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INTERNATIONAL STANDARD

colour inside

Automatic electrical controls –
Part 2-9: Particular requirements for temperature sensing controls

IEC 60730-2-9:2015-05+AMD1:2018-01 CSV(en)

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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AUTOMATIC ELECTRICAL CONTROLS –

Part 2-9: Particular requirements for temperature sensing controls

FOREWORD

1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
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This consolidated version of the official IEC Standard and its amendment has been prepared for user convenience.

IEC 60730-2-9 edition 4.1 contains the fourth edition (2015-05) [documents 72/990/FDIS and 72/998/RVD] and its amendment 1 (2018-01) [documents 72/1112A/FDIS and 72/1118/RVD].

In this Redline version, a vertical line in the margin shows where the technical content is modified by amendment 1. Additions are in green text, deletions are in strikethrough red text. A separate Final version with all changes accepted is available in this publication.

International Standard IEC 60730-2-9 has been prepared by technical committee TC 72: Automatic electrical controls.

This fourth edition constitutes a technical revision.

This edition includes alignment with the text of 60730-1 fifth edition and the following significant technical changes with respect to the previous edition:

a) modification of heating-freezing tests in Clause 12;
b) alignment of the EMC requirements in H.26 to those in other part 2 standards;
c) addition of requirements in Clause H.27 to cover class B and C control functions of temperature sensing controls;

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

This Part 2-9 is intended to be used in conjunction with IEC 60730-1. It was established on the basis of the fifth edition (2013) of that publication. Consideration may be given to future editions of, or amendments to, IEC 60730-1.

This Part 2-9 supplements or modifies the corresponding clauses in IEC 60730-1 so as to convert that publication into the IEC standard: Particular requirements for temperature sensing controls.

Where this Part 2-9 states "addition", "modification", or "replacement", the relevant requirement, test specification or explanatory matter in part 1 should be adapted accordingly.

Where no change is necessary, this part 2 indicates that the relevant clause or subclause applies.

In the development of a fully international standard, it has been necessary to take into consideration the differing requirements resulting from practical experience in various parts of the world and to recognize the variation in national electrical systems and wiring rules.

The “in some countries” notes regarding differing national practices are contained in the following subclauses:

4.1.101	17.8.4.101	Annex AA
7.2, Table 1	17.16.101	Clause CC.2
11.4.101	17.16.102	DD.9.2
11.101	17.16.105	EE.3.6
12.101.3	18.102.3	
13.2	23.101	

In this publication:

1) The following print types are used:
   – Requirements proper: in roman type;
   – *Test specifications: in italic type;*
   – Notes; in small roman type;
   – Words defined in Clause 2: **bold**.
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.

A list of all parts of the IEC 60730 series, published under the title *Automatic electrical controls* can be found on the IEC website.

The committee has decided that the contents of the base publication and its amendment will remain unchanged until the stability 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.

A bilingual version of this publication may be issued at a later date.

IMPORTANT – The 'colour inside' logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.

AUTOMATIC ELECTRICAL CONTROLS –

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 Scope

Replacement:

This part of IEC 60730 applies to automatic electrical temperature **sensing controls** for use in, on or in association with equipment, 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.

NOTE Throughout this standard, the word "equipment" includes "appliance" and "control system".

This standard is applicable to automatic electrical temperature **sensing controls** forming part of a building automation **control system** within the scope of ISO 16484.

This standard also applies to automatic electrical temperature **sensing controls** for equipment that may be used by the public, such as equipment intended to be used in shops, offices, hospitals, farms and commercial and industrial applications.

This standard does not apply to automatic electrical temperature **sensing controls** intended exclusively for industrial process applications, unless explicitly mentioned in the relevant equipment standard.

1.1.1

Replacement:

This standard applies to the inherent safety, to the **operating values**, **operating times**, and **operating sequences** where such are associated with equipment safety, and to the testing of automatic electrical temperature **sensing control** devices used in, or in association with, equipment.

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

This standard is also applicable to the functional safety of low complexity safety-related temperature **sensing controls** and **systems**.

1.1.2

Addition:

This standard also applies to the electrical safety of temperature sensing controls with non-electrical outputs such as refrigerant flow and gas **controls**.

1.1.3 Not applicable.

1.1.4

Replacement:

This standard applies to **manual controls** when such are electrically and/or mechanically integral with automatic temperature **sensing controls**.

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

1.1.5

Replacement:

This standard applies to a.c. or d.c. powered temperature **sensing controls** with a rated voltage not exceeding 690 V a.c. or 600 V d.c.

1.1.6

Replacement:

This standard does not take into account the **response value** of an **automatic action** of a temperature **sensing control**, if such a **response value** is dependent upon the method of mounting it 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 equipment standard or as determined by the manufacturer shall apply.

1.1.7

Replacement:

This standard applies also to temperature **sensing controls** incorporating **electronic devices**, requirements for which are contained in Annex H and to temperature **sensing controls** using **NTC thermistors** or **PTC thermistors**, requirements for which are contained in Annex J.

Additional subclause:

1.1.101 This standard applies to **single operation devices** as defined in this standard.

1.1 Normative references

Addition:

IEC 60216-1:2013, *Electrical insulating materials – Thermal endurance properties – Part 1: Ageing procedures and evaluation of test results*

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

IEC 60730-2-4, *Automatic electrical controls for household and similar use – Part 2-4: Particular requirements for thermal motor protectors for motor-compressors of hermetic and semi-hermetic type*

2 Terms and definitions

This clause of Part 1 is applicable except as follows:

2.2 Definitions of types of control according to purpose

2.2.19
operating control

Add, to the definition, the following note:

Note 1 to entry: In general, a **thermostat** is an **operating control**.

2.2.20
protective control

Add, to the definition, the following note:

Note 1 to entry: In general, a **thermal cut-out** is a **protective control**.

Additional definitions:

2.2.101
single-operation device
SOD
control having a temperature **sensing element** which is intended to operate only once and then requires complete replacement

2.2.101.1
bimetallic single-operation device
single operation device (**SOD**) having a bimetallic temperature **sensing element**

Note 1 to entry: A **bimetallic single operation device** (**SOD**) does not reset above a declared temperature (see 11.4.103).

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

2.2.101.2
non-bimetallic single-operation device
single operation device (**SOD**) having a temperature **sensing element** which is part of a combination action **control**, the **operation** of which cannot be separated from other functions of the **control** and having a non-bimetallic thermal element that operates only once and then requires complete or partial replacement

Note 1 to entry: When such parts can be tested separately, they are considered to be thermal links within the scope of IEC 60691.

Note 2 to entry: The ageing period and thermal response of the device is dependent on the intended use of the device. As a result, the nature of the testing applicable to the device is representative of the application conditions for which the **protective control** is intended (see 7.2).

Note 3 to entry: **Non-bimetallic SODs** provide the equivalent of **micro-disconnection**.

2.2.101.2.1
rated functioning temperature
T_f
temperature of the **sensing element** of a **non-bimetallic SOD** which causes it to change the state of conductivity of the **control** when measured under specified conditions as declared by the manufacturer

2.2.102
room thermostat
independently mounted or incorporated **thermostat** intended to control the temperature of habitable space

2.2.103
fan control
automatic temperature **sensing control** intended to control the **operation** of a fan or blower

2.2.104
boiler thermostat
thermostat intended to control boiler/liquid temperature

2.2.105
modulating thermostat
thermostat which controls the temperature between two limits by continuously controlling the input to the load

2.2.106
voltage maintained thermal cut-out
thermal cut-out which is maintained in its operated condition by the voltage which appears across it in that condition

2.2.107
agricultural thermostat
thermostat intended for use in agricultural confinement buildings

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: