



**SLOVENSKI STANDARD**  
**oSIST prEN IEC 60730-2-9:2024**  
**01-september-2024**

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**Avtomatske električne krmilne naprave - 2-9. del: Posebne zahteve za temperaturne regulatorje**

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

Dispositifs de commande électrique automatiques - Partie 2-9: Exigences particulières pour les dispositifs de commande thermosensibles

**Ta slovenski standard je istoveten z: prEN IEC 60730-2-9:2024**

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**ICS:**

97.120	Avtomatske krmilne naprave za dom	Automatic controls for household use
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# 72/1428/CDV

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IEC TC 72 : AUTOMATIC ELECTRICAL CONTROLS	
SECRETARIAT: United States of America	SECRETARY: Ms Grace Roh
OF INTEREST TO THE FOLLOWING COMMITTEES:	PROPOSED HORIZONTAL STANDARD: <input type="checkbox"/> Other TC/SCs are requested to indicate their interest, if any, in this CDV to the secretary.
FUNCTIONS CONCERNED: <input type="checkbox"/> EMC <input type="checkbox"/> ENVIRONMENT <input type="checkbox"/> QUALITY ASSURANCE <input type="checkbox"/> SAFETY	
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TITLE:

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

PROPOSED STABILITY DATE: 2028

NOTE FROM TC/SC OFFICERS:

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## INTERNATIONAL ELECTROTECHNICAL COMMISSION

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**AUTOMATIC ELECTRICAL CONTROLS –**

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**Part 2-9: Particular requirements for temperature sensing controls**

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**FOREWORD**

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This 5.0 edition cancels and replaces Edition 4 and Amendment 1:2018-01 and Amendment 2:2020-04. This edition constitutes a technical revision.

146

147

This edition includes the following significant technical changes with respect to the previous edition:

148

a) adoption to IEC 60730-1 Ed.6.0 with all of its significant changes to IEC 60730-1 Ed.5.2,

149

The text of this International Standard is based on the following documents:

Draft	Report on voting
XX/XX/FDIS	XX/XX/RVD

150

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

153 The language used for the development of this International Standard is English

154 This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in  
155 accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available  
156 at [www.iec.ch/members\\_experts/refdocs](http://www.iec.ch/members_experts/refdocs). The main document types developed by IEC are  
157 described in greater detail at [www.iec.ch/publications](http://www.iec.ch/publications).

158 A list of all parts of the IEC 60730 series, under the general title: AUTOMATIC ELECTRICAL  
159 CONTROL, can be found on the IEC website.

160 This part 2-9 is intended to be used in conjunction with IEC 60730-1. It was established on the  
161 basis of the sixth edition of that standard (2022). Consideration may be given to future editions  
162 of, or amendments to, IEC 60730-1.

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

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

168 Where no change is necessary part 2-9 indicates that the relevant clause or subclause applies.

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

172 The reader's attention is drawn to the fact that Annex R, Annex S and Annex T list all of the "in-  
173 some-country" clauses on differing practices of a less permanent nature relating to the subject  
174 of this document.

175 In this publication:

176 1) The following print types are used:

- 177 – requirements proper: in roman type;
- 178 – *test specifications: in italic type*;
- 179 – explanatory matter: in smaller roman type.
- 180 – Defined terms: **bold type**.

181 2) Subclauses, notes or items which are additional to those in Part 1 are numbered starting  
182 from 101, additional annexes are lettered AA, BB, etc.

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186 The committee has decided that the contents of this document will remain unchanged until the  
187 stability date indicated on the IEC website under [webstore.iec.ch](http://webstore.iec.ch) in the data related to the  
188 specific document. At this date, the document will be

- 189 • reconfirmed,
- 190 • withdrawn,
- 191 • replaced by a revised edition, or
- 192 • amended.

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## AUTOMATIC ELECTRICAL CONTROLS –

### Part 2-9: Particular requirements for temperature sensing controls

#### 1 Scope

This clause of Part 1 is replaced by the following:

This document applies to temperature sensing controls

- for use in, on, or in association with equipment for household appliance and similar use, including equipment 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 1 Throughout this document, the word "equipment" means "appliance and equipment" and "controls" means "temperature sensing controls".

- for building automation within the scope of ISO 16484 series and IEC 63044 series (HBES/BACS);

EXAMPLE 1 Independently mounted temperature sensing controls, controls in smart grid systems and controls for building automation systems within the scope of ISO 16484-2.

- for equipment that is used by the public, such as equipment intended to be used in shops, offices, hospitals, farms and commercial and industrial applications;

EXAMPLE 2 Controls for commercial catering, heating and air-conditioning equipment.

- that are **smart enabled controls**;

EXAMPLE 3 Smart grid control, remote interfaces/control of energy-consuming equipment including computer or smart phone.

- that are AC or DC powered controls with a rated voltage not exceeding 690 V AC or 600 V DC where the DC source is provided by primary or secondary batteries;
- used in, on, or in association with equipment that use electricity, gas, oil, solid fuel, solar thermal energy, etc., or a combination thereof;
- utilized as part of a control system or controls which are mechanically integral with multifunctional controls having non-electrical outputs;
- using NTC or **PTC thermistors** and to discrete **thermistors**, requirements for which are contained in Annex J;
- that have electrical circuits and **control** circuits which are, for example, operated by bimetals, magnet coils, memory metals, pressure elements, temperature-sensitive expansion elements or electronic elements.
- as well as manual controls when such are electrically and/or mechanically integral with automatic controls.

NOTE 2 Requirements for manually actuated mechanical switches not forming part of an automatic control are contained in IEC 61058-1-1.

This document applies to

- the inherent safety of automatic electrical controls, and
- functional safety of temperature **sensing controls** and safety related systems,
- controls where the performance (for example the effect of EMC phenomena) of the product can impair the overall safety and performance of the controlled system,
- 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.

EXAMPLE 4 **boiler thermostats, fan controls, temperature limiters** and **thermal cut-outs**.

242 – electrical safety of temperature sensing controls with non-electrical outputs such as  
243 refrigerant flow and gas **controls**.

244 – **single operation devices** as defined in this standard.

245 This document specifies the requirements for construction, operation and testing of automatic  
246 electrical controls used in, on, or in association with an equipment.

247 This document does not

248 • apply to automatic electrical temperature **sensing controls** intended exclusively for  
249 industrial process applications unless explicitly mentioned in the relevant part 2 or the  
250 equipment standard. However, this document can be applied to evaluate automatic electrical  
251 controls intended specifically for industrial applications in cases where no relevant safety  
252 standard exists.

253 • take into account the response value of an automatic action of a control, if such a response  
254 value is dependent upon the method of mounting the control in the equipment. Where a  
255 response value is of significant purpose for the protection of the user, or surroundings, the  
256 value defined in the appropriate equipment standard or as determined by the manufacturer  
257 will apply.

258 • address the integrity of the output signal to the network devices, such as interoperability  
259 with other devices unless it has been evaluated as part of the control system.

## 260 **2 Normative references**

261 *Addition:*

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

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

## 265 **3 Terms and definitions**

266 This clause of Part 1 is applicable except as follows: <https://standards.iteh.ai/>  
267 <https://standards.iteh.ai/standards/iec/60730-2-9-2024>

### 267 **3.2 Definitions of types of controls according to purpose**

268

269 *Additional definitions:*

#### 270 **3.2.101**

271 **single-operation device**

272 **SOD**

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

#### 275 **3.2.101.1**

276 **bimetallic single-operation device**

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

278 Note 1 to entry: A **bimetallic single operation device (SOD)** does not reset above a declared temperature (see  
279 11.4.103).

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

281 **3.2.101.2**  
 282 **non-bimetallic single-operation device**  
 283 **single operation device (SOD)** having a temperature **sensing element** which is part of a  
 284 combination action **control**, the **operation** of which cannot be separated from other functions  
 285 of the **control** and having a non-bimetallic thermal element that operates only once and then  
 286 requires complete or partial replacement

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

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

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

293

294 **3.2.102**  
 295 **room thermostat**  
 296 independently mounted or incorporated **thermostat** intended to control the temperature of  
 297 habitable space

298 **3.2.103**  
 299 **boiler thermostat**  
 300 **thermostat** intended to control boiler/liquid temperature

301 **3.2.104**  
 302 **voltage maintained thermal cut-out**  
 303 **thermal cut-out** which is maintained in its operated condition by the voltage which appears  
 304 across it in that condition

305 **3.2.105**  
 306 **agricultural thermostat**  
 307 **thermostat** intended for use in agricultural confinement buildings

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309 **3.3 Definitions relating to the function of controls**

310 *Additional definition:*

311 **3.3.101**  
 312 **time factor**  
 313 transient response of temperature **sensing controls** by defined change of the **activating**  
 314 **quantity**

315

316 **3.5 Definitions of types of control according to construction**

317 *Add the following new definitions*

318 **3.5.101**  
 319 **push-and-turn actuation**  
 320 **two-step actuation** accomplished by first pushing, then rotating the **actuating member** of the  
 321 control

322 **3.5.102**  
 323 **pull-and-turn actuation**  
 324 **two-step actuation** accomplished by first pulling, then rotating the **actuating member** of the  
 325 control

## 326 4 General

327 This clause of Part 1 is applicable except as follows

### 328 4.3 General notes on tests

#### 329 4.3.2 Conditions of test

330 *Additional subclauses:*

331 4.3.2.101 For the purposes of the tests of this standard and unless otherwise indicated, ambient  
 332 temperature excursions beyond  $T_{max}$  during abnormal **operation** as a precursor to  
 333 the **operation** of a manual reset **thermal cut-out** or a **bimetallic SOD** are ignored.

334 4.3.2.102 For manual reset **thermal cut-outs** and **bimetallic SODs** which have an **operating**  
 335 **value** above  $T_{max}$ , the temperature at the **sensing element** is raised, as necessary, to achieve  
 336 any cycling required during the tests.

#### 337 4.3.3 Samples required

##### 338 4.3.3.1 Addition:

339 Six samples of **bimetallic SODs** are used for the test of Clause 17 and a further six for the test  
 340 of Clause 19.

## 341 5 Required technical information

342 This clause of Part 1 is applicable except as follows: <https://standards.iteh.ai/catalog/standards/sist/92d3bbde-a5b4-45ca-a34f-9d86e578d54e/osist-pren-iec-60730-2-9-2024>

### 343 5.2 Methods of providing technical information

344 **Table 1 – Required technical information and methods of providing these information**

	Information	Clause or subclause	Method
<i>Modifications:</i>			
<i>Addition:</i>			
101	Maximum <b>sensing element</b> temperature (other than relevant to requirement 105) <sup>101</sup> <ul style="list-style-type: none"> <li>- Controls for use in or on cooking appliances</li> <li>- Controls for use in or on ovens of the self-cleaning type</li> <li>- Controls for use in or on food-handling appliances</li> <li>- Controls having parts containing liquid metal</li> </ul>	16.101	X
102	<b>Time factor</b> with or without sheath	3.3.101 9.101 BB.2.2	X
103	<b>SOD</b> reset temperature (either –35 °C or 0 °C)	3.2.101 9.4.103 19.15.107.1.2	X
104	Number of cycles for <b>bimetallic SOD</b> with 0 °C reset	19.15.107.1.5	X

	Information	Clause or subclause	Method
105	Maximum <b>sensing element</b> temperature in °C of controls used in self-cleaning ovens ( $T_e$ )	19.15.105	D
106	<b>Controls</b> having parts containing liquid metal <sup>102</sup>	20.102	D
107	Tensile yield strength	9.1.101	X
108	Minimum current for the purpose of the test of 23.2.2 <sup>103</sup>	23.2.2	D
109	$T_{max.1}$ is the maximum ambient temperature in which the <b>control</b> may remain continuously in the operated condition so that Table 17 temperatures are not exceeded <sup>104</sup>	16.4.101	D
110	Time period $t_1$ is the maximum time during which the ambient temperature can be higher than $T_{max.1}$ after the <b>control</b> has operated <sup>104</sup>	16.4.101	D
111	Temperature limit above which automatic reset of a manual reset thermal cut-out or a <b>voltage maintained thermal cut-out</b> shall not occur (not higher than -20 °C)	3.2.104 9.4.106 19.15.106	X
112	For type 2.P <b>controls</b> , the method of test	19.101	X
113	The click rate $N$ or switching <b>operations</b> per minute for the purposes of testing to CISPR 14-1	23	X
114	<b>Rated functioning temperature (<math>T_f</math>)</b> <sup>107</sup> of the <b>sensing element</b> , which causes a <b>non-bimetallic SOD</b> to change state of conductivity	19.15.107.2	C
115	Ageing temperature for <b>non-bimetallic SOD</b> <sup>105,107</sup>	19.15.107.2.2	D
116	Rate of rise of temperature for testing <b>non-bimetallic SOD</b> <sup>106,107</sup>	19.15.107.2.2	D
117	<b>Agricultural thermostat</b>	3.2.105 9.4.107 9.6.3.101 Annex DD	D

345

Additional notes:
<sup>101</sup> ) This declaration applies only to temperature sensing controls containing liquid metal. For temperature <b>sensing controls</b> used in or on self-cleaning ovens, this declaration is the temperature for the cooking <b>operation</b> .
<sup>102</sup> ) Metal is an inclusive term that encompasses chemically metallic elements such as sodium (Na), potassium (K), and others. Mercury (Hg) is generally not allowed.
<sup>103</sup> ) When no minimum is declared, the test value is 15 mA.
<sup>104</sup> ) Consideration should be given to the provision of information by the <b>equipment manufacturer</b> relating to the minimum time that the appliance has to be disconnected from the supply to allow a <b>voltage maintained thermal cut-out</b> to reset.
<sup>105</sup> ) Determined by the <b>control manufacturer</b> based on the opening temperature of the <b>thermal-cut-out</b> .
<sup>106</sup> ) Determined by the <b>control manufacturer</b> referring to the actual maximum rate of rise probable in the projected end-use equipment.
<sup>107</sup> ) <b>Non-bimetallic SODs</b> are limited for use in appliances for heating or employing liquids or steam. They are not suitable for instantaneous water heaters and storage water heaters

346

347

348 **5.3 Class II symbol**

349 This clause of Part 1 is applicable except as follows:

350 **5.3.1 Addition:**