation (Type 1.Z or 2.Z).

CE **6.4.3.601** – an action which cannot be reset under declared electrically loaded conditions and at temperatures above –20 °C or a lower temperature if so declared (Type 1.AK or type 2.AK). **CE**

A1 **6.4.3.105** – an action which cannot be reset under electrically loaded conditions (Type 1AK or 2AK). **A1**

A2 **6.4.3.106** – an action which operates after declared agricultural environmental exposures (Type 1.AM or 2.AM) **A2**

6.7 According to ambient temperature limits of the switch head

Additional subclauses:

6.7.101 Controls for use in or on cooking appliances

6.7.102 Controls for use in or on ovens of the self-cleaning type

6.7.103 Controls for use in or on food-handling appliances

6.8.3 Modification:

Replace the first paragraph by:

For an in-line cord control, a free standing control, an independently mounted control or a control integrated or incorporated in an assembly utilizing a non-electrical energy source.

6.15 According to construction

Additional subclause:

6.15.101 – controls having parts containing liquid metal.

7 Information

This clause of part 1 is applicable, except as follows:

7.2 Methods of providing information

Table 7.2

Addition:

[C] Replace item 48 (of EN 60730-1) by:

48	Operating value (or values) or operating time	2.3.11, 2.3.12, 6.4.3.10, 11, 12, 15.4, 15.6, 17	D [C]
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	Information	Clause or subclause	Method
101	Maximum sensing element temperature (other than relevant to requirement 105) ¹⁰¹⁾	[A ₁] 18.102 [A ₁]	X
102	Time factor	2.3.14.101 11.101	X
103	[C] bi-metallic [C] SOD reset temperature (either -35 °C or 0 °C)	2.2.9 11.4.103	X
104	Number of cycles for bi-metallic single-operation devices with 0 °C reset	17.15.3.1	X
105	Maximum sensing element temperature for the test of 17.16.107 (T_e)	6.7.102 17.16.107	D
106	Controls having parts containing liquid metal ¹⁰²⁾	6.15.101 11.1.101 18.102	D
107	Tensile yield strength	11.1.101	X
108	Minimum current for the purpose of the test of 23.101 ¹⁰³⁾	23.101	D
[A ₁] 109	$T_{max.1}$ is the maximum ambient temperature in which the control may remain continuously in the operated condition so that Table 14.1 temperatures are not exceeded ¹⁰⁵⁾ [E] 602) [C]	14.4.3.1	D
110	Time period, t_1 is the maximum time during which the ambient temperature can be higher than $T_{max.1}$ after the control has operated ¹⁰⁵⁾ [E] 602) [C]	14.4.3.1	D
111	Temperature limit above which automatic reset of [C] [C] a voltage maintained thermal cut-out shall not occur (not higher than -20 °C)	2.2.105 11.4.106 17.16.104.1 17.16.108	X
112	For type 2.P controls, the method of test	17.101	X
113	The click rate N or switching operations per minute for the purposes of testing to CISPR 14-1	23	X
114	Rated functioning temperature (T_f)	2.2.9.2.1 17.15.2	C
115	Holding temperature (T_c)	2.2.9.2.2 17.15.2	D
116	Maximum temperature limit(T_m)	2.2.9.2.3 17.15.2	D [A ₁]
[A ₂] 117	Agricultural thermostat	2.2.106 6.4.3.106 11.4.107 11.6.3.101 Annex DD	D [A ₂]
601	Automatic reset temperature of a manual reset thermal cut-out (this shall not be higher than minus 20 °C).	11.4.601 [C] [C]	X
[C ₁]	Text deleted [C ₁]	14.4.3.1	D
[C ₁]	Text deleted [C ₁]	14.4.3.1	D
[C ₁₁] 604	For free standing, independently mounted or inline-cord-controls (and if so requested by the manufacturer for integrated and incorporated controls) click rate N or number of operations per minute, if applicable. (N ≤ 5, or N ≥ 5 or value of click rate, or if applicable, minimum time between contact operations ≥ 10 min)	23.1	X [C ₁₁]
[C ₁₂] 605	The minimum voltage at which a voltage maintained thermal cut-out will not reset (this shall not be higher than 0.85 times the minimum rated voltage).	11.4.602	[C ₁₂]

NOTES

[C] NOTE 3: A manual reset thermal cut-out and a voltage maintained thermal cut-out shall not reset automatically at a higher temperature than - 20 °C, or at a lower temperature if this has been declared. This requirement applies to a voltage maintained thermal cut-out in the operated condition with the voltage across it. [C]

Additional notes

[A₁]¹⁰¹⁾ This declaration applies only to temperature sensing controls containing liquid metal. For temperature sensing controls used in or on self-cleaning ovens, this declaration is the temperature for the cooking operation. [A₁]

[C]¹⁰²⁾ Refer snc [C]

¹⁰³⁾ When no minimum is declared, the test value is 15 mA.

[A₁]¹⁰⁵⁾ Consideration should be given to the provision of information by the equipment manufacturer relating to the minimum time that the appliance has to be disconnected from the supply to allow a voltage maintained thermal cut-out to reset. [A₁]

[C₁] Text deleted [C₁]

⁶⁰²⁾ Not applicable if the maximum operating temperature is lower than the declared $T_{max.1}$.

8 Protection against electric shock

Ⓒ This clause of part 1 is applicable. Ⓒ

9 Provision for protective earthing

Ⓒ This clause of part 1 is applicable. Ⓒ

10 Terminals and terminations

Ⓒ This clause of part 1 is applicable. Ⓒ

11 Constructional requirements

This clause of part 1 is applicable except as follows:

11.1 Materials

Additional subclause:

11.1.101 Parts containing liquid metal

For controls declared under requirement 106 of table 7.2, parts that contain mercury (Hg), and parts of any control that contain sodium (Na), potassium (K), or both, shall be constructed of metal that has a tensile yield strength at least four times the circumferential (hoop) or other stress on the parts at a temperature 1,2 times the maximum temperature of the sensing element (T_e).

Compliance is checked by inspection of the manufacturer's declaration and by the test of 18.102.

11.3 Actuation and operation

11.3.9 Pull-cord actuated control

Addition:

The second explanatory paragraph is not applicable to controls classified as Type 1.X or 2.X or Type 1.Z or 2.Z.

11.4 Actions

11.4.3 Type 2 action

Additional subclauses:

11.4.3.101 Capacitors shall not be connected across the contacts of a thermal cut-out.

Ⓒ Ⓒ

11.4.3.102 Constructions requiring a soldering operation to reset thermal cut-outs are not permitted.