

INTERNATIONAL STANDARD

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





THIS PUBLICATION IS COPYRIGHT PROTECTED

Copyright © 2015 IEC, Geneva, Switzerland

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either IEC or IEC's member National Committee in the country of the requester. If you have any questions about IEC copyright or have an enquiry about obtaining additional rights to this publication, please contact the address below or your local IEC member National Committee for further information.

IEC Central Office
3, rue de Varembe
CH-1211 Geneva 20
Switzerland

Tel.: +41 22 919 02 11
Fax: +41 22 919 03 00
info@iec.ch
www.iec.ch

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 It also gives information on projects, replaced and withdrawn publications.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 20 000 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 - www.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.

INTERNATIONAL STANDARD

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

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

ICS 97.120

ISBN 978-2-8322-2673-5

Warning! Make sure that you obtained this publication from an authorized distributor.

CONTENTS

FOREWORD.....	4
1 Scope and normative references.....	7
2 Terms and definitions.....	8
3 General requirements.....	10
4 General notes on tests.....	10
5 Rating.....	11
6 Classification.....	11
7 Information.....	12
8 Protection against electric shock.....	14
9 Provision for protective earthing.....	14
10 Terminals and terminations.....	14
11 Constructional requirements.....	14
12 Moisture and dust resistance.....	17
13 Electric strength and insulation resistance.....	18
14 Heating.....	18
15 Manufacturing deviation and drift.....	19
16 Environmental stress.....	20
17 Endurance.....	20
18 Mechanical strength.....	26
19 Threaded parts and connections.....	28
20 Creepage distances, clearances and distances through solid insulation.....	28
21 Resistance to heat, fire and tracking.....	28
22 Resistance to corrosion.....	28
23 Electromagnetic compatibility (EMC) requirements – Emission.....	28
24 Components.....	29
25 Normal operation.....	29
26 Electromagnetic compatibility (EMC) requirements – Immunity.....	29
27 Abnormal operation.....	29
28 Guidance on the use of electronic disconnection.....	29
Annexes.....	30
Annex G (normative) Heat and fire resistance tests.....	30
Annex H (normative) Requirements for electronic controls.....	31
Annex J (normative) Requirements for thermistor elements and controls using thermistors.....	38
Annex AA (informative) Maximum manufacturing deviation and drift ^{a, b}	39
Annex BB (informative) Time factor.....	40
Annex CC (informative) Number of cycles.....	43
Annex DD (normative) Controls for use in agricultural confinement buildings.....	44
Annex EE (informative) Guide to the application of temperature sensing controls within the scope of IEC 60730-2-9.....	47
Bibliography.....	63

Figure 101 – Impact tool.....	16
Figure 102 – Aluminium cylinder for temperature change method.....	26
Figure BB.1 – Determination of time factor in the case of a sudden temperature change	41
Figure BB.2 – Determination of time factor in the case of a linear rise of test-bath temperature	42
Figure EE.1 – Thermostat	55
Figure EE.2 – Self-resetting temperature limiter.....	56
Figure EE.3 – Non-self-resetting temperature limiter.....	57
Figure EE.4 – Self-resetting thermal cut-out	58
Figure EE.5 – Manual reset thermal cut-out.....	58
Figure EE.6 – Single operation device	60
Figure EE.7 – Three-stage control system	61
Table 1 – Required information and methods of providing information.....	13
Table H.101 – Compliance criteria.....	33
Table BB.1 – Method to determine and verify time factor values (see H.101)	42
Table EE.1 – Typical examples of the classification of temperature sensing controls in accordance with IEC 60730-2-9.....	62

INTERNATIONAL ELECTROTECHNICAL COMMISSION

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.
- 2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
- 3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
- 4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
- 5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
- 6) All users should ensure that they have the latest edition of this publication.
- 7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
- 8) Attention is drawn to the normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
- 9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

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

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

FDIS	Report on voting
72/990/FDIS	72/998/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 fourth edition cancels and replaces the third edition published in 2008, and its Amendment 1:2011. This 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	8.102.3	
13.2	2.101	

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 this publication 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.

Currently in preview, click buy full version

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**.